2.7 Support Systems

2.7.1 Component Cooling Water System

1.0 Description

The component cooling water system (CCWS) is a safety related closed loop cooling water system comprising four divisions that remove heat generated from safety related and non-safety related components connected to the CCWS. Heat transferred from these components to the CCWS is rejected to the essential service water system (ESWS) via the component cooling water heat exchangers.

The CCWS provides the following significant safety related functions:

- The CCWS provides the transport of the heat from the safety injection system (SIS) and residual heat removal system (RHRS) to the ESWS.
- The CCWS provides the cooling of the thermal barrier of the reactor coolant pump (RCP) seals during all plant operating modes when the RCPs are running. There is a cross-connect in the header that supplies cooling to the RCP thermal barriers to allow thermal barrier cooling from either CCWS Common 1.b or 2.b headers. The cross-connect is inside containment, downstream of the CIVs on each of the Common 1.b and 2.b headers.
- The CCWS provides heat removal from the safety chilled water system (SCWS) divisions 2 and 3.
- The CCWS provides the removal of the decay heat from the fuel pool cooling water heat exchanger.
- The CCWS containment isolation valves close upon receipt of a containment isolation signal.

The CCWS provides the following significant non-safety-related functions:

- The non-safety-related dedicated CCWS train removes heat from the severe accident heat removal system (SAHRS).

2.0 Arrangement

2.1 The functional arrangement of the CCWS is as shown on Figure 2.7.1-1—Component Cooling Water System Functional Arrangement.

2.2 The location of CCWS equipment is as listed in Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design.

2.3 Physical separation exists between divisions of the CCWS.

3.0 Mechanical Design Features

3.1 Pumps and valves listed in Table 2.7.1-1 will be functionally designed and qualified such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under conditions ranging from normal operating to design-basis accident conditions.

3.2 Check valves will function as listed in Table 2.7.1-1.

3.3 Deleted.

3.4 Components identified as Seismic Category I in Table 2.7.1-1 can withstand seismic design basis loads without a loss of the function listed in Table 2.7.1-1.

3.5 Deleted.

3.6 Deleted.

3.7 Deleted.

3.8 Deleted.

3.9 CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 is designed in accordance with ASME Code Section III requirements.

3.10 CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 is installed in accordance with an ASME Code Section III Design Report.

3.11 Pressure boundary welds in CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 are in accordance with ASME Code Section III.

3.12 CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 retains pressure boundary integrity at design pressure.

3.13 CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 is installed and inspected in accordance with ASME Code Section III requirements.

3.14 Components listed in Table 2.7.1-1 as ASME Code Section III are designed in accordance with ASME Code Section III requirements.

3.15 Components listed in Table 2.7.1-1 as ASME Code Section III are fabricated in accordance with ASME Code Section III requirements.

3.16 Pressure boundary welds on components listed in Table 2.7.1-1 as ASME Code Section III are in accordance with ASME Code Section III requirements.

3.17 Components listed in Table 2.7.1-1 as ASME Code Section III retain pressure boundary integrity at design pressure.

3.18 Components listed in Table 2.7.1-1 as ASME Code Section III are installed in accordance with ASME Code Section III requirements.

4.0 I&C Design Features, Displays and Controls

4.1 Displays listed in Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design are retrievable in the main control room (MCR) and the remote shutdown station (RSS) as listed in Table 2.7.1-2.

4.2 The CCWS equipment controls are provided in the MCR and the RSS as listed in Table 2.7.1-2.

4.3 Equipment listed as being controlled by a priority and actuator control system (PACS) module in Table 2.7.1-2 responds to the state requested by a test signal.

4.4 A CCWS low flow condition automatically opens the low head safety injection (LHSI)/residual heat removal (RHR) heat exchanger (HX) inlet valve.

4.5 A surge tank level of MIN3 automatically isolates the associated train common header switchover valves.

4.6 A surge tank level of MIN4 automatically trips the associated CCWS pump and unlocks the common header switchover function to allow restoration of flow to the common users.

4.7 A low surge tank level and a flow rate difference between the supply and return from the Nuclear Auxiliary Building (NAB) and the Radioactive Waste Building (RWB) automatically isolates the non-safety-related branch.

4.8 Loss of one CCWS train initiates an automatic switchover to allow cooling of the common ‘a’ and/or ‘b’ headers.

4.9 Deleted.

4.10 CCWS train separation to RCP thermal barriers is maintained by interlocks provided on the supply and return thermal barrier containment isolation valves. The interlocks require that CIVs associated with one common header be closed before the other common header CIVs can be opened.

4.11 Manual or automatic actuation of a CCWS pump automatically actuates the corresponding ESWS pump.

4.12 Upon receipt of a SIS, the four CCWS trains are started, supplying SIS pump coolers and the four LHSI heat exchangers. The non-safety-related users outside of the Reactor Building are also isolated. The following CCWS actuations are automatically initiated:

- Start operable CCWS pumps (KAA10/20/30/40 AP001), if not previously running.
- Open LHSI HX isolation valves (KAA 12/22/32/43 AA005).
- Open LHSI pump seal cooler isolation valves (KAA22/32 AA013).
- Close isolation valves for non-safety-related users outside of the Reactor Building (KAB50 AA001/004/0006 and KAB80 AA015/016/019).

