

**2.7.8 Spray Deluge System**

There are no Tier 1 entries for this system.



**2.7.9**

**Demineralized Water Distribution System**

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There are no Tier 1 entries for this system.



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**2.7.10 Potable and Sanitary System**

There are no Tier 1 entries for this system.

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**2.7.11 Essential Service Water System****1.0 Description**

The essential service water system (ESWS) is a safety-related system that provides cooling water to the component cooling water system (CCWS) heat exchangers, the emergency diesel generator (EDG) heat exchangers, and the essential service water pump building ventilation system (ESWPBVS) room coolers under normal operating, shutdown/cooldown, design basis events. The Ultimate Heat Sink (UHS) dissipates heat rejected from the ESW during normal operation and post accident shutdown.

The ESWS provides the following safety related functions:

- The ESWS provides the capability to transfer heat from CCWS and EDG to the environment following an anticipated operational occurrence (AOO) or postulated accident.
- The ESWS provides continued heat transfer from the fuel pool cooling system (FPCPS) via the CCWS as long as any fuel assemblies are in the spent fuel storage pool located outside containment.
- The ESW normal and emergency makeup water systems and blowdown system piping from pump discharge piping up to and including the isolation valves provided for isolation of the tower basins to prevent loss of tower water inventory.
- Pursuant to NRC Regulatory Guide 1.27 requirements, each UHS cooling tower basin is sized to contain sufficient water to allow for 72 hours of ESW train operation under DBE conditions without addition of makeup water. The water level in the basin at the end of the 72 hour period is sufficient to meet pump minimum suction head (NPSH) requirements.
- After 72 hours have elapsed since the initiation of design basis event, the ESW emergency makeup water system provides water to the ESW system to replenish cooling water lost to evaporation, drift, blowdown and other losses in order to ensure cooling tower basin water levels remain within established limits under DBE conditions.
- The site specific ESW emergency makeup water system will provide this makeup water for at least 27 days following the initial 72 hour post-accident period (balance of 30 day scenario).

The ESWS provides the following non-safety-related functions:

- The ESWS provides the cooling of the system users during all normal plant operating conditions.
- The ESWS capability is designed so that the temperatures in the CCWS remain within their specified limits.
- The ESW normal makeup water system provides makeup water to the ESW system to replenish cooling water lost to evaporation, drift, and other losses in order to

ensure cooling tower basin water levels remain within established limits.

- The ESW system provides the means of transferring heat loads from the dedicated CCW heat exchanger under severe accident conditions to ensure containment integrity.
- Freeze protection is provided by diverting ESW return flow directly to the tower basin and controlling fan operation under low load/low ambient temperature conditions.

The non-safety-related dedicated ESWS train provides water as a cooling medium to the non-safety-related dedicated CCWS train heat exchanger and to the division 4 ESWS ESWPBVS room cooler for the removal of reject heat under severe accident conditions.

## 2.0 Arrangement

- 2.1 The functional arrangement of the ESWS is as shown in Figure 2.7.11-1—Essential Service Water System Functional Arrangement.
- 2.2 The location of the ESWS equipment is as listed in Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design.
- 2.3 Physical separation exists between divisions of the ESWS.
- 2.4 The non-safety-related dedicated ESWS train functional arrangement is as shown in Figure 2.7.11-1.
- 2.5 The location of non-safety-related dedicated ESWS equipment is in the division 4 essential service water pump structure (ESWPS) and division 4 Safeguard Building (SB).

## 3.0 Mechanical Design Features

- 3.1 Equipment listed in Table 2.7.11-1 as ASME Code Section III is designed and tested to ASME Code Section III.
- 3.2 Check valves listed in Table 2.7.11-1 will function as listed in Table 2.7.11-1.
- 3.3 Piping indicated in Figure 2.7.11-1 as ASME Code Section III is designed and tested in accordance with ASME Code Section III.
- 3.4 Equipment identified as Seismic Category I in Table 2.7.11-1 can withstand a design basis seismic load without loss of safety function as listed in Table 2.7.11-1.
- 3.5 Non-safety-related ASME classification boundaries for dedicated ESWS are as indicated in Figure 2.7.11-1.
- 3.6 Non-safety related equipment in the dedicated ESWS as indicated in Figure 2.7.11-1 is designed and tested to ASME B31.1, Power Piping Code and ASME Section VIII, Pressure Vessel Code.

