2.2.2 In-Containment Refueling Water Storage Tank System

1.0 Description

The in-containment refueling water storage tank system (IRWSTS) is a safety-related system. The IRWSTS provides the following safety-related functions:

- Borated water supply for the emergency core cooling systems.
- Containment isolation.

The IRWSTS provides the following non-safety-related function:

- Borated water supply to the severe accident heat removal system (SAHRS) during a severe accident.

2.0 Arrangement

2.1 The functional arrangement of the IRWSTS is as shown in Figure 2.2.2-1—In-Containment Refueling Water Storage Tank System Functional Arrangement.

2.2 The location of the IRWSTS equipment is as listed in Table 2.2.2-1—IRWSTS Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the IRWSTS.

3.0 Mechanical Design Features

3.1 Equipment listed in Table 2.2.2-1 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 2.2.2-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.2.2-1.

3.4 Deleted.

3.5 Deleted.

3.6 Deleted.

3.7 Deleted.

3.8 Portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 are designed in accordance with ASME Code Section III requirements.

3.9 Portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 are installed in accordance with an ASME Code Section III Design Report.

3.10 Pressure boundary welds in portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 are in accordance with ASME Code Section III.

3.11 Portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 retain their pressure boundary integrity at their design pressure.

3.12 Portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 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 2.2.2-2—IRWSTS Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.2.2-2.

4.2 The IRWSTS equipment controls are provided in the MCR and the RSS as listed in Table 2.2.2-2.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.2.2-2 responds to the state requested by a test signal.

4.4 IRWST has level indication.

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.2.2-2 are powered from the Class 1E division as listed in Table 2.2.2-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.2.2-2 fail as-is on loss of power.

6.0 Environmental Qualifications

6.1 Equipment listed in Table 2.2.2 -2 for harsh environment can perform the function in Table 2.2.2-1 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 2.2.2-2 can perform the function listed in Table 2.2.2-1 under system design conditions.

7.2 Containment isolation valves listed in Table 2.2.2-1 close within the containment isolation response time following initiation of a containment isolation signal.

7.3 The IRWST provides a required water volume.

7.4 Post-LOCA pH control is provided for the IRWST with trisodium phosphate (TSP).

7.5 The IRWST suction inlet line for each safety injection system division has a debris screen.

7.6 The IRWST supplies water to the safety injection system (SIS) and to the SAHRS.

7.7 The IRWST provides water to flood the spreading area.

7.8 The IRWST has a retaining basket located directly below each heavy floor opening.

7.9 The IRWST has a trash rack located over each heavy floor opening.

7.10 The IRWST has a weir located around each trash rack at the heavy floor opening.

7.11 The IRWST has a weir located at the annular space wall openings.

8.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.2.2-3 lists the IRWSTS ITAAC.

Table 2.2.2-1—IRWSTS Equipment Mechanical Design (3 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
IRWST Three-way Isolation Valve for SIS Division 1	30JNK10 AA001	Safeguard Building 1	Yes	open/close (Cont. Isol.)	I
IRWST Three-way Isolation Valve for SIS division 2	30JNK20 AA001	Safeguard Building 2	Yes	open/close (Cont. Isol.)	I
IRWST Three-way Isolation valve for SIS Division 3	30JNK30 AA001	Safeguard Building 3	Yes	open/close (Cont. Isol.)	I
IRWST Three-way Isolation Valve for SIS Division 4	30JNK40 AA001	Safeguard Building 4	Yes	open/close (Cont. Isol.)	I
IRWST Isolation Valve for CVCS	30JNK10 AA009	Safeguard Building 1	Yes	close (Cont. Isol.)	I
IRWST Isolation Valve for CVCS	30JNK10 AA013	Safeguard Building 1	Yes	close (Cont. Isol.)	I
IRWST Isolation Valve for SAHRS	30JNK11 AA009	Safeguard Building 4	Yes	open/close (Cont. Isol.)	I
SIS Division 1 Strainer Backflush Isolation Valve	30JNK10 AA006	Reactor Building	N/A	close	II
SIS Division 1 Strainer Backflush Isolation Valve	30JNK10 AA007	Reactor Building	N/A	close	II
SIS Division 2 Strainer Backflush Isolation Valve	30JNK10 AA004	Reactor Building	N/A	close	II
SIS Division 2 Strainer Backflush Isolation Valve	30JNK10 AA005	Reactor Building	N/A	close	II
SIS Division 3 Strainer Backflush Isolation Valve	30JNK11 AA004	Reactor Building	N/A	close	II
SIS Division 3 Strainer Backflush Isolation Valve	30JNK11 AA005	Reactor Building	N/A	close	II