5.0 Electrical Power Design Features

5.1 The components designated as Class 1E in Table 2.7.1-2 are powered from the Class 1E division as listed in Table 2.7.1-2 in a normal or alternate feed condition.

5.2 Valves listed in Table 2.7.1-2 fail as-is on loss of power.

6.0 Environmental Qualifications

6.1 Components in Table 2.7.1-2, that are designated as harsh environment, will perform the function listed in Table 2.7.1-1 in the environments that exist during and following design basis events.

7.0 Equipment and System Performance

7.1 The CCWS heat exchangers as listed in Table 2.7.1-1 have the capacity to transfer the design heat load to the ESWS.

7.2 The pumps listed in Table 2.7.1-1 have net positive suction head available (NPSHA) that is greater than net positive suction head required (NPSHR) at system run-out flow.

7.3 The CCWS delivers water to the LHSI/RHRS heat exchangers to provide cooling.

7.4 The CCWS delivers water to the RCP thermal barrier coolers at the required flow from Common 1.b header and also from Common 2.b header.

7.5 The CCWS delivers water to Divisions 2 and 3 of the SCWS chiller heat exchangers.

7.6 The CCWS delivers water to the spent fuel pool cooling heat exchangers.

7.7 Class 1E valves listed in Table 2.7.1-2 can perform the function listed in Table 2.7.1-1 under system operating conditions.

7.8 The CCWS provides for flow testing of CCWS pumps during plant operation.

7.9 Containment isolation valves listed in Table 2.7.1-1 close within the containment isolation response time following initiation of a containment isolation signal.

7.10 The CCWS surge tanks provide adequate capacity for system operation.

7.11 Each CCWS surge tank maintains a reserve volume of 750 gallons to accommodate potential total train leakage of 4 gallons per hour for 7 days of continuous operation with no makeup source available.

8.0 System Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.7.1-3 lists the CCWS ITAAC.

Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design (6 Sheets)

Description	Tag Number [(1)]	Location	ASME Code Section III	Function	Seismic Category
Component Cooling Water Pumps	KAA10AP001 KAA20AP001 KAA30AP001 KAA40AP001	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Run	I
Heat Exchangers	KAA10AC001 KAA20AC001 KAA30AC001 KAA40AC001	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Heat Transfer Device	I
Surge Tanks	KAA10BB001 KAA20BB001 KAA30BB001 KAA40BB001	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Provide the following: 1. Pump NPSH 2. Adequate Surge Volume 3. Makeup Volume for normal leakage	I
CCWS Pump/Heat Exchanger Downstream Check Valves	KAA10AA004 KAA20AA004 KAA30AA004 KAA40AA004	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Prevent Backflow	I
Heat Exchanger Bypass Valves	KAA10AA112 KAA20AA112 KAA30AA112 KAA40AA112	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Temperature control	I

Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design (6 Sheets)

Description	Tag Number [(1)]	Location	ASME Code Section III	Function	Seismic Category
Surge Tank Demin. Water Makeup Isolation Valves	KAA10AA027 KAA20AA027 KAA30AA027 KAA40AA027	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Open/Close	I
Train Switchover Valves	KAA10AA033 KAA10AA032 KAA20AA033 KAA20AA032	Safeguard Building 1 Safeguard Building 1 Safeguard Building 2 Safeguard Building 2	Yes	Open/Close	I
Train Switchover Valves	KAA30AA033 KAA30AA032 KAA40AA033 KAA40AA032	Safeguard Building 3 Safeguard Building 3 Safeguard Building 4 Safeguard Building 4	Yes	Open/Close	I
Train Switchover Valves	KAA10AA006 KAA10AA010 KAA20AA006 KAA20AA010	Safeguard Building 1 Safeguard Building 1 Safeguard Building 2 Safeguard Building 2	Yes	Open/Close	I
Train Switchover Valves	KAA30AA006 KAA30AA010 KAA40AA006 KAA40AA010	Safeguard Building 3 Safeguard Building 3 Safeguard Building 4 Safeguard Building 4	Yes	Open/Close	I

Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design (6 Sheets)