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- 3.7 Non-safety-related piping in the dedicated ESWS as indicated in Figure 2.7.11-1 is designed and tested in accordance with ASME B31.1 Section Code.
  - 3.8 Supports for piping shown as ASME Section III in Figure 2.7.11-1 will be designed per ASME Section III.
  - 3.9 Specifications exist for components listed as ASME Section III in Table 2.7.11-1.
  - 3.10 Specifications exist for piping shown as ASME Section III in Figure 2.7.11-1.
  - 3.11 Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.11-1.

#### **4.0 I&C Design Features, Displays and Controls**

- 4.1 Displays listed in Table 2.7.11-2— Essential Service 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 2.7.11-2.
- 4.2 The ESWS equipment controls are provided in the MCR and the RSS as listed in Table 2.7.11-2.
- 4.3 Actuators listed as being controlled by a priority actuation and control system (PACS) module in Table 2.7.11-2 are controlled by a PACS module.
- 4.4 If one ESWS pump (30PEB10/20/30/40 AP001) fails during normal operation, a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.
- 4.5 A spurious closure of the ESWS pump discharge valve (30PEB10/20/30/40 AA005) has the same consequences as the failure of the ESW pump (30PEB10/20/30/40 AP001), a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.
- 4.6 The non-safety-related dedicated ESWS is provided with displays retrievable in the MCR and the RSS.
- 4.7 The non-safety-related dedicated ESWS is provided with controls in the MCR and the RSS.

#### **5.0 Electrical Power Design Features**

- 5.1 The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.
- 5.2 Valves listed in Table 2.7.11-2 fail as-is on loss of power.
- 5.3 The non-safety related dedicated ESWS is powered from Class 1E division power. In the case of LOOP, the dedicated ESWS is powered from the station blackout diesel generator.

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**6.0 Environmental Qualifications**

- 6.1 Electrical drivers for equipment listed in Table 2.7.11-2 for harsh environment can perform the safety function in Table 2.7.11-1 following exposure to the design basis environments for the time required.

**7.0 Equipment and System Performance**

- 7.1 The ESWS UHS has the capacity to remove the design heat loads from the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.
- 7.2 The pumps listed in Table 2.7.11-1 have sufficient net positive suction head absolute.
- 7.3 Class 1E valves listed in Table 2.7.11-2 can perform the function listed in Table 2.7.11-1 under system design conditions.
- 7.4 The ESWS provides for flow testing of the ESWS pumps during plant operation.
- 7.5 The non-safety related dedicated ESWS has the capability to remove the design heat load from the non-safety-related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.
- 7.6 The ESWS delivers water to the CCWS and EDG heat exchangers and the ESWPBVS room coolers.

**8.0 Interface Information**

- 8.1 The site specific emergency makeup water system provides makeup water in order to maintain the minimum water level in the ESW cooling tower basins.

**9.0 Inspections, Tests, Analyses, and Acceptance Criteria**

- 9.1 Table 2.7.11-3 specifies the inspections, tests, analyses, and acceptance criteria for the ESWS.

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
ESWS PUMP DIVISION 1	30PEB10 AP001	Essential Service Water Pump Structure Division 1	Yes	Run	I
RECIRC ISOLATION VALVE DIVISION 1	30PEB10 AA002	Essential Service Water Pump Structure Division 1	Yes	Close	I
EMER. BLOWDOWN ISOLATION VALVE DIVISION 1	30PEB10 AA003	Essential Service Water Pump Structure Division 1	Yes	Close	I
PUMP DISCHARGE ISOLATION VALVE DIVISION 1	30PEB10 AA005	Essential Service Water Pump Structure Division 1	Yes	Open	I
FILTER BLOWDOWN ISOLATION VALVE DIVISION 1	30PEB10 AA015	Essential Service Water Pump Structure Division 1	Yes	Close	I
BLOWDOWN ISOLATION VALVE DIVISION 1	30PEB10 AA016	Essential Service Water Pump Structure Division 1	Yes	Close	I
PUMP	30PEB10 AA204	Essential Service	Yes	Open	I



