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Table 3.1-9 ESP Site Characteristics and Design Parameters

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
Part 1 - Site Characteristics		
Normal Plant Heat Sink		• Item 2 of Table 3.1-1
• Maximum Inlet Temperature Condenser/ Heat Exchanger	95°F (Unit 3 only)	• Maximum water temperature at condenser and heat exchanger inlet • Item 2.2.1 of Table 3.1-1 • Refer to Section 3.4.1.3.2.
• Evaporation Rate	12,600 gpm, average, at 96% capacity factor (13,000 gpm, average, at full-load operation)	• Site-specific expected average rates of water lost by evaporation from Lake Anna, at 96% capacity factor and full load operation, as a result of heat rejection to the WHTF at the specified cooling water flow rate and cooling water temperature rise of 18°F. • Item 2.5.4.1 of Table 3.1-1 • Refer to Section 5.2.1.2; Tables 3.3-1 & 5.2-1; Figure 3.3-1.
Atmospheric Dispersion (χ/Q) (Accident)		• Atmospheric dispersion coefficients used to estimate dose consequences of accident airborne releases. • Item 9.1 of Table 3.1-1 • Refer to Section 2.7.5; Tables 2.7-11 & 2.7-12.
• EAB	3.34E-5 sec/m^3 [Same for 2nd unit/group]	
• LPZ	2.17E-6 sec/m^3 [Same for 2nd unit/group]	
Gaseous Effluents Dispersion, Deposition (Annual Average)		• Item 9.2 of Table 3.1-1
• Atmospheric Dispersion (χ/Q)	χ/Q values in Table 2.7-14 [Same for 2nd unit/group]	• The atmospheric dispersion coefficients used to estimate dose consequences of normal airborne releases. • Refer to Section 2.7.6; Table 2.7-14.
• Ground Deposition (D/Q)	D/Q values in Table 2.7-14 [Same for 2nd unit/group]	• The ground deposition coefficients used to estimate dose consequences of normal airborne releases. • Refer to Section 2.7.6; Table 2.7-14.
Dose Consequences		• Item 9.3 of Table 3.1-1
• Normal	10 CFR 20, 10 CFR 50 Appendix I, and 40 CFR 190 dose limits [Same for 2nd unit/group]	• Radiological dose consequences due to gaseous releases from normal operation of the plant. • Item 9.3.1 of Table 3.1-1 • Refer to Section 5.4.3; Tables 5.4-10 & 5.4-11.

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
• Post-Accident	10 CFR 50.34(a)(1) and 10 CFR 100 dose limits [Same for 2nd unit/group]	• Radiological dose consequences due to gaseous releases from postulated plant accidents. • Item 9.3.2 of Table 3.1-1 • Refer to Sections 7.1.2 & 7.1.4.
	Part 1 - Site Characteristics (continued)	
• Minimum Distance to Site Boundary	2854.9 ft [Same for 2nd unit/group]	• Minimum lateral distance from the ESP Plant Parameter Envelope boundaries to the Exclusion Area Boundary • Item 9.4.4 of Table 3.1-1 • Refer to Figure 3.1-3.
Liquid Radwaste System		• Item 10 of Table 3.1-1
• Normal Dose Consequences	10 CFR 50 Appendix I, 10 CFR 20, and 40 CFR 190 dose limits [Same for 2nd unit/group]	• The radiological dose consequences due to liquid effluent releases from normal operation of the plant. • Item 10.1.1 of Table 3.1-1 • Refer to Section 5.4.3; Tables 5.4-10 & 5.4-11.
Population Density		
• Population density at the time of initial site approval and within about 5 years thereafter	Population density meets the guidance of RS-002, Section 2.1.3 for RG 4.7, Regulatory Position C.4 [Both units/groups]	• At the time of initial site approval and within about 5 years hereafter, the population densities, including weighted transient population, averaged over any radial distance out to 20 miles (cumulative population at a distance divided by the circular area at that distance), would not exceed 500 persons per square mile. • Refer to Section 2.5.1.5; Figure 2.5-13.
• Population density at the time of initial operation	Population density meets the guidance of RS-002, Section 2.1.3 [Both units/groups]	• The population densities, including weighted transient population, averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the area at that distance), would not exceed 500 persons per square mile at the time of initial operation. • Refer to Section 2.5.1.5; Figure 2.5-13.
• Population density over the lifetime of the new units until 2065	Population density meets the guidance of RS-002, Section 2.1.3 [Both units/groups]	• The population densities, including weighted transient population, averaged over any radial distance out to 30 miles (cumulative population at a distance divided by the area at that distance), would not exceed 1000 persons per square mile over the lifetime of new units. • Refer to Section 2.5.1.5; Figure 2.5-13.