Description	Tag Number [(1)]	Location	ASME Code Section III	Function	Seismic Category
LHSI HX Isolation Valves	KAA12AA005 KAA22AA005 KAA32AA005 KAA42AA005	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Open	I
LHSI Pump Seal Cooler Isolation Valves	KAA22AA013 KAA32AA013	Safeguard Building 2 Safeguard Building 3	Yes	Open	I
CCWS to Low Head Safety Injection Heat Exchanger Downstream Check Valves	KAA12AA012 KAA22AA012 KAA32AA012 KAA42AA012	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	Yes	Prevent Backflow	I
CCWS to Low Head Safety Injection Pump Seal Fluid Cooler Downstream Check Valves	KAA22AA014 KAA32AA014	Safeguard Building 2 Safeguard Building 3	Yes	Prevent Backflow	I
Safety Chilled Water Chiller CCWS Flow Control Valves	KAA22AA101 KAA32AA101	Safeguard Building 2 Safeguard Building 3	Yes	Open/Close	I
Common Header 1.a Fuel Pool Cooling Heat Exchanger 1 Downstream Control Valve	KAB10AA134	Fuel Building	Yes	Open/Close	I
Common Header 2.a Fuel Pool Cooling Heat Exchanger 2 Downstream Control Valve	KAB20AA134	Fuel Building	Yes	Open/Close	I

Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design (6 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
Common Header 1.b RCP Thermal Barriers Containment Isolation Valves	KAB30AA049 KAB30AA050 KAB30AA051 KAB30AA052	Safeguard Building 1 Reactor Building Reactor Building Safeguard Building 1	Yes	Close (Manually Initiated)	I
Common Header 2.b RCP Thermal Barriers Containment Isolation Valves	KAB30AA053 KAB30AA054 KAB30AA055 KAB30AA056	Safeguard Building 4 Reactor Building Reactor Building Safeguard Building 4	Yes	Close (Manually Initiated)	I
Common Header 1.b Non-Safety Loads Containment Isolation Valves	KAB40AA001 KAB40AA006 KAB40AA012	Safeguard Building 1 Reactor Building Safeguard Building 1	Yes	Close	I
Common Header 1.b Containment Supply Isolation Check Valve	KAB40AA002	Reactor Building	Yes	Close	I
Common Header 2.b Auxiliary Building and Waste Building Isolation Valves	KAB50AA001 KAB50AA006 KAB50AA004	Safeguard Building 4 Safeguard Building 4 Safeguard Building 4	Yes	Close	I
Common Header 2.b Auxiliary and Waste Building Return Isolation Check Valve	KAB50AA008	Safeguard Building 4	Yes	Close	I

Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design (6 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
Common Header 1.b Safety-Related Containment Isolation Valves	KAB60AA013 KAB60AA018 KAB60AA019	Safeguard Building 1 Reactor Building Safeguard Building 1	Yes	Close	I
Common Header 1.b CVCS HP Cooler 1 and RCP Coolers 1/2 Containment Supply Isolation Check Valve	KAB60AA014	Reactor Building	Yes	Prevent Backflow	I
Common Header 1.b CVCS HP Cooler 1 Downstream Control Valve	KAB60AA116	Reactor Building	Yes	Close	I
Common Header 2.b Safety-Related Loads Containment Isolation Valves	KAB70AA013 KAB70AA018 KAB70AA019	Safeguard Building 4 Reactor Building Safeguard Building 4	Yes	Close	I
Common Header 2.b Containment Supply Isolation Check Valve	KAB70AA014	Reactor Building	Yes	Prevent Backflow	I
Common Header 2.b CVCS HP Cooler 2 Downstream Control Valve	KAB70AA116	Reactor Building	Yes	Close	I
Common Header 1.b Auxiliary Building Isolation Valves	KAB80AA015 KAB80AA016	Safeguard Building 1 Safeguard Building 1	Yes	Close	I
Common Header 1.b Auxiliary Building Isolation Valve	KAB80AA019	Safeguard Building 1	Yes	Close	I
Common Header 1.b Nuclear Auxiliary Building Downstream Check Valve	KAB80AA020	Safeguard Building 1	Yes	Close	I
Dedicated CCWS Surge Tank Isolation Valve	KAA80AA020	Safeguard Building 4	No	Open	N/A

Table 2.7.1-1—Component Cooling Water System Equipment Mechanical Design (6 Sheets)

Description	Tag Number (1)	Location	ASME Code Section III	Function	Seismic Category
Dedicated CCWS Surge Tank Nitrogen Supply Valve	KAA80AA021	Safeguard Building 4	No	Open	N/A
Dedicated CCWS Demin Water Makeup Water Supply Valve	KAA80AA202	Safeguard Building 4	No	Open	N/A
Dedicated CCWS Pump	KAA80AP001	Safeguard Building 4	No	Run	N/A
Dedicated CCWS Demin Water Makeup Pump	KAA80AP201	Safeguard Building 4	No	Run	N/A
Dedicated CCWS Heat Exchanger	KAA80AC001	Safeguard Building 4	No	Heat Transfer Device	N/A
Dedicated CCWS Surge Tank	KAA80BB001	Safeguard Building 4	No	Provide the following: 1. Pump NPSH 2. Adequate surge volume 3. Makeup volume for normal leakage	N/A
Train 1 Surge Tank Makeup Isolation Valves	KAA10AA141 KAA10AA142	Safeguard Building 1 Safeguard Building 1	Yes	Open	I
Train 2 Surge Tank Makeup Isolation Valves	KAA20AA141 KAA20AA142	Safeguard Building 2 Safeguard Building 2	Yes	Open	I
Train 3 Surge Tank Makeup Isolation Valves	KAA30AA141 KAA30AA142	Safeguard Building 3 Safeguard Building 3	Yes	Open	I
Train 4 Surge Tank Makeup Isolation Valves	KAA40AA141 KAA40AA142	Safeguard Building 4 Safeguard Building 4	Yes	Open	I