**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
DISCHARGE CHECK VALVE DIVISION 1		Water Pump Structure Division 1			
BLOWDOWN CHECK VALVE DIVISION 1	30PEB10 AA205	Essential Service Water Pump Structure Division 1	Yes	Close	I
TOWER ISOLATION VALVE DIVISION 1	30PED10 AA010	Essential Service Water Pump Structure Division 1	Yes	Open	I
TOWER BYPASS ISOLATION VALVE DIVISION 1	30PED10 AA011	Essential Service Water Pump Structure Division 1	Yes	Close	I
MAKEUP WATER ISOLATION VALVE DIVISION 1	30PED10 AA019	Essential Service Water Pump Structure Division 1	Yes	Close	I
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 1	30PED10 AA021	Essential Service Water Pump Structure Division 1	Yes	Open	I
MAKEUP WATER CHECK VALVE DIVISION 1	30PED10 AA220	Essential Service Water Pump Structure Division 1	Yes	Close	I
ESWS PUMP	30PEB20 AP001	Essential Service	Yes	Run	I

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
DIVISION 2		Water Pump Structure Division 2			
RECIRC ISOLATION VALVE DIVISION 2	30PEB20 AA002	Essential Service Water Pump Structure Division 2	Yes	Close	I
EMER. BLOWDOWN ISOLATION VALVE DIVISION 2	30PEB20 AA003	Essential Service Water Pump Structure Division 2	Yes	Close	I
PUMP DISCHARGE ISOLATION VALVE DIVISION 2	30PEB20 AA005	Essential Service Water Pump Structure Division 2	Yes	Open	I
FILTER BLOWDOWN ISOLATION VALVE DIVISION 2	30PEB20 AA015	Essential Service Water Pump Structure Division 2	Yes	Close	I
BLOWDOWN ISOLATION VALVE DIVISION 2	30PEB20 AA016	Essential Service Water Pump Structure Division 2	Yes	Close	I
PUMP DISCHARGE CHECK VALVE	30PEB20 AA204	Essential Service Water Pump	Yes	Open	I

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
DIVISION 2		Structure Division 2			
BLOWDOWN CHECK VALVE DIVISION 2	30PEB20 AA205	Essential Service Water Pump Structure Division 2	Yes	Close	I
TOWER ISOLATION VALVE DIVISION 2	30PED20 AA010	Essential Service Water Pump Structure Division 2	Yes	Open	I
TOWER BYPASS ISOLATION VALVE DIVISION 2	30PED20 AA011	Essential Service Water Pump Structure Division 2	Yes	Close	I
MAKEUP WATER ISOLATION VALVE DIVISION 2	30PED20 AA019	Essential Service Water Pump Structure Division 2	Yes	Close	I
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 2	30PED20 AA021	Essential Service Water Pump Structure Division 2	Yes	Open	I
MAKEUP WATER CHECK VALVE DIVISION 2	30PED20 AA220	Essential Service Water Pump Structure Division 2	Yes	Close	I
ESWS PUMP DIVISION 3	30PEB30 AP001	Essential Service Water Pump Structure Division 3	Yes	Run	I

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
RECIRC ISOLATION VALVE DIVISION 3	30PEB30 AA002	Essential Service Water Pump Structure Division 3	Yes	Close	I
EMER. BLOWDOWN ISOLATION VALVE DIVISION 3	30PEB30 AA003	Essential Service Water Pump Structure Division 3	Yes	Close	I
PUMP DISCHARGE ISOLATION VALVE DIVISION 3	30PEB30 AA005	Essential Service Water Pump Structure Division 3	Yes	Open	I
FILTER BLOWDOWN ISOLATION VALVE DIVISION 3	30PEB30 AA015	Essential Service Water Pump Structure Division 3	Yes	Close	I
BLOWDOWN ISOLATION VALVE DIVISION 3	30PEB30 AA016	Essential Service Water Pump Structure Division 3	Yes	Close	I
PUMP DISCHARGE CHECK VALVE DIVISION 3	30PEB30 AA204	Essential Service Water Pump Structure Division 3	Yes	Open	I

