2.0 Site Characteristics

The information in this section of the reference ABWR DCD, including all tables, is incorporated by reference with the following site-specific supplements.

Supplemental Table 2.0-2 provides a comparison of the reference ABWR DCD design parameters with the actual STP 3 & 4 site characteristics. A column is provided indicating whether or not the site-specific parameters are bounded by the ABWR Standard Plant Site Design Parameters. Another column provides a discussion of those values that are not bounded, with a basis for any departure from the reference ABWR DCD design. The "Discussion" column also provides a roadmap to the FSAR sections where further information is provided.

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
Maximum Ground Water Level	61.0 cm (2 ft) below grade	> 61.0 cm (2 ft) below grade.	Yes	Further information on maximum groundwater level is provided in Subsection 2.4S.12.
Extreme Wind	Basic Wind Speed: 177 km/h [1] /197 km/h [2] Per Section 3.3.1.1, the reference ABWR DCD basic wind speed corresponds to a 50-year/100-year wind velocity (3-second wind gust) of: 203 km/h/225 km/h (126 mph/140 mph)	 201 km/h/215 km/h (125 mph/134 mph) for 3-second wind gust	 Yes	Further information on extreme winds is provided in Subsection 2.3S.1.

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
Maximum Flood (or Tsunami) Level [8]	30.5 cm (1 ft) below grade	414.5 cm (13.6 ft) above nominal plant grade	No	As discussed in Subsection 2.4S.4, the maximum flood level is 47.6 ft (1450.8 cm) above MSL (MSL NVGD29). This level is due to breach of the Main Cooling Reservoir (MCR) resulting in a flood level of approximately 13.6 ft (414.5 cm) above nominal plant grade, which is 34 ft (1036.3 cm) MSL (see STP DEP T1 5.0-1). STP 3 & 4 safety-related structures, systems, and components (SSCs) are designed for or protected from this flooding event by watertight doors to prevent the entry of water into the Reactor Buildings and Control Buildings in case of a flood. Flooding protection requirements due to the maximum flood level are discussed in Section 3.4. In addition, an external flooding PRA analyses for STP 3 & 4 concluded that the risk from external flooding is acceptably low as discussed in Section 19R.
Tornado	Maximum Tornado Wind Speed: 483 km/h (300 mph)	322 km/h (200 mph)	Yes	Further information on tornado parameters is provided in Subsection 2.3S.1.
	Maximum Rotational Speed: 386 km/h (240 mph)	257 km/h (160 mph)	Yes	
	Translational Velocity: 97 km/h (60 mph)	64 km/h (40 mph)	Yes	
	Radius: 45.7 m (150 ft)	45.7m (150 ft)	Yes	

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
	Maximum Pressure Drop: 13.827 kPaD (2.0 psi)	6.2 kPaD (0.9 psi)	Yes	
	Rate of Pressure Drop: 8.277 kPa/s (1.2 psi/sec)	2.8 kPa/sec (0.4 psi/sec)	Yes	
	Missile Spectra: Spectrum I [4]	STP site is enveloped by the maximum tornado wind speed corresponding to a probability of 1×10^{-7} per year 483 km/h (300 mph)	Yes	Further information on missile spectra is provided in Subsections 3.5.1.4.
Precipitation (for Roof Design)	Maximum Rainfall Rate: 49.3 cm/h (19.4 in/hr) [3]	50.3 cm/h (19.8 in/hr)	No	As discussed in Subsection 2.4S.2, the site-specific maximum rainfall rate is 50.3 cm/h (19.8 in/hr), which exceeds the DCD standard plant site design parameter (see STP DEP T1 5.0-1). The maximum rainfall rate is used as one factor in determining the structural loading conditions for roof design. A review of the reference ABWR DCD Tier 2 Appendices 3H.1, 3H.2, and 3H.3, indicates that standard ABWR Seismic Category I structures have roofs without parapets or parapets with scuppers to supplement roof drains so that large inventories of precipitation cannot accumulate. Appendix 3H.6 states that the roof of the site-specific Seismic Category I structures (i.e. reactor service water pump houses) are designed without parapets so that excessive ponding of water cannot occur. Therefore, the 1 cm/hr exceedance in maximum rainfall rate will not result in a substantial increase in the roof design loading; and therefore, will not affect the design of these structures.