Table 2.2.2-1—IRWSTS Equipment Mechanical Design (3 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
SIS Division 4 Strainer Backflush Isolation Valve	30JNK11 AA006	Reactor Building	N/A	close	II
SIS Division 4 Strainer Backflush Isolation Valve	30JNK11 AA007	Reactor Building	N/A	close	II
Trash Rack (IRWST Heavy Floor Opening)	30JNK10 AT014	Reactor Building	N/A	debris retaining device	I
Trash Rack (IRWST Heavy Floor Opening)	30JNK10 AT015	Reactor Building	N/A	debris retaining device	I
Trash Rack (IRWST Heavy Floor Opening)	30JNK11 AT014	Reactor Building	N/A	debris retaining device	I
Trash Rack (IRWST Heavy Floor Opening)	30JNK11 AT015	Reactor Building	N/A	debris retaining device	I
IRWST Retaining Basket	30JNK10 AT004	Reactor Building	N/A	debris retaining device	I
IRWST Retaining Basket	30JNK10 AT005	Reactor Building	N/A	debris retaining device	I
IRWST Retaining Basket	30JNK11 AT004	Reactor Building	N/A	debris retaining device	I
IRWST Retaining Basket	30JNK11 AT005	Reactor Building	N/A	debris retaining device	I
SIS Sump Strainer Division 1	30JNK10 AT001	Reactor Building	N/A	filtering device	I
SIS Sump Strainer Division 2	30JNK10 AT002	Reactor Building	N/A	filtering device	I
SIS Sump Strainer Division 3	30JNK11 AT002	Reactor Building	N/A	filtering device	I

Table 2.2.2-1—IRWSTS Equipment Mechanical Design (3 Sheets)

Equipment Description	Equipment Tag Number (1)	Equipment Location	ASME Code Section III	Function	Seismic Category
SIS Sump Strainer Division 4	30JNK11 AT001	Reactor Building	N/A	filtering device	I
CVCS Sump Strainer	30JNK10 AT003	Reactor Building	N/A	filtering device	II
SAHRS Sump Strainer	30JNK11 AT003	Reactor Building	N/A	filtering device	II
IRWST Tank	30JNK00 BB001	Reactor Building	N/A	storage volume	I

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

Table 2.2.2-2—IRWSTS 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 Displays	MCR/RSS Controls
IRWST Three-way Isolation Valve for SIS Division 1	30JNK10 AA001	Safeguard Building 1	1^N 2^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Three-way Isolation Valve for SIS Division 2	30JNK20 AA001	Safeguard Building 2	2^N 1^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Three-way Isolation valve for SIS Division 3	30JNK30 AA001	Safeguard Building 3	3^N 4^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Three-way Isolation Valve for SIS Division 4	30JNK40 AA001	Safeguard Building 4	4^N 3^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Isolation Valve for CVCS	30JNK10 AA009	Safeguard Building 1	1^N 2^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Isolation Valve for CVCS	30JNK10 AA013	Safeguard Building 1	4^N 3^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Isolation Valve for SAHRS	30JNK11 AA009	Safeguard Building 4	4^N 3^A	yes	yes	Position/Position	Open-Close/Open-Close
IRWST Train 1 and 2	30JNK10 CL050	Reactor Building Annulus	yes	yes	no	Level	N/A
IRWST Train 1 and 2	30JNK10 CL052	Reactor Building Annulus	yes	yes	no	Level	N/A
IRWST Train 3 and 4	30JNK11 CL050	Reactor Building Annulus	yes	yes	no	Level	N/A