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
BLOWDOWN CHECK VALVE DIVISION 3	30PEB30 AA205	Essential Service Water Pump Structure Division 3	Yes	Close	I
TOWER ISOLATION VALVE DIVISION 3	30PED30 AA010	Essential Service Water Pump Structure Division 3	Yes	Open	I
TOWER BYPASS ISOLATION VALVE DIVISION 3	30PED30 AA011	Essential Service Water Pump Structure Division 3	Yes	Close	I
MAKEUP WATER ISOLATION VALVE DIVISION 3	30PED30 AA019	Essential Service Water Pump Structure Division 3	Yes	Close	I
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 3	30PED30 AA021	Essential Service Water Pump Structure Division 3	Yes	Open	I
MAKEUP WATER CHECK VALVE DIVISION 3	30PED30 AA220	Essential Service Water Pump Structure Division 3	Yes	Close	I
ESWS PUMP DIVISION 4	30PEB40 AP001	Essential Service Water Pump Structure Division 4	Yes	Run	I
RECIRC	30PEB40 AA002	Essential Service	Yes	Close	I

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
ISOLATION VALVE DIVISION 4		Water Pump Structure Division 4			
EMER. ISOLATION VALVE DIVISION 4	30PEB40 AA003	Essential Service Water Pump Structure Division 4	Yes	Close	I
PUMP DISCHARGE ISOLATION VALVE DIVISION 4	30PEB40 AA005	Essential Service Water Pump Structure Division 4	Yes	Open	I
FILTER BLOWDOWN ISOLATION VALVE DIVISION 4	30PEB40 AA015	Essential Service Water Pump Structure Division 4	Yes	Close	I
BLOWDOWN ISOLATION VALVE DIVISION 4	30PEB40 AA016	Essential Service Water Pump Structure Division 4	Yes	Close	I
PUMP DISCHARGE CHECK VALVE DIVISION 4	30PEB40 AA204	Essential Service Water Pump Structure Division 4	Yes	Open	I
BLOWDOWN CHECK VALVE	30PEB40 AA205	Essential Service Water Pump	Yes	Close	I

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
DIVISION 4		Structure Division 4			
DEDICATED SYSTEM CHECK VALVE UPSTR 30SAQ40 AC001 DIVISION 4	30PEB41 AA011	Essential Service Water Pump Structure Division 4	Yes	Open	I
TOWER ISOLATION VALVE DIVISION 4	30PED40 AA010	Essential Service Water Pump Structure Division 4	Yes	Open	I
TOWER BYPASS ISOLATION VALVE DIVISION 4	30PED40 AA011	Essential Service Water Pump Structure Division 4	Yes	Close	I
MAKEUP WATER ISOLATION VALVE DIVISION 4	30PED40 AA019	Essential Service Water Pump Structure Division 4	Yes	Close	I
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 4	30PED40 AA021	Essential Service Water Pump Structure Division 4	Yes	Open	I
MAKEUP WATER CHECK VALVE DIVISION 4	30PED40 AA220	Essential Service Water Pump Structure Division 4	Yes	Close	I
ISOLATION	30PEB80 AA003	Essential Service	No	Open	N/A

**Table 2.7.11-1—Essential Service Water System Equipment Mechanical Design  
(9 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>ASME Code Section III</b>	<b>Function</b>	<b>Seismic Category</b>
VALVE UPSTR KAA80 AC001		Water Dedicated Division Safeguards Building 4			
ISOLATION VALVE DNSTR KAA80 AC001	30PEB80 AA004	Essential Service Water Dedicated Division Safeguards Building 4	Yes	Open	I
DEDICATED ESW PUMP	30PEB80 AP001	Essential Service Water Pump Structure Division 4	No	Run	II

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



**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>IEEE Class 1E (2)</b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
ESWS PUMP DIVISION 1	30PEB10 AP001	Essential Service Water Pump Structure Division 1	Division 1	No	Yes	On-Off/ On-Off	Start-Stop/ Start-Stop
RECIRC ISOLATION VALVE DIVISION 1	30PEB10 AA002	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
EMER. BLOWDOWN ISOLATION VALVE DIVISION 1	30PEB10 AA003	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
PUMP DISCHARGE ISOLATION VALVE DIVISION 1	30PEB10 AA005	Essential Service Water Pump Structure Division 1	Division 1	No	Yes	Pos/Pos	Open-Close/Open-Close
FILTER BLOWDOWN ISOLATION VALVE DIVISION 1	30PEB10 AA015	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
BLOWDOWN ISOLATION VALVE DIVISION 1	30PEB10 AA016	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A

