North Anna 3 Combined License Application

Part 2: Final Safety Analysis Report

Revision 5

March 2012

REVISION SUMMARY

Revision 5

Section	Changes	Reason for Change
1.1, 1.4.1, 2.1.1.2, 2.1.2.1	ODEC terminated its ownership interest in North Anna Unit 3.	Revised to reflect change in ODEC ownershiip interest in North Anna Unit 3.
1.1	Inserted "and" in "Virginia Electric and Power Company."	Revised to correct name
Tables 2.2-204 & 6.4-201	See RAI 06.04-6, Onsite Hazards Analysis Calculation	
Tables 11.2-2R & 12.2-73R	See RAI 12.02-14, Degasifier Impact on Radwaste Systems	
11AA.1.2; Table 11.3-202	See RAI 14.03.08-1, IRSF ITAAC	
11AA.3.1	See RAI 12.03-12.04-26, High Integrity Container (HIC) Stacking	
11AA.3.1, 11AA.4.7	See RAI 12.03-12.04-29, Temperature Impact on IRSF Components	
11AA.3.4; Table 12.5-201	See RAI 12.03-12.04-24, Interim Radwaste Storage Facility (IRSF) Physical Barriers	
11AA.3.4, 12.2.3, 12.4.1.7; Table 11AA-208; Figure 11AA-202	See RAI 12.03-12.04-31, Occupational Radiation Exposure for the IRSF	
11AA.4.2	See RAI 12.03-12.04-25, IRSF Drainage Pipes	
12.2.1.1.3; Table 12.2-1R	See RAI 12.02-16, Degasifier Gaseous Source Terms	
12.3.1.1.1.2	See RAI 12.03-12.04-34, BD Sump Occupational Radiation Exposure	
Figure 12.3-1R	See RAI 12.03-12.04-33, BD Sump Radiation Zone	
12.4.1.9	See RAI 12.03-12.04-22, Construction Worker Dose Assessment	
14.2.12.1.119, 14.2.13; Tables 14.2-1R & 14A-201	See RAI 14.02-14, IRSF Testing	
Table 17.4-201	See RAI 19.05, Phase II D-RAP Table	

Revision 4

Section	Change	Reason for Change
1.1	Updated DCD revision number.	DCD R3
1.1.5	Changed estimated Construction and Operation schedule dates.	Updated schedule
1.1.6.1	Added explanations of STD CDI and NAPS CDI notations.	R-COLA R2
1.2.1.5.4.4	Changed LMN from "STD*" to "STD."	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
1.2.1.6	Changed LMN from “STD**” to “STD”; added “NAPS CDI.”	R-COLA R2
1.2.1.7.1	Changed LMNs “STD**” and “STD*” to “STD”; changed figure number.	R-COLA R2, correction
	Added statement that elevations are based on NAVD88.	Editorial
1.2.1.7.2.3	Changed LMN from “NAPS DEP 9.5(1)” to “NAPS SUP 1.2(3).”	DEP 9.5(1) deleted
1.2.1.7.2.9	Corrected NRC paper from “SECY 94-98” to “SECY-94-198.”	Editorial
1.2.2	Changed LMN from “STD**” to “STD.”	R-COLA R2
Figure 1.2-1R (Sheets 1 and 2)	Increased the size of the Electrical Room and relocated the Start-up Steam Generator Blowdown Equipment.	DCD R3
	Added note regarding security features.	Consistency with Section 13.6
	Added “NAPS CDI.”	DCD R3
Figure 1.2-2R	Updated layout, corrected elevation in title, and deleted LMN “NAPS DEP 10.2(1).”	DCD R3 and DEP 10.2(1) scope change
	Added “STD CDI.”	DCD R3
Figures 1.2-2R, 1.2-4R, 1.2-6R, 1.2-8R thru 1.2-13R, 1.2-39R thru 1.2-46R	Updated.	Consistency with DCD R3
Figures 1.2-4R, 1.2-6R, 1.2-8R thru 1.2-12R, 1.2-40R thru 1.2-48R	Updated layout deleted LMN “NAPS DEP 10.2(1).”	DCD R3 and DEP 10.2(1) scope change
Figure 1.2-12R	Added “NAPS CDI.”	DCD R3
Figures 1.2-13R, 1.2-29R & 1.2-201	Updated layout.	DCD R3
Figure 1.2-31R	Updated layout.	Consistency with DCD R3, change from Reactor Coolant Drain Demin to Degasifier Feed Demin, and change from Reactor Coolant Drain Filter to Degasifier Feed Filter

Revision 4 *(continued)*

Section	Change	Reason for Change
1.4.1, 1.4.2.3	Deleted MHI responsibility for standard plant design and added MNES responsibility for COLA support.	Editorial clarification
1.6, 1.7	Changed LMN “STD*” to “STD.”	R-COLA R2
Table 1.7-202	Added Figures 9.2.2-1R, 9.3.4-1R Sheets 4–7; corrected figure numbers 9.2.5-1R & 10.4.11-1R; corrected figure titles.	DCD R3 and editorial
1.8, 1.8.1.1	Changed LMNs “STD**” and “STD*” to “STD.” Changed text.	R-COLA R2
1.8.1.4	Changed LMN from “STD**” to “STD”; changed “Chapter 2” to “Chapter 2.0.”	R-COLA R2
1.8.2	Changed LMNs “STD**” and “STD*” to “STD.”	R-COLA R2
Table 1.8-1R	Conformed to DCD R3 and R-COLA R2.	New CDI in DCD R3 and R-COLA R2
	For the UHS system, added reference to DCD Chapter 16 and COLA Part 4, Section 3.7.9.	New CDI in DCD R3
Table 1.8-201	Changed COL items throughout.	DCD R3
Table 1.8-202	Deleted information on NAPS DEP 02.3(1) and NAPS DEP 09.5(1). Added information on new NAPS DEP 03.5(1) and 03.7(5). Corrected FSAR section references.	DCD R3
Table 1.8-203	Added NAPS ESP VAR 2.3-1; changed titles, changed FSAR section references; corrected subject of NAPS ESP VAR 2.4-4. Corrected FSAR section references.	Change in Part 7 Variance status and consistency with Part 7, and FSAR sections.
Table 1.8-204	Editorial.	Editorial
1.9	Editorial.	Editorial
Table 1.9-201	Updated SRP conformance evaluation for Section 15.4.4–15.4.5.	Align with DCD R3
Table 1.9-202	Updated Regulatory Guide conformance evaluations.	Align with DCD R3 and R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
Table 2.0-201	Changed χ/Q values, subsurface stability parameters, meteorology parameters, and footnotes in DCD R3.	DCD R3 and ESP correction
	Deleted “NAPS DEP 3.7(1)” for Maximum Groundwater Level.	DCD R3
	Changed EAB atmospheric dispersion factor evaluation.	Consistency with RAI MET-1 response
Figure 2.0-205	Changed electrical room dimensions.	DCD R3
2.1, 2.1.4	Changed “STD**” to “STD.”	R-COLA R2
2.1.2.1	Changed “for the all” to “for all of the.”	Editorial
Figure 2.1-201	Changed electrical room dimensions.	DCD R3
2.2.3.1.1	Corrected n value subscripts.	Editorial
2.2.3.1.3	Changed “fifteen” to “seventeen.”	New chemicals were identified during site separation activities
Tables 2.2-202 & 2.2-203	Added chemicals screened in revised chemical hazards calculation.	New chemicals were identified during site separation activities
Table 2.2-203	Changed hydrogen vapor pressure.	Correction
Table 2.2-204	Corrected “NACLO” to “NALCO.”	Editorial
	Added chemicals screened in revised chemical hazards calculation.	New chemicals were identified during site separation activities
2.3.1.2	See RAI 02.03.01-6, 100-year return period minimum dry bulb temperature	
2.3.1.3.2 & 19.1.5; Tables 1.8-203, 2.0-201, 2.3-219, 19.1-202 & 19.1-205	See RAI 02.03.01-5, Tornado Site Characteristic Values	
2.3.4.3; Tables 1.8-202, 2.0-201, 2.3-1R, 2.3-217 & 2.3-218	See RAI 02.03.04-2 S1 R1, Deleted Departure 2.3(1)	
2.3.5.1	Added that no milk cows or goats are within 5 miles of NAPS.	Provide more complete list of inputs for χ/Q analyses
	Added reference to Table 2.3-15R for EAB distances and identified US-APWR cross sectional area.	Provide source of EAB χ/Q values and US-APWR cross section

Revision 4 *(continued)*

Section	Change	Reason for Change
2.3.5.1, 11.2.3.1, 11.3.3.1; Tables 2.0-201, 2.3-16R, 11.2-12R, 11.3-6R & 11.3-7R	See RAI 11.03-4, Annual Gaseous Effluent Releases	
2.3.6	Changed “resolved” to addressed.”	Editorial
Table 2.3-1R	Changed “m^3” to “m^2.”	Editorial
Table 2.3-15R	Changed to reflect Unit 3 and ESP Application SSAR values.	Revert to ESPA SSAR EAB distances for consistency with the ESPA
Table 2.3-16R	Changed to reflect replacement of values from the ESP Application.	Revert to ESPA SSAR EAB distances for consistency with the ESPA
Table 2.3-17R	Changed “6.9B1E-07” and “2.4B7E-08” to 6.981E-07” and 2.487E-08.”	Editorial corrections
	Changed to reflect replacement of values from the ESP Application.	Revert to ESPA SSAR EAB distances for consistency with the ESPA
Table 2.3-216	Changed “(1/40)” to “(1/1940).”	Editorial correction
2.4, 2.4.3	Updated title of Section 2.4.3.	DCD R3
2.4.2.2, 2.4.3, 2.4.10; Table 19.1-205	See RAI 02.04.02-8, Design Basis Flood Level	
2.4.2.3	Added supercritical flow area outside the PA in the plant north-east side of the site and to reference new Figure 2.4-221 showing supercritical flow and hydraulic jump locations.	Response to RAI 02.04.02-9
2.4.10	Provided clarity to discern which flood level is being referenced.	Editorial
2.4.12.3	Provided consistency with words in the Virginia Well Regulations.	Editorial
2.4.12.4, Reference 2.4-209	Updated the program name to be consistent with the software name.	Editorial
2.4.13, 2.4.13.4, 11.2.3.2; Tables 2.0-201, 2.4-206, 2.4-206a, & 11.2-16R	See RAI 11.02-6, Failed Liquid Tank Assessment	
2.4.15	Updated COL item 2.4(1).	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
Table 2.4-17R	Changed Note c. from Reference “2.4-203” to “2.4-207.”	Editorial
Figures 2.4-201, 2.4-203, 2.4-206 thru 2.4-215, & 2.4-219	Increased the size of the Electrical Room and relocated the Start-up Steam Generator Blowdown Equipment.	DCD R3
Figure 2.4-221	Added supercritical flow and hydraulic jump locations.	Response to RAI 02.04.02-9
2.5.2, 2.5.2.5, 2.5.2.6.7, 3.7, 3.7.1, 3.7.2.4.1, 3.7(6), 3.7(20), 3OO, 3OO.1.1, 3OO.1.2, 3OO.1.3; Tables 1.8-201, 1.8-202, 1.8-203, 1.9-202, 2.0-201, 2.0-202, 2.0-203, 2.5-201; Figures 2.0-206, 2.0-207, 2.5-202a thru 2.5-202j, 3.7-203, 3.7-204	See RAI 02.05.02-1, Justify GMRS Determination and Describe Site Response Analysis	
2.5.2.6.7	See RAI 02.05.02-3, Site Subsurface Variability	
2.5.2.6.7; Figure 2.5-53R	Replaced “SSAR Figure 2.5-53” with “Figure 2.5-53.” Added Figure 2.5-53R.	Correct the mean 10^{-4} data
2.5.2.6.7	Added departure LMNs for NAPS DEP 3.7(5).	Identify specific content that departs from DCD R3 regarding RG 1.165
2.5.4.2.5	See RAI 02.05.04-22, Concrete Fill Thermal Cracking Prevention	
2.5.4.2.5, 2.5.4.5.3, 2.5.4.7.1; Table 2.5-212	See RAI 02.05.04-25, Concrete Fill Shear Wave Velocity	
2.5.4.2.b, Structural Backfill	Changed “sound rock available from the excavation” to “on-site sources.” Specified the gradation of crushed rock used for structural backfill.	Clarification
2.5.4.5.3	Added a description regarding the use of Zone III material beneath the ESWPTs or the UHSRS. Added description of use of crushed Zone III rock for structural backfill.	Clarify use of Zone III material
2.5.4.7.1	Changed requirement from “3 to 4 ft” to “3 ft.”	Clarify minimum required concrete fill thickness
2.5.4.10.3, 3.7.2.4.1, 3.7.2.8, 3NN.6; Figure 3NN-22	See RAI 02.05.04-24, Total Lateral Earth Pressure Comparison	

Revision 4 *(continued)*

Section	Change	Reason for Change
Table 2.5-212	Changed "g" to "γ" for Total unit weight.	Editorial
Table 2.5-213	Changed the T/B Base of Foundation elevation and depth and the Concrete Fill thickness for the Avg. Stratum Bottom Elevation.	Editorial
Table 2.5-215	Changed "Ration" to "Ration."	Editorial
Figures 2.5-209 thru 2.5-214, 2.5-221 & 2.5-222	Changed electrical room and relocated Start-up Steam Generator Blowdown Equipment.	Site Plan changes
Figures 2.5-229 thru 2.5-233, & 2.5-255	Changed the T/Bs foundation bottom elevation and the top of tunnel elevation.	Reflect T/B foundation elevation change and correct minor elevation depictions
Figures 2.5-229, 2.5-231, 2.5-232 & 2.5-234	Added clarifying note to each figure.	Clarify minimum required concrete fill thickness
Figure 2.5-241b	Changed "Zone III" to "Concrete Fill."	Editorial
Figures 2.5-241c & 2.5-241d	Changed concrete layer properties from soil to concrete.	Align with supporting analysis
3.1.4.16.1	Added "third" to action statement.	R-COLA R2
3.2.1.2	Added description regarding codes and standards applicable to site-specific SSCs.	R-COLA R2
3.2.2.5	Added section.	DCD R3
3.2.3	Added "and 3.2-203" for COL item 3.2(4) and added COL item 3.2(6).	DCD R3
Table 3.2-201	Added COL item 3.2(6) and classifications for new site-specific components.	DCD R3 and R-COLA R2
Table 3.2-203	Added codes and standards applicable to site-specific SSCs.	R-COLA R2
3.3.1.2	Changed "STD**" to "NAPS"; Added description regarding acceptability of using method 2 of ASCE/SEI 7-05 for the wind load design of the UHSRS.	R-COLA R2
3.3.2.2.2	Added detail regarding venting of the pump houses and transfer pump rooms.	R-COLA R2
3.3.2.3	Changed "STD*" to "STD."	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
3.3.3	Changed "STD*" to "STD" for COL item 3.3(3) and "STD**" to "NAPS" for COL item 3.3(4).	R-COLA R2
3.4.1.2	Changed "STD**" and "STD*" to "STD."	R-COLA R2
3.4.1.3, 3.4.3, 9.4.5.3.6; Figures 3.8-208 & 3.8-209	See RAI 09.04.05-4, Barrier Between ESW Pump and UHS Transfer Pump Rooms	
3.4.1.3	Changed action statement, changed "NAPS COL 3.4(3)" to "STD COL 3.4(7)" and split paragraph added by RAI 09.05.04-4.	R-COLA R2
3.4.1.4	Changed "STD*" to "STD"; changed "Chapter 2" to "Section 2.4."	R-COLA R2
3.4.2	Changed "STD*" to "STD."	R-COLA R2
3.4.3	Changed "STD*" and "STD** to "STD"; added COL item 3.4(7).	R-COLA R2
3.5.1.1.2	Added supplemental text addressing internally generated missiles in the UHS ESW pump house. Added LMN "STD* SUP 3.5(2).	R-COLA R2
3.5.1.1.4	Changed LMN from "STD** COL 3.5(1)" to "STD COL 3.5(1)."	R-COLA R2
3.5.1.3.1	Changed LMN from "NAPS DEP 9.5(1)" to NAPS DEP 3.5(1)" and changed the Unit 3 turbine geometry to a favorable orientation.	Changes made by NAPS DEP 3.5(1)
3.5.1.3.2	Changed the LMN from "NAPS DEP 9.5(1)" to "NAPS DEP 3.5(1)" in two places and changed the Unit 3 turbine geometry to favorable orientation and changed the impact on the risk rate calculation.	Changes made by NAPS DEP 3.5(1)
3.5.1.3.2	Changed "Reference 3.5-18R" to "DCD Reference 3.5-18," which is incorporated by reference.	DCD R3
3.5.1.3.2, 3.5-17R, 10.2-9R; Table 19.1-205	See RAI 10.02.03-1, Turbine and Turbine Generator Models	
3.5.1.6	See RAI 03.05.01.06-1, Aircraft Impact Probability	

Revision 4 *(continued)*

Section	Change	Reason for Change
3.5.4	Changed COL Item 3.5(1) LMN from "STD** COL 3.5(1)" to "STD COL 3.5(1)."	R-COLA R2
3.5.5	Deleted Reference 3.5-18R.	DCD R3
3.6.1.3, 3.6.2.1, 3.6.4	Changed "NAPS" to "STD" in LMN.	R-COLA R2
3.6.3.3.1, 3.6(10)	Added section to address water hammer procedures.	New COL item 3.6(10) in DCD R3
3.7	Added "NAPS DEP 3.7(5)" and additional sentence to paragraph.	DCD R3
3.7.1.1	Added description of probabilistic seismic hazards analysis basis. Added LMN NAPS DEP 3.7(4) and removed changes to text now incorporated by reference.	NAPS DEP 3.7(5) and DCD R3
	Deleted portion of statement that site-specific analyses considered cumulative absolute velocity of seismic input motion.	Editorial
3.7.1.2	Deleted entries associated with NAPS DEP 3.7(3).	DCD R3
3.7.1.3	Changed to be consistent with COL Item 3.7(7); added reference to Table 2.5-214; added LMN NAPS DEP 3.7(4) and removed changes to text now incorporated by reference.	DCD R3
3.7.2	Deleted entries associated with NAPS DEP 3.7(3).	DCD R3
3.7.2.1	Deleted entries associated with NAPS DEP 3.7(3).	DCD R3
3.7.2.2	Deleted entries associated with NAPS DEP 3.7(3); added "NAPS DEP 3.7(4)"; changed reference to "3.7-201" to "3.7-47R" and reference to "3.7-202" to "3.7-48R."	DCD R3
3.7.2.3.1	Deleted entries associated with NAPS DEP 3.7(3); changed references to "3.7-17R" to "3.7-17";	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
3.7.2.3.2	Deleted entries associated with NAPS DEP 3.7(3); added “NAPS DEP 3.7(4)”; changed reference to “3.7-18” to “3.7-204” and reference to “3.7-201” to “3.7-47R”; added action statement for last sentence of DCD Subsection 3.7.2.3.2.	DCD R3
3.7.2.3.3	Deleted entries associated with NAPS DEP 3.7(3); added “NAPS DEP 3.7(4)”; deleted “first and” in the action statement; changed reference to “3.7-201” to “3.7-47R” and reference to “3.7-202” to “3.7-48R”; added action statement for last sentence of DCD Subsection 3.7.2.3.2.	DCD R3
3.7.2.3.4	Added section.	DCD R3
3.7.2.3.6.1	Deleted content now in DCD; added NAPS DEP 3.7(4); changed reference to “3.7-201” to “3.7-47R” and reference to “3.7-202” to “3.7-48R.”	
3.7.2.3.10	Deleted.	DCD R3
3.7.2.4	Deleted entries associated with NAPS DEP 3.7(3); added “NAPS DEP 3.7(4)”; added “the last sentence of” to the remaining action statement; changed reference to “3.7-201” to “3.7-47R.”	DCD R3
3.7.2.4.1	Changed Reference “3.7-17R” to “3.7-17”; added “NAPS DEP 3.7(4)”; inserted hyphen in “P-Wave.”	DCD R3 and editorial
	Deleted details of rock formations and reference to SSAR; added reference to Section 2.5.4 for detailed description.	Editorial
3.7.2.5	Deleted content now in DCD; added “NAPS DEP 3.7(4)”; added “the third sentence of” to the action statement; changed reference to “3.7-201” to “3.7-47R” and reference to “3.7-202” to “3.7-48R.”	DCD R3
3.7.2.6, 3.7.2.7	Deleted.	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
3.7.2.8	Changed “NAPS COL 3.7(9)” to “STD COL 3.7(9)”; changed “category” to “Category.”	R-COLA R2
	Deleted details of rock formations; added reference to Section 2.5.4 for detailed description.	Editorial
3.7.2.8.6	Deleted entries associated with NAPS DEP 3.7(3); added “NAPS DEP 3.7(4)”; changed reference to “3.7-201” to “3.7-47R” and reference to “3.7-202” to “3.7-48R.”	DCD R3
3.7.2.9, 3.7.2.12	Deleted.	DCD R3
3.7.3.9	Deleted “NAPS DEP 9.5(1).”	Incorporate revision to DEP 9.5(1)
3.7.4.1	Changed “second” to “first” in the action statement for the fifth paragraph of DCD Subsection 3.7.4.1.	DCD R3
3.7.4.2	Changed the action statement.	DCD R3
3.7.4.4	Added section.	DCD R3 and R-COLA R2
3.7.5	Changed title of COL item 3.7(7); changed “NAPS” to “STD” for COL item 3.7(9); changed title, LMN, and referenced sections for COL item 3.7(16); changed title of COL item 3.7(7).	DCD R3 and R-COLA R2
3.7.6	Added “NAPS DEP 3.7(4)”; deleted entries associated with NAPS DEP 3.7(3); deleted 3.17R; changed “3.7-201” to “3.7-47R” and added “NAPS DEP 3.7(4); changed “3.7-202” to “3.7-48R” and added “NAPS DEP 3.7(4)”; added references 3.7-203 and 3.7-204.	DCD R3
	Added references 3.7-203 and 3.7-204.	NAPS DEP 3.7(4)
Table 3.7.1-3R	Deleted LMN NAPS DEP 3.7(3).	Departure deleted
Tables 3.7.1-4R, 3.7.1-5R, & 3.7-203	Deleted.	NAPS DEP 3.7(3) deleted
Table 3.7.2-1R	Deleted “NAPS DEP 3.7(3)” and added “NAPS DEP 3.7(4)”; changed reference to “3.7-201” to “3.7-47R” and reference to “3.7-202” to “3.7-48R.”	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
3.8.1.4, 3.8.1.4.1.1	Deleted.	DCD R3
3.8.1.6	Changed “STD**” and “STD*” to “STD”; incorporated R-COLA text.	R-COLA R2
3.8.1.7	Changed to align with STD COL 3.8(14).	R-COLA R2
3.8.4.1.3	Deleted change to first paragraph. Added standard text from R-COLA.	DCD R3 and R-COLA R2
3.8.4.1.3.2	Added standard text regarding expansion/separation joint characteristics.	R-COLA R2
3.8.4.1.3.3	Deleted “NAPS DEP 9.5(1).”	DCD R3
3.8.4.3.4.2	Changed “NAPS COL 3.8(20)” to “NAPS COL 3.8(25).”	R-COLA R2
3.8.4.3.7.1	Changed “STD*” to “STD.”	R-COLA R2
3.8.4.4.1	Deleted.	DCD R3
3.8.4.4.2	Deleted change to third paragraph.	DCD R3
3.8.4.4.3	Added “NAPS COL 3.8(30).”	DCD R3
3.8.4.4.3.1	See RAI 03.08.04-6, ESWPT Soil Embedment	
3.8.4.4.3.1, 3.8.4.4.3.2, 3.8.4.4.3.3	See RAI 03.08.04-12, PSFSV Design Code	
3.8.4.4.3.2	Added reference to Subsection 3.8.5.5.2.	DCD R3
3.8.4.4.3.3	See RAI 03.08.04-13, PSFSV Seismic Loads	
3.8.4.6.1.1	Added “at least.”	Clarify concrete strength requirements
3.8.4.7	Adopted R-COLA text and changed “STD**” to “STD.”	R-COLA R2
3.8.5.1	Changed “STD**” to “STD.”	R-COLA R2
3.8.5.1.2	Added change to last sentence of first paragraph.	DCD R3
3.8.5.4.1	Deleted.	DCD R3
3.8.5.4.3	Changed LMN, action statement, and text to agree with DCD and added clarification regarding FE model.	DCD R3
3.8.5.4.4	Changed “STD**” to “STD” and changed text to be consistent with COL item.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
3.8.5.5.1	Deleted.	NAPS DEP 3.7(1)
3.8.5.5.2	Added to address COL item 3.8(30).	DCD R3
3.8.6	Changed “STD**” and “STD*” to “STD”; revised title for COL item 3.8(25); added COL item 3.8(30).	DCD R3 and R-COLA R2
3.8.7	Deleted References 3.8-202 thru 3.8-204.	Editorial
Table 3.8.5-3	Deleted action to delete this table.	DCD R3
Table 3.8-202	See RAI 03.08.05-2, Allowable Bearing Capacities	
Table 3.8-203	See RAI 03.08.05-3, Sliding Factor of Safety	
Figure 3.8-201	Clarified expansion joint and Segment #2 locations.	Editorial
3.9.2.1	Deleted.	DCD R3
3.9.3.3.1	Changed “STD*” to “STD.”	R-COLA R2
3.9.3.4.2.5	Deleted “that.”	Editorial
3.9.6.2	Changed “STD*” to “STD.” Changed “frequency is” to frequencies are.”	R-COLA R2
3.9.6.3	Editorial.	R-COLA R2
3.9.6.4	Changed “STD” to “NAPS.” Added “12 months before initial fuel load.”	Clarified that current Code addenda specify 12 months for snubbers.
3.9.9	Changed “STD” to “NAPS” for COL Item 3.9(6)) and “STD*” to “STD” for COL Items 3.9(10) and 3.9(11).”	DCD R3
Table 3.9-201	Changed Normal and Post LOCA status of the transfer pumps and added clarifying notes.	R-COLA R2
Table 3.9-202	Updated tag numbers and corrected the ASME edition and table number of ASME acceptance criteria for UHS Water Transfer Pumps.	R-COLA R2
Table 3.9-203	Added valve type for MOVs UHS-MOV-503A-D and 506A-D. Changed tag numbers for EWS-HCV-2000-2003 to 010-013 and added valve types.	R-COLA R2
	See RAI 03.09.06-7, Basis for Deferral of Exercise Testing	