Table 2.2.2-2—IRWSTS 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 Displays	MCR/RSS Controls
IRWST Train 3 and 4	30JNK11 CL052	Reactor Building Annulus	yes	yes	no	Level	N/A

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 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The functional arrangement of the IRWSTS is as shown on Figure 2.2.2-1.	Inspections of the as-built system as shown on Figure 2.2.2-1 will be conducted.	The as-built IRWSTS conforms with the functional arrangement as shown in Figure 2.2.2-1.
2.2	The location of the IRWSTS equipment is as listed in Table 2.2.2-1.	An inspection will be performed of the location of the equipment listed in Table 2.2.2-1.	The equipment listed in Table 2.2.2-1 is located as listed in Table 2.2.2-1.
2.3	Physical separation exists between divisions of the IRWSTS.	An inspection will be performed to verify that the divisions of the IRWSTS are located in separate Safeguard Buildings.	The divisions of the IRWSTS are located in separate Safeguard Buildings.
3.1	Equipment listed in Table 2.2.2-1 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 2.2.2-1 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 2.2.2-1 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 2.2.2-1 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 2.2.2-1 as ASME Code Section III meets ASME Code Section III design requirements. b. Equipment identified in Table 2.2.2-1 as ASME Code Section III has been welded per ASME Code Section III welding requirements. c. Equipment identified in Table 2.2.2-1 as ASME Code Section III has been hydrostatically tested per ASME Code Section III hydrostatic testing requirements.
3.2	Deleted.	Deleted.	Deleted.

Table 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.3	Equipment identified as Seismic Category I in Table 2.2.2-1 can withstand seismic design basis loads without loss of safety function as listed in Table 2.2.2-1.	.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 2.2.2-1 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 2.2.2-1 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 2.2.2-1 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 2.2.2-1 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 IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 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 IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1.
3.9	Portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 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 IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1, 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.

Table 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.10	Pressure boundary welds in portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 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 IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 has been performed in accordance with ASME Code Section III.
3.11	Portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 retain their pressure boundary integrity at their design pressure.	Hydrostatic tests will be performed on the as-fabricated system.	For portions of the IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1, 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 IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1 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 IRWSTS piping shown as ASME Code Section III in Figure 2.2.2-1, 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 2.2.2-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.2.2-2.	a. The displays listed in Table 2.2.2-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.2.2-2 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 2.2.2-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.2.2-2.	a. The controls listed in Table 2.2.2-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.2.2-2 as being in the RSS exist in the RSS.
4.3	Equipment listed as being controlled by a PACS module in Table 2.2.2-2 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 2.2.2-2 responds to the state requested by the signal.

Table 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
4.4	IRWST has level indication.	A test will be performed.	a. IRWST level instruments included in Table 2.2.2-2 provide level indication in the MCR. b. IRWST level instruments included in Table 2.2.2-2 provide level indication in the RSS.
5.1	The components designated as Class 1E in Table 2.2.2-2 are powered from the Class 1E division as listed in Table 2.2.2-2 in a normal or alternate feed condition.	a. Testing will be performed for components designated as Class 1E in Table 2.2.2-2 by providing a test signal in each normally aligned division. b. Testing will be performed for components designated as Class 1E in Table 2.2.2-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair.	a. The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.2.2-2. b. The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E component identified in Table 2.2.2-2.
5.2	Valves listed in Table 2.2.2-2 fail as-is on loss of power.	Testing will be performed for the valves listed in Table 2.2.2-2 to fail as-is on loss of power.	Following loss of power, the valves listed in Table 2.2.2-2 fail as-is.
6.1	Components listed as Class 1E in Table 2.2.2-2 that are designated as harsh environment will perform the function listed in Table 2.2.2-1 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 2.2.2-2 to perform the function listed in Table 2.2.2-1 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 2.2.2-2 can perform the function listed in Table 2.2.2-1 before and during design basis accidents for the time required to perform the listed function.