**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>IEEE Class 1E (2)</b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
TOWER ISOLATION VALVE DIVISION 1	30PED10 AA010	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
TOWER BYPASS ISOLATION VALVE DIVISION 1	30PED10 AA011	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
MAKEUP WATER ISOLATION VALVE DIVISION 1	30PED10 AA019	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 1	30PED10 AA021	Essential Service Water Pump Structure Division 1	Division 1	No	No	Pos/N/A	Open-Close/N/A
ESWS PUMP DIVISION 2	30PEB20 AP001	Essential Service Water Pump Structure Division 2	Division 2	No	Yes	On-Off/ On-Off	Start-Stop/ Start-Stop
RECIRC ISOLATION VALVE DIVISION 2	30PEB20 AA002	Essential Service Water Pump Structure Division 2	Division 2	No	No	Pos/N/A	Open-Close/N/A
EMER. BLOWDOWN	30PEB20	Essential Service Water Pump	Division 2	No	No	Pos/N/A	Open-

**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>IEEE Class 1E (2)</b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
ISOLATION VALVE DIVISION 2	AA003	Structure Division 2					Close/N/A
PUMP DISCHARGE ISOLATION VALVE DIVISION 2	30PEB20 AA005	Essential Service Water Pump Structure Division 2	Division 2	No	Yes	Pos/Pos	Open-Close/Open-Close
FILTER BLOWDOWN ISOLATION VALVE DIVISION 2	30PEB20 AA015	Essential Service Water Pump Structure Division 2	Division 2	No	No	Pos/N/A	Open-Close/N/A
BLOWDOWN ISOLATION VALVE DIVISION 2	30PEB20 AA016	Essential Service Water Pump Structure Division 2	Division 2	No	No	Pos/N/A	Open-Close/N/A
TOWER ISOLATION VALVE DIVISION 2	30PED20 AA010	Essential Service Water Pump Structure Division 2	Division 2	No	No	Pos/N/A	Open-Close/N/A
TOWER BYPASS ISOLATION VALVE DIVISION 2	30PED20 AA011	Essential Service Water Pump Structure Division 2	Division 2	No	No	Pos/N/A	Open-Close/N/A
MAKEUP WATER	30PED20 AA019	Essential Service Water Pump	Division 2	No	No	Pos/N/A	Open-Close/N/A

**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>IEEE Class 1E (2)</b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
ISOLATION VALVE DIVISION 2		Structure Division 2					
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 2	30PED20 AA021	Essential Service Water Pump Structure Division 2	Division 2	No	No	Pos/N/A	Open-Close/N/A
ESWS PUMP DIVISION 3	30PEB30 AP001	Essential Service Water Pump Structure Division 3	Division 3	No	Yes	On-Off/ On-Off	Start-Stop/ Start-Stop
RECIRC ISOLATION VALVE DIVISION 3	30PEB30 AA002	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
EMER. BLOWDOWN ISOLATION VALVE DIVISION 3	30PEB30 AA003	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
PUMP DISCHARGE ISOLATION VALVE DIVISION 3	30PEB30 AA005	Essential Service Water Pump Structure Division 3	Division 3	No	Yes	Pos/Pos	Open-Close/Open-Close
FILTER BLOWDOWN	30PEB30 AA015	Essential Service Water Pump	Division 3	No	No	Pos/N/A	Open-Close/N/A

**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

<b>Equipment Description</b>	<b>Equipment Tag Number (1)</b>	<b>Equipment Location</b>	<b>IEEE Class 1E (2)</b>	<b>EQ – Harsh Env.</b>	<b>PACS</b>	<b>MCR/RSS Displays</b>	<b>MCR/RSS Controls</b>
ISOLATION VALVE DIVISION 3		Structure Division 3					
BLOWDOWN ISOLATION VALVE DIVISION 3	30PEB30 AA016	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
TOWER ISOLATION VALVE DIVISION 3	30PED30 AA010	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
TOWER BYPASS ISOLATION VALVE DIVISION 3	30PED30 AA011	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
MAKEUP WATER ISOLATION VALVE DIVISION 3	30PED30 AA019	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 3	30PED30 AA021	Essential Service Water Pump Structure Division 3	Division 3	No	No	Pos/N/A	Open-Close/N/A
ESWS PUMP DIVISION 4	30PEB40 AP001	Essential Service Water Pump	Division 4	No	Yes	On-Off/ On-Off	Start-Stop/ Start-Stop