Revision 4 *(continued)*

Section	Change	Reason for Change
3.10	Changed scope of applicability of equipment qualification records requirements and editorial changes.	R-COLA R2
3.10.2	Editorial and changed IEEE 344 from "1987" to "2004."	R-COLA R2
3.10.4.1	Editorial and changed LMN from "STD**" to "STD."	R-COLA R2
3.10.5	Changed COL Item 3.10(1) LMN from "STD**" to "STD."	R-COLA R2
3.11.1.1	Clarified the use of term "important to safety"; added that DCD provisions for environmental qualification apply to plant-specific systems; changed LMN from "STD**" to "STD."	R-COLA R2
3.11.1.2	Changed method of documenting EQ parameters for plant-specific equipment; changed LMN from "STD*" to "STD."	R-COLA R2
3.11.3	Deleted "site-specific" and clarified that documentation for qualification of safety-related and nonsafety-related equipment is the responsibility of the Licensee. Change LMN from "STD**" to "STD."	R-COLA R2
3.11.4	Added reference to TR MUAP-08015 and changed LMN from "STD*" to "STD."	R-COLA R2
3.11.5, 3.11.6	Added reference to Technical Report MUAP-08015 and changed LMN from "STD*" to "STD."	R-COLA R2
3.11.7	Changed LMNs for COL Items 3.11(2) and 3.11(5) from "STD**" to STD"; Changed LMNs for COL Items 3.11(6) thru 3.11(9) from "STD*" to "STD"; added LMNs "NAPS COL 3.11(5)" for COL Item 3.11(5) and "NAPS COL 3.11(8)" for COL Item 3.11(8).	R-COLA R2
3.12.5.6	See RAI 03.12-1, High Frequency Modes	
3C	Revised action statement.	DCD R3
3C.1, 3C.5	Deleted.	DCD R3
3D.1.6	Added.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
Table 3D-201	See RAI 03.11-9, Site-Specific EQ Equipment List	
	Changed and added site-specific equipment information.	DCD R3
3E	Revised action statement and deleted text.	DCD R3
3H.1	Changed “NAPS DEP 3.7(3)” to “NAPS DEP 3.7(4)” and replaced text for first paragraph. Deleted change to second paragraph.	NAPS DEP 3.7(4)
3H.2, 3H.3	Deleted.	NAPS DEP 3.7(4)
3H.4	Added.	NAPS DEP 3.7(4)
Tables 3H.2-2R thru 3H.2-8R; Figure 3H.2-1R	Deleted.	DCD R3
3I.1	Changed “NAPS DEP 3.7(3)” to “NAPS DEP 3.7(4)” and changed “Reference 3I-201” to “Reference 3I-1R.”	DCD R3 and NAPS DEP 3.7(4)
3I.2	Changed “NAPS DEP 3.7(3)” to “NAPS DEP 3.7(4)”; changed action statement; and changed “3I-201” to “3I-1R.”	DCD R3 and NAPS DEP 3.7(4)
3LL	Deleted duplicate heading.	Editorial
3NN.1	Changed “NAPS DEP 3.7(3)” to “NAPS DEP 3.7(4).”	NAPS DEP 3.7(4)
3NN.2, 3NN.6, 3NN-3, 3NN-9	See RAI 03.07.02-3, SSI Analysis for Standard Plant Structures	
3NN.2	Deleted details of rock formations; added reference to Section 2.5.4 for detailed description.	Editorial
3NN.6	Changed “has” to “have.”	Editorial
Figure 3NN-22	Added Note 4.	RAI 02.05.02-24
5.2.1.1	Changed LMN “STD**” to “STD.” Added “in DCD Subsection 5.2.1.1” in action statement. Added citations to Table 5.2.1-1 and DCD Reference 3.9-13.	R-COLA R2
5.2.1.2	Changed LMNs “STD**” to “STD.”	R-COLA R2
5.2.3.2.1	Changed commitment for the basis of the Reactor Coolant Chemistry Program.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
5.2.4.1	Added a detailed description of the boric acid corrosion control program.	R-COLA R2
5.2.5.9	Added a detailed description of the guidance for operating procedures to address leakage.	R-COLA R2
5.2.6	Changed “STD**” LMAs to “STD.”	R-COLA R2
5.2.6	Deleted “COL” prefix from COL item numbers.	Editorial
5.3.1.6.1	Changed “STD**” and “STD*” LMAs to “STD.”	R-COLA R2
	Clarified the description of the use of standby surveillance capsules.	R-COLA R2
5.3.1.6.3	Changed “STD*” LMN to “STD.”	R-COLA R2
5.3.2.3, 5.3.2.4, 5.3.3.7, 5.3.4	Changed “STD**” and “STD*” LMNs to “STD.”	R-COLA R2
5.3.4	Deleted “COL” prefix from COL item numbers.	Editorial
6.1.2	Added number to title.	Clarify title
6.2.2.3	Corrected action statement. Added additional requirements for the containment cleanliness program.	R-COLA R2
Tables 6.2.2-2R (Sheets 6 & 13)	Revised table sheet reference number; no changes in the table.	DCD R3 table repagination
6.4.3, 6.4.4.2	See RAI 06.04-3, Operator actions upon sensing toxic chemicals/asphyxiates	
6.4.3	See RAI 06.04-4, Compliance with regulatory requirements and required operator actions during a toxic gas release	
	Changed “STD COL 6.4(2)” to “NAPS COL 6.4(2).”	Markups for responses to RAI 5669 Q06.04-3 and Q06.04-4 created Unit 3-specific content.
	Deleted “against toxic gas release event.”	To be consistent with the response to RAI 5669 Q06.04-3
6.4.4.2	See RAI 06.04-1, Onsite and offsite surveys of stationary and mobile sources of hazardous chemicals	

Revision 4 *(continued)*

Section	Change	Reason for Change
6.4.4.2; Tables 2.2-202, 2.2-203 & 6.4-201	See RAI 06.04-5, RG 1.78 evaluation in FSAR of refrigerants to be used at Unit 3	
6.4.6	Changed “STD** COL 6.4(5)” to “STD COL 6.4(5)”	Reflect R-COLA change
6.4.7	Changed COL 6.4(2) from STD to NAPS.	Reflect site-specific content
	Changed COL 6.4(5) from STD** to STD.	Reflect R-COLA changes
Table 6.4-201	Added citation to footnote 11 for all asphyxiants	To be consistent with the response to RAI 5669 Q06.04-5
	Added footnote 13 for hydrazine solutions.	To provide consistent level of detail
6.6.1	Deleted.	Addressed in DCD R3
7.4.1.2.2	Inserted “degasifier.”	Editorial
7.4.1.6	Changed “STD*” to “STD.”	R-COLA R2
7.4.4	Deleted “STD* COL 7.4(1)” for COL 7.4(1).	R-COLA R2
Table 7.4-202	Changed “STD*” to “STD.”	R-COLA R2
7.5.1.1	Changed “STD*” to “STD.”	R-COLA R2
7.5.4	Changed “STD*” to “STD” for COL item 7.5(1).	R-COLA R2
7.9.2.6	Replaced NAPS SUP 7.9(1) with treatment of new COL item 7.9(1).	DCD R3
7.9.4	Added COL item 7.9(1).	DCD R3
8.2.1.2	Added description of the iso-phase bus duct current rating, changed LMN “STD*” to “STD,” and clarified description regarding cables in underground duct bank.	R-COLA R2 and clarify site-specific design
8.2.1.2.1, 8.2-210, 8.2-211	See RAI 08.02-49, Switchyard Support Systems	
8.2.1.2.1, 8.2.2.1, 8.2-214; Table 1.9-202	See RAI 08.02-45, Switchyard Grounding and Lightning Protection	
8.2.1.2.1	See RAI 08.02-63, Switchyard Support System follow-up question	
8.2.1.2.2	Editorial.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
8.2.1.2.2, 8.2-207, 8.2-208, 8.2-209	See RAI 08.02-46, NERC Standards	
8.2.1.2.3	See RAI 08.02-40, Technical Specifications	
8.2.1.2.3, 8.2-212, 8.2-213	See RAI 08.02-41, Switchyard Interface Agreement	
8.2.1.2.3	See RAI 08.02-43, Switchyard Equipment Ratings	
8.2.2.2, 8.2-201	See RAI 08.02-42, GDC 5 Compliance See RAI 08.02-43, Switchyard Equipment Ratings See RAI 08.02-50, Adequate Power to RCPs After Trip See RAI 08.02-52, Grid Reliability and Stability Analysis See RAI 08.02-55, Switchyard Frequency Variations	
8.2.2.2	See RAI 08.02-63, Switchyard Support System follow-up question	
8.2.2.3.3	See RAI 08.02-51, Switchyard Protection Schemes	
8.2.2.3.3, 8.4, 8.4.1.4	See RAI 08.02-57, FMEA of Switchyard Components	
8.2.3	Changed LMN “STD*” to “STD.” Changed description of stability analysis.	R-COLA R2
8.2.4	Added STD* LMNs to COL Items 8.2(4) and 8.2(5). Changed LMNs “STD*” to “STD” for COL Items 8.2(10) and 8.2(11); updated section and figure references for COL items 8.2(3), 8.2(4) and 8.2(5).	R-COLA R2
Figure 8.2-201	Added “Bus 1” and “Bus 2” labels.	Editorial
Figure 8.2-202	Increased size of Electrical Room and relocated the Start-up Steam Generator Blowdown Equipment.	DCD R3
8.3.1.1.3.9	Deleted due to removal of DEP 9.5(1).	DCD R3
8.3.3	Added section to address new COL Item 8.3(12).	DCD R3
8.3.4	Added COL Item 8.3(12).	DCD R3
Table 8.3.1-4R	Changed LMNs from “STD*” to “STD.”	R-COLA R2
Figure 8.3.1-1R (Sheets 5 and 6 of 7), Figure 8.3.1-2R (Sheets 18-21)	Changed LMNs from “STD*” to “STD.”	R-COLA R2
Figure 8.3.1-201	Increased size of Electrical Room and relocated the Start-up Steam Generator Blowdown Equipment.	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
8.4.2.2	Added description regarding SBO procedures and training.	R-COLA R2
9.1.2.1	Changed “STD*” to “STD.”	R-COLA R2
9.1.5.1	Added.	Address COL item 9.1(6)
9.1.5.3	Changed “STD*” to “STD.”	R-COLA R2
9.1.6	Changed COL Item 9.1(6) from “addressed in Section 9.1” to “addressed in Sections 9.1.5.1 and 9.1.5.3”; changed COL Item 9.1(9) from “addressed in Section 9.1” to “addressed in Section 9.1.2.1.”	R-COLA R2
9.2.1.2.1	Changed LMN from “STD*” to “STD” for first paragraph; added change to fifth paragraph regarding how the UHS piping layout maintains the EWS/UHS system pressure above saturation based on fluid design temperature; changed action statement for eighth paragraph from “eighth” to “seventh” and changed “STD*” to “NAPS”; added change for eighth paragraph to discuss UHS cooling tower design temperatures; changed action statement for eleventh paragraph from “eleventh paragraph” to “ninth and tenth paragraphs”; changed “STD*” to “STD” and added “CDI”; changed the action statement for the twelfth paragraph from “twelfth” to “eleventh,” changed “STD* COL 9.2(7)” to “NAPS COL 9.2(31)” and replaced the existing paragraph; changed action statement for thirteenth paragraph from “thirteenth” to “twelfth” and changed “STD*” to “STD”; deleted the replacement for the last paragraph.	DCD R3, R-COLA R2, editorial
9.2.1.2.2	Changed “STD*” to “STD.”	R-COLA R2
9.2.1.2.2.1, 9.2.1.3, 9.2.5.3	See RAI 09.02.01-14, ESWS Pumps and UHS Design	

Revision 4 *(continued)*

Section	Change	Reason for Change
9.2.1.2.2.1	Changed NPSH values provided in response to RAI 09.02.01-14; changed “STD*” to “NAPS”; changed the action statement for the third paragraph from “second sentence” to “third and fourth sentences”; added items for the fifth and eighth sentences of the third paragraph; added to ESW system description.	DCD R3 and R-COLA R2
9.2.1.2.2.2	Added.	DCD R3 and R-COLA R2
9.2.1.2.2.5	Added.	DCD R3
9.2.1.2.3.1	Added.	DCD R3 and R-COLA R2
9.2.1.3	Changed “STD*” to “NAPS” and added “CDI” LMNs; changed action statement from “”twelfth” to “eleventh”; clarified measures taken to assure freeze protection; changed action statement from “last two paragraphs” to “thirteenth paragraph”; changed “”STD*” to “NAPS” and added “NAPS COL 9.2(29)”; identified nonsafety-related portions of ESWS; added description of strainer backwash line.	DCD R3 and R-COLA R2
9.2.1.4	Added.	DCD R3 and R-COLA R2
9.2.1.5.4	Deleted.	DCD R3
9.2.2.1.2.1	See RAI 09.02.02-1, Degasifier Impact on CCW Evaluation	
	Added “system” after instrument air.	Editorial
9.2.4	Changed “NAPS COL 9.2(13) to “NAPS COL 9.2(11)” and added “NAPS CDI.”	DCD R3
9.2.4.1	Deleted “NAPS COL 9.2(13)”; added “NAPS CDI” (3 places); and changed “bullet” to “sentences” in the action statement.	DCD R3
9.2.4.2.1	See RAI 09.02.04-1, Sanitary Drain Contamination	
	Deleted “NAPS COL 9.2(13)” and “NAPS COL 9.2(16)”; added “NAPS CDI” (2 places).	DCD R3
9.2.4.2.2.1, 9.2.4.2.2.2, 9.2.4.2.2.3	Changed “STD**” to “STD” and added “STD CDI.”	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
9.2.4.2.2.4	Added "NAPS CDI."	DCD R3
9.2.4.2.3	Deleted "NAPS COL 9.2(13)"; added "NAPS COL 9.2(11)," "NAPS COL 9.2(17)" and "NAPS CDI"; changed "second sentence" to "content" in the action statement for the fifth paragraph; added statement regarding no interconnections between the potable water system and any other system.	DCD R3
9.2.4.4	Replaced "NAPS COL 9.2(13)" with "NAPS COL 9.2(11)" and added "NAPS CDI."	DCD R3
9.2.4.5	Replaced "NAPS COL 9.2(13)" with "NAPS COL 9.2(11)" and added "NAPS CDI"; added action statement.	DCD R3
9.2.5.1	Changed "STD*" to "STD"; changed action statement from "eighth bullet of the second" to "second sentence of the first"; added statement to address interface requirements; added replacement text for the first three sentences of the fifth bullet of the seventh paragraph and added statement that performance of the UHS is based on the SSAR.	DCD R3 and R-COLA R2
9.2.5.2	Added "NAPS CDI"; changed action statement from "six" to "seven" paragraphs; updated references to descriptions and drawings of the UHS; added references to information for the UHS and ESWS.	DCD R3, R-COLA R2, and editorial
9.2.5.2.1	Added "NAPS COL 9.2(3)," "NAPS COL 9.2(4)," NAPS COL 9.2(5)," NAPS COL 9.2(18)," NAPS COL 9.2(19)," NAPS COL 9.2(20)," NAPS COL 9.2(21)," NAPS CDI"; added action statement; added explicit identification of LOOP power source; added cooling tower design conditions; added ESW basin design information; updated referenced sections for ESWS descriptions.	R-COLA R2 and editorial

Revision 4 *(continued)*

Section	Change	Reason for Change
9.2.5.2.2	Added “NAPS COL 9.2(3),” NAPS COL 9.2(4),” NAPS COL 9.2(5),” NAPS COL 9.2(18),” NAPS COL 9.2(19),” NAPS COL 9.2(20),” NAPS COL 9.2(21),” NAPS COL 9.2(28),” NAPS COL 9.2(31),” NAPS CDI”; added action statement; changed “basin” to “basins” (2 places); changed “Adequate” to “The maintained water level in each UHS basin assures adequate” and “is maintained” to “for the ESWP”; added discussion how water hammer forces are minimized for ESW and UHS system; added details of power and activation signals for power-operated valves, pumps and cooling tower fans, equipment response during an accident; described adequacy of UHS basin level for 30 days without makeup; minor grammar edits.	R-COLA R2 and editorial
9.2.5.2.3	Added “NAPS COL 9.2(3),” NAPS COL 9.2(4),” NAPS COL 9.2(5),” NAPS COL 9.2(18),” NAPS COL 9.2(19),” NAPS COL 9.2(20),” NAPS COL 9.2(21),” NAPS COL 9.2(28),” NAPS COL 9.2(31),” NAPS CDI”; added action statement.	R-COLA R2 and editorial
9.2.5.3	Changed to state that ESWS has four divisions but can operate with only three; changed to state that UHS and ESWS safety-related SSCs are seismic Category I; changed references for UHSRS structural adequacy and for hydrology-related events; added UHS basin floor level elevation; added discussion of maximum temperatures reached in safe shutdown versus LOCA peak heat loads; minor grammar edits.	DCD R3, R-COLA R2, and editorial
9.2.5.4	Changed “NAPS COL 9.2(23)” to “STD* COL 9.2(23)” and added “NAPS COL 9.2(30)”; added statements that inspections and testing are performed in accordance with industry operating experience; added discussion of inspection and testing requirements.	DCD R3 and R-COLA R2
9.2.5.5	Changed “sentence” to “first paragraph” in action statement.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
9.2.6	Deleted.	Editorial
9.2.6.2.6	Added “first” in the action statement.	NAPS DEP 9.2(1)
9.2.10	Changed and added references to applicable COL items. Revised STD*, NAPS and STD, deleted STD ** and added references to new STD and NAPS.	DCD R3 and R-COLA R2
Table 9.2.1-1R	Changed “STD*” to “NAPS.”	R-COLA R2
Table 9.2.4-1R	Deleted “NAPS COL 9.2(16)” and added “NAPS CDI.”	DCD R3
Table 9.2.5-201/9.2.5-3R	Changed table number from “9.2.5-201” to “9.2.5-3R”; added “NAPS CDI.”	DCD R3
Table 9.2.5-202/9.2.5-4R	Changed table number from “9.2.5-202” to “9.2.5-4R”; added “NAPS CDI”; changed UHS Cooling Tower Fan tag number descriptor from OEQ to MFN; changed UHS Transfer Pump tag number descriptor from OPP to MPP; changed UHS Basin Blowdown Control Valve tag number descriptor from EWS-HCV-2000, 2001, 2002, 2003 to EWS-HCV-010, 011, 012, 013.	DCD R3
Figure 9.2.1-1R (Sheets 1 thru 3)	Changed to simplified P&ID; deleted Sheet 2; added Sheet 3.	DCD R3
Figure 9.2.2-1R (Sheets 8 & 9)	Changed to simplified P&ID.	DCD R3
Figure 9.2.4-1R (Sheet 1)	Deleted “NAPS COL 9.2(13)”; added “NAPS CDI”; changed to simplified P&ID.	DCD R3
Figure 9.2.4-1R (Sheet 2)	Added “NAPS CDI”; changed to simplified P&ID.	DCD R3
Figure 9.2.5-201/9.2.5-1R (Sheets 1 and 2)	Changed number from 9.2.5-201 to 9.2.5-1R; added “NAPS CDI”; changed to simplified P&ID.	DCD R3
Figure 9.2.6-2R	Changed to simplified P&ID.	DCD R3
Figure 9.2.6-3R	Changed to simplified P&ID.	DCD R3
9.3.1.2.2.3, 9.3.6	Changed LMN from “STD*” to “STD.”	R-COLA R2
9.3.4.2.6.17	Deleted “, which is also known as the Reactor Coolant Drain Demineralizer,”.	NAPS DEP 9.2(1)