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
Population Center Distance	10 CFR 100.21(b) Meets requirement [Both units/groups]	• The distance from the ESP plant parameter envelope to the nearest boundary of a densely populated center containing more than about 25,000 residents is not less than one and one-third times the distance from the ESP plant parameter envelope to the outer boundary of the LPZ. • Refer to Section 2.5.1.2.
Part 1 - Site Characteristics (continued)		
Exclusion Area Boundary (EAB)	10 CFR 100.21(a) Meets requirement [Both units/groups]	• The exclusion area boundary is the perimeter of a 5000-ft-radius circle from the center of the abandoned Unit 3 containment. • Refer to Sections 2.7.5, 2.7.6, 3.1.5, 4.1.1, 4.4.1.3, 5.1.1, 5.3.3.2.3, 5.3.4, 5.3.4.2, 5.4.1.3, 5.4.2.2, 5.5.1.3, 5.8.1.1, 5.8.1.2, 5.8.1.4, 5.8.3.1, 7.1.2, 7.1.4; Tables 2.7-10, 2.7-11, 2.7-14, 4.4-2, 7.1-1, 7.1-2, 7.1-4, 7.1-6, 7.1-8, 7.1-10, 7.1-11, 7.1-13, 7.1-15, 7.1-17, 7.1-19, 7.1-20, 7.1-22, 7.1-24, 7.1-26 & 7.1-28; Figures 1.1-1 & 2.1-2.
Low Population Zone (LPZ)	10 CFR 100.21(a) Meets requirement [Both units/groups]	• The LPZ is a 6-mile-radius circle centered at the Unit 1 containment building. • Refer to Sections 2.7.5, 2.7.6, 5.8.3.1, 7.1.2, 7.1.4; Tables 2.7-12, 7.1-1, 7.1-2, 7.1-4, 7.1-6, 7.1-8, 7.1-10, 7.1-11, 7.1-13, 7.1-15, 7.1-17, 7.1-19, 7.1-20, 7.1-22, 7.1-24, 7.1-26 & 7.1-28.
Part 2 - Design Parameters		
Structure Height	≤ 234 ft [Same for 2nd unit/group]	• The height from finished grade to the top of the tallest power block structure, excluding cooling towers • Item 1.1.1 of Table 3.1-1 • Refer to Sections 2.7.5, 3.1.2.2 & 6.4.1.1.
Structure Foundation Embedment	≤ 140 ft [Same for 2nd unit/group]	• The depth from finished grade to the bottom of the basemat for the most deeply embedded power block structure • Item 1.1.2 of Table 3.1-1 • Refer to Section 4.2.1.2.
Normal Plant Heat Sink		• Item 2 of Table 3.1-1
• Condenser / Heat Exchanger Duty	≤ 9.7 E9 Btu/hr [Additional 9.7 E9 Btu/hr for 2nd unit/group]	• Waste heat rejected from the main condenser and the auxiliary heat exchangers during normal plant operation at full station load • Item 2.2.2 of Table 3.1-1 • Refer to Sections 3.4.1.1, 3.4.1.3, 3.4.2.3, 5.3.2.1, 5.3.2.1.2.
• Unit 3 Once-Through Cooling		• Item 2.5 of Table 3.1-1