**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

Equipment Description	Equipment Tag Number (1)	Equipment Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
		Structure Division 4					
RECIRC ISOLATION VALVE DIVISION 4	30PEB40 AA002	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A
EMER. BLOWDOWN ISOLATION VALVE DIVISION 4	30PEB40 AA003	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A
PUMP DISCHARGE ISOLATION VALVE DIVISION 4	30PEB40 AA005	Essential Service Water Pump Structure Division 4	Division 4	No	Yes	Pos/Pos	Open-Close/Open-Close
FILTER BLOWDOWN ISOLATION VALVE DIVISION 4	30PEB40 AA015	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A
BLOWDOWN ISOLATION VALVE DIVISION 4	30PEB40 AA016	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A
TOWER ISOLATION VALVE	30PED40 AA010	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A

**Table 2.7.11-2—Essential Service Water System Equipment I&C and Electrical Design  
(7 Sheets)**

Equipment Description	Equipment Tag Number (1)	Equipment Location	IEEE Class 1E (2)	EQ – Harsh Env.	PACS	MCR/RSS Displays	MCR/RSS Controls
DIVISION 4							
TOWER BYPASS ISOLATION VALVE DIVISION 4	30PED40 AA011	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A
MAKEUP WATER ISOLATION VALVE DIVISION 4	30PED40 AA019	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A
EMER. MAKEUP WATER ISOLATION VALVE DIVISION 4	30PED40 AA021	Essential Service Water Pump Structure Division 4	Division 4	No	No	Pos/N/A	Open-Close/N/A

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

(2) <sup>N</sup> denotes the division the component is normally powered from.

<sup>A</sup> denotes the division the component is powered from when alternate feed is implemented.

**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
2.1	The functional arrangement of the ESWS is as shown on Figure 2.7.11-1.	Inspections of the as-built system as shown on Figure 2.7.11-1 will be conducted	The as-built ESWS conforms to the functional arrangement as shown in Figure 2.7.11-1.
2.2	The location of the ESWS equipment is as listed in Table 2.7.11-1.	An inspection will be performed of the location of the equipment listed in Table 2.7.11-1.	The equipment listed in Table 2.7.8-1 is located as listed in Table 2.7.11-1.
2.3	Physical separation exists between divisions of the ESWS.	An inspection will be performed to verify that the divisions of the ESWS are located in separate ESW and SB buildings.	The divisions of the ESWS system are located in separate ESW and SB buildings.
3.1	The components designated as ASME Code Section III in Table 2.7.11-1 are designed to ASME Code Section III requirements.	Inspections will be conducted of ASME design, NDE and hydrostatic test reports for the components listed as ASME Code Section III in Table 2.7.11-1.	A report exists and concludes that the components listed as ASME Code Section III in Table 2.7.11-1 have been designed and hydrostatically tested in accordance ASME Code Section III requirements.
3.2	Check valves listed in Table 2.7.8-1 will function as listed in Table 2.7.11-1.	Tests will be performed for the operation of the check valves listed in Table 2.7.11-1.	The check valves listed in Table 2.7.11-1 perform the functions listed in Table 2.7.11-1.
3.3 a	The piping identified as being within the ASME Code Section III boundary as indicated in Figure 2.7.11-1 has been designed in accordance with ASME Code Section III requirements including seismic loads.	Analysis of the as-designed piping will be performed in accordance with ASME Code Section III requirements for the piping indicated in Figure 2.7.11-1.	ASME Code Section III stress reports exist and conclude that the as-designed piping identified as ASME Code Section III in Figure 2.7.11-1 meets ASME Code Section III design requirements.