Revision 4 *(continued)*

Section	Change	Reason for Change
Tables 9.3.1-1R, 9.3.2-6R, 9.3.4-3R	Updated DCD content and page breaks.	DCD R3
Figure 9.3.4-1R (Sheets 3 thru 7)	Replaced with simplified versions.	DCD R3
9.4.1.2	See RAI 09.04.05-2, Design Basis Information for MCR Heaters	
	Changed “STD*” to “NAPS”; deleted “NAPS SUP 9.4(1)” that appeared in RAI 09.04.05-3 markup.	R-COLA R2
9.4.3.2.1, 9.4.3.2.3, 9.4.3.2.4, 9.4.5.4.6, 9.4.6.2.4.1, 9.4.6.2.4.2	Changed “STD*” to “STD.”	R-COLA R2
9.4.3.2.2, 9.4.5.2.2	Changed “STD*” to “NAPS.”	R-COLA R2
9.4.5	See RAI 09.04.05-3, Design Basis Information for ESF Ventilation Heaters	
9.4.5.1.1.6, 9.4.5.2.6, 9.4.5.3.6	See RAI 09.04.05-7, Design Input for UHS ESW Pump House Ventilation System	
9.4.5.2.5	Changed “second” to “fourth” in action statement.	Editorial correction
9.4.5.2.6	See RAI 09.04.05-5, UHS ESW Pump House Air Intake	
9.4.5.2.6, 9.4.5.4.6; Tables 3D-201 & 9.4-203; Figure 9.4-201	See RAI 09.04.05-6, Safety/Seismic Classification of UHS ESW Pump House Ventilation System Components	
9.4.5.5.6	Changed “STD*” to “STD”; added item to address temperature switches.	R-COLA R2
9.4.7	Changed “STD*” to “STD” for COL Items 9.4(4) and 9.4(6).	R-COLA R2
Table 9.4-201	Added in-duct heaters.	R-COLA R2
9.5.1	Changed “STD**” to “STD.”	R-COLA R2
9.5.1.2	Changed “STD*” to “STD.”	R-COLA R2
9.5.1.2.1	Deleted NAPS DEP 9.5(1).	DCD R3
9.5.1.2.2	Added “Reference 9.5.1-216” for NFP 20; clarified separation between the electric fire pump and the diesel-driven fire pump; clarified capability to inject sodium hypochlorite.	Editorial

Revision 4 *(continued)*

Section	Change	Reason for Change
9.5.1.2.3	Added description of features/practices for conformance with NFPA 804 Paragraph 9.4.6.	Editorial
9.5.1.2.3, 9.5.1-215	See RAI 09.05.01-21, Standard AWWA C906 for Fire Main	
9.5.1.2.4	Changed "STD*" to "STD."	R-COLA R2
9.5.1.3	Changed "STD*" to "STD"; revised action statement; editorial change.	R-COLA R2
	Changed "eight" to "eighth" and added a period to action statement.	Editorial
	Changed to state that final Fire Hazards Analysis will be implemented as part of the Fire Protection Program in accordance with Table 13.4-201 milestones.	R-COLA R2
9.5.1.6	See RAI 09.05.01-25, Discussion of Modification Procedures	
9.5.1.6.2.4	Added description of RG 1.189 Position Number 3.5.2.1 conformance.	Clarification
9.5.1.6.4	See RAI 09.05.01-22, Maintenance of Fire Protection Program Related Records	
	See RAI 09.05.01-23, Reporting of Fire Events and Deficiencies	
9.5.2, 9.5.2.2.2	Changed "STD*" to "STD."	R-COLA R2
9.5.2.2.5.2	Changed "STD*" and "STD**" to "STD"; deleted reference to the operations support center in the sixth paragraph; added description of the OSC telecommunications system.	R-COLA R2
9.5.2.3	Changed "STD*" to "STD."	R-COLA R2
9.5.4.2.1	Deleted.	DCD R3
9.5.4.2.2.1	Added description of site-specific design for maintaining acceptable minimum temperatures in the PSFSVs and access tunnels.	DCD R3 (COL item 9.5(12))
9.5.4.3	Deleted.	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
9.5.9	Changed “STD*” and “STD**” to “STD.”	R-COLA R2
	Added “9.5.1.2” to COL item 9.5(1).	R-COLA R2
	Deleted “9.5.1” and added “9.5.1.2.1, 9.5.1.2.2, 9.5.1.2.3 9.5.1.2.4, 9.5.1.5, Tables 9.5.1-1R & 2R, Figures 9.5.1-201, 202, 203, 294, Appendices 9A & 11AA” to COL item 9.5(2).	Editorial
	Added COL item 9.5(12).	DCD R3
9.5.10	Added 9.5.1-216.	Editorial
Table 9.5.1-1R	Changed all “STD*” to “STD.”	R-COLA R2
	Position Numbers 1.1 and 1.8.6: changed “Remark” to “Remarks” in the Conformance column.	Editorial
	Position Number 6.1.8: Added “NAPS COL 9.5(2)” LMN; changed “N/A” to “Conform” in Conformance and added “The security diesel generator is installed with 3-hour fire rated barriers providing separation from plant areas containing safety-related equipment and circuits.” in Remarks.	Site-specific design
	Position Number 6.1.9: added “STD COL 9.5(2)” LMN.	R-COLA R2
	Position Number 7.4: deleted “partially underground” in the Remark column.	DCD R3
	Position Number 8.5: added “STD COL 9.5(1)” LMN.	R-COLA R2
Table 9.5.1-2R	Changed all “STD*” to “STD” except as stated below.	R-COLA R2
	Paragraph 4.1.2: changed “STD*” to “NAPS.”	R-COLA R2
	Paragraphs 8.2.4, 8.2.5, and 8.2.6: changed “STD* COL 9.5(1)’ to “STD COL 9.5(2).”	R-COLA R2
	Paragraph 10.10.1: deleted “NAPS DEP 9.5(1)” and in the Remarks column, deleted “partially buried.”	DCD R3
9A.3	Changed all “STD*” to “STD.”	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
9A.3.144, 9A.3.147	Paragraphs with heading “Smoke Control Features”: added “STD COL 9.5(2).”	R-COLA R2
Table 9A-202	All sheets: changed “DCD Figure” to “Figure” and changed “DCD Section” to Section.”	Editorial
	Fire Zone FA7-202-01: changed figure from “91-201” to “9A-201.”	Editorial
	Fire Zones FS7-301-5 through FA7-301-10: changed the Fire Barrier Descriptions.	DCD R3 and FSAR Section 8.2.1.2
Table 9A-203	Fire Zone FA7-212-01: corrected entries for Adjacent Fire Zones.	Editorial
Figure 9A-13R	Rearranged labels to make text visible.	Editorial
Figure 9A-14R	Changed “Reactor Coolant Drain Demineralizer” to “Degasifier Feed Demineralizer.”	NAPS DEP 9.2(1)
	Rearranged labels to make text visible.	Editorial
Figure 9A-20R	Deleted “NAPS DEP 10.2(1)”; changed “-262'-5"” to “262'-5"” in title; revised figure.	DCD R3, updated site-specific design information, and editorial
Figure 9A-21R	Deleted “NAPS DEP 10.2(1)”; revised figure.	DCD R3 and updated site-specific design information
Figures 9A-22R thru 9A-26R	Deleted “NAPS DEP 10.2(1)”; added “)” to LMN; revised figure.	DCD R3, updated site-specific design information, and editorial
Figure 9A-27R	Changed “NAPS DEP 10.2(1)” and “NAPS DEP 10.4(1” to “NAPS COL 9.5(2).”	DCD R3
Figure 9A-202	Revised figure.	DCD R3 and FSAR Section 8.2.1.2
Figure 10.1-1R	Added “NAPS CDI.”	DCD R3
10.2.6	Deleted Reference 1.2-10R.	DCD R3
10.3.2.4.3	Editorial.	R-COLA R2
10.3.5.5	Added section.	Commit to EPRI water chemistry guidelines
10.3.6.3.1.6, 10.3.6.3.1.7	Deleted LMNs.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
10.3.7	Deleted “STD** COL 10.3(1)” for COL Item 10.3(1).	R-COLA R2
10.4.5.2.1	Added “NAPS CDI.”	DCD R3
	Deleted duplicate LMN “NAPS COL 10.4(1).	Editorial
10.4.5.2.2	Added “NAPS CDI” and updated action statement.	DCD R3 and editorial
10.4.5.2.2.1, 10.4.5.2.2.2, 10.4.5.2.2.4, 10.4.5.2.2.5, 10.4.5.2.2.8, 10.4.5.3.2, 10.4.5.6, 10.4.8.1.2, 10.4.8.2.1, 10.4.8.2.2.4	Added “NAPS CDI.”	DCD R3
10.4.5.2.2.6	Updated action statement and deleted last sentence.	DCD R3
10.4.8.2.1	Changed “STD*” to “STD.” Added information about radiation monitor.	R-COLA R2
	Added specific design features of the steam generator blowdown line related to RG 4.21.	DCD R3
10.4.8.2.2.4	Changed action statement.	R-COLA R2
10.4.8.2.3	Changed “STD*” to STD” and corrected action statement.	R-COLA R2
10.4.8.5	Changed “STD*” to STD.”	R-COLA R2
10.4.11.2.1	Changed “Figure 10.4.11R” to Figure 10.4.11-1R” and change “fifth” to “seventh” in third action statement.	Editorial and DCD R3
10.4.12	Changed “STD*” to “STD” for COL Item 10.4(2).	DCD R3
Table 10.4.5-1R	Added “NAPS CDI.”	DCD R3
Table 10.4.8-1R (Sheet 4 of 4)	Deleted Sheets 1 through 3 and moved NAPS COL 10.4(2) items to new Sheet 4; added “NAPS COL 10.4(2).”	DCD R3
Figure 10.4.2-1R	Changed to simplified P&ID.	DCD R3
Figure 10.4.5-1R	Changed to simplified P&ID; changed title by adding “Piping and Instrumentation Diagram”; added “NAPS CDI.”	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
Figure 10.4.5-201	Changed to simplified P&ID.	DCD R3
Figures 10.4.5-202 and 10.4.5-203	Changed to simplified layout.	DCD R3
Figure 10.4.7-2R	Changed to simplified P&ID.	DCD R3
Figures 10.4.8-1R & 10.4.8-2R	Changed to simplified P&ID; changed title from “Flow Diagram” to “Piping and Instrumentation Diagram”; added “NAPS CDI.”	DCD R3
Figure 10.4.8-201	Changed to simplified P&ID; changed title from “Flow Diagram” to “P&ID.”	DCD R3
Figure 10.4.11-1R	Corrected figure number; changed to simplified P&ID; changed title from “Flow Diagram” to “P&ID.”	DCD R3
11.2.1.5	See RAI 11.02-3 Site Specific LW Cost Benefit Analysis Input	
11.2.1.6	Changed action statement; changed “STD**” to “STD” and added “STD COL 12.3(7); added information regarding temporary and mobile equipment.	R-COLA R2
	Added description of connections to mobile equipment.	R-COLA R2
11.2.2	See RAI 11.05-6 Process and Effluent Monitor Sensitivity	
	Added specific design features of the LWMS to delineate compliance with RG 4.21. Deleted requirement to tag the bypass valve.	DCD R3 and editorial
	Corrected the name of the blowdown sump.	Editorial
11.2.3.1, 11.2.5, 11.2.6	See RAI 11.02-4, Annual Liquid Effluent Releases	
11.2.4	Added description of coatings program with reference to new NAPS COL 11.2(7).	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
11.2.5	Updated section numbering; replaced “11.2.4” with “11.2.5” in the action statement.	DCD R3
	Changed “STD**” to “STD” for COL Item 11.2(1).	R-COLA R2
	Added COL Items 11.2(7) & (8).	DCD R3
Table 11.2-9R (Sheet 1 of 2)	Corrected topic heading and removed duplicate entry Decontamination factor for Cs and Rb under Dirty Waste; moved Blowdown Waste section to Sheet 2.	Editorial and DCD R3
Tables 11.2-12R thru 11.2-14R	See RAI 11.02-5, Calculation of Liquid Effluent Doses	
Figure 11.2-1R (Sheet 1)	Replaced with simplified P&ID.	DCD R3
Figure 11.2-201	Replaced with simplified P&IDs.	DCD R3
11.3.1.5	See RAI 11.03-3, Site Specific GW Cost Benefit Analysis Input	
11.3.1.5, 11.3.3.1; Tables 11.3-6R thru11.3-9R, 11.3-201 thru 11.3-203	See RAI 11.02-7, Cooling Tower Makeup Water Tritium	
Figure 11.3-1R	Replaced with simplified P&IDs.	DCD R3
Figure 11.3-201	Replaced with simplified P&IDs.	DCD R3
11.4.1.3	Changed “STD*” to “STD” for COL item 11.4(5).	R-COLA R2
11.4.1.6	Changed “STD*” to “STD” and added “STD COL 11.4(10)”; added description of de-watering station connections.	DCD R3 and R-COLA R2
11.4.2.1.1	Changed “STD*” to “STD.”	R-COLA R2
11.4.2.2.1	Changed “least” to “last” in the action statement.	Editorial
11.4.3.2	Changed “STD*” to “STD” and added NEI 07-10A title.	R-COLA R2
11.4.4.5	Changed “STD*” to “STD” and added text consistent with R-COLA.	R-COLA R2
11.4.6, 11.4(9); Tables 1.8-201 & 1.9-202	See RAI 11.04-5, Decontaminable Paints and Coatings	

Revision 4 *(continued)*

Section	Change	Reason for Change
11.4.8	Changed “STD*” LMNs to “STD”; added COL items 11.4(9) and 11.4(10).	DCD R3 and R-COLA R2
Figure 11.4-201	Replaced with simplified P&ID.	DCD R3
11.5.2.5.3	Added text consistent with R-COLA.	R-COLA R2
11.5.2.7	Changed “STD*” to “STD.”	R-COLA R2
11.5.2.8	Changed “STD*” to “STD.”	R-COLA R2
11.5.2.9	Changed “STD**” to “NAPS” and corrected ODCM milestone.	Editorial
11.5.2.10	Changed “STD**” to “STD” and deleted “for Unit 3.”	R-COLA R2
11.5.2.11	Changed “STD*” to “STD.”	R-COLA R2
11.5.5	Changed “STD*” to “STD”; added NAPS COL 11.5(2)” to COL item 11.5(2).	R-COLA R2
Figure 11.5-2aR thru 11.5-2eR and 11.5-2gR thru 11.5-2kR	Deleted reference to Departure 10.2(1) and updated general arrangement in figures.	DCD R3
11AA.4.3.2	Corrected “FH7-302” to “FA7-302,” “FH7-302-01” to “FA7-302-01,” and FH7-302-02” to FA7-302-02.”	Editorial
11AA.4.3.2.1	Corrected “FH7-302” to “FA7-302,” “FH7-302-01” to “FA7-302-01,” and FH7-302-02” to FA7-302-02.”	Editorial
11AA.4.3.2.2	Corrected “FH7-303” to “FA7-303,” “FH7-303-01” to “FA7-303-01,” and FH7-303-02” to FA7-303-02”; changed “operation” to “operating” in Radioactive Release to Environment Evaluation.	Editorial
11AA.4.4, 11AA.4.7; Table 1.9-202; Figure 11AA-201 (Sheet 1)	See RAI 11.04-11, Interim Radwaste Storage Facility Radiation Monitors	
Table 11AA-204	Added note 3 to describe IRSF shield wall tolerance.	Support ITAAC commitment
Table 11AA-205	Corrected fire area and fire zone for the Crane Operating Room to FA7-303 and FA7-303-02, respectively.	Editorial
Table 11AA-206	Deleted reference to a DCD figure and section and corrected nomenclature.	Editorial

Revision 4 *(continued)*

Section	Change	Reason for Change
12.1.1.3.1, 12.1.1.3.2, 12.1.1.3.3	Deleted “in combination with existing or modified site program information.”	R-COLA R2
12.1.3	Changed “STD**” to “STD”; deleted “in combination with existing or modified site program information.”	R-COLA R2
	Replaced paragraph, changed “STD**” to “STD,” and added “STD COL 12.1(8) for third paragraph of DCD Subsection 12.1.3.	DCD R3 and R-COLA R2
12.1.4	Changed “STD*” and “STD**” to “STD”; added “and Table 12.5-201” to COL item 12.1(5); added “and 12.3.1.3.2” to COL items 12.1(6) and 12.1(7); added COL item 12.1(8).	R-COLA R2
12.2.1.1.3	Changed “reactor coolant drain” to “degasifier feed.”	Editorial to agree with DEP 9.2(1)
12.2.1.1.10	Clarified where the additional source of activity could be identified, changed “STD**” to “STD”; changed and “STD*” to “NAPS,” added description of control sources.	R-COLA R2
12.2.3	Changed “STD*” to “NAPS” for COL item 12.2(1); changed “STD**” to “STD” for COL item 12.2(2); added COL items 12.2(3) and 12.2(4).	DCD R3 and R-COLA R2
Tables 12.2-1R (Sheet 4 of 6), 12.2-64R, 12.2-65R, 12.2-73R & 12.2-75R	Changed “Reactor coolant drain” to “Degasifier feed.”	Align with DEP 9.2(1)
Table 12.2-1R (Sheet 6 of 6)	Changed “Reactor coolant drain filter” to “Degasifier feed filter.”	Align with DEP 9.2(1)
12.3.1.1.1.2	Added Item N for Mobile Liquid Waste Processing.	DCD R3 and R-COLA R2
12.3.1.2.1.1	Changed “STD**” to “STD.”	R-COLA R2
12.3.1.3.1.1	Added.	DCD R3 (to comply with RG 4.21)
12.3.1.3.2	Added section.	DCD R3
12.3.2.2.8	Changed “STD*” to “STD.”	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
12.3.4	Changed “STD*” to “STD.”	R-COLA R2
12.3.6	Changed “STD*” to “STD”; added “NAPS COL 12.3(4) to COL item 12.3(4); added COL items 12.3(6) through 12.3(10).	DCD R3 and R-COLA R2
	Added citations to Sections 12.3.1.3.1.1 and Tables 12.3-8R & 12.3-201 for COL item 12.3(10).	DCD R3
Table 12.3-1R (Sheet 4 of 4)	Changed “Reactor Coolant Drain” to “Degasifier feed.”	Align with DEP 9.2(1)
Table 12.3-8R	Added.	DCD R3 Show site-specific design features for boric acid evaporator DEP 9.2(1) to comply with RG 4.21
Table 12.3-201	Added.	DCD R3 Show site-specific design features for minimization of contamination to comply with RG 4.21
Figure 12.3-1R (Sheets 1, 15–19, 24–31 of 34)	Sheets 1, 15–19, and 24–31 changed to reflect DCD General Arrangement Drawing revisions; Sheet 17 also had changes for reactor coolant drain filter to degasifier feed filter; Sheets 24–31 also deleted Turbine Building DEP 10.2(1).	DCD R3 Deletion of DEP 10.2(1) Nomenclature for DEP 9.2(1)
Figure 12.3-2R (Sheets 1–5, 7–10 of 10)	Sheets 1, 3, 5, 7–10 changed to reflect DCD General Arrangement Drawing revisions and to reflect deletion of DEP 10.2(1).	DCD R3 Deletion of DEP 10.2(1) Nomenclature for DEP 9.2(1)
Figures 12.3-3R thru 12.3-6R (Sheets 1–5, 7–10 of 10)	Sheets 1–5 and 7–10 changed to reflect DCD General Arrangement Drawing revisions; deleted DEP 10.2(1) on Sheets 1, 3, 5, 7–10.	DCD R3 Deletion of DEP 10.2(1)
Figures 12.3-4R thru 12.3-6R (Sheets 1, 3–5, 7–10 of 10)	Changed to reflect DCD General Arrangement Drawing revisions.	DCD R3
Figure 12.3-11R (Sheets 1–5, 7–10 of 10)	Added due to DCD RAI 524-4020, R1.	DCD R3
12.5	Clarified NEI 07-03A.	R-COLA R2
Table 12.5-201	Added table.	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
13.1.1.2.1.1	Added CNO responsibility for the Independent Review Committee (IRC).	Added description to align with the QAPD
13.1.2.1.5	See RAI 09.05.01-26, Access to Keys for Locked Doors	
13.1.5; Table 13.1-201; 14AA.2.1, 14AA.2.2.1, 14AA.3.2	See RAI 14.02-11, Testing Personnel Education and Experience Requirements	
Table 13.1-201	Removed the "*" footnote.	"*" footnote no longer used
Figure 13.1-204	Added the Independent Review Committee.	Update chart to align with the QAPD
13.2.1.1	Changed LMNs from "STD" to "NAPS."	Plant specific information was added to R-COLA
13.2.3	Changed LMNs for COL items 13.2(1), 13.2(2), 13.2(3), and 13.2(5) from "STD" to "NAPS."	Plant specific information was added to R-COLA
13.3, 13.3.1	Changed LMNs "STD**" to "STD."	Reflect R-COLA changes
13.3.4	Changed LMNs for COL items 13.3(1), 13.3(3), 13.3(4), and 13.3(7) from "STD**" to "STD."	Reflect R-COLA changes
13.4	Added discussion of leakage monitoring and prevention program, and implementation milestone.	New COL item in DCD R3
	See RAI 13.04-2, Leakage Control and Detection for Systems Outside Containment	
13.4.1	Added COL item 13.4(2).	New COL item in DCD R3
Table 13.4-201	Added reference to ASME Code Section XI to the inservice inspection program under "Requirement." Added the Steam Generator Program to the inservice and preservice inspection programs.	Conform to R-COLA and clarify source of IWA-2430(b)
13.5.1	Clarified that procedures outline the essential elements of the administrative programs and controls as specified in the QAPD instead of ASME NQA-1.	Clarification of applicable QA requirements
13.5.2.1.1.4	Added the general objectives of the EOP V&V process.	R-COLA R2
13.5.3	Changed the LMN for COL item 13.5(7) from "STD" to "NAPS."	Align with revision to LMN in text

Revision 4 *(continued)*

Section	Change	Reason for Change
13.6	See RAI 13.06-10, Security Plans in Part 8 of the COLA	
	Changed “STD” to “NAPS.”	R-COLA R2
13.6.1, 13.6.2, 13.6(2), 13.6(5); Table 1.8-1R	See RAI 13.06-9, Describe Design of Physical Protection Systems See RAI 13.06-12, Detail Design for Security Lighting See RAI 13.06-17, Describe Design of Physical Barriers See RAI 13.06-18, Provide Detail Design for Security Searches See RAI 13.06-28, Describe Design of Physical Protection System See RAI 13.06-31, Provide Detail Design of Buildings that are Part of the Protected Area	
13.6.2.3	Deleted paragraph regarding role of US-APWR Cyber Security Program.	DCD R3
13.6.4	Deleted reference to 13.6.2.3 for COL item 13.6(1) and deleted “STD COL 13.6(1)” for COL item 13.6(1).	R-COLA R2
13.6-201	Changed title and revision of PSP.	Dominion Letter NA3-11-005RC
13.6-202 thru 13.6-205	Change revisions.	DCD R3
13.7; Table 13.4-201	See RAI 13.07-2, Site-specific FFD Information	
Table 13.4-201	Added “10 CFR 20.1406” to Item 10, Program Source.	Completeness
13AA.1	Clarified activities performed by MNES as primary contractor. Deleted statement regarding nuclear island and turbine island contractor.	Editorial clarification
13AA.1.3	Changed “reactor vendor” to “primary contractor.”	Editorial clarification
13AA.1.9	Clarified management and responsibility for construction activities and deleted reference to Figure 13AA-201.	Editorial clarification
Figure 13AA-201	Updated to align with QAPD.	Consistency with QAPD R4
14.2.1	Deleted replacement action for sixth paragraph.	DCD R3
14.2.1.2	Changed the title from “ITP” to “Test Program.”	DCD R3
14.2.8.1	Editorial.	R-COLA R2
14.2.11	Changed LMN from “STD*” to “STD.”	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
14.2.12.1.113	Changed LMN from “STD*” to “STD”; added “and the UHS transfer pumps” in A.2, C.2, and D1; deleted “and associated interlocks in A.3 and D.2; replaced “interlocks” with basin water level logic” in A4; deleted “and UHS transfer pump interlocks” in C1; added “using the ESWS blowdown feature” in C.3; added C.4 and D.4.	R-COLA R2
14.2.13	Changed LMN from “STD*” to “STD.”; editorial change to COL Item 3.1(11).	R-COLA R2
Table 14.2-1R (Sheet 3 of 5)	Editorial.	DCD R3
Table 14.2-201	Changed LMNs from “STD*” to “STD.”	R-COLA R2
Table 14.2-202	Updated test descriptions and references to DCD.	DCD R3
14.3.4.6	Editorial.	R-COLA R2
14.3.4.7	Changed “STD*” to “NAPS” and editorial to include portions of offsite electrical system and fire protection system as site specific.	R-COLA R2
14.3.4.10	Editorial.	R-COLA R2
14.3.4.12	Changed “STD*” to “NAPS” and added Unit 3 information on physical security ITAAC test abstracts.	R-COLA changed to site specific
14.3.6	Changed “STD*” to “NAPS” for COL Item 14.3(1) and “STD” to “NAPS” for COL Item 14.3(3).	R-COLA R2
14A	Changed “STD*” to “STD.”	R-COLA R2
Table 14A-1R (Sheet 10 of 17)	Updated to agree with DCD.	DCD R3
Table 14A-201	Changed “STD*” to “STD” in two places.	R-COLA R2
14AA.4.1 & 14AA.4.2	See RAI 14.02-12, Requirements for the Control of Individual Parts of Multiple Tests	
14AA.7	Deleted RG 1.139 from applicable guidance documents.	DCD R3
15.0.3.3, 15.0.4	Changed “NAPS COL 15.0(1)” to “STD COL 15.0(1)”	R-COLA R2