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
Cooling Water Flow Rate	1,140,000 gpm	• Total cooling water flow rate through the condenser at specified heat rejection rate and temperature rise of 18°F. • Item 2.5.2 of Table 3.1-1 • Refer to Sections 3.4.1.1, 3.4.2.1, 3.4.2.2, 5.2.1.1, 5.2.2.1.2, 5.3.1, 5.3.1.1, 5.3.1.1.2, 5.3.2.1.2 & 5.3.2.1.3; Table 3.3-1; Figure 3.3-1.
Part 2 - Design Parameters (continued)		
Heat Rejection Rate	≤ 9.7 E9 Btu/hr	• The expected maximum heat rejection rate to the WHTF, during normal operation at full station load • Item 2.5.5 of Table 3.1-1 • Refer to Sections 3.4.1.1, 3.4.1.3.1, 3.4.2.3, 5.3.2.1 & 5.3.2.1.2.
Cooling Water Discharge Temperature	113°F	• Site-specific bounding value based on a maximum inlet temperature of 95°F and a condenser temperature rise of 18°F at full flow condition • Item 2.5.1.1 of Table 3.1-1 • Refer to Sections 3.4.1.1, 3.4.2.2, 3.4.2.3, 5.2.2.1.2 & 5.3.2.1.2.
• Unit 4 Dry Cooling Towers		
Evaporation Rate	None or negligible (on the order of 1 gpm, average)	• The expected rate at which water is lost by evaporation from the cooling water system • Refer to Sections 1.1.4, 2.3.1.1, 3.1.5, 3.3.1, 3.4.1.1, 5.2.1, 5.2.2.1.2, 5.3.3.1 & 5.3.3.2.1; Table 3.3-2; Figure 3.3-2.
Height	≤ 150 ft	• The vertical height above finished grade of the cooling towers • Refer to Sections 3.1.2.2, 5.3.3.2.4 & 5.8.1.5.
Makeup Flow Rate	None or negligible (on the order of 1 gpm, average)	• The expected rate of removal of water from Lake Anna to replace evaporative water losses from the cooling water system • Refer to Sections 2.3.1.1, 2.3.3.1, 3.3.1, 3.4.1.1, 3.4.2.1, 5.2.1, 5.2.1.1, 5.2.1.4, 5.3.1, 5.3.1.1, 5.3.1.2.2 & 5.3.3.1; Table 3.3-2; Figure 3.3-2.
Noise	< 60 – 65 dbA at EAB	• Maximum expected sound level produced by operation of the cooling towers • Refer to Sections 3.1.5, 5.3.3.2.3, 5.3.4.2 & 5.8.1.2.
Heat Rejection Rate	≤ 9.7 E9 Btu/hr	• Waste heat rejected to the atmosphere from the cooling water system, during normal plant operation at full station load • Refer to Sections 3.4.1.1, 3.4.1.3.1 & 3.4.2.3.
Part 2 - Design Parameters (continued)		

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
Ultimate Heat Sink Mechanical Draft Cooling Towers		• Item 3 of Table 3.1-1 • Item 3.3 of Table 3.1-1
• Blowdown Constituents and Concentrations	Values in Table 3.1-1 [Same for 2nd unit/group]	• The maximum expected concentrations for anticipated constituents in the UHS blowdown to the WHTF • Item 3.3.3 of Table 3.1-1 • Refer to Section 5.5.1.1.
• Blowdown Flow Rate	144 gpm expected, 850 gpm maximum [288 gpm expected, 1700 gpm maximum]	• The normal expected and maximum flow rate of the blowdown stream from the UHS system to the WHTF • Item 3.3.4 of Table 3.1-1 • Refer to Sections 3.4.1.2, 3.4.2.2 & 5.3.2.1; Tables 3.3-1 & 3.3-2; Figures 3.3-1 & 3.3-2.
• Evaporation Rate	411 gpm normal, 850 gpm shutdown [822 gpm normal, 1700 gpm shutdown]	• The expected (and maximum) rate at which water is lost by evaporation from the UHS system • Item 3.3.7 of Table 3.1-1 • Refer to Section 3.4.1.2; Tables 3.3-1 & 3.3-2; Figures 3.3-1 & 3.3-2.
• Height	≤ 60 ft [Same for 2nd unit/group]	• The vertical height above finished grade of mechanical draft cooling towers associated with the UHS system. • Item 3.3.8 of Table 3.1-1 • Refer to Section 3.1.5.
• Maximum Consumption of Raw Water	850 gpm, nominal [1700 gpm]	• The expected maximum short-term consumptive use of water from Lake Anna by the UHS system (evaporation and drift losses) • Item 3.3.14 of Table 3.1-1 • Refer to Tables 3.3-1 & 3.3-2; Figures 3.3-1 & 3.3-2.
• Monthly Average Consumption of Raw Water	411 gpm [822 gpm]	• The expected normal operating consumption of water from Lake Anna by the UHS system (evaporation and drift losses) • Item 3.3.15 of Table 3.1-1 • Refer to Tables 3.3-1 & 3.3-2; Figures 3.3-1 & 3.3-2.
Release Point		
• Elevation	Ground Level	• The elevation above finished grade of the release point for routine operational and accident sequence releases • Item 9.4 of Table 3.1-1
Part 2 - Design Parameters (continued)		
Source Term		• Item 9.5 of Table 3.1-1
• Gaseous (Normal)	Values in Table 5.4-7 (maximum values) [Double values in Table 5.4-7]	• The annual activity, by isotope, contained in routine plant airborne effluent streams • Item 9.5.1 of Table 3.1-1 • Refer to Section 5.4.2.2; Table 5.4-7.