**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
3.3 b	The piping identified as being within the ASME Code Section III boundary as indicated in Figure 2.7.11-1 has been inspected and hydrostatically tested in accordance with ASME Code Section III.	Inspections will be conducted of the as-built piping as indicated in Figure 2.7.11-1 for the following: Welding has been performed per ASME Code Section III. Hydrostatic testing per ASME Code Section III was performed.	A report exists and concludes that the piping as indicated in Figure 2.7.11-1 as ASME Code Section III has been welded in accordance with ASME Code Section III welding requirements. A report exists and concludes that the piping as indicated in Figure 2.7.11-1 as ASME Code Section III has been hydrostatically tested in accordance with ASME Code Section III requirements.
3.4	Equipment identified as Seismic Category I in Table 2.7.11-1 can withstand a design basis seismic load without loss of safety function as listed in Table 2.7.11-1.	Inspection will be performed of the equipment identified as Seismic Category I in Table 2.7.11-1. Type tests, tests, analyses or a combination of tests and analyses will be performed on the equipment designated as Seismic Category I in Table 2.7.11-1.	A report exists and concludes that the equipment designated as Seismic Category I in Table 2.7.11-1 is installed as designed. A report exists and concludes that the equipment designated as Seismic Category I in Table 2.7.11-1 can withstand a design basis seismic load without loss of safety function.

**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
3.5	Supports for piping shown as ASME Section III in Figure 2.7.11-1 will be designed per ASME Section III.	An inspection will be performed.	<p>a. Supports for piping shown as ASME Section III in Figure 2.7.11-1 are designed to ASME Section III.</p> <p>b. Snubbers have been identified, including those analyzed for fatigue for piping shown as ASME Section III in Figure 2.7.11-1.</p> <p>Support mass is less than ten percent of the adjacent pipe span for piping shown as ASME Section III in Figure 2.7.11-1 .</p>
3.6	Specifications exist for components listed as ASME Section III in Table 2.7.11-1.	An inspection will be performed.	Specifications exist for components listed as ASME Section III in Table 2.7.11-1.
3.7	Specifications exist for piping shown as ASME Section III in Figure 2.7.11-1.	An inspection will be performed.	Specifications exist for piping identified as ASME Section III in Figure 2.7.11-1.
3.8	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.11-1.	An inspection will be performed.	Specifications exist for supports for piping shown as ASME Section III in Figure 2.7.11-1.
4.1	Displays exist or can be retrieved in the MCR and the RSS as identified in Table 2.7.11-2.	Inspections will be performed for the existence or retrievability of the displays in the MCR or the RSS as listed in Table 2.7.11-2.	<p>The displays listed in Table 2.7.11-2 as being retrieved in the MCR can be retrieved in the MCR.</p> <p>The displays listed in Table 2.7.11-2 as being retrieved in the RSS can be retrieved in the RSS.</p>

**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
4.2	Controls exist in the MCR and the RSS as identified in Table 2.7.11-2.	Tests will be performed for the existence of control signals from the MCR and the RSS to the equipment listed in Table 2.7.11-2.	The controls listed in Table 2.7.11-2 as being in the MCR exist in the MCR. The controls listed in Table 2.7.11-2 as being in the RSS exist in the RSS.
4.3	Actuators listed as being controlled by a PACS module in Table 2.7.11-2 are controlled by a PACS module.	An operational test will be performed using test signals for the actuators being controlled by a PACS module as listed in Table 2.7.11-2. An inspection will be performed on the actuation of the actuator.	The actuators listed as being controlled by a PACS module in Table 2.7.11-2 actuate to the state requested by the signal.
4.4	If one ESWS pump (30PEB10/20/30/40 AP001) fails during normal operation, a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS Switchover sequence.	Tests will be performed using simulated signals to verify the interlock.	The interlock functions in response to a simulated signal.
4.5	A spurious closure of the ESWS pump discharge valve (30PEB10/20/30/40 AA005) has the same consequences as the failure of the ESW pump (30PEB10/20/30/40 AP001), a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS switchover sequence.	Tests will be performed using simulated signals to verify the interlock.	The interlock functions in response to a simulated signal.