Revision 4 *(continued)*

Section	Change	Reason for Change
16.1.1.2, 16.1.2	Changed action statements.	Editorial
17.0, 17.1, 17.2, 17.4.8, 17.4.9 (COL Item 17.4(1)), 17.5.1 (COL Item 17.5(1)), 17.6.1 (COL Item 17.6(1))	Changed "STD*" to "STD."	R-COLA R2
17.4.5	Added programs that implement operational reliability assurance.	R-COLA R2
17.4.7.4	Changed "NAPS" to "STD."	R-COLA R2
17.4.7.4, 17.4.8	Clarified D-RAP scope.	R-COLA R2
Table 17.4-201	Corrected equipment tag numbers and editorial.	Correction and R-COLA R2
17.5	Changed type of procedures from" COL Project" to "North Anna 3."	Reflect internal procedure title changes
	Added citation to QAPD treatment of QA controls for nonsafety risk-significant SSCs.	Align with DCD R3
17.5-202	Updated to reflect revision of NEI template used in revised QAPD.	QAPD revised
17.6.2	See RAI 08.02-47, Cable Monitoring Program	
	Added LMN "NAPS SUP 17.6(1)."	Editorial
17AA	See RAI 17.05-9, Correction of Referenced NQA-1 dates	
	See RAI 17.05-10, Independent Review Function Details	
	Changed "Programs Engineering" to "Engineering Programs" in Section 1.2.1.2 and Figures II-1 and II-2.	Change in Department description
	Added Independent Review Committee to Figure II-3.	Editorial
	Changed requirement for individual(s) supervising QA or QA control functions to include at least 1 year nuclear plant experience.	RG 1.8 R3 and ANS-3.1-1993
	Modified organization to include construction interface and reflect current organization alignment.	QAPD revised
19.1.1.2.1	Changed "assessment" to "assessments."	Editorial

Revision 4 *(continued)*

Section	Change	Reason for Change
19.1.1.4.1	Inserted “programs” and changed “STD*” to “NAPS.”	Editorial
Figure 19.1-2R	Corrected valve tag numbers.	Editorial
19.1.4.1.2	Deleted “The fluid system of ESWS is the same as the standard US-APWR design except that the essential service water pump (ESWP) motor is air-cooled.” Changed “The standard US-APWR design simply indicates” to “UHS design for the ESWS is treated as conceptual design information in the standard US-APWR design, and the PRA for the standard design simply assumes.”	DCD R3
	Changed “Ventilation of the ESWP room is reliably not to significantly degrade the unavailability of ESWP” to “Ventilation of the essential service water pump (ESWP) room is sufficiently reliable that the availability of the ESWP is not degraded.”	Clarification
	Added new last bullet “The valve positions are monitored in the MCR.”	Additional information
	Changed Reference “19.1-20” to “19.1-23.”	Correction
	Changed initiating event frequency for loss of CCW from “2.3E-05” to 2.4E-05” and “2.4E-05/RY” to “2.5E-05/RY.”	DCD R3
19.1.4.2.2	Changed “STD*” to “STD.”	R-COLA R2
19.1.5; Table 19.1-206	See RAI 19-3, Assessment of Tornado Risks	

Revision 4 *(continued)*

Section	Change	Reason for Change
19.1.5	Changed “Reference 19-201” to “Reference 19.1-50.”	DCD R3
	Changed ASME Section reference from “4.4” to “6.2”	Correction
	Changed the FSAR “Chapter 2 Section 2.2, Section 2.3, and Section 2.4, and Chapter 3 Section 3.5” to “Sections 2.2, 2.3, 2.4, and 3.5.” Changed “Only tornadoes is” to “Only tornado events are not.”	Editorial
	Changed “probability” to “annual frequency.” Added “/year” after “10^{-7}.”	Corrections
	Deleted “(Reference 19.1-8).”	DCD R3
	Added “supply” between “steam” and “system.” Added “an” between “is” and “initiating.” Added “during at-power operation” between “strike” and “is.”	Editorial
19.1.5; Tables 19.1-201 & 19.1-203	Corrected tornado scale designation from “F” to “EF.”	Editorial
19.1.5.1.2	Changed the dominant sequence HCLPFs. Removed the description of the most dominant sequence HCLPF “SE-GSTC-0001.” Change the rank of dominant sequence HCLPF of SE-ELOCA-0001.”	DCD R3
	Changed HCLPF value for SE_ELOCA-0001 from “0.50 g” to “1.67*SSE.”	Correction
	Changed “RV” to “reactor vessel.”	Editorial
	Changed “The most important to...” to “The most important contributors to...”	Editorial
	Changed the rank of dominant sequence HCLPF of SE-CCW-0001.	DCD R3

Revision 4 *(continued)*

Section	Change	Reason for Change
19.1.5.1.2 *(continued)*	Changed “HVAC chillers intake structure” to “essential chiller units.” Inserted “intake structure” after “water.” Changed “component cooling” to “CCW.” Changed “CCWS surge tank” to “CCW surge tanks.”	Editorial
	Changed the rank of dominant sequence HCLPF of SE-LOOP-0027. Added the description of the fourth dominant sequence HCLPF “SE_GSTC-001.”	DCD R3
	Changed “HVAC chillers” to “essential chiller units.”	Editorial
	Deleted “safety power source buildings (1.67*SSE).”	DCD R3
	Changed “confirmed” to “reviewed to confirm”; changed “greater or equal” to “greater than or equal”; added “sensitivity analysis showed that the” between “”the” and “plant.”	Editorial
	Changed “1. SE-HVACHSFCHLHX (1.67*SSE): … CS/RHRS heat exchangers (structural failure)” to “1. SEHVACHSF001BC (1.67*SSE): … CS/RHRS heat exchangers (structural failure).”	DCD R3
	Changed “in order to drive the plant to” to “to cause.” Changed “this” to such a”; added “not” between “to” and “have”; changed “event” to “PRA study”; changed “function.” to “functions,”; changed “These include” to “including”; changed “PCCV” to “Containment”; changed “PCCV is 3.67*SSE” to “containment is 2.10*SSE.” Added “system” between “interfacing” and “LOCA.”	Editorial

Revision 4 *(continued)*

Section	Change	Reason for Change
19.1.5.1.2 *(continued)*	Changed "HVAC chillers" to "essential chiller units." Deleted "safety power source buildings (1.67*SSE)."	DCD R3
	Added "where" between "case" and "offsite." Changed "following LOOP and succeed in the release of" to "thereby releasing." Added "signal" between "trip" and "function"; changed "rod system is failed" to "rods mechanically bind or fail." Changed "case" to "the case where." Added "signal" between "trip" and "function." Added "determined" between "HCLPF" and "for." Deleted "determined."	Editorial
19.1.5.2.2, 19.1.5.3.2, 19.1.6.2, 19.1.7.1	Changed "STD*" to "STD."	DCD R3
19.1.7.6	Changed "RMTS and SFCP" to "RMTS, SFPC, and peer review." Deleted Section 19.1.9.	DCD R3
Tables 19.1-54R, 19.1-55R & 19.1-56R	Changed to reflect DCD PRA results.	DCD R3
Table 19.1-119R	Added.	DCD R3 and R-COLA R2
Table 19.1-204	Updated DCD PRA results.	DCD R3
Table 19.1-206	Removed statement regarding backup actions.	DCD R3
Figure 19.1-2R	Corrected component ID numbers.	Editorial
19.2.5, 19.2.6.1, 19.2.6.1.1, 19.2.6.5	Changed "STD*" to "STD."	R-COLA R2
19.2.6.2	Changed "STD**" to "STD."	R-COLA R2
	Added "-specific parameters" following "site."	Editorial

Revision 4 *(continued)*

Section	Change	Reason for Change
19.3.3	Added “and peer review” after “RMTS.”	DCD R3
	Changed “STD*” and “STD**” to “STD.”	R-COLA R2
	Added “19A.2, 19A.4.2, 19A.4.3” to “COL Item 19.3(4).	Correction
	Changed “STD* COL 19.3(6)” to “NAPS COL 19.3(6).”	R-COLA R2
	Added “and Table 19.1-119R” in COL item 19.3(6).”	R-COLA R2
19A.2, 19A.4.2, 19A.4.3	Changed “NAPS DEP 9.5(1)” to “NAPS COL 19.3(4).”	Departure 9.5(1) deleted
19A.4.3	Added “In addition, certain fire barriers, including doors and penetration seals, are credited for 5 psid. These 5 psid barriers are identified on DCD Figures 9A-1 through 9A-12.”	DCD R3

Revision 3

Section	Changes
All	Revised to reflect the change from ESBWR technology to US-APWR technology.
1.6	Revised to update NEI topical reports. Deleted topical reports not incorporated by reference.
1.10	Moved Section 1.12 to 1.10.
2	Revised receptor distances from ESP plant parameter envelope. Revised tornado wind and missile parameters consistent with RG 1.76, Rev. 1. Revised elevation datums from msl to NAVD88 and NGVD29, as appropriate. Included departure from DCD for maximum non-coincident wet bulb temperature. Revised seismic data per changes to Section 3.7.
2.2, 3.5.1.6; Tables 2.2-201 thru 2.2-204	Moved SSAR 3.5.1.6 IBR to FSAR 3.5. Changed military routes due to use of nautical miles for airway widths. Described sensitivity analysis performed as part of ALOHA/chemical hazards analysis. Corrected error on incident radiation.
2.3; Tables 2.3-1R, 2.3-15R thru 2.3-17R, & 2.3-201 thru 2.3-219	Identified departure from DCD for measuring source to receptor distances for main control room χ/Q. Updated text with results from US-APWR environmental calculations for SACTI, Arcon96, Tornado Guidance, XOQDOQ, and Snow Load Parameters.

Revision 3

Section	Changes
2.4, 2.4.1, 2.4.3, 2.4.5, 2.4.6, 2.4.8, 2.4.9, 2.4.11, 2.4-221, 2.4-222 & 2.4-223; Tables 1.8-204, 2.4-1R, 2.4-6R & 2.4-201; Figure 2.4-14R	Revised to provide elevations in both NAVD88 and NGVD29 datums, and to incorporate the 3-inch normal pool level increase.
2.4.2, 2.4-203; Tables 1.8-204, 2.4-201 thru 2.4-204; Figures 2.4-201 thru 2.4-203	Provided elevations in NAVD88 and NGVD29 datums. Updated HEC-RAS version.
2.4.2.3	RAI 02.04.02-4, Verifying Grading/Drainage Details with PMP Analysis RAI 02.04.02-5, Protection of Storm Water Drainage Facilities RAI 02.04.02-7, Margin at Dike Dividing Unit 3 and Units 1/2 Sites
2.4.12, 2.4.13, 3.4.1.2; Tables 1.8-202, 2.4-15R thru 2.4-17R & 2.4-205, 2.4-206, 2.4-207, 2.4-211 & 2.4-212; Figures 2.4-205 thru 2.4-220	Revised to provide elevations in both NAVD88 and NGVD29 datums.
2.5.2; Table 2.5-201; Figures 2.5-201 & 2.5-202a	Moved FIRS to Section 3.7.1 The GMRS redefined as equivalent to hard rock SSE in the SSAR. Aligned the horizontal and vertical spectra in Table 2.5-201 with expectations in the DCD, RG 1.206, and RG 1.208. Added figure to show the high- and low-frequency rock spectra. Deleted Tables 2.5-202 thru 2.5-204 and Figures 2.5-203 thru 2.5-208.
2.5.4, 2.5.4BB, 2.5.4CC, 2.5-218, 2.5-222; Tables 2.5-205 thru 2.5-216; Figures 2.5-209 thru 2.5-254	Removed metric units, RCTS testing commitments, and dynamic at rest lateral earth pressure calculation. Completed and taken samples of new borings.
3.7, 3.8; 2.0, 2.5, 19.1	Identified departures from DCD related to seismic exceedances and seismic analysis methodologies.
8.1, 8.2; 1.9	Identified departure from DCD related to GDC 2 and 4 applicability to offsite power system.
9.2	Identified departure from DCD's non-essential service water system's design service water temperature.
9.2, 9.3, 9A; 1.2, 3.2, 3E, 7.4, 10.4, 11.2–11.5, 12.2, 12.3, 14.2, 14A	Identified departure from DCD for replacement of Boron Recycle System with Degasifier subsystem.
9.5; 1.2, 1.9, 3.5, 3.7, 3.8, 8.3, 19A	Identified departure from DCD regarding PSFSVs' elevation.
10.1, 10.2, 10.4; 1.2, 3.5, 9A, 11.5, 12.3	Revised to reflect changes in the steam turbine type.
10.1, 10.2, 10.4; 1.2, 9A, 11.5, 12.3	Revised to reflect change in condenser type from Standard US-APWR single pressure to multi-pressure.

Revision 3

Section	Changes
10.4.5	Revised to reflect Unit 3 site specific requirements.
11.3; Tables 11.3-6R thru 11.3-9R, & 11.3-202 thru 11.3-203; Figure 11.3-201	Revised to reflect changes in food production rates within 50 miles of the plant and the resulting population doses. Tables 11.3-6R through 11.3-9R revised to conform to formatting guidelines.
11.4, 13.8	Revised to relocate operational program information from Section 11.4.2.3 to new Section 13.8.
Appendix 11AA	Revised description of Interim Radwaste Storage Facility.
12.1, 12AA	Reflected updated NEI reports. Deleted Appendix 12AA.
12.5, 12.5.5, 12A, 12B & 12BB; Table 13.4-201	Revised Section 12.5 to update the NEI template version, to utilize NEI 08-08A, to update treatment of bracketed text in NEI 07-03A, and to add access controls for an interim radwaste storage facility. Deleted Appendices 12A, 12B & 12BB.
13.1, 13AA; Tables 1.9-202, 13.1-201, & 13.1-202; Figures 13.1-203, 13.1-204, 13.1-205 & 13AA-201	Generally, the organizational structure described in the NAPS ESBWR COLA was retained, except as specified below. Revised Section 13.1 to conform to US-APWR DCD and R-COLA IBR and subsection numbering scheme and to designate sections that meet COL items. Revised Table 13.1-201 to update expected numbers of positions, to update titles from ANS 3.1, to modify site specific titles to conform to current Dominion practices, and to delete the information for expected staffing numbers prior to the operational phase. Revised Table 13.1-202 to reflect concurrent compliance with Technical Specifications, Emergency Plan, and fire brigade staffing requirements. Revised Figure 13.1-203 to reflect concurrent compliance with Technical Specifications, Emergency Plan, and fire brigade staffing requirements. Revised Figure 13.1-204 to change reporting relationship of Document Control & Records Manager.
13.2, 13BB	Deleted Appendix 13BB to conform to US-APWR R-COLA format.
13.4; Table 13.4-201	Revised Table 13.4-201 regulatory references for fitness for duty and security-related programs.
13.7; Table 13.4-201	Revised Section 13.7 to add revision and date information for NEI 06-06. Moved 13.7.1 to 13.7.2 and inserted new 13.7.1. Revised Table 13.4-201 to add NRC-suggested milestones.
14.1, 14.2; 3.9, 6.2, 6.3, 6.5	Identified departures from DCD for ITP administration, scope, and organization.

Revision 3

Section	Changes
17 through 17.3, 17.5, 17.6, 17AA; Table 13.4-201	Revised to reflect latest revision of NEI 06-14. Section 17.5 revised to differentiate between versions of QAP in effect prior to and after June 30, 2009, and to identify Appendix 17AA for a description of the program. Table 13.4-201 revised to indicate programmatic information for the QAPD and the Maintenance Rule Program.

Revision 2

Section	Changes
Table 1.9-201	Revised to indicate conformance with SRP 11.4.II.10.
11.4.1	Incorporated a description of the long-term interim low-level radioactive waste storage space in the Radwaste Building and to identify the increased storage as a departure from the ESBWR DCD. Editorial change.
11.4.2.2.4	Revised to provide a description of, and requirements for, the long-term interim low-level radioactive waste storage space in the Radwaste Building, including an estimate of the amount of waste storage capacity, shielding for Class B and C waste storage, handling and integrity requirements, and requirements for crane design features.

Revision 1

Section	Changes
Chapter 1, 1.1-1-A, 1.8.2, 3.7.2.4, 3D, 3E, 6.1, 6.2.1.6, 8.2.4, 12.4.9, 13.6.2, 17.3	Updated titles and numbering to align with DCD R5.
1.1.1.6, 1.1.1.7, 1.1.1.3, 1.1.2.1, 1.1.2.2, 1.1.2.4, Table 1.1-201, 1.3, 1.6, Tables 1.6-201, 1.7-201, 1.7-202, 1.8-201, 1.8-202, & 1.8-203	Modified LMAs. Deleted NEI 03-12, Appendix F and NEI 06-06. Editorial changes added CDI entries for Zinc Injection System.
1.1.1.7, 1.1.1.1, 1.1.2.1, 1.1.2.2, 1.1.2.4, Table 1.1-201, 2.3-203, 2.5.4.10, 14.3A-1-1, 19.5, 19AA.2	Editorial updates/corrections.
1.1.1.7, Figure 9.5-201, 9A.1, 9A.3.1, 9A.4.7, Table 9A.5-7 Revisions, Table 9A.5-7 Departure	RAI NA3 09.05.01-17, Firewater Supply Locations
1.1.2.7	Revised estimated gross and net electrical power output.
1.1.2.8	Revised estimated key milestones.

Revision 1 *(continued)*

Section	Changes
Table 1.1-201, 1.8.3, 1.8.4, 1.8.201, 1.8.202, Tables 1.8-202 & 1.9-205, 1.10, 1.10-201, 1.10-202, Table 1.10-202, 2.0, 2.0-201, 2.0-203, Table 2.0-201, 2.1.2.1, 2.4.13, Section 2.5.1.2.3.k, Section 2.5.1.2.6.b, Section 2.5.1.2.6.g, Section 2.5.4.2.5.b Structural Fill, Section 2.5.4.5.2.b, 2.5.4.5.3, 2.5.4.8, Figure 2.5-253, 12.2-201, 12.2-202, 15.6	Revised to reflect issuance of ESP-003.
1.2.2.12.7, Table 1.8-203, 9.2.1.2	Added NAPS CDI for Plant Service Water System.
1.2.2.16.10	Updated action statement to align with DCD R5.
1.2.2.16.10, Tables 1.8-203, 1.10-201 & 3.2-1; Appendix 9A (Contents), 9A.1, 9A.3.1, 9A.4.7, 9A.5.12, 9A.7-2-A	Removed references to warehouse and cold machine shop (1.2.2.16.10). Added CDI for (no) cold machine shop (Table 3.2-1) and no warehouse, 9A1, 9A.2.1, 9A.3.1, 9A.4.7. Updated section number for Water Treatment Building (9a.5.12, Tables 1.8-203 & 1.10-201; 9A.7-2-A).
1.3.1	Changed title of 1.3.1.
Tables 1.6-201, 1.9-201, & 1.9-203; 13BB	Updated NEI 06-13A to Rev. 1. Incorporated NEI 06-13A, Revision 1.
Table 1.6-201, 11.4.2.3.5, 11.4-201	Corrected NEI 07-10 title and revision.
Table 1.6-201, 12.2.2.4.2, Tables 12.2-15R, 12.2-18aR & 12.2-20aR	Deleted NEI 07-11 (Table 1.6-201). Editorial changes to align with RAI 11.02-1 response (12.2.2.4.2). Aligned with DCD R5 changes and added LMAs (Tables 12.2-15R, 12.2-18aR, & 12.1-20aR) RAI 11.02-1, Liquid Waste - Cost Benefit Analysis.
Table 1.6-201, 13AA.2.3, 13AA.2.4, 13BB	RAI NA3 13.02.01-1, NEI-06-13-A Revision 1 in FSAR
Table 1.6-201, 17.5, 17.5-202	Specified QAPD tie to NEI 06-14A.
Table 1.6-201, 17.6.3	RAI NA3 17.06-1, Maintenance Rule
Tables 1.8-201, 12.2-18bR & 12.2-203	RAI NA3 12.02-10, Clarification of FSAR Tables in Chapter 12, FSAR Table 12.2-17R Update w/Data on Radionuclide Ratios
Tables 1.8-202 & 1.10-201, 2.0, 2.0.1, Tables 2.0-2R & 2.0-201, 2.3.5.1, Tables 2.3-208 thru 2.3-215, 2A, Table 2A-4R	Updated to align with DCD R5.
Tables 1.8-202 & 2.0-201	RAI NA3 15.06.05-1, Radiological Consequence Doses - Evaluation Factors

Revision 1 *(continued)*

Section	Changes
Table 1.8-202; 12.2.2.2.2, 12.2.2.2.6, 12.2.2.4.2, 12.2.2.4.4; Tables 12.2-15R, 12.2-17R, 12.2-18bR, 12.2-201, 12.2-203, & 12.2-204	RAI NA3 12.02-1, Dose Analysis
Tables 1.8-203 and 1.10-201, 11.2, 11.2.2.3, 11.4, 11.4.2.3.5, 11.4-1-A, Table 11.5-201	Changed “mobile” liquid and solid radwaste systems to “process” systems.
1.9.2, 1.9.3, Tables 1.9-201, 1.9-202, 1.9-203, 1.9-204, 1.9-205, and 1.10-202, 1.11.1, 1C.1	Miscellaneous clarifications and corrections.
Table 1.9-201	Updated evaluation for SRP Section 6.5.1 to conform to DCD R5 changes. RAI NA3 08.02-18, GDC-2 Applicability, RAI NA3 08.02-20, BTP 8-3 Applicability, RAI NA3 08.02-21, BTP 8-5 Applicability, RAI NA3 08.02-22, BTP 8-6 Applicability, & RAI NA3 17.05-1, Comparison of QAPD and SRP 17.5 Criteria.
	Revised evaluation of BTP 8-2 to align with DCD R5.
Tables 1.9-201 and 1.9-202	Revised conformance evaluation for SRP 5.4.13 acceptance criterion 4 (Table 1.9-201) and for RG 1.93 (Table 1.9-202).
Tables 1.9-201, 1.9-203 & 1.10-201	Updated references to DCD R5. Editorial corrections.
Table 1.9-201	Updated turbine model number.
Tables 1.9-201, 1.9-202, & 1.9-204, 14.2.9.1.3	RAI NA3 14.02-5, Personnel Monitors and Radiation Survey Instruments
Tables 1.9-201 & 1.9-202	RAI NA3 14.02-6, Site-Specific Preoperational Test
Table 1.9-201, 13.1.1.2.1, 14AA.2.2.10, 17.5, 17AA	QA Policy incorporated in QAPD.
Table 1.9-202	Updated/corrected RGs 1.26 and 1.29.
Table 1.9-202	Changed RG 1.29 commitment from Rev. 4 to Rev. 3. Changed RG 4.15 commitment from Rev. 2 to Rev. 1. Editorial changes.
	Changed RG 1.40 to “Conforms” and RG 1.136 to reflect DCD R5 corrections.
	RAI NA3 03.02.01-3, RG 1.29 Revision Clarification
	RAI NA3 08.03.02-2, RGs 1.41, 1.128, 1.129 Conformance Clarification
Tables 1.9-202 & 1.9-203	RAI NA3 12.03-12.04-9, Editorial Corrections