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

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number (1)	Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Component Cooling Water Pumps	KAA10AP001 KAA20AP001 KAA30AP001 KAA40AP001	Safeguard Building 1 Safeguard Building 2 Safeguard Building 3 Safeguard Building 4	1 2 3 4	Yes	Yes	On-Off	Start-Stop
Train Switchover Valves	KAA10AA006 KAA10AA010 KAA10AA032 KAA10AA033	Safeguard Building 1	NA (3)	Yes	Yes	Pos	Open-Close
Train Switchover Valves	KAA20AA006 KAA20AA010 KAA20AA032 KAA20AA033	Safeguard Building 2	NA (3)	Yes	Yes	Pos	Open-Close
Train Switchover Valves	KAA30AA006 KAA30AA010 KAA30AA032 KAA30AA033	Safeguard Building 3	NA (3)	Yes	Yes	Pos	Open-Close
Train Switchover Valves	KAA40AA006 KAA40AA010 KAA40AA032 KAA40AA033	Safeguard Building 4	NA (3)	Yes	Yes	Pos	Open-Close
Heat Exchanger Bypass Valve	KAA10AA112	Safeguard Building 1	1^N 2^A	Yes	Yes	Pos	Open-Close
Heat Exchanger Bypass Valve	KAA20AA112	Safeguard Building 2	2^N 1^A	Yes	Yes	Pos	Open-Close

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number (1)	Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Heat Exchanger Bypass Valve	KAA30AA112	Safeguard Building 3	3^N 4^A	Yes	Yes	Pos	Open-Close
Heat Exchanger Bypass Valve	KAA40AA112	Safeguard Building 4	4^N 3^A	Yes	Yes	Pos	Open-Close
Surge Tank Level	KAA10CL094	Safeguard Building 1	1	N/A	No	Level	NA / NA
Surge Tank Level	KAA10CL099	Safeguard Building 1	1	N/A	No	Level	NA / NA
Surge Tank Level	KAA20CL094	Safeguard Building 2	2	N/A	No	Level	NA / NA
Surge Tank Level	KAA20CL099	Safeguard Building 2	2	N/A	No	Level	NA / NA
Surge Tank Level	KAA30CL094	Safeguard Building 3	3	N/A	No	Level	NA / NA
Surge Tank Level	KAA30CL099	Safeguard Building 3	3	N/A	No	Level	NA / NA
Surge Tank Level	KAA40CL094	Safeguard Building 4	4	N/A	No	Level	NA / NA
Surge Tank Level	KAA40CL099	Safeguard Building 4	4	N/A	No	Level	NA / NA
LHSI HX Isolation Valve	KAA12AA005	Safeguard Building 1	1^N 2^A	Yes	Yes	Pos	Open-Close
LHSI HX Isolation Valve	KAA22AA005	Safeguard Building 2	2^N 1^A	Yes	Yes	Pos	Open-Close
LHSI HX Isolation Valve	KAA32AA005	Safeguard Building 3	3^N 4^A	Yes	Yes	Pos	Open-Close
LHSI HX Isolation Valve	KAA42AA005	Safeguard Building 4	4^N 3^A	Yes	Yes	Pos	Open-Close

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number [(1)]	Location	IEEE Class 1E [(2)]	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
LHSI Pump Seal Cooler Isolation Valve	KAA22AA013	Safeguard Building 2	2^N 1^A	Yes	Yes	Pos	Open-Close
LHSI Pump Seal Cooler Isolation Valve	KAA32AA013	Safeguard Building 3	3^N 4^A	Yes	Yes	Pos	Open-Close
Common Header 2.b Auxiliary Building and Waste Building Isolation Valves	KAB50AA001 KAB50AA004 KAB50AA006	Safeguard Building 4	NA[(3)]	N/A	Yes	Pos	Open-Close
Common Header 1.b Auxiliary Building Isolation Valves	KAB80AA015 KAB80AA016 KAB80AA019	Safeguard Building 1	NA[(3)]	N/A	Yes	Pos	Open-Close
Common Header 1.b Non-Safety Loads Containment Isolation Valves	KAB40AA001 KAB40AA006 KAB40AA012	Safeguard Building 1 Safeguard Building 1 Reactor Building	1^N 2^A 1^N 2^A 4^N 3^A	Yes	Yes	Pos	Open-Close