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
	Maximum Snow Load: 2.394 kPa (50 psf)	 0 kPa (0 psf) (100-year return snow pack)	 Yes	Further information on maximum snow load is provided in Subsection 2.3S.1.
Ambient Design Temperature	1% Exceedance Values			The maximum dry-bulb temperature in combination with coincident wet-bulb temperature provides the state point (enthalpy of the air) that is used as design input for HVAC system design to determine cooling loads. The 1% exceedance STP site-specific state point value is not bounded by the 1% exceedance ABWR state point (see STP DEP T1 5.0-1). Based on a review of the reference ABWR DCD Tier 2 Section 9.4, the Control Building HVAC, Reactor Building Secondary Containment HVAC, and Reactor Building Safety Related Electrical Equipment HVAC systems are designed for an outdoor summer maximum temperature of 46°C. This temperature corresponds to the ABWR 0% exceedance value. The ABWR 0% exceedance state point bounds the STP site-specific 0% exceedance state point and the 1% exceedance state point. Therefore, the reference ABWR DCD cooling loads calculated based on 0% exceedance values for Control Building HVAC, Reactor Building Secondary Containment HVAC, and Reactor Building Safety Related Electrical Equipment HVAC systems are bounding. Therefore, the change in 1% exceedance wet bulb temperature has no adverse impact on these HVAC systems.
	Maximum: 37.8°C (100°F) dry-bulb	32.8°C (91°F) dry-bulb [9]	Yes	
	Maximum: 25°C (77°F) wet-bulb (coincident)	26.3°C (79.3°F) wet-bulb (coincident) [9]	No	
	Maximum: 26.7°C (80°F) wet-bulb (non-coincident)	27.3°C (81.2°F) wet-bulb (non-coincident)	No	
	Minimum: -23.3°C (-9.9°F)	2.1°C (35.8°F)	Yes	
	0% Exceedance Values (Historical limit)			
	Maximum: 46.1°C (115°F) dry-bulb	43°C (109.4°F) dry-bulb	Yes	
	Maximum: 26.7°C (80°F) wet-bulb (coincident)	24°C (75.2°F) wet-bulb (coincident)	Yes	

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
	Maximum 27.2°C (81°F) wet-bulb (non-coincident)	29.1°C (84.4°F) wet-bulb (non-coincident)	No	The Radwaste Building, some of the Radwaste Management systems, and the Radwaste Building HVAC systems have been redesigned. Further details of these changes can be found in Chapter 11 and Chapter 9.4. The Radwaste Building HVAC systems are STP specific and have been designed to STP site-specific ambient temperatures and the revised HVAC design is compliant with STP 3&4 Characteristics. The maximum non-coincident wet-bulb is used as input for short-term performance of cooling towers and evaporative coolers. In the case of STP 3 & 4, this value is an hourly data point. The site-specific maximum non-coincident wet-bulb temperatures on an hourly basis are not bounded by the reference ABWR site parameters. However, the calculated 30-day and 24-hour consecutive maximum non-coincident wet-bulb temperatures have been determined to be less than the DCD non-coincident hourly value (see STP DEP T1 5.0-1). The UHS cooling tower long-term cumulative evaporation for the postulated LOCA case has been evaluated using the STP site-specific worst-case 30 consecutive day weather data. The UHS basin water temperature has been evaluated using the worst one-day (24 hour) weather data. Thus, the 0% exceedance and 1% exceedance values for non coincident wet-bulb temperatures not being bounded have no adverse impact on the STP 3 & 4 UHS analysis.
	Minimum: -40°C (-40°F)	-12.2°C (10°F)	Yes	
Soil Properties	Minimum Static Bearing Capacity: 718.20 kPa (15,000 psf) [5]	Minimum bearing capacity 718.20 kPa (15,000 psf) (gross pressure) with average settlements up to 7.0 inches	Yes	Further information on minimum static bearing capacity is provided in Subsection 2.5S.4.

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
	Minimum Shear Wave Velocity: 305 m/s (1000 ft/sec) [6]	STP 3 - 381 m/s (1250 ft/sec) STP 4 - 379 m/s (1243 ft/sec)	Yes	Further information on minimum shear wave velocity provided in Subsection 2.5S.4.7.
	Liquefaction Potential: None at plant site resulting from site specific SSE ground motion	 None	 Yes	Further information on liquefaction potential is provided in Subsection 2.5S.4.8.
Seismology	SSE Peak Ground Acceleration (PGA): 0.30g [7]	Ground Mean Response Spectra (GMRS) PGA: 0.09g	Yes	Further information on the GMRS calculation of PGA is provided in Subsection 2.5S.2.6.
	SSE Response Spectra: per RG 1.60	GMRS developed per RG 1.208	Yes	Further information on the SSE Response Spectra with site-specific GMRS is provided in Subsection 2.5S.2.6.
	SSE Time History: Envelope SSE Response Spectra	–	–	See Appendix 3H.6 for discussion of site-specific time histories consistent with the GMRS defined in Subsection 2.5S.2 as input to the seismic analysis of the site specific structures.