Revision 1 *(continued)*

Section	Changes
Tables 1.9-202 & 1.9-204	Added an exception to RG 1.8 in Table 1.9-202; revised NQA-1 year/title in Table 1.9-204.
Table 1.9-202, 3.9.2.4	RAI NA3 03.09.02-2, FIV Program Schedule for Reactor Internals
Table 1.9-202. 13.1.1.2.1, 13.1.1.2.10, 13.1.2.1, 13.1.2.1.1, 13.1.2.1.1.2, 13.1.2.1.1.9, 13.1.2.1.1.10, 13.1.2.1.5, Table 13.1-201, Figure 13.1-204	RAI NA3 13.01.02-13.01.03-1, Fire Protection Organization
Table 1.9-202, 17AA	RAI NA3 03.02.02-1, RG 1.26 Revision Clarification
Table 1.9-203	Added conformance evaluations for RG Positions C.III.1.5.4.3 through C.III.1.5.4.13.
Table 1.9-203	RAI NA3 14.03.10-1.4, ITAAC for Offsite Full Participation Exercise
Table 1.9-204	RAI NA3 09.05.01-9, COLA Reference to NFPA 55
	Added NERC standards.
Table 1.9-204, 2.3.1.3.1, 2.3-204, 2.3-205, 2.3-206	RAI NA3 02.03.01-1, Wind Speed Values
Table 1.9-204, 2.3.2.3.1, 2.3.2.3.2, Section 2.3 References	RAI NA3 02.03.02-1, Local Meteorology
Table 1.9-205, 2.2.3.1.1, 2.2-213, 2.2-214, 2.2-215	RAI NA3 02.02.03-1, Explosion Hazard - Underground Gasoline Storage Tanks
Table 1.10-201	Updated to align with DCD R5 changes; revised COL Item 12.3-3-A from applicant to holder.
	Corrected referenced section for COL Item 8.2.4-5-A.
Table 1.10-201, 3.6	Deleted COL Item 3.6.5-1-A.
Table 1.10-201, 3.11.4.4, 3.11.7, 3.11-1-A	Added reference to DCD EQ Program description. Administrative changes to reflect DCD R5 numbering and title changes.
Table 1.10-201, 4.3.3.1, 4.3-1-A, 4A.1	Editorial changes to align with DCD R5; revised COL items 4.3-1-A and 4A-1-A.
Table 1.10-201, 5.2.4, 5.2.4.11, 5.2.5, 5.2-1-A, 5.2-2-H, 5.2-3-A	Revised 5.2-1-H to 5.2-1-A. Added Section 5.2.5 to COL Item 5.2-2-H. Added COL Item 5.2-3-A and updated associated content accordingly. Updated to align with DCD R5.
Table 1.10-201, 5.2.4.3.4, 5.2.4.6, 5.2-1-A, 6.6.6	Editorial corrections related to COL Item 5.2-1-A.
Table 1.10-201, 5.3.1.5	Revised for future submittal of PTLR curves.

Revision 1 *(continued)*

Section	Changes
Table 1.10-201, 6.1	Incorporated deletion of COL Item 6.1.3-1-A in DCD R5.
Table 1.10-201, 6.2.4.2, 6.2-1-H	Updated to align with DCD R5 changes related to COL Item 6.2-1-H.
Table 1.10-201, 6.6, 6.6.2, 6.6.7, 6.6.7.1.1, 6.6.7.1.2, 6.6.7.1.4, 6.6.7.1.5, 6.6.7.1.6, 6.6.7.1.7, 6.6-2-A, 6.6.12	RAIs NA3 10.03.06-1, FAC - Construction Phase, 10.03.06-2, FAC - Baseline Thickness, and 14.02-1, Initial Plant Test - Switchyard Components. Added COL Item 6.6-2-A to align with DCD R5. Added weld accessibility controls description.
Table 1.10-201, 9.1.1.7, 9.1.4.13, 9.1.4.19, 9.1.5.8, 9.1-4-A	Added Section 9.1.1.7. Revised COL Item 9.1.6-4-A to 9.1-4-A to align with DCD R5.
Table 1.10-201, 9.2.5, 9.2.5-1-H	COL Item 9.2.5-1-A changed to 9.2.5-1-H in DCD R5.
Table 1.10-201, 9.5.1.12, 9.5.1.15.3, 13.1-1-A, Appendix 13AA	Editorial changes to align with DCD R5 related to deleting STD SUP 9.5.1-2 and adding COL Items 9.5.1-7-H and 13.1-1-A.
Table 1.10-201, 9.5.1.15.2, 9.5.1-9-A	RAI NA3 09.05.01-1, Fire Protection Program Change Process
Table 1.10-201, 9.5.2.2, 9.5.2.5-1-A, 9.5.2.5-2-A, 9.5.2.5-3-A, 9.5.2.5-4-A, 9.5.2.5-5-A	Changed COL Item 9.5.2.5-1-A to 9.5.2.5-3-A. Added COL Items 9.5.2.5-4-A and 9.5.2.5-5-A.
Table 1.10-201, 10.2.3.4, 10.2.5	Added description of plant-specific turbine maintenance and inspection program. Acknowledged permission to use bounding property values in turbine missile evaluations until actual material specimens are available.
Table 1.10-201, 11.4.1, 11.4.2.3.5, 11.4-1-A, 11.4-2-A, 11.4-3-A	Updated to align with DCD R5. Editorial corrections.
Table 1.10-201, 11.5.7	Deleted references to Section 12.2.
Table 1.10-201, 11.5.4.6, 11.5.4.7, 11.5-1-A, DCD Table 11.5-2, DCD Table 11.5-4	Editorial corrections related to title changes and to add a description of process radiation monitoring procedures.
Table 1.10-201, 12.2.1.5, 12.2-4-A	RAI NA3 12.02-4, STD SUP 12.3-4-A Not Included
Table 1.10-201, 12.5-2-A	Changed title of COL Item 12.5-2-A.
Table 1.10-201, 12BB, 13.6.6, 16.0.1, 16.0-1-A, 16.0-2-H	Editorial corrections. Updated to align with DCD R5 COL Items 16-0-1-A & H, and to address NEI template 07-03 in Appendix 12BB.
Table 1.10-201, 13.6.1.1.3, 13.6.1.1.5, 13.6.1.1.8, 13.6.2, 13.6.3	Updated to align with DCD R5 changes. Added 10 new COL items to Section 13.6.

Revision 1 *(continued)*

Section	Changes
Tables 1.10-201 & 13.4-201, 6.6, 6.6.2, 6.6.7.1	Added new COL Item. RAI NA3 10.03.06-1, FAC - Construction Phase (Added description of augmented ISI program). RAI NA3 10.03.06-2, FAC - Baseline Thickness (Added discussion of controls to ensure accessibility for PSI and ISI NDE. Added reference to FAC program.)
Table 1.10-201, 14.2.2.1, 14.2.2.2, 14.2.7, 14.2.9, 14.2.10	Updated to align with DCD R5 changes related to new COL Items 14.2-1-1 and 14.2-5-A.
Table 1.10-201, 14.3A	Added Appendix 14.3A to align with DCD R5.
Table 1.10-201, 17.4.1, 17.4.6, 17.4.9, 17.4.10, 17.4-1-H	Updated to reflect DCD R5 changes to COL Item 17.4-1-A.
Table 1.10-201, 18.13, 18.13.3, 18.13.5	Added COL Item 18.13-1-H.
2.0, Tables 2.0-2R, 2.0-201 thru 2.0-203, Figures 2.0-201 thru 2.0-207, 2.1.1.1, 2.1.1.2, 2.1.2.1, Figure 2.1-201, 2.2.2.6.1, 2.2.2.6.2, 2.2.3, 2.2.3.2.2, 2.2.3.4, Tables 2.2-201 thru 2.3-204, Figure 2.2-201, 2.3.1, 2.3.1.3.4, 2.3.2, 2.3.2.3, 2.3.3, 2.3.3.1.2, 2.3.4.1, 2.3.4.3, 2.3.5, 2.3.5.1, Tables 2.3-17R thru 2.3-203, 2.3-201	Editorial corrections.
Table 2.0-201	RAI NA3 02.03.01-3, Clarification of Ambient Temperatures
	RAI NA3 02.05.04-6, Allowable Dynamic Bearing Capacity Differences
Table 2.0-201, 2.3.3.1.2, 2.3.4.1	Updated tallest structure information.
Table 2.0-201, Figure 2.3-201	Updated to reflect GEH analysis. Added Fuel Building information, added Radwaste Building unfiltered inleakage information, deleted Fuel Building Cask Doors information, and added Reactor Building TSC information.
Table 2.0-201, 2.3.1.2, 2.3-207	RAI NAPS 02.03.01-2, 10 CFR 52.79(a)(1)(iii) Dry/Wet Bulb Temperatures
Tables 2.0-201, 2.3-15R, 12.2-18bR, 12.2-201 & 12.2-203, 2.3.5.1, 12.2.2.4.4	RAI NAPS 02.03.05-2, Clarification of χ/Q and D/Q Values, FSAR Table 2.3-16R vs. ER Table 2.7-4 re: EQ
Figure 2.0-205	Updated building coordinates to align with DCD R5.
Figure 2.1-201	Updated to align with DCD R5 (cooling tower pond, construction zones, and plot plan background).

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Section	Changes
Table 2.2-202	Added Ancillary Diesel Building data.
Tables 2.2-202, 2.2-203, & 2.2-204	Updated chemicals and chemical quantities for Unit 3 and removed Units 1 & 2 chemicals.
2.3.2.3.2	Clarification of RAI NA3 02.03.02-1, Local Meteorology, response.
2.3.4.3	Added TSC and renumbered Table 2.3-205 to 2.3-207.
2.3.5.1	RAI NA3 02.03.05-1, χ/Q and D/Q Values
2.3.5.1, Table 2.3-15R	Updated receptor distances.
2.3.5.1, Tables 2.3-204 thru 2.3-215	RAI NA3 02.03.05-3, Long Term (Routine) Diffusion Estimates
Tables 2.3-201 thru Tables 2.3-207	Updated to reflect GEH analysis. Inserted two new tables.
2.4.1, 2.4.1.1, 2.4.2, 2.4.2.2, 2.4.2.3, 2.4.3, 2.4.4, 2.4.5, 2.4.6, 2.4.7, 2.4.7.2, 2.4.7.4, 2.4.7.5, 2.4.7.6, 2.4.8, 2.4.9, 2.4.10, 2.4.11, 2.4.11.5, 2.4.11.6, 2.4.12, 2.4.12.1.2, 2.4.12.1.3, 2.4.12.3, 2.4.12.4, 2.4.13, 2.4.14, Tables 2.4-15R thru 2.4-17R, Tables 2.4-201 thru 2.4-212, 2.5.1, 2.5.1.2.3, 2.5.1.2.6, 2.5.1.2.7, 2.5.2, 2.5.2.5, 2.5.2.6.7, 2.5.2.6.8, 2.5.2.6.9, 2.5.2.6.10, 2.5.4, 2.5.4.3, 2.5.4.5.3, 2.5.4.5, 2.5.4.6, 2.5.4.6.3, 2.5.4.7, 2.5.4.7.1, 2.5.4.7.2, 2.5.4.7.4, 2.5.4.8, 2.5.4.10, 2.5.4.10.1, 2.5.4.10.2, 2.5.4.11, 2.5.4.12, 2.5.5, 2.5.5.1.2, 2.5.5.1.3, 2.5.5.2.3, 2.5.5.2.4, 2.5.5.3, 2.5.6, Tables 2.5-201 thru 2.5-219, Figures 2.5-201 thru 2.5-276	Miscellaneous editorial changes (LMAs, delimiters).
2.4.2.3, Tables 2.4-201 thru 2.4-204, Figures 2.4-201, 2.4-203, 2.4-204, & 2.4-206 thru 2.4-216	Updated to align with DCD R5; revised Section 2.4 based on DCD R5 impacts.
2.4.14	Corrected typographical error.
Tables 2.4-15R	Added note explaining WP-3 “?” value.
2.5.4.5.3	RAI NA3 02.05.04-3, Material and Engineering Properties of Backfill
2.5.4.8, 2.5.4.10, Table 2.5-213	Corrected seismic classification of Turbine Building to align with DCD R5.

Revision 1 *(continued)*

Section	Changes
2.5.4.10, Tables 2.5-213 & 2.5-215, Figures 2.5-209 thru 2.5-215, 2.5-221, 2.5-222, 2.5-229 thru 2.5-234, 2.5-252, 2.5-255	Updated to align with DCD R5.
Table 2.5-213	Updated Radwaste Building seismic reference.
2.5.4AAS1, 2.5.4AAS2	Revised title on link page. Added MACTEC Geotechnical Data Report Supplement 2.
3.2, 4.2, 9.3.10.2, 9.5.1.4	Added metric values and deleted STD COL 4.2.6 from Section 4.2.
3.7.1.1, 3.12	Editorial changes.
3.7.2.8	Updated action statement to account for DCD R5 changes.
3.9.3.7.1(3)e, 3.9.3.7.1(3)f, 3.9.6, 3.9.6.1, 3.9.6.1.4, 3.9.6.1.5, 3.9.6.5, 3.9.6.6, 3.9.6.7, 3.9.6.8, 3.9.8, 3.9.10, Table 13.4-201	Expanded IST Program Description.
3.9.3.7.1(3)f, 3.10.1.4, 3.11.2.2, 3.11-1-A, 3.12	Added supplement separator line. Corrected EQD definition. Added dotted lines to signify supplement information within a supplement.
3.9.3.7.1(3)f	RAI NA3 03.09.03-2, Update Reference to Snubber ITAAC Table
3.9.6.8	RAI NA3 03.09.06-3, Dynamic/Static Testing of AOVs
	Clarified IST description for other than air-operated, power-operated valves.
3.10.1.4, 3.10.4	Added commitment to provide an implementation schedule for seismic and dynamic qualification of mechanical and electrical equipment. Updated title to DCD R5.
3.11-1-A	Editorial correction.
3.11.4.4	RAI NA3 03.11-1, EQ Process Implementation; RAI NA3 03.11-2, DCD EQ Approach Implementation; & RAI NA3 03.11-3, Additional EQ Approach Implementation
4.2, 4.3, 4A	Editorial changes.
4.2	Revised to be all IBR. Editorial changes. Deleted COL Item 4.2.6.
5.2.1.1	RAI NA3 05.02.01.01-1, ASME BPV Code + ASME Code for O&M
5.2.1.2	RAI NA3 05.02.01.02-1, Code Cases Not in EWBWR DCD re: ASME BPV or OM Codes

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Section	Changes
5.2.4, 5.2.4.2	RAI NA3 05.02.04-3, PSI Exams Equivalent to Inservice Inspection (ISI) Exams
5.2.4.3.4, 5.2.4.6, 6.6.6	RAI NA3 05.02.04-4, Incorporating Limits of 10 CFR 50.55a(b)(2)
5.2.5.9	RAI NA3 05.02.05-1, Leak Detection Monitoring
	Restored sentence proposed to be deleted per RAI 05.02.05-1.
5.3.1.5	Added 5.3.1.5 to include a commitment to PT LR.
5.3.1.8, 5.3.1.8.1, 5.3.1.8.2, 5.3.1.8.3, 5.3.1.8.4, Table 5.3-201	Revised 5.3.1.8 and added Table 5.3-201 to include information provided in response RAI NA3 05.03.01-1, Reactor Vessel Surveillance Capsule Program.
6.2.4.2, 6.4.4	Corrected LMA. Editorial change.
6.4.5	Revised action statement to delete last paragraph of DCD Section 6.4.5.
	Updated to reflect GEH analysis.
6.6.7.1.3	Replaced “initial inspections” with “preservice inspections.”
6.6.10.2	Editorial changes.
6B	Updated title per DCD R5.
6D	Added Appendix 6D.
6E, 6G, & 6I	Added appendices 6E, 6G, & 6I.
6F	Added Appendix 6F.
6H	Added to reflect DCD R5 addition of Appendix 6H.
8.2.1.2	RAI NA3 08.02-2, Cable Routing Intermediate Switchyard; & NA3 RAI 08.02-4, Potential Cable Degradation
	RAI NA3 08.02-29, Underground Cable Testing
8.2.1.2, 8.2.1.2.1, 8.2.1.2.2, 8.2.2.1, 8.2.3, 8.2.4-5-A, 8.2-201, 8.2-202, Figures 8.2-202 & 8.2-203, 8.3.2.1.1, 8A.2.1	Editorial corrections. Added 8.2.3.
8.2.1.2.1	RAI NA3 08.02-25, Surge and Lightning Protection Description
8.2.1.2.2	RAI NA3 08.02-7, Protective Relay Acceptance
8.2.1.2.3	RAI NA3 08.02-8, Industry Standards for Switchyard; & NA3 RAI 08.02-9, Transformer Testing Inclusion

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Section	Changes
8.2.2.1	RAI NA3 08.02-13, Clarify Tech Spec Reference
	RAI NA3 08.02-32, 34.5 kV Loads Impact on Grid Stability
Figure 8.2-201	RAI NA3 08.02-1, Switchyard Figure Discrepancy
	RAI NA3 08.02-30, Identify Switchyard Transformers
Figures 8.2-201 & 8.2-202	Added new bay to connect 500 kV Ladysmith line.
8.3.2.1.1, 8.3.5, 8.3-201	RAI NA3 08.03.02-1, SBO Response Procedures
9.1.4.13, 9.1.4.19	Editorial changes.
9.1.5.6	RAI NA3 09.01.05-1, Size and Rating Requirements for Slings
9.1.5.9, 9.1-5-A	RAI NA3 09.01.05-2, Heavy Load Equipment Outside Scope of DCD
9.2.1.2, 9.2.4.2, 9.2.4.3, 9.2.4.5, Figure 9.2-203, 10.4.2.2.3, Table 11.5-201	RAI NA3 11.05-2, Process and Effluent Monitoring
9.2.1.2; Tables 9.2-2R, 9.2-202, 9.2-203, & 9.2-204; Figures 9.2-201, 9.2-202, 9.2-203, 9.2-204, & 9.2-205; 9.3.9.1, 9.3.9.2, 9.3.9.2.1, 9.3.9-2-A, 9.5.1.4, 9.5.1-1-A, DCD Table 9.5-2, 9.5.4.2, 9A.4.7	Corrected and added LMAs. Corrected section titles. Added commitment to update FSAR with detailed fire hazards analysis information.
9.2.1.2	RAI NA3 09.02.01-3, PSWS Material Selections Based on Water Quality
9.2.1.2, Table 9.2-2R	Updated to align with DCD R5 related to valve and strainer terminology, cooling tower capacity, and elimination of AOVs.
9.2.3.2	Aligned terminology with DCD R5 related to shutdown/refueling/startup and water storage tanks.
Figure 9.2-201	RAI NA3 09.02.01-1, Cooling Tower Performance Capability
Figures 9.2-202 & 9.2-203	Deleted the Potable Water System connection to the Turbine Building. Added a PWS connection to the Ancillary Diesel Building. Changed Security Building to Guard House, Intake Structure to Station Water Intake Building, and Hot/Cold Machine Shop to Hot Machine Shop (Figure 9.2-202). Changed Security Building to Guard House, Hot/Cold Machine Shop to Hot Machine Shop, and deleted the Sanitary Waste Discharge System connection to the Turbine Building (Figure 9.2-203).
Figure 9.2-204	Revised to reflect Plant Cooling Tower Makeup System design changes.

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Section	Changes
9.3.2.2	RAI NA3 09.03.02-1, Sampling Containment Atmosphere
9.5.1.4	RAI NA3 09.05.01-8, Quality of Fire Water Sources
9.5.1.4, Figures 9.5-202 and 9.5-203	Updated to align with DCD R5 changes related to the capacity of the secondary firewater source. Added LMAs.
9.5.4.2	RAI NA3 09.05.01-15, Fire Barrier Testing
	Editorial changes.
Table 9.5-201	Added NFPA codes and NEIL.
Figure 9.5-201	Deleted Cold Machine Shop & Office Building, and updated general arrangement.
Figure 9.5-202	Changed “Intake Structure” to “Station Water Intake Building” and updated general arrangement.
Figure 9.5-203	Added Cooling Tower Maintenance Building, Hybrid Cooling Tower Electrical Room, and Dry Cooling Tower Electrical Room.
9.5.1.15.6	RAI NA3 09.05.01-5, Control of Combustibles in Rooms Adjacent to MCR; RAI NA3 09.05.01-6, Control of Combustibles Below Floor in MCR Complex; RAI NA3 09.05.01-7, Control of Combustibles in Computer Rooms; & RAI NA3 09.05.01-13, Storage of Hazardous Chemicals
9.5.1.15.6, 9.5.1-8-A	Aligned titles with DCD R5.
9.5.1.15.9	RAI NA3 09.05.01-11, Fire Protection Program QA
9.5.4.2	Added treatment of Ancillary Diesel Generators.
	RAI NA3 09.05.04-2, Diesel Fuel Oil for Seven-Day Loaded Run
	RAI NA3 09.05.04-4, Fuel Oil Transfer System Corrosion Control
	Updated to align with DCD R5 related to material and corrosion protection for underground systems; and editorial changes to RAI NA3 09.05.04-4 markups.
	RAI NA3 09.05.04-6, Corrosion Protection Systems
9.5.5	Corrected title to agree with DCD.
9A.1, 9A.3.1	Deleted reference to Station Water Pump House.
9A.2.1	Deleted reference to Tables 1.9-202 and 1.9-203.
Table 9A.5-7 Revisions	Revised applicable fire areas.
	Added F7500 to deleted fire area list. Removed Table 9A.5-7 Departure added by RAI NA3 09.05.01-17, Fire Water Supply Locations.