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number (1)	Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Common Header 1.b Safety Related Loads Containment Isolation Valves	KAB60AA013	Safeguard Building 1	1^N 2^A	Yes	Yes	Pos	Open-Close
	KAB60AA018	Reactor Building	4^N 3^A				
	KAB60AA019	Safeguard Building 1	1^N 2^A				
Common Header 2.b Safety Related Loads Containment Isolation Valves	KAB70AA013	Safeguard Building 4	4^N 3^A	Yes	Yes	Pos	Open-Close
	KAB70AA018	Reactor Building	1^N 2^A				
	KAB70AA019	Safeguard Building 4	4^N 3^A				
Common Header 1.b RCP Thermal Barriers Containment Isolation Valves	KAB30AA049	Safeguard Building 1	1^N 2^A	Yes	Yes	Pos	Open-Close
	KAB30AA050	Reactor Building	4^N 3^A				
	KAB30AA051	Reactor Building	4^N 3^A				
	KAB30AA052	Safeguard Building 1	1^N 2^A				

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number (1)	Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Common Header 2.b RCP Thermal Barriers Containment Isolation Valves	KAB30AA053	Safeguard Building 4	4^N 3^A	Yes	Yes	Pos	Open-Close
	KAB30AA054	Reactor Building	1^N 2^A				
	KAB30AA055	Reactor Building	1^N 2^A				
	KAB30AA056	Safeguard Building 4	4^N 3^A				
Surge Tank Demin. Water Makeup Isolation Valves	KAA10AA027	Safeguard Building 1	1^N 2^A	N/A	Yes	Pos	Open-Close
	KAA20AA027	Safeguard Building 2	2^N 1^A				
	KAA30AA027	Safeguard Building 3	3^N 4^A				
	KAA40AA027	Safeguard Building 4	4^N 3^A				
Common Header 1.a Fuel Pool Cooling Heat Exchanger 1 Downstream Control Valve	KAB10AA134	Fuel Building	1^N 2^A	N/A	Yes	NA / NA	NA / NA

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number (1)	Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Common Header 2.a Fuel Pool Cooling Heat Exchanger 2 Downstream Control Valve	KAB20AA134	Fuel Building	4[N] 3[A]	N/A	Yes	NA / NA	NA / NA
Common Header 1.b Safety Related Loads CVCS HP Cooler 1 Downstream Control Valve	KAB60AA116	Reactor Building	NA	N/A	Yes	Pos	Open-Close
Common Header 2.b Safety Related Loads CVCS HP Cooler 2 Downstream Control Valve	KAB70AA116	Reactor Building	NA	N/A	Yes	Pos	Open-Close
Dedicated CCWS Surge Tank Isolation Valve	KAA80AA020	Safeguard Building 4	4 (4)	N/A	Yes	Pos	Open-Close
Dedicated CCWS Surge Tank Nitrogen Supply Valve	KAA80AA021	Safeguard Building 4	4 (4)	N/A	Yes	Pos	Open-Close
Dedicated CCWS Demin Water Makeup Water Supply Valve	KAA80AA202	Safeguard Building 4	4 (4)	N/A	Yes	Pos	Open-Close

Table 2.7.1-2—Component Cooling Water System Equipment I&C and Electrical Design (7 Sheets)

Description	Tag Number (1)	Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
Dedicated CCWS Pump	KAA80AP001	Safeguard Building 4	4 (4)	N/A	Yes	On-Off / NA	Start-Stop / NA
Dedicated CCWS Demin Water Makeup Pump	KAA80AP201	Safeguard Building 4	4 (4)	N/A	Yes	On-Off / NA	Start-Stop / NA
Safety Chilled Water Chiller CCWS Flow Control Valve	KAA22AA101	Safeguard Building 2	2^N 1^A	N/A	Yes	NA / NA	NA / NA
Safety Chilled Water Chiller CCWS Flow Control Valve	KAA32AA101	Safeguard Building 3	3^N 4^A	N/A	Yes	NA / NA	NA / NA

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.

3) Each hydraulically operated valve has multiple solenoid-operated pilot valves and hydraulic fluid pumps. Pilot valves and hydraulic fluid pumps are powered from different Class 1E divisions to provide redundancy.

