2.0 Site Characteristics

The U.S. EPR standard design is based on a set of conservatively established site characteristics. These characteristics represent more demanding site conditions than normally expected for most U.S. nuclear power plant sites. These site-related design basis parameters are provided in Table 2.1-1—U.S. EPR Site Design Envelope.

A COL applicant that references the U.S. EPR design certification will compare site-specific data to the design parameter data in Table 2.1-1. If the specific data for the site falls within the assumed design parameter data and characteristics in Table 2.1-1, then the U.S. EPR standard design is bounding for the site. For site-specific design parameter data or characteristics that are outside the bounds of the assumptions presented in Table 2.1-1, the COL applicant will confirm that the U.S. EPR design acceptably meets any additional requirements that may be imposed by the more limiting site-specific design parameter data or characteristic, and that the design maintains conformance to the design commitments and acceptance criteria described in this FSAR.

2.1 Geography and Demography

A COL applicant that references the U.S. EPR design certification will provide site-specific information related to site location and description, exclusion area authority and control, and population distribution.

2.1.1 Site Location and Description

The site location and description is site-specific and will be addressed by the COL applicant, including:

- Specific location by longitude and latitude, Universal Transverse Mercator (UTM) coordinates, and political subdivisions; the site's relative location with respect to natural and man-made features of the area such as highways, railways, and waterways; and local population distribution.

- A map of the site area of suitable scale (with explanatory text as necessary) showing relevant features such as the plant property lines, site and exclusion area boundaries (EAB), location and orientation of principal plant structures within the site area, and highways, railways and waterways that traverse or are adjacent to the site.

2.1.2 Exclusion Area Authority and Control

The authority for control of activities in the site exclusion area is site-specific and will be addressed by the COL applicant. This information will describe activities unrelated to plant operation that are permitted within the exclusion area.

2.1.3 Population Distribution

The distribution of the population in the site vicinity is site-specific and will be addressed by the COL applicant.

Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 1 of 3

U.S. EPR Site Design Envelope	
Precipitation (Refer to Section 2.4)	
Rainfall	≤19.4 in/hr
Snow (design: extreme live load, including 48-hour probable maximum winter precipitation)	≤100 psf
Seismology (Refer to Sections 2.5 & 3.7)	
Horizontal SSE Acceleration	0.3g Peak (CSDRS shapes – See Section 3.7.)
Vertical SSE Acceleration	0.3g Peak (CSDRS shapes – See Section 3.7.)
Fault Displacement Potential	No fault displacement is considered for safety-related SSCs in U.S. EPR design certification.
Soil (Refer to Section 2.5)	
Minimum Bearing Capacity (Static)	22 ksf in localized areas at the bottom of the Nuclear Island basemat and 15 ksf on average across the total area of the bottom of the Nuclear Island basemat.
Minimum Shear Wave Velocity (Low strain best estimate average value at bottom of basemat)	1000 fps
Liquefaction	None
Maximum Differental Settlement (across the basemat)	1/2 inch in 50 feet in any direction
Slope Failure Potential	No slope failure potential is considered in the design of safety-related SSCs for U.S. EPR design certification.
Maximum Ground Water	3.3 ft below grade
Inventory of Radionuclides Which Could Potentially Seep Into the Groundwater	
See Table 2.1-2, Bounding Values for Component Radionuclide Inventory	
Flood Level (Refer to Section 2.4)	
Maximum Flood (or Tsunami)	1 ft below grade
Wind (Refer to Section 3.3)	
Maximum Sustained Speed	145 mph (Based on 3-sec gust at 33 ft above ground level and factored for 50-yr mean recurrence interval.)
Importance Factor	1.15 (Safety-related structures for 100-year mean recurrence interval.)

Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 2 of 3

U.S. EPR Site Design Envelope			
Tornado (Refer to Sections 3.3 and 3.5)			
Maximum Pressure Drop		1.2 psi at 0.5 psi/sec	
Maximum Rotational Speed		184 mph	
Maximum Translational Speed		46 mph	
Maximum Wind Speed		230 mph	
Radius of Maximum Rotational Speed		150 ft	
Missile Spectra		6 in Schedule 40 pipe, 6.625 in diameter x 15 ft long, 287 lb, 34.5 in^2 impact area, impact velocity of 135 ft/sec horizontal and 90 ft/sec vertical.	
		Automobile, 16.4 ft x 6.6 ft x 4.3 ft, 4000 lb, 4086.7 in^2 impact area, impact velocity of 135 ft/sec horizontal & 90 ft/sec vertical. (Automobile missile is considered at elevations up to 30.0 ft above grade elevation.)	
		Solid steel sphere, 1 in diameter, 0.147 lb, 0.79 in^2 impact area, impact velocity of 26 ft/sec horizontal & 17 ft/sec vertical.	
Temperature (Refer to Section 2.3)			
Air	0% Exceedance Values	Maximum	115°F Dry Bulb / 80°F Wet Bulb (coincident) 81°F Wet Bulb (non-coincident)[1]
		Minimum	-40°F
	1% Exceedance Values	Maximum	100°F dry bulb/77°F coincident wet bulb 80°F wet bulb (noncoincident)[1]
		Minimum	-10°F
UHS Meteorological Conditions			
Conditions resulting in Maximum Evaporation and Drift Loss of Water from the UHS (Section 2.3.1)			As presented in Table 2.1-3 - Design Values for Maximum Evaporation and Drift Loss of Water from the UHS
Conditions resulting in Minimum Water Cooling in the UHS (Section 2.3.1)			As presented in Table 2.1-4 - Design Values for Minimum Water Cooling in the UHS
Potential for Water Freezing in the UHS Water Storage Facility (Sections 2.4.7 and 9.2.5)			As presented in Section 2.4.7 and 9.2.5