Revision 1 *(continued)*

Section	Changes
Table 9A.5-7R	Completed to-be-done items with available information and updated design basis fire impact on safe shutdown. Added Fire Areas F7155, 7165, 8182 & 8201.
Figure 9A.2-33R	Revised site plot plan.
Figures 9A.2-201 thru 9A.2-204	Updated general arrangement; added LMA.
Figures 9A.2-205 & 9A.2-206	Deleted “Cold” machine shop; updated general arrangement; added LMA.
9A.5.12	Clarified commitment item.
10.2.3.4	Updated turbine model number.
10.2.3.6	Section inserted (new COL Item 10.2-1-A, Turbine Rotor Maintenance).
10.2.3.8	Section inserted (new COL Items 10.2-2-A, Turbine Missiles.
10.4.2.2.1, 10.4.2.2.2	RAI NA3 10.04.05-1: Circulating Water Large Bore Piping Codes and Failures
10.4.2.5	RAI NA3 10.04.05-2: Flooding due to Hybrid Cooling Tower Failure
	Corrected CW minimum inlet temperature.
10.4.2.6	Inserted Section title.
Table 10.4-3R	Changed to reflect DCD R5 revisions.
Table 10.4-201	Corrected units of conductivity.
Figures 10.4-201, 10.4-202, & 10.4-203	Added LMAs. Editorial changes deleted reference to NEI Topical Reports not incorporated by reference.
11.2.1	RAI NA3 11.02-1, Liquid Waste - Cost Benefit Analysis
	RAI NA3 11.03-2, Cost Benefit for GWMS
11.2.2.3.3	Changed action statements to agree with DCD R5 modifications.
	RAI NA3 11.02-2, LWMS: Sampling Non-Radioactive Systems
11.3.1	RAI NA3 11.03-0, Gaseous Waste - Cost Benefit Analysis
11.4.1	RAI NA3 11.04-1A, Solid Waste - Cost Benefit Analysis
11.4.2.3.5	RAI NA3 11.04-2, SWMS: Sampling Non-Radioactive Systems
11.5.4.9	Added “sampling and analytical” to “frequencies” with respect to discussion radioactive gaseous and liquid wastes.
Table 11.5-201	Revised Note 1

Revision 1 *(continued)*

Section	Changes
12.1.1.3.1, 12.1.1.3.2, 12.1.1.3.3, 12.1.3, 12.1-1-A, 12.1-2-A, 12.1-3-A, 12.1-4-A	Added supplements to address ALARA DCD COL Items 12.1-4-A, 12.1-1-A, 12.1-2-A, & 12.1-3-A.
12.2.1.5	RAI NA3 12.02-6, Additional Contained Source Uses
	Corrected LMA delimiters to reflect Section 12.2.1.5, other Contained Sources, as DCD item.
12.2.2.4.4	Updated distance from ISFSI to nearest residence.
12.2.2.4.4, Table 12.2-203	RAI NA3 12.02-2, Dose Analysis and EPA Standards
	Changed ISFSI number of casks and dose contribution, and changed existing units and site total doses.
	RAI NA3 12.02-12, Dose Contributions
Table 12.2-18bR	Editorial clarifications to Note 4.
12.3, Tables 12.2-20bR & 12.2-201, 12A	Deleted LMA. Corrected table values from mSv to mrem. Corrected dose rate units. Editorial changes.
12.4.7.1	Changed section number to align with DCD Section 12.4 R5 changes.
12.5, 12.5.4	Editorial changes.
Tables 12.2-15R, 12.2-18bR & 12.2-204	RAI NA3 12.02-11, Clarify Information In Section 12 Tables
Tables 12.2-17R & 12.2-19bR	RAI NA3 12.02-3, Liquid Dose Offsite
12B	Added to reflect DCD R5 addition of Appendix 12B.
12BB	RAI NA3 12.03-12.04-2, Very High Radiation Area Drawings; and RAI NA3 12.05-2, Site-Specific Alterations to NEI 07-03
	Editorial
13.1, 13.1.1, 13.1.2.1.1.9, 13.1.2.1.1.12, 13.1.2.1.5, 13.1.3.1, Table 13.1-201, Figure 13.1-201, 13.6.2, 13AA, 13AA.1.4, 13AA.2.3	Corrected LMAs. Updated executive titles. Revised to specifically address NAPS ESP COL 13.6-1.
13.1.1	RAI NA3 17.05-7, Making Changes to Organizational Descriptions
13.1.1, 13.1.1.1, 13.1.1.2	RAI NA3 13.01.01-3, Corporate Organization
13.1.1, 13.1.1.2.10, 13.1.1.3.1.5, Figures 13.1-201 & 13.1-205	Updated corporate structure and responsibilities.

Revision 1 *(continued)*

Section	Changes
13.1.1.2, 13.1.1.2.1, 13.1.1.2.9, 13.1.1.3.1.7, 13.1.1.3.1.8, 13.1.1.3.2, 13.1.1.3.2.1, 13.1.1.3.2.2.1, 13.1.1.3.2.2.2, 13.1.1.3.2.2.3, 13.1.1.3.2.2.5, 13.1.2.1.1, 13.1.2.1.1.1, 13.1.2.1.1.2, 13.1.2.1.1.3, 13.1.2.1.1.8, 13.1.2.1.2, 13.1.2.1.2.1, 13.1.2.1.2.2, 13.1.2.1.2.3, 13.1.2.1.2.6, 13AA.1.9	Added component and project engineering. Changed SNSOC to FSRC. Revised the corporate director of nuclear engineering position description. Corrected the reporting relationship for the EPC in Appendix 13AA. Corrected/updated the reporting relationships in Figures 13.1-203 and 204. Resequenced the operations department functions (13.1.2.1.2).
13.1.1.2.1	RAI NA3 13.01.01-1, Guidance Regarding Outside Company Work
13.1.1.2.10	RAI NA3 13.02.02-1, SRP Section 12.2.2 re: Section 13.1
13.1.1.3, 13.1.1.3.1, 13.1.1.3.1.1, 13.1.1.3.1.2, 13.1.1.3.1.3, 13.1.1.3.1.4, 13.1.1.3.1.6, 13.1.1.3.1.7, 13.1.1.3.1.8, 13.1.1.3.2, 13.1.1.3.2.1, 13.1.1.3.2.2, 13.1.1.3.2.2.1, 13.1.1.3.2.2.2, 13.1.1.3.2.2.3, 13.1.1.3.2.2.4, 13.1.1.3.2.3, 13.1.1.3.2.4, 13.1.1.3.2.5, 13.1.1.3.2.6, 13.1.1.3.2.7, 13.1.1.3.2.8, 13.1.1.3.2.9	RAI NA3 13.01.01-2, Executive and Management Positions
13.1.2.1	RAI NA3 13.01.02-13.01.03-3, Plant Organization regarding Section 17.5
13.1.2.1.1.3	RAI NA3 13.01.01-4, Plant Maintenance Programs
13.1.2.1.2.2, 13.1.2.1.2.3	RAI NA3 13.05.02.01-2, Procedures in FSAR Section 13.5.2
13.1.2.1.5	RAI NA3 09.05.01-12, Fire Brigade Leader Qualifications
Figure 13.1-204	RAI NA3 13.01.01-6, Organizational Arrangement Regarding Nuclear w/ Corporate
13.3	Updated to align with DCD R5.
13.5, 13.5.1, 13.5.2, 13.5.2.1, 13.5.2.1.1, 13.5.2.1.2, 13.5.2.1.3, 13.5.2.1.4, 13.5.2.1.5, 13.5.2.1.6, 13.5.2.1.7, 13.5.2.2.1, 13.5.2.2.2, 13.5.2.2.3,13.5.2.2.4, 13.5.2.2.5, 13.5.2.2.6, 13.5.2.2.6.2, 13.5.2.2.6.4 13.5.2.2.6.5, 13.5.2.2.7, 13.5.2.2.8, 13.5.2.2.9, 13.5-5-A, 13.5-5-A, 13.5-6-H	Corrected LMA applicability and delimiter notations. Revised 13.5.2.2.6.5 to reference Section 9.1.5.8. Corrected titles for 13.5-5-A and 13.5-6-H.

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Section	Changes
13.5.2.1.4	RAI NA3 13.05.02.01-3, P-STGs from GTGs
	RAI NA3 13.05.02.01-4, P-SWG re: EOPs and P-STGs
	Editorial correction.
13.5.2.2.1	RAI NA3 13.05.02.01-1, Management of Radioactive Waste
13.7, 13.7-202	Deleted references to pending revision to 10 CFR 26.
Table 13.4-201	Corrected entries in the Section column.
	Deleted the reference to a construction test program in Item 19.
	Consolidated snubber testing and inspection information into new item 20.
14.2.1.4, 14.2.7, 14.2.9, 14.2.9.1.1, 14.2.9.2.1	Changed supplements from STD to site-specific. Added reference to Initial Test Program implementation milestones. Clarified treatment of startup test procedures. Editorial changes.
14.2.2.1, 14AA	RAI NA3 14.02-3, Initial Test Program Administrative Document
14.2.8.1.36	RAI NA3 14.02-1, Initial Plant Test - Switchyard Components
14.2.9.1.4	RAI NA3 14.02-1, Initial Plant Test - Switchyard Components
14.3.8, 14.3.9, 14.3-1-A	Defined EP-ITAAC. Updated to align with DCD R5 changes.
14AA	RAI NA3 14.02-3, Initial Test Program Administrative Document
14AA.2.2.10	Consolidated multiple IRB names to FSRC.
	Added alternated IRB titles.
14AA.3.4	RAI NA3 14.02-7, Subsection 14.AA.3.4 - License Amendment
17.0, 17.2, 17.2.1, 17.3, 17.3.1, 17.4.10, 17.5	Changed supplements from STD to site-specific. Added reference to Operational QA Program implementation milestones.
17.5	Editorial change.
17.6.3	Deleted incorrect cross-referenced sections.
17AA	RAI NA3 17.05-4, QAPD Organization Charts; RAI NA3 17.05-5, Correct CFR Citation to 10 CFR 52.79(a)(27); & RAI 17.05-6, Commitment to RG 1.137
19.5, 19AA	RAI NA3 19-1, PRA and Severe Accident Evaluation (Internal Flooding) & RAI NA3 19-2, PRA and Severe Accident Evaluation (Site-Specific)

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Acronyms/Abbreviations/Initialisms

χ/Q	relative concentration, in sec/m^3
°F	degrees Fahrenheit
ΔT	delta temperature (temperature difference or change)
A/B	auxiliary building
ABC	allowable bearing capacity
ABP	applied bearing pressure
ac	alternating current
ACI	American Concrete Institute
ALARA	as low as reasonably achievable
ALOHA	Areal Locations of Hazardous Atmospheres
ANS	American Nuclear Society
ANSI	American National Standards Institute
AOO	anticipated operational occurrence
ARD	automatic ringdown circuits
ARS	acceleration response spectra
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASSS	auxiliary steam supply system
ASTM	American Society for Testing and Materials
BACCP	boric acid corrosion control program
BAT	boric acid tank
BE	best estimate
BE-EPS/B	best estimate - east Power Source Building
BE-WPS/B	best estimate - west Power Source Building
BOP	balance of plant
C/V	containment vessel
CCDP	conditional core damage probability
CCF	common cause failure
CCTV	closed-circuit television
CCW	component cooling water
CCWS	Component Cooling Water System
CDF	core damage frequency
CEUS	Central and Eastern United States
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIS	containment internal structure
cm/sec	centimeters per second
CNO	chief nuclear officer
COL	Combined Operating License
COLA	Combined Operating License Application
COVRERP	Commonwealth of Virginia’s Radiological Emergency Response Plan
CPNPP	Comanche Peak Nuclear Power Plant

Acronyms/Abbreviations/Initialisms

CPT	cone penetrometer test
Cr	chromium
CRDM	control rod drive mechanism
CRE	control room envelope
CS/RHR	containment spray/residual heat removal
CS/RHRS	Containment Spray/Residual Heat Removal System
CSDRS	certified site design response spectra certified seismic design response spectra
CSS	Containment Spray System
CTW	cooling tower
C-U	consolidated-undrained
CV	control valve
CVCS	Chemical and Volume Control System
CWS	Circulating Water System
D/Q	deposition factor
DBA	design basis accident
DBFL	design basis flooding level
dc	direct current
DCD	Design Control Document
DOT	Department of Transportation
D-RAP	design reliability assurance program
DVI	direct vessel injection
EAB	exclusion area boundary
ECCS	Emergency Core Cooling System
ECL	effluent concentration limit
EFW	emergency feedwater
ENS	Emergency Notification System
EOF	emergency operations facility
EOL	end-of-life
EOP	emergency operating procedure
EPC	engineering, procurement, and construction
EPRI	Electric Power Research Institute
EPS/B	east Power Source Building
EQ	environmental qualification
EQSDS	equipment qualification summary data sheet
ER	Environmental Report
ERO	emergency response organization
ESF	engineered safety features
ESP	Early Site Permit
ESPA	Early Site Permit Application
ESW	essential service water
ESWP	essential service water pump

Acronyms/Abbreviations/Initialisms

ESWPT	essential service water pipe tunnel
ESWS	Essential Service Water System
ETR	energy transfer ratio
E-W	east-west
Fe	iron
FE	finite element
FFD	fitness for duty
FFT	Fast Fourier Transformation
FH/A	fuel handling area
FHA	fire hazard analysis
FIRS	foundation input response spectra
FMEA	failure modes and effects analysis
FOAK	first of a kind
FPP	fire protection program
FPS	Fire Protection System
FSAR	Final Safety Analysis Report
FSRC	Facility Safety Review Committee
FSS	Fire Protection Water Supply System
ft	feet
FV	Fussell Vesely
g	gravity
GA	general arrangement
GDC	General Design Criteria
GIS	Geographic Information System
GLBS	generator load break switch
GMRS	ground motion response spectra
gpd	gallons per day
gpm	gallons per minute
GTG	gas turbine generator
GWMS	Gaseous Waste Management System
HCLPF	high confidence of low probability of failure
HEPA	high-efficiency particulate air
HDPE	high density polyethylene
HF	high-frequency
HFE	human factors engineering
HIC	high integrity container
HPT	high-pressure turbine
hr	hour
HSS	high-safety-significant
HVAC	heating, ventilation, and air conditioning
I&C	instrumentation and control

Acronyms/Abbreviations/Initialisms

I/O	input/output
IAS	Instrument Air System
IBC	International Building Code
ICRP	International Commission on Radiation Protection
IDLH	immediately dangerous to life or health
IEEE	Institute of Electrical and Electronics Engineers
IRC	Independent Review Committee
ILRT	integrated leak rate test
IRSF	Interim Radwaste Storage Facility
ICEA	Insulated Cable Engineers Association
INPO	Institute of Nuclear Power Operations
ISFSI	independent spent fuel storage installation
ISI	inservice inspection
ISLOCA	interfacing system LOCA
ISRS	in-structure response spectra
IST	inservice testing
ITAAC	inspections, tests, analyses, and acceptance criteria
ITP	initial test program
JIT	just-in-time
JTG	Joint Test Group
ksi	kips per square inch
kW	kilowatts
LB	lower bound
LCCF	labor cost correction factor
LCO	limiting condition for operation
LF	low frequency
LL	liquid limit
LLNL	Lawrence Livermore National Laboratory
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LPSD	low-power and shutdown operation
LPT	low-pressure turbine
LPZ	low-population zone
LRF	large release frequency
LWMS	Liquid Waste Management System
m^2	square meters
M/D	motor-driven
M&TE	measuring and test equipment
MCES	Main Condenser Evacuation System
MCR	main control room
MELB	moderate energy line break

Acronyms/Abbreviations/Initialisms

MFIV	main feedwater isolation valve
MHI	Mitsubishi Heavy Industries, Ltd.
MNES	Mitsubishi Nuclear Energy Systems, Inc.
MOV	motor-operated valve
mph	miles per hour
m/s	meters per second
m/sec	meters per second
MSIV	main steam isolation valve
msl	mean sea level
MSR	maximum steaming rate
MT	main transformer
NAPS	North Anna Power Station
NaTB	sodium tetraborate decahydrate
NAVD88	North America Vertical Datum of 1988
NDE	nondestructive examination
NEI	Nuclear Energy Institute
NEMA	National Electrical Manufacturers Association
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NGVD29	National Geodetic Vertical Datum of 1929
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
non-ESW	non-essential service water
NPSH	net positive suction head
NQA	nuclear quality assurance
NRC	U.S. Nuclear Regulatory Commission
NS	non-seismic
N-S	north-south
NSSS	Nuclear Steam Supply System
NUMARC	Nuclear Management and Resources Council
NUREG	NRC Technical Report Designation (Nuclear Regulatory Commission)
O/B	outside building
O-RAP	operational reliability assurance program
OATC	Operator-At-The-Controls
OBE	operating basis earthquake
ODCM	offsite dose calculation manual
ODEC	Old Dominion Electric Cooperative
OE	operating experience
OLTC	on-load tap changer
OSC	Operations Support Center
OSHA	Occupational Safety and Health Administration

Acronyms/Abbreviations/Initialisms

P-STG	plant-specific technical guidelines
P-SWG	plant-specific writer's guide
P-wave	compression wave
P&ID	piping and instrumentation diagram
PABX	private automatic branch telephone exchange
PAM	post accident monitoring
PASS	Personal Alert Safety System
PC	Permit Condition
PCCV	prestressed concrete containment vessel
pcf	pounds per cubic foot
PCP	Process Control Program
PE	polyethylene
PGA	peak ground acceleration
PGP	procedures generation package
PI	plasticity index
PMF	probable maximum flood
PMP	probable maximum precipitation
PMWP	probable maximum winter precipitation
PMWS	Primary Makeup Water System
ppm	parts per million
PPS	preferred power supply
PRA	probabilistic risk assessment
PS/B	Power Source Building
PSFSV	power source fuel storage vault
PSMS	Protection and Monitoring System
psi	pounds per square inch
PSI	preservice inspection
PSP	physical security plan
PSPSR	Physical Security Protection Systems Report
PST	preservice testing
PSWS	Potable and Sanitary Water System
PTLR	pressure and temperature limits report
QA	quality assurance
QAP	quality assurance program
QAPD	Quality Assurance Program Description
QC	quality control
R/B	Reactor Building
RAP	reliability assurance program
RAT	reserve auxiliary transformer
RAW	risk achievement worth
RCL	reactor coolant loop
RCP	reactor coolant pump

Acronyms/Abbreviations/Initialisms

RCPB	reactor coolant pressure boundary
RCS	Reactor Coolant System
RG	regulatory guide
RHRS	Residual Heat Removal System
RLE	review level earthquake
RO	reactor operator
RP	radiation protection
RPT	radiation protection technician
RRS	required response spectra
RT_{PTS}	reference pressurized thermal shock temperature
RTO	Regional Transmission Organization
RV	reactor vessel
RWP	radiation work permit
RWSP	refueling water storage pit
RY	reactor-year
S-wave	shear-wave
SA	spectral acceleration
SAM	Startup Administrative Manual
SAMA	severe accident mitigation alternative
SAMDA	severe accident mitigation design alternative
SAR	safety analysis report
SBO	station blackout
SCBA	self-contained breathing apparatus
SD	standard deviation
SDOF	single degree of freedom
SDV	safety depressurization valve
sec	second, seconds
SECY	Secretary of the Commission, Office of the (NRC)
SEI	Structural Engineering Institute
SFPCS	Spent Fuel Pit Cooling and Purification System
SG	steam generator
SGBDS	Steam Generator Blowdown System
SIS	Safety Injection System
SLOCA	small pipe break LOCA
SMA	seismic margin analysis
SOC	System Operations Center
SOER	significant operating experience report
SPT	standard penetration test
SR	surveillance requirement
SRO	senior reactor operator
SRP	Standard Review Plan
SRSS	square root sum of the squares

Acronyms/Abbreviations/Initialisms

SRV	safety relief valve
SSAR	Site Safety Analysis Report (Part 2 of ESPA)
SSC	structure, system, and component
SSE	safe-shutdown earthquake
SSI	soil-structure interaction
STA	shift technical advisor
STP	sewage treatment plant
SWMS	Solid Waste Management System
SWR	service water reservoir
T/B	Turbine Building
T/D	turbine-driven
T/G	turbine generator
TAC	total annual cost
TBE	thin bed effect
TDH	total dynamic head
TMI	Three Mile Island
TNT	trinitrotoluene
TSC	Technical Support Center
TSCR	truncated soil column response
UAT	unit auxiliary transformer
UB	upper bound
UFSAR	Updated Final Safety Analysis Report
UHS	ultimate heat sink
UHSRS	ultimate heat sink related structures
UHSS	Ultimate Heat Sink System
UPS	uninterruptible power supply
US-APWR	United States Advanced Pressurized Water Reactor
USCS	Unified Soil Classification System
USE	upper shelf energy
V	velocity
V&V	verification and validation
VCT	volume control tank
VRS	Engineered Safety Features Ventilation System
	velocity response spectra
V_p	compression wave velocity
V_s	shear wave velocity
VWO	valve wide open
WHTF	Waste Heat Treatment Facility
wt	weight
WPS/B	west Power Source Building
WWS	Waste Water System

FINAL SAFETY ANALYSIS REPORT

1 Introduction and General Description of Plant

1.0 Introduction and General Description of Plant

1.1 Introduction

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS SUP 1.1(1) Add the following paragraphs at the end of DCD Section 1.1.

This Final Safety Analysis Report (FSAR) describes the design, construction, and operation of a nuclear power plant designated as the North Anna Power Station Unit 3 (Unit 3). The design information provided demonstrates that Unit 3 can be constructed and operated without undue risk to the health and safety of the public.

The Combined License (COL) Applicant for Unit 3 is Virginia Electric and Power Company (Dominion). Dominion has corporate responsibility for the design, engineering, construction, licensing, operation, procurement, quality assurance (QA), and fuel management for Unit 3.

Portions of the information required for this FSAR are incorporated by reference from the US-APWR DCD Revision 3.

In cases where a section is incorporated without the need for further information, the following standard language is used: “This section of the referenced DCD is incorporated by reference with no departures or supplements.”

In cases where a section is incorporated by reference with additional information provided in the FSAR, the following standard language is used: “This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.”

Information that is added to a section that is incorporated by reference is identified as either a departure or a supplement.

As with the DCD, the FSAR incorporates by reference the North Anna Early Site Permit Application (ESPA) Site Safety Analysis Report (SSAR), Revision 9, with certain variances and/or supplements (see Section 1.1.6.1). A variance is a plant-specific deviation from one or more of the site characteristics, design parameters, or terms and conditions of an ESP or from the SSAR.

SSAR Chapter 1 is incorporated by reference for historical purposes as an appendix to this chapter.

1.1.1 Plant Location

NAPS COL 1.1(2)

Replace the last sentence in DCD Subsection 1.1.1 with the following.

SSAR Section 2.1.1.1 is incorporated by reference and supplemented by information provided in FSAR Section 2.1.1.1.

1.1.5 Schedule

NAPS COL 1.1(1)

Replace the entire text in DCD Subsection 1.1.5 with the following.

Subject to required regulatory approvals and a decision to build, the following are estimated dates related to construction and operation of Unit 3.

Milestone	Estimated Schedule Date
Construction Completion	2021
Commercial Operation	2022

1.1.6.1 Regulatory Guide 1.206

NAPS SUP 1.1(2)

Add the following text to the end of DCD Subsection 1.1.6.1.

This FSAR generally follows the US-APWR DCD organization and numbering. Some organization and numbering differences are adopted where necessary to include additional material. Any exceptions are identified with the appropriate left margin notation as discussed below.

The standard left margin notations used in the FSAR, and descriptions of each, are as follows:

- STD DEP X.Y(#) - FSAR information that departs from the generic DCD and is common to all COL applicants referencing the generic DCD. Each standard departure is numbered separately based on the applicable section down to the X.Y level, e.g., STD DEP 1.2(1).

- NAPS DEP X.Y (#) - FSAR information that departs from the generic DCD and is plant-specific. Each departure item is numbered separately based on the applicable section down to the X.Y level, e.g., NAPS DEP 1.2(1).
- STD[1] COL X.Y(#) - FSAR information that addresses a DCD COL Information item and is common to all COL applicants referencing the generic DCD. Each COL item is numbered as identified in DCD Table 1.8-2 and applicable sections, e.g., STD COL 1.2(1). This annotation may be used in case of the replacement of the DCD information that contains CDI information when applicable COL item exists.
- NAPS COL X.Y(#) - FSAR information that addresses a DCD COL Information item and is plant-specific. Each COL item is numbered as identified in DCD Table 1.8-2 and applicable sections, e.g., NAPS COL 1.2(1). This annotation may be used in case of the replacement of the DCD information that contains CDI information when applicable COL item exists.
- STD[1] SUP X.Y(#) - FSAR information that supplements the material in the DCD and is common to all COL applicants referencing the generic DCD. Each SUP item is numbered separately at an appropriate section level, e.g., STD SUP 1.2(1).
- NAPS SUP X.Y(#) - FSAR information that supplements the material in the DCD and is plant-specific. Each SUP item is numbered separately at an appropriate section level, e.g., NAPS SUP 1.2(1).
- NAPS ESP COL X.Y-# - ESP COL Action items identify matters that an applicant for a construction permit or operating license addresses in a COLA. An ESP COL Item designation is used to identify FSAR information that addresses an ESP COL Action Item. Responses to all ESP COL Action Items are assumed to be plant-specific. An ESP COL Action Item is numbered as identified in the applicable ESP; e.g., NAPS ESP COL 2.4-2.