4) Dedicated components are non-Class 1E components but are powered from the Class 1E division as shown.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The functional arrangement of the CCWS is as shown on Figure 2.7.1-1.	Inspections of the as-built system will be conducted.	The as-built CCWS conforms to the functional arrangement as shown on Figure 2.7.1-1.
2.2	The location of CCWS equipment is as listed in Table 2.7.1-1.	An inspection will be performed of the location of the equipment listed in Table 2.7.1-1.	The equipment listed in Table 2.7.1-1 is located as listed in Table 2.7.1-1.
2.3	Physical separation exists between redundant divisions of the CCWS.	An inspection will be performed to verify that redundant divisions of the CCWS are located in separate Safeguard Buildings.	The equipment listed in Table 2.7.1-1 is located as listed in Table 2.7.1-1.
3.1	Pumps and valves listed in Table 2.7.1-1 will be functionally designed and qualified such that each pump and valve is capable of performing its intended function for a full range of system differential pressure and flow, ambient temperatures, and available voltage (as applicable) under conditions ranging from normal operating to design-basis accident conditions.	Tests or type tests of the pumps and valves listed in Table 2.7.1-1 will be conducted to demonstrate that the pumps and valves function under conditions ranging from normal operating to design-basis accident conditions.	A test report exists and concludes that the pumps and valves listed in Table 2.7.1-1 function under conditions ranging from normal operating to design-basis accident conditions.
3.2	Check valves listed in Table 2.7.1-1 will function as listed in Table 2.7.1-1.	Tests will be performed for the operation of the check valves listed in Table 2.7.1-1.	The check valves listed in Table 2.7.1-1 perform the functions listed in Table 2.7.1-1.
3.3	Deleted.	Deleted.	Deleted.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.4	Components identified as Seismic Category I in Table 2.7.1-1 can withstand seismic design basis loads without a loss of the function listed in Table 2.7.1-1.	a. Type tests, analyses, or a combination of type tests and analyses will be performed on the components identified as Seismic Category I in Table 2.7.1-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements. b. Inspections will be performed of the Seismic Category I components identified in Table 2.7.1-1 to verify that the components, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQDP, EQDP, or analyses).	a. Seismic qualification reports (SQDP, EQDP, or analyses) exist and conclude that the Seismic Category I components identified in Table 2.7.1-1 can withstand seismic design basis loads without a loss of the function listed in Table 2.7.1-1 including the time required to perform the listed function. b. Inspection reports exist and conclude that the Seismic Category I components identified in Table 2.7.1-1, including anchorage, are installed as specified on the construction drawings and deviations have been reconciled to the seismic qualification reports (SQDP, EQDP, or analyses).
3.5	Deleted.	Deleted.	Deleted.
3.6	Deleted.	Deleted.	Deleted.
3.7	Deleted.	Deleted.	Deleted.
3.8	Deleted.	Deleted.	Deleted.
3.9	CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 is designed in accordance with ASME Code Section III requirements.	Inspections of the ASME Code Section III Design Reports (NCA-3550) and associated reference documents will be performed. **{{DAC}}**	ASME Code Section III Design Reports (NCA-3550) exist and conclude that CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 complies with ASME Code Section III requirements. **{{DAC}}**

