

2.1.5 Essential Service Water Building

1.0 Description

Each of the four essential service water buildings (ESWBs) is an independent, safety-related, Seismic Category I, reinforced-concrete structure. Each ESWB houses an essential service water cooling tower structure (ESWCT) and an essential service water pump building (ESWPB). The ESWCT houses two cooling towers and a water storage basin. The ESWPB houses pumps and electrical equipment. A total of four ESWBs are located in pairs on each side of the Nuclear Island (NI) complex. The pairs of buildings are separated to protect them from being simultaneously affected by external events such as aircraft hazards and explosion pressure waves. As shown on Figure 2.1.5-1—U.S. EPR Building Layout Showing ESWBs Location, one pair is located adjacent to the Turbine Building and the other pair is located adjacent to the Fuel Building (FB). The dimensions on this and other figures in this section are for information only.

Each ESWB is embedded 22 feet below grade and is approximately 164 feet by 108 feet wide by 118 feet high (i.e., from the bottom of the basemat to the top of the building at elevation 96 feet, 0 inches). The ESWBs are Seismic Category I structures, which are capable of performing their safety function during and following a safe shutdown earthquake (SSE). The buildings are designed for external hazards including rain and snow, flooding, wind loads, tornado loads, missile impact loads, SSE loads, and site proximity hazards. The buildings are also designed for structure and component dead loads, live loads, pipe reactions, and thermal effects.

The function of the ESWBs is to house equipment and cooling water associated with the Essential Service Water System.

2.0 Arrangement

2.1 The as-installed basic configuration of the four ESWBs is as described in 1.0 Description of this section and as shown on Figure 2.1.5-1.

3.0 Key Design Features

3.1 The physical separation of the two pairs of ESWBs by the NI complex provides protection against external hazards such as aircraft hazard and is shown on Figure 2.1.5-1.

3.2 As shown on Figure 2.1.5-2—Essential Service Water Building - View 1, Figure 2.1.5-3, Essential Service Water Building - View 2, Figure 2.1.5-4—Essential Service Water Building - View 3, and Figure 2.1.5-5—Essential Service Water Building - View 4, the

two ESWBs located adjacent to the turbine building have five missile protection shields provided for the safety-related fans and pumps; these ESWBs are positioned favorably outside the low-trajectory hazard zone for turbine missiles.

4.0 Mechanical Design Features, Seismic 1E Classifications

4.1 The ESWBs site grade level is at elevation 0 feet, 0 inches as indicated on Figures 2.1.5-4 and 2.1.5-5.

4.2 ESWBs are separated to address internal hazards, including fire and flood as described in Table 2.1.5-1—ESWB Separation For Internal Hazards.

4.3 The ESWBs as installed basic configuration structural supports are Seismic Category I and are designed and constructed to withstand design basis loads without loss of structural integrity and safety-related functions. The design basis loads are those loads associated with:

- Normal plant operation (including dead loads, live loads, lateral earth pressure loads, hydrostatic loads, hydrodynamic loads, and temperature loads).
- External events (including rain, snow, flood, tornado, tornado-generated missiles, and earthquake).

5.0 Interface Requirements

There are no interface requirements for the ESWB structures.

6.0 Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.1.5-2—Essential Service Water Building Inspections, Tests, Analyses, and Acceptance Criteria (2 Sheets) specifies the inspections, tests, analyses, and associated acceptance criteria for the ESWBs.

Table 2.1.5-1—ESWB Separation For Internal Hazards

Building	From Room(s) [KKS]	To Room(s) [KKS]	Door	Wall	Slab	Elevation(s)
ESWB 1	1UQB02 001	1URB02 002		X		14' 0" to 63'
	1UQB02 001	1UQB01 001, 1UQB01 002			X	14' 0"
	1URB03 001	1URB03 002		X		63' 0" to 96' 0"
	1URB03 001, 1URB03 002	1URB02 002, 1URB02 005			X	63'
ESWB 2	2UQB02 001	2URB02 002		X		14' 0" to 63'
	2UQB02 001	2UQB01 001, 2UQB01 002			X	14' 0"
	2URB03 001	2URB03 002		X		63' 0" to 96' 0"
	2URB03 001, 2URB03 002	2URB02 002, 2URB02 005			X	63'
ESWB 3	3UQB02 001	3URB02 002		X		14' 0" to 63'
	3UQB02 001	3UQB01 001, 3UQB01 002			X	14' 0"
	3URB03 001	3URB03 002		X		63' 0" to 96' 0"
	3URB03 001, 3URB03 002	3URB02 002, 3URB02 005			X	63'
ESWB 4	4UQB02 001	4URB02 002		X		14' 0" to 63'
	4UQB02 001	4UQB01 001, 4UQB01 002			X	14' 0"
	4URB03 001	4URB03 002		X		63' 0" to 96' 0"
	4URB03 001, 4URB03 002	4URB02 002, 4URB02 005			X	63'

Table 2.1.5-2—Essential Service Water Building Inspections, Tests, Analyses, and Acceptance Criteria

	Commitment Wording	Inspection, Analysis, or Test	Acceptance Criteria
2.1	The as-installed basic configuration of the four ESWBs is as shown on Figure 2.1.5-1.	An inspection of the ESWBs will be performed.	The as-installed configuration of the ESWBs is that there are four separate ESWBs as shown on Figure 2.1.5-1.
3.1	As shown in Figure 2.1.5-1, physical separation of the two pairs of ESWBs is provided by the NI complex.	An inspection of the ESWBs will be performed.	The as-installed configuration of the ESWBs is that the two pairs of ESWBs are separated by the NI complex as shown on Figure 2.1.5-1.
3.2	Two of the ESWBs have missile protection shields provided for the safety-related fans and pumps as shown on Figures 2.1.5-2, 2.1.5-3, 2.1.5-4, and 2.1.5-5.	An inspection of the ESWBs will be performed.	The as-installed configuration of the ESWB's includes five missile protection shields for each ESWB located adjacent to the turbine building as shown on Figures 2.1.5-2, 2.1.5-3, 2.1.5-4, and 2.1.5-5.
4.1	The ESWBs site grade level is at elevation 0' 0" as shown on Figures 2.1.5-4 and 2.1.5-5.	An inspection of the ESWBs site grade level will be performed.	The as-installed ESWB site grade level is at elevation 0' 0" as shown on Figures 2.1.5-4 and 2.1.5-5.
4.2	ESWBs are separated to address internal hazards, including fire and flood as described in Table 2.1.5-1	An inspection of the ESWBs will be performed.	The as-installed configuration of the ESWBs provides internal hazards barriers as described in Table 2.1.5-1
4.3	The ESWB structures are Seismic Category I and are designed and constructed to withstand design basis loads as specified in Section 2.1.5, without loss of structural integrity.	A verification inspection of the ESWB structures seismic design analysis versus construction records will be performed.	ESWB structures conform to the approved design and withstand the design basis loads specified in Section, 2.1.5, without loss of structural integrity.