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
• Gaseous (Post-Accident)	Values in Section 7.1 tables (maximum values) [Same for 2nd unit/group]	• The activity, by isotope, contained in post-accident airborne effluents • Item 9.5.2 of Table 3.1-1 • Refer to Section 7.1.4; Tables 7.1-3, 7.1-5, 7.1-7, 7.1-9, 7.1-12, 7.1-14, 7.1-16, 7.1-18, 7.1-21, 7.1-23, 7.1-25 & 7.1-27.
• Tritium	3530 Ci/y [7060 Ci/yr] (maximum values)	• The annual activity of tritium contained in routine plant airborne effluent streams • Item 9.5.3 of Table 3.1-1 • Refer to Section 5.4.2.2; Table 5.4-7.
Liquid Radwaste System		• Item 10 of Table 3.1-1
• Release Point Dilution Factor	10 (minimum) [Same for 2nd unit/group]	• The ratio of liquid potentially radioactive effluent streams to liquid non-radioactive effluent streams from plant systems to the WHTF through the discharge canal used for NAPS Units 1 and 2 • Refer to Section 5.4.1.1; Table 5.4-1.
• Liquid	Values in Table 5.4-6 (maximum values) [Double the values in Table 5.4-6]	• The annual activity, by isotope, contained in routine plant liquid effluent streams • Item 10.3.1 of Table 3.1-1 • Refer to Section 5.4.2.1; Table 5.4-6.
• Tritium	≤ 3100 Ci/yr [≤ 6200 Ci/yr]	• The annual activity of tritium contained in routine plant liquid effluent streams • Item 10.3.2 of Table 3.1-1 • Refer to Section 5.4.2.1; Table 5.4-6.
Solid Radwaste System		• Item 11 of Table 3.1-1
• Activity	≤ 2700 Ci/yr [≤ 5400 Ci/yr]	• The annual activity contained in solid radioactive wastes generated during routine plant operations • Item 11.2.1 of Table 3.1-1 • Refer to Section 3.5.3.
• Volume	≤ 9041 cu ft/yr [≤ 18,646 cu ft/yr]	• The expected volume of solid radioactive wastes generated during routine plant operations • Item 11.2.2 of Table 3.1-1 • Refer to Section 3.5.3.
Part 2 - Design Parameters (continued)		
Plant Characteristics		• Item 16 of Table 3.1-1
• Acreage	Approximately 128.5 acres [Both units/groups]	• Approximate area on the NAPS site that would be affected on a long-term basis as a result of additional permanent facilities • Item 16.2 of Table 3.1-1 • Refer to Section 4.1.1.4.

Item	Single Unit/Group Value [Second Unit/Group Value]	Description and References
• Megawatts Thermal	≤ 4300 MWt [≤ 8600 MWt]	• The thermal power generated by one unit (may be the total of several modules) • Item 16.3 of Table 3.1-1 • Refer to Sections 1.1.3, 3.1.2.2, 3.2.1, 3.8.1 & 7.1.4; Table 3.8-1.
• Plant Population – Operation	Approximately 720 permanent employees [Both units/groups]	• Anticipated number of new employees that would be required for operation of the new units • Item 16.5.1 of Table 3.1-1 • Refer to Sections 2.5.2, 5.8.2 & 5.8.2.2.
• Plant Population – Refueling / Major Maintenance	Approximately 700–1,000 temporary workers during planned outages [Same for 2nd unit/group]	• Anticipated number of additional workers onsite during planned outages of the new units • Item 16.5.2 of Table 3.1-1 • Refer to Sections 2.5.2 & 5.8.2.1.2.
• Plant Population – Construction	5,000 people maximum [simultaneous construction]	• Peak workforce of 5,000 for construction of both new units/groups • Item 17.4.1 of Table 3.1-1 • Refer to Sections 2.5.2, 4.4.2, 4.4.2.2.1, 4.5.4, 5.8.2.2 & 5.8.2.2.2.
• Maximum Fuel Enrichment for Light-Water-Cooled Reactors	5% [Same for 2nd unit/group]	• Concentration of U-235 in fuel • Refer to Sections 3.2.1 & 3.8; Table 3.8-1.
• Maximum Fuel Burn-up for Light-Water-Cooled Reactors	62,000 MWd/MTU [Same for 2nd unit/group]	• The value derived by calculating the reactor thermal power multiplied by the time of irradiation divided by fuel mass (expressed as megawatt-days per metric ton of irradiated fuel) • Refer to Sections 3.2.1 & 3.8; Table 3.8-1.
• Maximum Fuel Enrichment for Gas-Cooled Reactors	19.8% [Same for 2nd unit/group]	• Concentration of U-235 in fuel • Refer to Sections 3.2.1 & 3.8; Table 3.8-2.
• Maximum Fuel Burn-up for Gas-Cooled Reactors	133,000 MWd/MTU [Same for 2nd unit/group]	• The value derived by calculating the reactor thermal power multiplied by the time of irradiation divided by fuel mass (expressed as megawatt-days per metric ton of irradiated fuel) • Refer to Sections 3.2.1 & 3.8; Table 3.8-2.