1. Notations with STD* indicate FSAR information that is identical to the reference COLA (R-COLA), except for left margin notations. Notations with STD** indicate FSAR information that is identical to the R-COLA except for reference to the specific applicant and/or facility name, along with any required grammatical changes.

- NAPS ESP PC (#) - ESP Permit Conditions are requirements to take certain actions as specified in that permit. An ESP Permit Condition designation is used to identify FSAR information that addresses an ESP Permit Condition. Responses to all ESP Permit Conditions are assumed to be plant-specific. An ESP Permit Condition is numbered as identified in the applicable ESP; e.g., NAPS ESP PC 3.E(1).
- NAPS ESP VAR X.Y-# - An ESP Variance is a request for deviation from one or more site characteristics, design parameters, or terms and conditions of the ESP; or from the SSAR. Each ESP Variance is numbered based on the applicable section down to the X.Y level, e.g., NAPS ESP VAR 2.4(1).
- ESP COR - An ESP Correction is a correction to the information provided in the ESP SSAR in order to ensure that the information is complete and accurate for FSAR.
- STD CDI - FSAR information that addresses DCD conceptual design information (CDI) and is common to all COL applicants referencing the generic DCD. For DCD CDI contents, when corresponding Unit 3 plant-specific design content matches the R-COLA FSAR content, including DCD CDI content that is incorporated by reference in the R-COLA FSAR, this annotation is used and is not numbered.
- NAPS CDI - FSAR information that addresses DCD conceptual design information (CDI) and is plant-specific. For DCD CDI content, when the corresponding Unit 3 plant-specific design content differs from the R-COLA FSAR content, this annotation is used and is not numbered.

1.1.6.3 Text, Tables, and Figures

NAPS SUP 1.1(3)

Add the following text at the end of DCD Subsection 1.1.6.3.

FSAR tables, figures, and references are numbered in the same manner as in the DCD or ESPA, but the first new FSAR item is numbered as 201, the second 202, the third 203, and consecutively thereafter. When a table, figure, or reference in the DCD or ESPA is changed, the change is appropriately annotated in the left margin as identified above. New appendices are included in the FSAR with letter designations following the pertinent chapter, e.g., Appendix 1AA.

When it provides greater contextual clarity, an existing DCD or ESPA table or figure is revised by adding new information to the table or figure and replacing the DCD or ESPA table or figure with a new one in the FSAR. In such an instance, the revised table or figure clearly identifies the information being added, and retains the same numbering as in the DCD or ESPA, but the table or figure number is revised to end with the designation “R” to indicate that the table or figure has been revised and replaced. For example, revised “Table 1.2-1” becomes “Table 1.2-1R.” New and revised tables and figures are labeled in the left margin as standard or plant-specific departures, supplements, etc., as described in Subsection 1.1.6.1. Generally, only those sheets of the tables or figures on which COL information is provided are physically included in the COL application.

For figures or tables in the DCD or SSAR that are revised for the S-COLA FSAR and renumbered with an “R”, each cross-reference in the DCD or SSAR that refers to the original DCD or SSAR figure or table are not renumbered to reflect the revised figure or table number.

1.1.6.7 Combined License Information

Replace the content of DCD Subsection 1.1.6.7 with the following.

NAPS COL 1.1(1)

1.1(1) ***Estimated schedule***

This COL item is addressed in Subsection 1.1.5.

NAPS COL 1.1(2)

1.1(2) ***Plant location***

This COL item is addressed in Subsection 1.1.1.

1.2 General Plant Description

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

1.2.1.5.4.4 Water Systems

NAPS DEP 9.2(1)

Replace the last paragraph under the subheading *Primary Makeup Water System* in DCD Subsection 1.2.1.5.4.4 with the following:

The PMWS receives water from the demineralized water system.

STD COL 1.8(1)

Add the following paragraph at the end of DCD Subsection 1.2.1.5.4.4.

Ultimate heat sink - The ultimate heat sink (UHS) is comprised of cooling towers (CTWs), basins, transfer pumps, piping, valves, and instrumentation. The system provides the capability to remove heat from the essential service water system (ESWS).

The UHS satisfies the following design requirements:

- The UHS is designed to perform safety-related functions assuming a single failure in one train, with another train out of service for maintenance.
- The UHS consists of four independent trains. Each train includes a mechanical draft cooling tower, a basin, and a transfer pump.
- The UHS is designed to cool the heated service water by the forced airflow in the mechanical draft cooling towers, and return the water to the basin.
- The UHS is designed to provide sufficient cooling capacity during normal, transient, and accident operating conditions, for the safe operation and orderly shutdown of the plant. The maximum supply water temperature from the UHS is 95°F under the peak heat loads condition.
- Each basin provides 33-1/3 percent of the combined inventory for the 30-day storage capacity, to satisfy the recommendation of Regulatory Guide (RG) 1.27.
- A transfer pump is provided in each basin to allow transfer of water between basins and thus permit full utilization of the total water inventory in three basins, assuming the most limiting single active failure with another train out of service for maintenance.

- The mechanical draft cooling towers and the transfer pumps are powered from the safety buses so safety-related functions are maintained during a loss of offsite power (LOOP).

1.2.1.5.4.5 Process Auxiliary Systems

NAPS DEP 9.2(1)

Replace the sixth paragraph of DCD Subsection 1.2.1.5.4.5 with the following:

CVCS – The CVCS includes heat exchangers, letdown orifices, purification filters and demineralizers, volume control tank, boric acid tanks (BATs) and transfer pumps, holdup tanks, degasifier, charging pumps, seal injection filters, piping, valves, and instrumentation.

NAPS DEP 9.2(1)

Replace the third, fourth, and fifth sentences of the twelfth paragraph in DCD Subsection 1.2.1.5.4.5 with the following:

If the water level in the VCT exceeds the normal operating range, a three-way valve downstream of the reactor coolant filter diverts a portion of the letdown fluid to the holdup tanks. The degasifier is installed downstream of the holdup tanks to remove dissolved gases and processed liquid waste is transferred to the waste holding tanks in the Liquid Waste Management System (LWMS) for further processing.

1.2.1.5.6 Electric Power

NAPS COL 1.8(1)

Replace the last sentence of the first paragraph in DCD Subsection 1.2.1.5.6 with the following.

Generator output voltage is stepped up to 500 kV and transmitted through overhead transmission lines to the plant switching station, where distribution to the transmission system is accomplished. Four 500 kV transmission lines and one 230 kV transmission line connect the plant switching station to the transmission grid.

1.2.1.6 Site Characteristics

STD COL 1.2(1)

Replace the second paragraph in DCD Subsection 1.2.1.6 with the following.

Site characteristics are addressed in Chapter 2. The site plan is shown in Figure 1.2-1R.

NAPS COL 1.2(1) **NAPS CDI**	Replace the fourth sentence of the third paragraph in DCD Subsection 1.2.1.6 with the following.
	The configuration of the ultimate heat sink and related structures is addressed in Subsections 1.2.1.5.4.4 and 1.2.1.7.2.8. Each UHS and related structure is located on the plant north side of the Reactor Building (R/B).
NAPS COL 1.2(1)	Replace the last sentence of the third paragraph in DCD Subsection 1.2.1.6 with the following.
	The plant switchyard is located on plant east side of the Turbine Building as depicted on Figure 1.2-1R (Sheet 1 of 2) and described in Subsection 8.2.1.2.1.

1.2.1.7.1 General Plant Arrangement

STD COL 1.8(1)	Add the following text at the end of first paragraph in DCD Subsection 1.2.1.7.1.
	In addition, the UHS is the major site-specific structure.
NAPS COL 1.2(1)	Replace the first sentence of the second paragraph in DCD Subsection 1.2.1.7.1 with the following.
	The outline and the site plan are shown in Figure 1.2-1R.
STD COL 1.8(1)	Add the following text after the first sentence of the third paragraph in DCD Subsection 1.2.1.7.1.
	The UHS is designed and constructed as a safety-related structure, to the requirements of seismic category I, as defined in RG 1.29.
NAPS COL 1.8(1)	Replace the last sentence in DCD Subsection 1.2.1.7.1 with the following.
	The general arrangement drawings are provided in Figures 1.2-6R through 1.2-48R, as well as Figures 1.2-201 through 1.2-211.
NAPS SUP 1.2(1)	Add the following after the last paragraph in DCD Subsection 1.2.1.7.1.
	These figures indicate a direction of Plant North (or “P. N.”), which is defined in the DCD as the path from the centerline of the Turbine Building

through the centerline of the R/B or the direction fuel moves from the containment to the R/B. For the NA3 site, this is approximately 217.5° from true north or 142.5° counterclockwise from true north.

“Plant North” is designated as “Unit 3 North” on Figure 1.2-1R (Sheet 1 of 2).

NAPS SUP 1.2(2)

The design plant grade shown in the DCD figures is 2'-7", whereas the nominal Unit 3 plant grade elevation is 290 ft. NAVD88 (290.86 ft. NGVD29). Therefore, DCD elevations are to be increased by 287'-5" to be actual site elevations based on the NAVD88 datum. Elevations presented in tables and figures are based on NAVD88 unless noted otherwise. The equivalent NGVD 29 datum is 0.86 ft. higher than the NAVD88 datum in the power block area. The actual plant grade floor elevation varies to accommodate floor slope and layout requirements.

1.2.1.7.2.3 Power Source Fuel Storage Vault (PSFSV)

NAPS SUP 1.2(3)

Replace DCD Subsection 1.2.1.7.2.3 with the following:

The PSFSVs are partially underground structures constructed with reinforced concrete and classified as seismic Category I. The vaults contain the fuel oil tanks for the safety-related gas-turbine generators.

NAPS COL 1.8(1)

Add the following new subsections after DCD Subsection 1.2.1.7.2.7.

1.2.1.7.2.8 Ultimate Heat Sink Related Structures

The ultimate heat sink related structures (UHSRS) are seismic category I structures that connect to the essential service water pipe tunnel (ESWPT).

Each UHSRS consists of a cooling tower enclosure, UHS essential service water (ESW) pump house and a UHS basin.

Each UHS ESW pump house contains one safety-related pump and one UHS transfer pump. The UHS ESW pump house ventilation system maintains environmental conditions to UHS ESW pump house that meet the design requirements during normal, transient, and accident operating conditions, for the safe operation and orderly shutdown of the plant.

1.2.1.7.2.9 Interim Radwaste Storage Facility

The Interim Radwaste Storage Facility (IRSF) is designed to safely handle, store, monitor, and control Class B and C stabilized waste generated as a result of normal operation, including anticipated operational occurrences (AOO) based on the provisions of NRC Standard Review Plan (SRP) 0800, Section 11.4, Solid Waste Management System, Appendix 11.4-A, *Design Guidance for Temporary Storage of Low-Level Radioactive Waste*. The IRSF design also incorporates the guidance of NRC Generic Letter (GL) 81-38, *Storage of Low Level Radioactive Wastes at Power Reactor Sites*, and NRC Commission Paper SECY-94-198.

1.2.2 Combined License Information

Replace the content of DCD Subsection 1.2.2 with the following.

STD COL 1.2(1)
NAPS COL 1.2(1)

1.2(1) ***Site-specific site plan***

This COL item is addressed in Subsections 1.2.1.6 and 1.2.1.7.1 and Figure 1.2-1R.

NAPS COL 1.2(1)
NAPS CDI

Figure 1.2-1R Site Plan (Sheet 1 of 2)

NAPS COL 1.2(1)
NAPS CDI

Figure 1.2-1R Site Plan (Sheet 2 of 2)

NAPS COL 1.8(1)

Figure 1.2-2R Power Block at Elevation 261'-1" NAVD88 – Plan View

STD CDI
NAPS DEP 9.2(1)
NAPS DEP 10.4(1)

NAPS DEP 9.2(1)

Figure 1.2-3R Power Block at Elevation 278'-10" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-4R Power Block at Elevation 291'-0" NAVD88

NAPS DEP 10.4(1)

NAPS DEP 9.2(1)

Figure 1.2-5R Power Block at Elevation 300'-11" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-6R Power Block at Elevation 312'-08" NAVD88

NAPS DEP 10.4(1)

NAPS DEP 10.4(1) **Figure 1.2-8R Power Block at Elevation 337'-07" NAVD88**

NAPS DEP 10.4(1) **Figure 1.2-9R Power Block at Elevation 363'-10" NAVD88**

NAPS DEP 10.4(1) **Figure 1.2-10R Power Block at Elevation 388'-05" NAVD88**

NAPS DEP 10.4(1) **Figure 1.2-11R Power Block at Elevation 402'-11" NAVD88**

NAPS DEP 10.4(1) **Figure 1.2-12R Power Block General Arrangement Section A-A (NAVD88 Elevations)**

NAPS CDI

NAPS DEP 9.2(1)

Figure 1.2-13R Power Block General Arrangement Section B-B (NAVD88 Elevations)

NAPS DEP 9.2(1)

Figure 1.2-29R Auxiliary Building Elevation 261'-01" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-30R Auxiliary Building Elevation 278'-10" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-31R Auxiliary Building Elevation 291'-00" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-32R Auxiliary Building Elevation 303'-02" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-33R Auxiliary Building Elevation 312'-08" NAVD88

NAPS DEP 9.2(1)

Figure 1.2-39R Auxiliary Building Section B-B (NAVD88 Elevations)

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 1.2-40R Turbine Building at Elevation 262'-5" NAVD88 - Plan View**

NAPS DEP 10.4(1) **Figure 1.2-41R Turbine Building at Elevation 291'-0" NAVD88 - Plan View**

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 1.2-42R Turbine Building at Elevation 326'-5" NAVD88 - Plan View**

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1) **Figure 1.2-43R Turbine Building at Elevation 353'-5" NAVD88 - Plan View**

Security-Related Information Withheld Under 10 CFR 2.390

NAPS DEP 10.4(1)

Figure 1.2-44R Turbine Building at Elevation 381'-3" NAVD88 - Plan View

NAPS DEP 10.4(1) **Figure 1.2-45R Turbine Building at Elevation 400'-11" NAVD88 - Plan View**

NAPS DEP 10.4(1)

Figure 1.2-46R Turbine Building at Elevation 461'-10" NAVD88 - Plan View

NAPS DEP 10.4(1) **Figure 1.2-47R Turbine Building Sectional View A-A (NAVD88 Elevations)**

NAPS DEP 10.4(1) **Figure 1.2-48R Turbine Building Sectional View B-B (NAVD88 Elevations)**

NAPS COL 1.8(1)

Figure 1.2-201 Ultimate Heat Sink Related Structures and ESW Pipe Tunnel Plan View

NAPS COL 1.8(1)

Figure 1.2-202 Ultimate Heat Sink Related Structure Sectional View A-A (NAVD88 Elevations)

NAPS COL 1.8(1)

Figure 1.2-203 Ultimate Heat Sinks C and D at Elevation 298.67' NAVD88 - Plan View

NAPS COL 1.8(1)

Figure 1.2-204 Ultimate Heat Sinks C and D at Elevation 322.00' NAVD88 - Plan View

NAPS COL 1.8(1)

Figure 1.2-205 Ultimate Heat Sinks C and D at Elevation 340.00' NAVD88 - Plan View

NAPS COL 1.8(1)

Figure 1.2-206 Ultimate Heat Sinks C and D - Sectional Views (NAVD88 Elevations)

NAPS COL 1.8(1)

Figure 1.2-207 Ultimate Heat Sinks A and B at Elevation 298.67' NAVD88 - Plan View

NAPS COL 1.8(1) **Figure 1.2-208 Ultimate Heat Sinks A and B at Elevation 322.00' NAVD88 - Plan View**

NAPS COL 1.8(1)

Figure 1.2-209 Ultimate Heat Sinks A and B at Elevation 340.00' NAVD88 - Plan View

NAPS COL 1.8(1)

Figure 1.2-210 Ultimate Heat Sinks A and B Sectional Views (NAVD88 Elevations)

NAPS COL 1.8(1)

Figure 1.2-211 ESW Pipe Tunnel Sectional View B-B (NAVD88 Elevations)

1.3 Comparison with Other Facilities

This section of the referenced DCD is incorporated by reference with no departures or supplements.

1.4 Identification of Agents and Contractors

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

1.4.1 Applicant/Program Manager

Insert the following paragraphs before first paragraph in DCD Subsection 1.4.1.

NAPS COL 1.4(1)

Dominion is the applicant for the COL, and Dominion will be the licensee authorized to construct and operate Unit 3. Dominion is therefore responsible for making each of the key project decisions, including the ultimate decision on whether to build a new nuclear power plant, and would be the plant operator.

Mitsubishi Nuclear Energy Systems, Inc. (MNES) supports COL application development, relevant design, and support for the FSAR and related parts of the COL application.

1.4.2.3 Washington Division of URS Corporation

Add the following sentence to the end of first sentence in DCD Subsection 1.4.2.3.

NAPS COL 1.4(1)

The Washington Division of URS Corporation, as a subcontractor to MNES, provides consultation, engineering, construction and selected procurement services in support of Unit 3.

NAPS COL 1.4(1)

Add the following subsections after DCD Subsection 1.4.2.3.

1.4.2.4 Mitsubishi Nuclear Energy Systems, Inc.

Mitsubishi Nuclear Energy Systems, Inc. is the primary contractor to Dominion for the engineering, procurement, and construction of Unit 3.

1.4.2.5 Bechtel Power Corporation

Bechtel is responsible for selected analyses, engineering and licensing support of the COLA.

1.4.2.6 Tetra Tech NUS, Inc.

Tetra Tech NUS, Inc. conducted new and significant information reviews for the Environmental Report (ER) and prepared several sections of the ER, including the ecological description of the site and vicinity, environmental impacts of construction, and plant cooling system impacts on terrestrial and aquatic ecosystems. Tetra Tech NUS, Inc. also provided general National Environmental Policy Act (NEPA) consultation.

1.4.2.7 MACTEC Engineering and Consulting, Inc.

MACTEC Engineering and Consulting, Inc. performed geotechnical field investigations and laboratory testing in support of Chapter 2. That effort included performing standard penetration tests; obtaining core samples and rock cores; performing cone penetrometer tests (CPTs), cross-hole seismic tests, and laboratory tests of soil and rock samples; installing ground water observation wells; and preparing a data report.

1.4.2.8 Risk Engineering, Inc.

Risk Engineering, Inc. performed probabilistic seismic hazard assessments and related sensitivity analyses in support of Chapter 2. These assignments included sensitivity analyses of seismic source parameters and updated ground motion attenuation relationships, development of updated Safe Shutdown Earthquake (SSE) ground motion values, and preparation of the related sections.

1.4.3 Combined License Information

Replace the content of DCD Subsection 1.4.3 with the following.

1.4(1) ***Identification of major agents, contractors, and participants***

NAPS COL 1.4(1) *This COL item is addressed in Subsections 1.4.1, and 1.4.2.3 through 1.4.2.8.*

1.5 Requirements for Further Technical Information

This section of the referenced DCD is incorporated by reference with no departures or supplements.

1.6 Material Referenced

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Add the following text after the last paragraph in DCD Subsection 1.6.

STD SUP 1.6(1) A list of topical reports incorporated by reference as part of the FSAR is shown in Table 1.6-201.

NAPS SUP 1.6(2)

Table 1.6-201 Material Referenced

Report Number	Title	FSAR Section
NEI 07-03A	Generic FSAR Template Guidance for Radiation Protection Program Description, Rev. 0, May 2009	12.5
NEI 06-13A	Template for an Industry Training Program Description, Rev. 2, March 2009	13.1, 13.2
NEI 07-02A	Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52, Rev. 0, March 2008	17.6

1.7 Drawings and Other Detailed Information

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Add the following text after the last paragraph in DCD Section 1.7.

STD SUP 1.7(1) Table 1.7-201 contains a list of site-specific instrument and control functional diagrams and electrical one-line diagrams. A list of site-specific system drawings is shown in Table 1.7-202.

NAPS SUP 1.7(1)

Table 1.7-201 Site-Specific I&C Functional and Electrical One-Line Diagrams

Figure Number	Subject
8.2-201	500/230 kV Switchyard Single Line Diagram
8.3.1-1R	Onsite AC Electrical Distribution System (Sheet 1 of 7) — Main One Line Diagram
8.3.1-1R	Onsite AC Electrical Distribution System (Sheet 5 of 7) — Class 1E 480V Buses A and B One Line Diagram
8.3.1-1R	Onsite AC Electrical Distribution System (Sheet 6 of 7) — Class 1E 480V Buses C and D One Line Diagram
8.3.1-2R	Logic Diagrams (Sheet 18 of 24) — Class 1E Train A LOOP and LOCA Load Sequencing
8.3.1-2R	Logic Diagrams (Sheet 19 of 24) — Class 1E Train B LOOP and LOCA Load Sequencing
8.3.1-2R	Logic Diagrams (Sheet 20 of 24) — Class 1E Train C LOOP and LOCA Load Sequencing
8.3.1-2R	Logic Diagrams (Sheet 21 of 24) — Class 1E Train D LOOP and LOCA Load Sequencing

NAPS SUP 1.7(2)

Table 1.7-202 Site-Specific System Drawings

Figure Number	Subject
9.2.1-1R	Essential Service Water System Piping and Instrumentation Diagram (Sheet 1 of 3)
9.2.2-1R	Component Cooling Water System Piping and Instrumentation Diagram (Sheet 8 of 9)
9.2.2-1R	Component Cooling Water System Piping and Instrumentation Diagram (Sheet 9 of 9)
9.2.4-1R	Potable and Sanitary Water System Flow Diagram
9.2.5-1R	Ultimate Heat Sink System Piping and Instrumentation Diagram
9.2.6-2R	Primary Makeup Water System Flow Diagram
9.2.6-3R	Demineralized Water System Flow Diagram
9.3.1-201	Hydrogen and Nitrogen Gas Supply Configuration
9.3.4-1R	Chemical and Volume Control System Flow Diagram (Sheet 3 of 7)
9.3.4-1R	Chemical and Volume Control System Flow Diagram (Sheet 4 of 7)
9.3.4-1R	Chemical and Volume Control System Flow Diagram (Sheet 5 of 7)
9.3.4-1R	Chemical and Volume Control System Flow Diagram (Sheet 6 of 7)
9.3.4-1R	Chemical and Volume Control System Flow Diagram (Sheet 7 of 7)
9.4-201	UHS ESW Pump House Ventilation System Flow Diagram
9.5.1-201	Fire Protection System Schematic
9.5.1-202	Fire Pumping Station Flow Schematic
9.5.1-203	ESW to Fire Protection Cross-Tie Flow Schematic
9.5.1-204	Fire Main Arrangement
10.1-1R	Overall System Flow Diagram
10.1-2R	Heat Balance Diagram Rated Condition (Cond. press.: 2.6 in HgA)
10.1-3R	Heat Balance Diagram VWO Condition (Cond. press.: 1.5 in HgA)
10.2-1R	Turbine-Generator Outline Drawing
10.4.2-1R	Main Condenser Evacuation System Piping and Instrumentation Diagram
10.4.5-1R	Circulating Water System Piping and Instrumentation Diagram
10.4.5-201	Cooling Tower Make-Up and Blowdown System
10.4.5-202	Dry Cooling Tower Array P&ID
10.4.5-203	Hybrid Cooling Tower
10.4.7-2R	Condensate and Feedwater System Piping and Instrumentation Diagram (2/4)
10.4.8-1R	Steam Generator Blowdown System Piping and Instrumentation Diagram (1/2)

NAPS SUP 1.7(2)

Table 1.7-202 Site-Specific System Drawings

Figure Number	Subject
10.4.8-2R	Steam Generator Blowdown System Piping and Instrumentation Diagram (2/2)
10.4.8-201	Steam Generator Blowdown System Flow Piping and Instrumentation Diagram
10.4.11-1R	Auxiliary Steam Supply System Piping and Instrumentation Diagram
11.2-1R	Liquid Waste Processing System Process Flow Diagram (Sheet 1 of 3)
11.2-201	LWMS P&ID
11.3-1R	Gaseous Waste Management System Process Flow Diagram (Sheet 1 of 3)
11.3-201	Gaseous Waste Management System P&ID
11.4-3R	Process Flow Diagram of SWMS Oil and Sludge Handling System
11.4-201	Solid Waste Management System P&ID
11.2-1R	Liquid Waste Processing System Process Flow Diagram (Sheet 1 of 3)
11.5-2bR	Location of Radiation Monitors at Plant (Power Block at Elevation 278'-10" NAVD88)
11.5-2cR	Location of Radiation Monitors at Plant (Power Block at Elevation 291'-0" NAVD88)
11.5-2dR	Location of Radiation Monitors at Plant (Power Block at Elevation 300'-11" NAVD88)
11.5-2eR	Location of Radiation Monitors at Plant (Power Block at Elevation 312'-8" NAVD88)
11.5-2gR	Location of Radiation Monitors at Plant (Power Block at Elevation 337'-7" NAVD88)
11.5-2hR	Location of Radiation Monitors at Plant (Power Block at Elevation 363'-10" NAVD88)
11.5-2iR	Location of Radiation Monitors at Plant (Power Block at Elevation 388'-5" NAVD88)
11.5-2jR	Location of Radiation Monitors at Plant (Power Block at Elevation 402'-11" NAVD88)
11.5-2kR	Location of Radiation Monitors at Plant (Power Block at Section A-A (NAVD88 Elevations)
11.5-201	Typical Process In-Line Radiation Monitor Schematic (Site-Specific)
19.1-2R	Simplified System Diagram (Sheet 20 of 42) (Essential Service Water System [2 of 3])

1.8 Interfaces for Standard Design

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

STD COL 1.8(1) Replace the first sentence of the fourth paragraph in DCD Section 1.8 with the following.