Table 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
		b. For equipment listed for harsh environment in Table 2.2.2-2, 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 2.2.2-2 for harsh environment conform with the design.
7.1	Class 1E valves listed in Table 2.2.2-2 perform the function listed in Table 2.2.2-1 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 2.2.2-2 to change position as listed in Table 2.2.2-1 under system design conditions.	The as-installed valve changes position as listed Table 2.2.2-1 under system design conditions.
7.2	Containment isolation valves listed in Table 2.2.2-1 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 2.2.2-1 to close within the containment isolation response time following initiation of a containment isolation signal.	Containment isolation valves listed in Table 2.2.2-1 close within 60 seconds following initiation of a containment isolation signal.
7.3	The IRWST provides a required water volume.	An inspection will be performed of the IRWST required water volume.	The IRWST provides the following required minimum water volume: 66,886 ft^3.
7.4	Post-LOCA pH control is provided for the IRWST with TSP.	An inspection and analysis will be performed of the post LOCA pH control for the IRWST with TSP.	The following quantity of TSP exists for the IRWST to provide a post-LOCA pH control > 7: $\geq$ 12,200 lb_m TSP.
7.5	The IRWST suction inlet line for each safety injection system division has a debris screen.	a. An inspection will be performed for the existence of a debris screen in the IRWST suction inlet line for each safety injection system division.	a. A debris screen exists in the IRWST suction inlet line for each safety injection system division.

Table 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
		b. An inspection will be performed to verify the minimum surface area and maximum mesh grid opening of the debris screen.	b. The debris screen has a minimum surface area of 753 ft2 and the screen mesh is a maximum grid opening of 0.08 x 0.08 inches.
7.6	The IRWST supplies water to the safety injection system and to the severe accident heat removal system.	An inspection will be performed of the IRWST to supply water to the safety injection system and severe accident heat removal system.	The IRWST supplies water to the safety injection system and the severe accident heat removal system.
7.7	The IRWST provides water to flood the spreading area.	An inspection will be performed of the IRWST to provide water to flood the spreading area.	The IRWST provides water to flood the spreading area.
7.8	The IRWST has a retaining basket located directly below each heavy floor opening.	a. An inspection will be performed for the existence of a retaining basket in the IRWST directly under each heavy floor opening. b. An inspection will be performed to verify the minimum surface area and maximum mesh grid opening of the retaining basket.	a. A retaining basket exists in the IRWST directly below each heavy floor opening. b. The retaining basket has a minimum surface area of 721 ft2 and a maximum grid opening of 0.08 x 0.08 inches.
7.9	The IRWST has a trash rack located over each heavy floor opening.	a. An inspection will be performed for the existence of a trash rack over each heavy floor opening. b. An inspection will be performed to verify the maximum grid opening of the trash rack.	a. A trash rack exists over each heavy floor opening to the IRWST. b. The trash rack has a maximum grid opening of 4 x 4 inches.
7.10	The IRWST has a weir located around each trash rack at the heavy floor opening.	a. An inspection will be performed for the existence of a weir around each trash rack at the heavy floor opening	a. A weir exists around each trash rack at the heavy floor opening.

Table 2.2.2-3—IRWSTS ITAAC (7 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
		b. An inspection will be performed to verify the height of the weir around each trash rack at the heavy floor opening.	b. The weir has a minimum height of 2 inches.
7.11	The IRWST has a weir located at the annular space wall openings.	a. An inspection will be performed for the existence of a weir at the annular space wall openings.	a. A weir exists at the annular space wall opening.
		b. An inspection will be performed to verify the height of the weir at the annular space wall openings.	b. The weir has a minimum height of 4 inches.

Next File