**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
4.6	A spurious closure of the ESWS pump discharge valve (30PEB10/20/30/40 AA005) has the same consequences as the failure of the ESW pump (30PEB10/20/30/40 AP001), a switchover to the other ESWS train is carried out automatically for the entire cooling train and is initiated by the CCWS switchover sequence.	Tests will be performed using simulated signals to verify the interlock.	The interlock functions in response to a simulated signal.
5.1	The components designated as Class 1E in Table 2.7.11-2 are powered from the Class 1E division as listed in Table 2.7.11-2 in a normal or alternate feed condition.	Testing will be performed for components designated as Class 1E in Table 2.7.11-2 by providing a test signal in each normally aligned division.  Testing will be performed for components designated as Class 1E in Table 2.7.11-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair.	The test signal provided in the normally aligned division is present at the respective Class 1E component identified in Table 2.7.11-2.  The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E component identified in Table 2.7.11-2.
5.2	Valves listed in Table 2.7.11-2 fail as-is on loss of power.	Testing will be performed for the valves listed in Table 2.7.11-2 to fail as-is on loss of power.	Following loss of power, the valves listed in Table 2.7.11-2 fail as-is.

**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
6.1	Components listed as Class 1E in Table 2.7.11-2 that are designated as harsh environment will perform the function listed in Table 2.7.11-1 in the environments that exist before and during the time required to perform their safety function.	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 2.7.11-2 to perform the function listed in Table 2.7.11-1 for the environmental conditions that could occur before and during a design basis accident.  For equipment listed for harsh environment in Table 2.7.11-2, an inspection will be performed of the as-installed Class 1E equipment and the associated wiring, cables and terminations.	A report exists and concludes that the Class 1E equipment listed for harsh environment in Table 2.7.11-2 can perform the function listed in Table 2.7.11-1 before and during design basis accidents for the time required to perform the listed function. Inspection concludes the as-installed Class 1E equipment and associated wiring, cables, and terminations as listed in Table 2.7.11-2 for harsh environment conform to the design.
7.1	The ESW UHS system as listed in Table 2.7.11-1 has the capacity to transfer the design heat load from the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.	Tests and analyses will be performed to demonstrate the capability of the ESWS UHS as listed in Table 2.7.11-1 to transfer the heat load from CCWS and EDG heat exchangers, and the ESWPBVS room coolers .	A report exists and concludes that the ESWS UHS has the capacity to remove the design heat load from the CCWS and EDG heat exchangers, and the ESWPBVS room coolers.
7.2	The pumps listed in Table 2.7.11-1 have sufficient NPSHA.	Testing and analyses will be performed to verify adequate NPSHA for pumps listed in Table 2.7.11-1.	A report exists and concludes that the pumps listed in Table 2.7.11-1 have sufficient NPSHA.

**Table 2.7.11-3—Essential Service Water System Inspections, Tests, Analyses, and Acceptance Criteria (7 Sheets)**

	<b>Commitment Wording</b>	<b>Inspection, Analysis or Test</b>	<b>Acceptance Criteria</b>
7.3	Class 1E valves listed in Table 2.7.11-2 perform the function listed in Table 2.7.11-1 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 2.7.11-2 to change position as listed in Table 2.7.11-1 under system design conditions.	The as-installed valve changes position as listed Table 2.7.11-1 under system design conditions.
7.4	The ESWS has provisions to allow flow testing of the ESWS pumps during plant operation.	Testing for flow of the ESWS pumps back to the ESW cooling tower basin will be performed.	The flow test line allows ESWS pump flow back to the ESW cooling tower basin.
7.5	The non-safety related dedicated ESWS as listed in Table 2.7.11-1 has the capacity to transfer the design heat load from the non-safety related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.	Tests and analyses will be performed to demonstrate the capability of the ESWS as listed in Table 2.7.11-1 to transfer heat has the capacity to transfer the heat load from the non-safety related dedicated CCWS heat exchanger and ESWPBVS division 4 room cooler.	A report exists and concludes that the non-safety related dedicated ESWS has the capacity to remove the design heat load from the CCWS heat exchanger and ESWPBVS division 4 room cooler.
7.6	The ESWS delivers water to the CCWS and EDG heat exchangers and the ESWPBVS room coolers at the required flow and within the required time due to design basis events.	Tests and analyses will be performed to determine the ESWS delivery rate under design conditions. An integrated system test will be performed using a simulated actuation signal to verify the startup time of the ESWS.	A report exists and concludes that the ESWS system delivers the following design flowrate to the CCWS and EDG heat exchangers and the ESWPBVS room coolers: 19,340 gpm A report exists and concludes that the ESWS starts within the following required time in response to a simulated actuation signal.