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
Hazards in Site Vicinity	Site Proximity Missiles and Aircraft: $\leq 10^{-7}$ per year	Site Proximity: Missiles - None Aircraft hazard 1.16×10^{-7} per year	No	An evaluation of the aircraft hazards that could impact the STP site was conservatively estimated at 1.16×10^{-7} as discussed in Subsection 2.2S.2.7.2. When estimating the number of operations along the nearest airway to the STP site (V-70), the number of operations at each of the airports-Palacios Municipal Airport, and Scholes International Airport (the terminal points of airway V-70)-were equally divided among the airways for each airport to determine the potential number of operations along the V-70 airway. This is a very conservative assumption since general aviation aircraft mainly fly under Visual Flight Rules or Instrument Flight Rules condition and under new Federal Aviation Administration regulations, most commercial and military aircraft will fly point-to-point rather than in specific airways. Thus, because of the inherent conservatism in the aircraft accident analysis, the estimated aircraft hazard of 1.16×10^{-7} is within the order of magnitude of 10^{-7} and meets the intent of the criteria specified in RG 1.206 and NUREG-0800, Section 3.5.1.6. No other hazards in the STP site vicinity were identified that could approach a frequency of 10^{-7} per year as discussed in Section 2.2S.
	Toxic Gases: None	None	Yes	Further information on toxic gases is provided in Subsection 2.2S.3.
	Volcanic Activity: None	None	Yes	Further information on volcanic activity is discussed in Subsection 2.5S.1.

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics (Continued)

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
Exclusion Area Boundary (EAB)	An area whose boundary has a χ/Q less than or equal to 1.37 x 10^{-3} s/m^{-3}	1.96x10^{-4}s/m^3	Yes	Further information on the EAB is provided in Subsection 2.3S.4.
Meteorological Dispersion (χ/Q)	Maximum 2-hour 95% EAB: 1.37x10-3 s/m^3	1.96x10^{-4}s/m^3	Yes	Further information on χ/Q values is provided in Subsection 2.3S.4.
	Maximum 2-hour 95% LPZ: 4.11x10^{-4} s/m^3	4.76x10^{-5}s/m^3	Yes	
	Maximum annual average (8760 hour) LPZ: 1.17x10^{-6} s/m^3	6.54x10^{-7}s/m^3	Yes	

[1] 50-year recurrence interval; value to be utilized for design of non-safety-related structures only; corresponds to a wind velocity (3-second gust) of 203 km/h wind per Subsection 3.3.1.1.

[2] 100-year recurrence interval; value to be utilized for design for safety-related structures only; corresponds to a wind velocity (3-second gust) of 225 km/h per Subsection 3.3.1.1.

[3] Maximum value for 1 hour over 2.6 km2 probable maximum precipitation (PMP) with ratio of 5 minutes to 1 hour PMP of 0.32 as found in National Weather Source Publication HMR No. 52. Maximum short term rate: 16.3cm/5 min per Subsection 2.4S.2.3.1.

[4] Spectrum I missiles consist of a massive high-kinetic energy missile that deforms on impact, a rigid missile to test penetration resistance, and a small rigid missile of a size sufficient to just pass through any openings in protective barriers. These missiles consists of an 1800-kg automobile, a 125-kg, 20-cm diameter armor piercing artillery shell, and a 2.54-cm diameter solid steel sphere, all impacting at 35% of the maximum horizontal wind speed of the design basis tornado. The first two missiles are assumed to impact at normal incidence, the last to impinge upon openings in the most damaging directions.

[5] At foundation level of the reactor and control buildings.

[6] This is the minimum shear wave velocity at low strains after the soil property uncertainties have been applied at the Reactor Building embedment depth of 25.7 meters (85 feet).

[7] Free-field, at plant grade elevation.

[8] Probable maximum flood level (PMF), as defined in ANSI/ANS-2.8, “Determining Design Basis Flooding at Power Reactor Sites.”

[9] The site-specific annual cooling, dehumidification, and enthalpy design conditions for HVAC system design are: maximum dry-bulb 32.8OC and 26.3OC wet-bulb (coincident). These values will be used as design input for determining the cooling loads for site specific HVAC design.