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.10	CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 is installed in accordance with an ASME Code Section III Design Report.	Analyses to reconcile as-built deviations to the ASME Code Design Reports (NCA-3550) will be performed.	For CCWS piping shown as ASME Code Section III on Figure 2.7.1-1, ASME Code Data Reports (N-5) exist and conclude that design reconciliation (NCA-3554) has been completed in accordance with the ASME Code Section III for the as-built system. The report(s) document the as-built condition.
3.11	Pressure boundary welds in CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 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 CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 has been performed in accordance with ASME Code Section III.
3.12	CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 retains pressure boundary integrity at design pressure.	Hydrostatic tests will be performed on the system.	For CCWS piping shown as ASME Code Section III on Figure 2.7.1-1, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements.
3.13	CCWS piping shown as ASME Code Section III on Figure 2.7.1-1 is installed and inspected in accordance with ASME Code Section III requirements.	An inspection of the as-built piping will be performed.	For as-built CCWS piping shown as ASME Code Section III on Figure 2.7.1-1, N–5 Data Reports exist and conclude that installation and inspection are in accordance with ASME Code Section III requirements.
3.14	Components listed in Table 2.7.1-1 as ASME Code Section III are designed in accordance with ASME Code Section III requirements.	Inspections of ASME Code Section III Design Reports and associated reference documents will be performed.	ASME Code Section III Design Reports (NCA-3550) exist and conclude that components listed as ASME Code Section III in Table 2.7.1-1 comply with ASME Code Section III requirements.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
3.15	Components listed in Table 2.7.1-1 as ASME Code Section III are fabricated in accordance with ASME Code Section III requirements.	An analysis will be performed to verify that deviations to the component design reports (NCA-3550) have been reconciled.	ASME Code Section III Design Reports (NCA-3550) exist and conclude that components listed as ASME Code Section III in Table 2.7.1-1 comply with ASME Code Section III requirements and any deviations to the design report have been reconciled.
3.16	Pressure boundary welds on components listed in Table 2.7.1-1 as ASME Code Section III are in accordance with ASME Code Section III requirements.	Inspections of pressure boundary welds will be performed to verify that welding is performed in accordance with ASME Code Section III requirements.	For components listed as ASME Code Section III in Table 2.7.1-1, ASME Code Section III Data Reports (NCA-8000) exist and conclude that pressure boundary welding has been performed in accordance with ASME Code Section III.
3.17	Components listed in Table 2.7.1-1 as ASME Code Section III retain pressure boundary integrity at design pressure.	Hydrostatic tests will be performed on the components.	For components listed as ASME Code Section III in Table 2.7.1-1, ASME Code Section III Data Reports exist and conclude that hydrostatic test results comply with ASME Code Section III requirements.
3.18	Components listed in Table 2.7.1-1 as ASME Code Section III are installed in accordance with ASME Code Section III requirements.	An inspection of ASME Code Data Reports will be performed.	ASME Code Section III N-5 Data Reports exist and conclude that components listed as ASME Code Section III in Table 2.7.1-1 have been installed 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 2.7.1-2.	Tests will be performed for the retrieveability of the displays in the MCR or the RSS as listed in Table 2.7.1-2.	a. The displays listed in Table 2.7.1-2 as being retrieved in the MCR can be retrieved in the MCR. b. The displays listed in Table 2.7.1-2 as being retrieved in the RSS can be retrieved in the RSS.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
4.2	Controls exist in the MCR and the RSS as identified in Table 2.7.1-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.7.1-2.	a. The controls listed in Table 2.7.1-2 as being in the MCR exist in the MCR. b. The controls listed in Table 2.7.1-2 as being in the RSS exist in the RSS.
4.3	Equipment listed as being controlled by a PACS module in Table 2.7.1-2 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 2.7.1-2 responds to the state requested by the test signal.
4.4	A CCWS low flow condition automatically opens the LHSI/RHR HX inlet valve.	Tests will be performed using test signals to verify the interlock.	The following interlock responds as specified below when activated by a test signal: CCWS low flow condition automatically opens the LHSI/RHR HX inlet valve.
4.5	A surge tank level of MIN3 automatically isolates the associated train common header switchover valves.	Tests will be performed using test signals to verify the interlock.	The following interlock responds as specified below when activated by a test signal: Surge tank level of MIN3 automatically isolates the associated train common header switchover valves.
4.6	A surge tank level of MIN4 automatically trips the associated CCWS pump and unlocks the common header switchover function to allow restoration of flow to the common users.	Tests will be performed using test signals to verify the interlock.	The following interlocks respond as specified below when activated by a test signal: • Surge tank level MIN4 automatically trips the associated CCWS pump. • Surge tank level MIN4 unlocks the switchover sequence. This interlock to be verified by performing a switchover sequence in the interlock test for surge tank MIN4 level.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
4.7	A low surge tank level and a flow rate difference between the supply and return from NAB and RWB automatically isolates the non-safety related branch.	Tests will be performed using test signals to verify the interlock.	The following interlock responds as specified below when activated by a test signal: A low surge tank level and a flow rate difference between the supply and return from NAB and RWB automatically isolates the non-safety related branch.
4.8	Loss of one CCWS train initiates an automatic switchover to allow cooling of the common “a” and/or “b” headers.	Tests will be performed using test signals to verify the interlock.	The following interlock responds as specified below when activated by a test signal: Loss of one CCWS train automatically initiates a switchover to allow cooling of the common “a” and/or “b” headers.
4.9	Deleted.	Deleted.	Deleted.
4.10	CCWS train separation to RCP thermal barriers is maintained by interlocks provided on the supply and return thermal barrier containment isolation valves. The interlocks require that CIVs associated with one common header be closed before the other common header CIVs can be opened.	Tests will be performed using test signals to verify the interlocks.	The following interlock responds as specified below when activated by a test signal: Thermal barrier CIVs associated with common header 1 fail to open while CIVs associated with common header 2 are opened and vice versa. Thermal barrier CIVs associated with common header 1 open when CIVs associated with common header 2 are closed and vice versa.
4.11	Manual or automatic actuation of a CCWS pump automatically actuates the corresponding ESWS pump.	Tests will be performed using test signals to verify the interlocks.	The following interlock responds as specified below when activated by a test signal: Actuation of a CCWS pump automatically actuates the corresponding ESWS pump.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
4.12	Upon receipt of an SIS, the following CCWS actuations are automatically initiated: • Start operable CCWS pumps (KAA10/20/30/40 AP001), if not previously running. • Open LHSI HX isolation valves (KAA 12/22/32/43 AA005). • Open LHSI pump seal cooler isolation valves (KAA22/32 AA013). • Close isolation valves for non-safety-related users outside of the Reactor Building (KAB50 AA001/004/0006 and KAB80 AA015/016/019).	A test will be performed using test signals	The following components respond as specified below when activated by a safety injection test signal: • CCWS operable pumps (KAA10/20/30/40 AP001) start (if not previously running). • LHSI HX isolation valves (KAA12/22/32/43 AA005) open. • LHSI pump seal cooler isolation valves (KAA22/32 AA013) open. • Isolation valves for non-safety-related users outside of Reactor Building (KAB50 AA001/004/0006 and KAB80 AA015/016/019) close.
5.1	The components designated as Class 1E in Table 2.7.1-2 are powered from the Class 1E division as listed in Table 2.7.1-2 in a normal or alternate feed condition.	a. Testing will be performed for components designated as Class 1E in Table 2.7.1-2 by providing a test signal in each normally aligned division. b. Testing will be performed for components designated as Class 1E in Table 2.7.1-2 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 2.7.1-2. 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 2.7.1-2.
5.2	Valves listed in Table 2.7.1-2 fail as-is on loss of power.	Testing will be performed for the valves listed in Table 2.7.1-2 to fail as-is on loss of power.	Following loss of power, the valves listed in Table 2.7.1-2 fail as-is.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
6.1	Components in Table 2.7.1-2, that are designated as harsh environment, will perform the function listed in Table 2.7.1-1 in the environments that exist during and following design basis events.	a. Type tests or type tests and analysis will be performed to demonstrate the ability of the components listed as harsh environment in Table 2.7.1-2 to perform the function listed in Table 2.7.1-1 for the environmental conditions that could occur during and following design basis events.	a. Environmental Qualification Data Packages (EQDP) exist and conclude that the components listed as harsh environment in Table 2.7.1-2 can perform the function listed in Table 2.7.1-1 during and following design basis events including the time required to perform the listed function.
		b. Components listed as harsh environment in Table 2.7.1-2 will be inspected to verify installation in accordance with the construction drawings including the associated wiring, cables and terminations. Deviations to the construction drawings will be reconciled to the EQDP.	b. Inspection reports exists and conclude that the components listed in Table 2.7.1-2 as harsh environment has been installed per the construction drawings and any deviations have been reconciled to the EQDP.
7.1	The CCWS heat exchanger as listed in Table 2.7.1-1 has the capacity to transfer the design heat load to the ESWS system.	Tests and analyses will be performed to demonstrate the capability of the CCWS heat exchanger as listed in Table 2.7.1-1 to transfer the heat load to the ESWS.	A report exists and concludes that the CCWS heat exchanger is capable of removing the DBA heat load of 293.35 E+06 BTU/hr with a minimum additional margin of 10% above the specified 10% tube plugging allowance.
7.2	The pumps listed in Table 2.7.1-1 have NPSHA that is greater than NPSHR at system run-out flow.	Testing will be performed to verify NPSHA for pumps listed in Table 2.7.1-1.	The pumps listed in Table 2.7.1-1 have NPSHA that is greater than NPSHR at system run-out flow with consideration for minimum allowable surge tank water level (as corrected to account for actual temperature and atmospheric conditions).