Table 2.1-1—U.S. EPR Site Design Envelope
Sheet 3 of 3

U.S. EPR Site Design Envelope	
UHS Design Parameters (Section 9.2.5)	
Maximum UHS Evaporative Water Loss	571 gpm
Maximum Drift Water Loss	≤0.005%
Design Cold (outlet) Water Temperature	≤95°F (max ESWS supply design limit)
Atmospheric Dispersion Factors (χ/Q) (Refer to Section 2.3)	
Maximum Annual Average (0.5 mile - limiting sector)	≤4.973E-6 sec/m^3
Accident	
0-2 hr (EAB, 0.5 miles)	≤1E-3 sec / m^3
0-2 hr (LPZ, 1.5 miles)	≤1.75E-4 sec / m^3
2-8 hr (LPZ, 1.5 miles)	≤1.35E-4 sec / m^3
8-24 hr (LPZ, 1.5 miles)	≤1.00E-4 sec / m^3
1-4 day (LPZ, 1.5 miles)	≤5.40E-5 sec / m^3
4-30 day (LPZ, 1.5 miles)	≤2.20E-5 sec / m^3

Notes:

1. UHS Design Only.

Table 2.1-2—Bounding Values for Component Radionuclide Inventory

Nuclide	Activity (μCi/g)	Nuclide	Activity (μCi/g)
Br-83	3.2E-02	Y91M	5.2E-04
Br-84	1.7E-02	Y91	8.1E-05
Br-85	2.0E-03	Y92	1.4E-04
I-129	4.6E-08	Y93	6.5E-05
I-130	5.0E-02	ZR95	9.3E-05
I-131	7.4E-01	NB95	9.3E-05
I-132	3.7E-01	MO99	1.1E-01
I-133	1.3E+00	TC99M	4.6E-02
I-134	2.4E-01	RU103	7.7E-05
I-135	7.9E-01	RU106	2.7E-05
Cs-134	1.7E-01	RH103M	6.8E-05
Cs-136	5.3E-02	RH106	2.7E-05
Cs-137	1.1E-01	AG110M	2.0E-07
Cs-138	2.2E-01	TE127M	4.4E-04
Cr-51	2.0E-03	TE129M	1.5E-03
Mn-54	1.0E-03	TE129	2.4E-03
Fe-55	7.6E-04	TE131M	3.7E-03
Fe-59	1.9E-04	TE131	2.6E-03
Co-58	2.9E-03	TE132	4.1E-02
Co-60	3.4E-04	TE134	6.7E-03
Na-24	3.7E-02	BA137M	1.0E-01
Zn-65	3.2E-04	BA140	6.2E-04
W-187	1.8E-03	LA140	1.6E-04
Rb-88	1.0E+00	CE141	8.9E-05
Rb-89	4.7E-02	CE143	7.6E-05
Sr-89	6.3E-04	CE144	6.9E-05
Sr-90	3.3E-05	PR143	8.8E-05
Sr-91	1.0E-03	PR144	6.9E-05
Sr-92	1.7E-04	NP239	8.7E-04
Y-90	7.7E-06		

Table 2.1-3—Design Values for Maximum Evaporation and Drift Loss of Water from the UHS[1]

Time (hr)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)		Time (hr)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)		Time (hr)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)
1	69.87	84		25	70.49	86		49	74.14	91
2	68.69	82		26	71.03	86		50	72.99	87
3	66.82	78		27	71.03	86		51	70.96	84
4	67.02	77		28	71.03	86		52	69.33	84
5	69.04	78		29	71.03	86		53	68.90	81
6	68.48	78		30	70.02	81		54	69.46	81
7	68.14	77		31	68.24	79		55	69.13	80
8	67.10	74		32	68.25	79		56	69.69	80
9	67.10	74		33	68.13	77		57	67.70	79
10	67.80	76		34	68.13	77		58	67.70	79
11	67.23	76		35	69.70	80		59	68.58	80
12	69.79	82		36	71.79	83		60	71.53	84
13	70.98	84		37	72.98	85		61	72.40	85
14	72.71	86		38	75.02	88		62	73	87
15	74.15	89		39	76.71	92		63	73.29	88
16	74.71	93		40	77.49	95		64	73.58	89
17	74.98	94		41	78.24	98		65	73.58	89
18	75.82	93		42	78.72	100		66	73.33	92
19	74.98	98		43	78.48	99		67	73.08	93
20	74.20	97		44	77.91	99		68	73.36	94
21	74.19	97		45	77.91	99		69	74.42	94
22	74.16	95		46	77.10	98		70	74.14	93
23	74.15	93		47	76.85	97		71	74.68	93
24	72.22	90		48	75.24	93		72	73.28	88

Notes:

1. Only 72 hours of temperature data are provided because the site specific makeup water system will provide sufficient flow rates of makeup water to compensate for system volume losses for the remaining 27 days of the required 30-day period.

Table 2.1-4—Design Values for Minimum Water Cooling in the UHS

Time (hr)	Wet Bulb Temp (°F)	Dry Bulb Temp (°F)
1	75.8	82
2	76.1	83
3	76.1	83
4	77.3	85
5	79.7	89
6	80.8	91
7	82	93
8	84.6	99
9	85.3	99
10	85.3	99
11	84.2	100
12	84.2	100
13	84.6	99
14	83.9	99
15	83.9	99
16	82.6	96
17	82.6	93
18	82.1	91
19	82.1	91
20	81.9	90
21	80.7	88
22	80.7	88
23	79.5	86
24	79.5	86