Table 2.7.1-3—Component Cooling Water System ITAAC
(10 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
7.3	The CCWS delivers water to the LHSI/RHRS heat exchangers to provide cooling.	Tests and analyses will be performed to determine the CCWS delivery rate under operating conditions.	The CCWS delivers at least a flowrate to each LHSI/RHR heat exchanger of 2.19×10^6 lb/hr.
7.4	The CCWS delivers water to the RCP thermal barrier coolers at the required flow from Common 1.b header and also from Common 2.b header.	Tests and analyses will be performed to determine the CCWS delivery rate under operating conditions.	The CCWS delivers at least a flowrate to the thermal barrier coolers of 0.0792×10^6 lb/hr from Common 1.b header and also from Common 2.b header.
7.5	The CCWS delivers water to Divisions 2 and 3 SCWS chiller heat exchangers.	Tests and analyses will be performed to determine the CCWS delivery rate under operating conditions.	The CCWS delivers at least a flowrate to the safety chilled water chillers of 0.514×10^6 lb/hr.
7.6	The CCWS delivers water to the spent fuel pool heat exchangers.	Tests and analyses will be performed to determine the CCWS delivery rate under operating conditions.	The CCWS delivers at least a flowrate to the spent fuel pool cooling heat exchangers of 0.8818×10^6 lb/hr.
7.7	Class 1E valves listed in Table 2.7.1-2 perform the function listed in Table 2.7.1-1 under system operating conditions.	Tests and analyses or a combination of tests and analyses will be performed to demonstrate the ability of the valves listed in Table 2.7.1-2 to change position as listed in Table 2.7.1-1 under system operating conditions.	The valves change position as listed in Table 2.7.1-1 under system operating conditions.
7.8	The CCWS provides for flow testing of CCWS pumps during plant operation.	A test will be performed.	Normal system alignment allows testing of each CCWS pump during plant operation.
7.9	Containment isolation valves listed in Table 2.7.1-1 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 2.7.1-1 to close within the containment isolation response time following initiation of a containment isolation signal.	Containment isolation valves listed in Table 2.7.1-1 close within 60 seconds following initiation of a containment isolation signal.
7.10	The CCWS surge tanks provide adequate capacity for system operation.	Tests and analysis will be performed to determine the CCWS surge tank capacity.	The CCWS surge tank capacity is equal to or greater than 950 ft^3.

Table 2.7.1-3—Component Cooling Water System ITAAC (10 Sheets)

	Commitment Wording	Inspections, Tests, Analyses	Acceptance Criteria
7.11	Each CCWS surge tank maintains a reserve volume of 750 gallons to accommodate potential total train leakage of 4 gallons per hour for 7 days of continuous operation with no makeup source available.	Tests and analysis will be performed to determine the total train leakage for each CCWS train.	A report exists and concludes that the worst case leakage between trains is less than or equal to 4 gph assuming one train is running with its associated A/B switchover valves open and the opposite train depressurized. Testing to support this report should be performed with one train in standby and one train running with its associated A/B switchover valves open. This test should be performed on all four CCWS trains.

Next File