The site plan is shown on Figure 1.2-1R.

STD COL 1.8(1) Replace the fifth paragraph in DCD Section 1.8 with the following.

This site plan includes site-specific structures such as the essential service water pipe tunnel, power source fuel storage vaults, and ultimate heat sink-related structures designated as CDI in the DCD. Section 1.2 provides the descriptions and figures for these SSCs. When IBR portion of this application includes CDI designators such as double brackets "[[ ]]" in text and tables and "cloud shape borders" around SSCs and notes in figures, it means that the CDI in DCD is adopted as actual design and the CDI designators are deleted.

STD COL 1.8(1) Replace the first sentence of the sixth paragraph in DCD Section 1.8 with the following:

FSAR Table 1.8-1R has columns summarizing the site-specific interface description and providing its location in the FSAR.

STD COL 1.8(1) Add the following bullets to the end of the last bullet of the sixth paragraph.

Column 5, Description of the Interface in the FSAR: This column summarizes how the interface is met in the FSAR.

Column 6, FSAR Section: This column identifies the FSAR location of the interface description.

STD COL 1.8(1) Replace the last paragraph in DCD Section 1.8 with the following.

10 CFR 52 clarifies that Tier 2 information in a standard design certification rule does not include CDI and Section C.III.6 of RG 1.206 states that Tier 2 information in a standard design certification application does not include CDI. Therefore, replacement or revision of CDI identified in Table 1.8-1R does not constitute a departure. Additionally,

information addressing COL information items identified in Table 1.8-201 and supplemental information (see Subsection 1.1.6.1) that does not change the intent or meaning of the DCD text is not a departure from the DCD.

STD COL 1.8(1)

Add the following text after the last paragraph in DCD Section 1.8.

10 CFR 52.79 requires demonstration that interface requirements established for the certified standard design have been met. This section identifies the interfaces between the US-APWR standard plant design and the site-specific design. This COLA, which references the certified US-APWR design, provides design features and characteristics that comply with the interface requirements for the site-specific portion of the facility design in the FSAR. The following subsections describe the site-specific interfaces and the location where the design features for each interface are addressed.

1.8.1.1 Consolidated Combined License Items for the Entire Design Control Document

STD COL 1.8(2)
STD COL 1.8(3)

Replace the second and third paragraphs in DCD Subsection 1.8.1.1 with the following new subsections.

1.8.1.2 Resolution of Combined License Information Items

Table 1.8-201 lists the FSAR location where each COL information item from the DCD is resolved. In addition, this table shows which COL information items are resolved in the Combined License Application (COLA), and which items remain as regulatory commitments, license conditions, and ITAAC.

Each COL information item is categorized and designated according to the following:

1. Operational programs: Operational programs are specific programs that are required by regulations. These programs are described in the FSAR to the extent that the NRC can conclude with reasonable assurance that the program is “fully described” and the implementation milestones of these programs are described in the FSAR in accordance with RG 1.206.

1a. Implementation requirements of other operational programs that the regulations do not address are proposed as "license conditions" associated with the implementation milestones.

1b. Implementation milestones for several of these operational programs addressed in the regulations are proposed as "regulatory commitments" of COL Applicant.

2. Plant procedures: Brief description of the nature and content of these procedures and the schedule for the preparations of these procedures are described in the FSAR. Implementation schedules of these procedures are proposed as "regulatory commitments" of COL Applicant.

3. Design information:

3a. Information needed in the COL application to meet the guidelines of RG 1.206, and additional/supplementary information that is available for NRC staff review.

3b. Sufficient design information necessary to the COL application that will be provided in the FSAR updates before the Issuance of the COL is proposed as "regulatory commitments" of COL Applicant.

3c. Design information depending on as-procured/as-built information that will be addressed in the FSAR updates after issuance of the COL, or will be demonstrated under the construction inspection program (except for ITAAC program). The FSAR in the COL application includes commitments and information sufficient for the NRC to conclude its safety evaluation.

4. Detailed schedule information: Detailed schedule information cannot be fixed during the COLA review phase and is subject to change in accordance with the progress of design or construction. Such detailed schedule information is proposed as "regulatory commitments" of COL Applicant.

5. The inspections, tests, analyses, and acceptance criteria (ITAAC): Information that will be verified in the ITAAC.

The column entitled "Resolution Category" in Table 1.8-201 indicates the resolution status of each COL item categorized to 1a, 1b, 2, 3a, 3b, 3c, 4, or 5 as noted above.

1.8.1.3 Summary of Departures

NAPS COL 1.8(3)

Table 1.8-202 provides a summary list of departures from the referenced certified design. These departures are described and evaluated in COLA Part 7.

1.8.1.4 Conformance with Site Parameters

STD COL 1.8(3)

The site parameters assumed for the US-APWR design certification are found in Section 2.1 of Tier 1 of the referenced US-APWR DCD, and in Chapter 2.0 of Tier 2 of the referenced US-APWR DCD. Conformance of the site with these site parameters is evaluated in Chapter 2.0.

NAPS SUP 1.8(1)

Chapter 2 also provides information demonstrating that the design of the facility falls within the site characteristics and bounding design parameters for the ESP (Reference 1.8-201).

NAPS SUP 1.8(2)

1.8.1.5 Variances from the ESP and ESPA SSAR

Requests for variances from the ESP and ESPA SSAR comply with the requirements of 10 CFR 52.39 and 10 CFR 52.93. Variances are listed in Table 1.8-203, along with the section of the FSAR in which each is discussed. These variances are described and evaluated in COLA Part 7.

NAPS SUP 1.8(3)

1.8.1.6 COL Action Items and Permit Conditions from the ESP

Table 1.8-204 provides a summary listing of COL Action Items and Permit Conditions from the ESP, along with the section of the FSAR in which each is discussed.

NAPS SUP 1.8(4)

1.8.1.7 Probabilistic Risk Assessment

Site- and plant-specific information, including site meteorological data and site-specific population distribution, plant-specific design information, that replaced conceptual design information described in the DCD, and the departures listed in Table 1.8-202, were reviewed with respect to the design certification PRA. The conclusion, which is documented in Section 19.1, is that there is no significant change from the certified design PRA.

1.8.2 Combined License Information

Replace the content of DCD Subsection 1.8.2 with the following.

STD COL 1.8(1)
NAPS COL 1.8(1)

1.8(1) ***Interface requirements***

This COL item is addressed in Section 1.8 and Table 1.8-1R.

STD COL 1.8(2)
NAPS COL 1.8(2)

1.8(2) ***Resolution for COL information items***

This COL item is addressed in Subsection 1.8.1.2 and Table 1.8-201.

STD COL 1.8(3)
NAPS COL 1.8(3)

1.8(3) ***Summary of departure and conformance with site parameter***

This COL item is addressed in Subsections 1.8.1.3 and .

1.8.3 References

1.8-201 Early Site Permit (ESP) for the North Anna ESP Site, No. ESP-003, U.S. Nuclear Regulatory Commission, November 2007.

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Circulating Water System	CDI	The system design of the circulating water system (CWS) is CDI. A typical “reference plant” physical layout, configuration and the associated design basis information for the CWS are presented in the DCD. The final system configuration for the CWS is site-specific.	1.2 8.3.1 10.1 10.4.5 10.4.8 10.4.13 11.2.3.1 14.2.12.1.33	CWS is cooled by an array of dry, mechanical draft cooling towers and a combination (hybrid) wet/dry, mechanical draft cooling tower. • The makeup water and blowdown system is provided to supply water to the hybrid cooling tower to compensate for losses due to evaporation and wind drift, and to control water chemistry of the cooling tower basins.	1.2 8.3.1* 10.1 10.4.5 10.4.8 10.4.13* 11.2.3.1 14.2.12.1.33*

* DCD CDI is incorporated by reference.

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Essential Service Water System and Ultimate Heat Sink	CDI	Certain functional aspects of the ESWS and the UHS must meet interface requirements to be consistent with the standard plant design. The UHS is a safety-related system required to remove the heat transferred from the ESWS during normal operation, design basis events and safe shutdown. Decisions regarding the UHS design are to be based on available water sources and how the cooling water can be supplied to the ESWS. A typical configuration for the ESWS and UHS is presented in this DCD as CDI. The final configuration of the ESWS will be comprised of the ESWPT (see below) and UHS related structures (including piping and piping support layout) and is site-specific.	1.2 3.8.4.1.3 9.2.1 9.2.5 12.3 Ch 16, 3.7.9	The UHS consists of four 50 percent capacity mechanical draft cooling towers, one for each ESWS train, and four 33-1/3 percent capacity basins and four transfer pumps. ESWPs are respectively located in each basin with adequate submergence of the pumps to ensure the net positive suction head (NPSH) for the pumps. A portion of the basin water is discharged through the blowdown via the ESWS when the makeup water is available to maintain an acceptable water chemistry composition. The blowdown water is discharged to the Waste Heat Treatment Facility (WHTF).	1.2 2.4 3.8.4.1.3* 9.2.1 9.2.5 12.3 COLA Part 4, 3.7.9**

* DCD CDI is incorporated by reference.
** Part 4 does not use the CDI LMN.

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Essential Service Water Pipe Tunnel	CDI	The portions of the essential service water pipe tunnel (ESWPT) is outside the standard US-APWR buildings and is CDI. The termination points of the ESWPT are under the T/B and at the UHS related structures. A typical design for the ESWPT is presented in figures in this DCD and is CDI. The final configuration, including physical layout of the ESWPT, is site-specific.	1.2 8.3.1 App 9A 11.5 12.3	The ESWPT is an underground reinforced concrete structure. The tunnel layout is a rectangular configuration forming a closed looped structure starting at the UHSRS and terminating at the R/B. The tunnel is divided into two sections by an interior concrete wall to provide separation of piping trains. Each section contains both ESWS supply and return lines. End walls are also provided where required to maintain train separation. * DCD CDI is incorporated by reference.	1.2 8.3.1* 9A 11.5 12.3
Offsite Power System	CDI	The offsite power system, transmission circuits, and components that are located outside the high voltage terminals of the main and reserve transformers are CDI. The interface requirements between the standard plant design and the local electrical grid are addressed in this DCD. A typical configuration of the transformers is presented in the DCD, and is CDI. The final configuration of the offsite power transmission system including location and design of the main switchyard area physical layout of the equipment; as well as design details such as transmission tie line voltage level, is site-specific.	8.1 8.2	The interface with the offsite power to transmission system is through the low-voltage terminals of the main and reserve auxiliary transformers in the transformer yard. Generator voltage is stepped up to 500 kV and transmitted through overhead transmission tie lines to the 500 kV plant switchyard. The reserve transformer steps down the 230 kV to the onsite medium voltage bus voltage.	8.1 8.2

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Power Source Fuel Storage Vault	CDI	The typical design of the power source fuel storage vaults (PSFSVs) as presented in figures in this DCD is CDI. The final configuration of the PSFSVs including physical location in relation to the standard US-APWR buildings is site-specific.	1.2 App. 9A 12.3	The PSFSVs are partially underground reinforced concrete structures required to house the safety-related and nonsafety-related fuel oil tanks. There is one vault for each PS/B. The vault contains two safety-related and one nonsafety-related oil tanks. Each tank contained in a separate compartment. Compartments are separated by reinforced concrete walls.	1.2 9A 12.3
Potable and Sanitary Water Systems	CDI	The design and configuration of the potable and sanitary water systems (PSWS) is CDI. The potable water system provides water supply and distribution fit for human consumption, and the sanitary water system provides collection of sanitary wastewater, with standard plant design features to prevent the potential for contamination from radioactive sources.	9.2.4	Potable water supply to Unit 3 is from on-site wells. Sanitary/domestic wastes generated in the plant are transferred to the Unit 3 Sewage Treatment Plant (STP). Treated liquid effluent is discharged to the blowdown sump and subsequently drained to the WHTF; sludge is transferred to a truck for off-site disposal.	9.2.4

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Steam Generator Blowdown System	CDI	The portions of steam generator blowdown system (SGBDS) that are downstream of the processing equipment for steam generator blowdown are CDI; including the flow path to the waste water system that is outside of the US-APWR standard plant design.	9.3.2 10.4.8 14.1.12.1.83	The blowdown line from each steam generator is provided with multiple flow paths: a line for purifying blowdown water used during normal plant operation, a line for discharging the blowdown water to the blowdown sump (which is a portion of the waste water system (WWS)) when disposal is required, and a line for discharging to the Liquid Waste Management System if radioactivity is detected.	9.3.2* 10.4.8 14.2.12.1.83*
				* DCD CDI is incorporated by reference.	
Equipment and Floor Drainage Systems	CDI	The portions of equipment and floor drainage systems that are outside the US-APWR standard plant design buildings are CDI and addressed by the COL Applicant; this includes the discharge path to the waste water system. The waste water system used for processing effluent from the systems is a site-specific design and is not part of the standard design.	9.3.2 9.3.3 10.4.8 14.2.12.1.116	The T/B drain sump collects drainage from equipment and floor drains in the T/B and nonradioactive drain sump. This sump normally drains to the WWS. The SGBDS is used to drain the steam generators. In this mode, the blowdown drain water is directed to the condenser or to the blowdown sump which is a part of the WWS.	9.3.2* 9.3.3* 10.4.8 14.2.12.1.116*
				* DCD CDI is incorporated by reference.	

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Communications Systems	COL Item	The communications systems and equipment which are outside the standard US-APWR buildings are addressed by the COL Applicant. The COL Applicant shall provide adequate external communications, including interfaces with the local telecommunications provider, and communication links between the on-site system and other on-site and offsite facilities such as the emergency operations facility and the training simulator.	9.5.2	Onsite and offsite communications are accomplished by a multi-tiered communications and notification system.	9.5.2
Administrative, Emergency Response and Training Facilities	COL Item	The location and design of the administrative building, training structures (including the training simulator), and the Emergency Response Facility are site specific and are addressed by the COL Applicant.	7.5.1 9.5.2 13.3	Operations, administration, training, and emergency response functions are conducted in dedicated spaces around the plant site.	7.5.1 9.5.2 13.3
Security Systems	COL Item	The site security/surveillance systems, which includes surveillance cameras, video displays, security detection sensors, communications, security fences and barricades, access control, etc., that are not located within the standard US-APWR building designs, are site-specific and are addressed by the COL Applicant.	13.6	Security systems and procedures are discussed separately in the Physical Security Plan and Safeguards Contingency Plan, and Security Training and Qualification Plan. Security systems are also discussed in the Physical Security Protection Systems Report (PSPSR).	13.6

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
General Site Improvements	CDI	The landscaping features, roadways, walkways, traffic control barriers, etc., that are located outside the US-APWR standard plant buildings, are site specific and are addressed by the COL Applicant. These features as presented in the DCD are CDI.	1.2 App 9A 12.3[q3]	A site arrangement plan is provided in Figure 1.2-1R, which shows site-specific features and improvements, as well as the standard US-APWR buildings and features. Physical protection systems (fences, delays, and barriers) are discussed in the PSPSR.	1.2 9A 12.3
Fire Protection	COL Item	The fire protection features (such as fire water supply facilities, sprinkler systems, smoke and fire detection devices, and fire alarm systems) that are located outside the US-APWR standard plant buildings, are site-specific and are addressed by the COL Applicant. This includes a seismic category I water source supplied to the seismic standpipe system.	1.2 9.5.1	Site-specific fire protection systems are provided throughout the plant. Each of the ESW lines in the R/B and in the ESWP house is tapped to supply water to the fire protection system.	1.2 9.5.1
Effluent Monitoring and Sampling	COL Item	The effluent monitoring and sampling systems and features required to monitor levels of activity in plant effluent released to the environment that are not part of the standard US-APWR buildings, are addressed by the COL Applicant.	11.5	The Offsite Dose Calculation Manual is implemented as part of the operational program.	11.5

NAPS COL 1.8(1)

Table 1.8-1R Significant Site-Specific Interfaces with the Standard US-APWR Design

Interface	Interface Type	Description of Items Considered to be Outside the Standard Scope of Design	DCD Section	Description of the Interface in the FSAR	FSAR Section
Compressed Gas Systems	COL Item	The supply portions of oxygen, hydrogen, nitrogen and carbon dioxide systems that are outside the US-APWR standard buildings are addressed by the COL Applicant. Supply lines from yard areas connect to distribution lines within US-APWR standard buildings and are necessary for operation of standard plant design components.	9.3.1	Bulk nitrogen is provided to equipment that requires N_2. Bottled hydrogen is supplied to equipment that requires H_2. Carbon dioxide gas cylinders supply gas to equipment that requires the carbon dioxide. Miscellaneous gases are delivered to gas analyzers that require the gases.	9.3.1

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 1.1(1)	The COL Applicant is to provide scheduled completion date and estimated commercial operation date of nuclear power plants referencing the US-APWR standard design.	1.1.5	3a
COL 1.1(2)	The COL Applicant is to identify the actual plant location.	1.1.1	3a
COL 1.2(1)	The COL Applicant is to develop a complete and detailed site plan in the site-specific licensing process.	1.2.1.6 1.2.1.7.1 Figure 1.2-1R	3a
COL 1.4(1)	The COL Applicant is to identify major agents, contractors, and participants for the COL application development, construction, and operation.	1.4.1 1.4.2.3–1.4.2.8	4
COL 1.8(1)	The COL Applicant is to demonstrate that the interface requirements established for the design have been met.	1.2 1.8 Figure 1.2-6R Figures 1.2-201–1.2-211 Table 1.8-1R	3a
COL 1.8(2)	The COL Applicant is to provide the cross-reference identifying specific FSAR sections that address each COL information item from the DCD	1.8.1.2 Table 1.8-201	3a
COL 1.8(3)	The COL Applicant is to provide a summary of plant specific departures from the DCD, and conformance with site parameters.	1.8.1.2 1.8.1.3 Table 1.8-202 Table 1.8-204	3a
COL 1.9(1)	The COL Applicant is to address an evaluation of the applicable RG, SRP, Generic Issues including Three Mile Island (TMI) requirements, and operational experience for the site-specific portion and operational aspect of the facility.	1.9 1.9.1-1.9.4 Table 1.9-201–1.9-202 Table 1.9-206–1.9-207	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 2.1(1)	The COL Applicant is to describe the site geography and demography including the specified site characteristics.	2.1 Figure 2.1-201	3a
COL 2.2(1)	The COL Applicant is to describe nearby industrial, transportation, and military facilities within 5 miles of the site, or at greater distances as appropriate based on their significance. The COL Applicant is to establish the presence of potential hazards, determine whether these accidents are to be considered as DBEs, and the design parameters related to the accidents determined as DBEs.	2.2	3a
COL 2.3(1)	The COL Applicant, whether the plant is to be sited inside or outside the continental US, is to provide site-specific pre-operational and operational programs for meteorological measurements, and is to verify the site-specific regional climatology and local meteorology are bounded by the site parameters for the standard US-APWR design or demonstrate by some other means that the proposed facility and associated site-specific characteristics are acceptable at the proposed site.	2.3.1 2.3.2 2.3.3	3a
COL 2.3(2)	The COL Applicant is to provide conservative factors as described in SRP 2.3.4 (Reference 2.3-2). If a selected site will cause excess to the bounding χ/Q values, then the COL Applicant is to demonstrate how the dose reference values in 10 CFR 52.79(a)(1)(vi) (Reference 2.3-3) and the control room dose limits in 10 CFR 50, Appendix A, General Design Criteria 19 (Reference 2.3-4) are met using site-specific χ/Q values.	2.3.4	3a
COL 2.3(3)	The COL Applicant is to characterize the atmospheric transport and diffusion conditions necessary for estimating radiological consequences of the routine release of radioactive materials to the atmosphere, and provide realistic estimates of annual average χ/Q values and D/Q values as described in SRP 2.3.5 (Reference 2.3-5).	2.3.5	3a
COL 2.4(1)	The COL Applicant is to provide sufficient site-specific information to verify that hydrologic events will not affect the safety-basis for the US-APWR.	2.4	3a
COL 2.5(1)	The COL Applicant is to provide sufficient information regarding the seismic and geologic characteristics of the site and the region surrounding the site.	2.5	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.1(1)	The COL Applicant is to provide a design that allows for the appropriate inspections and layout features of the ESWS.	3.1.4.16.1	3a
COL 3.2(1)	Deleted from the DCD.		
COL 3.2(2)	Deleted from the DCD.		
COL 3.2(3)	Deleted from the DCD.		
COL 3.2(4)	The COL Applicant is to identify the site-specific, safety-related systems and components that are designed to withstand the effects of earthquakes without loss of capability to perform their safety function; and those site-specific, safety-related fluid systems or portions thereof; as well as the applicable industry codes and standards for pressure-retaining components.	3.2.1.2 Table 3.2-2R Table 3.2-201 Table 3.2-203	3a
COL 3.2(5)	The COL Applicant is to identify the equipment class and seismic category of the site-specific, safety-related and nonsafety-related fluid systems, components (including pressure retaining), and equipment as well as the applicable industry codes and standards.	3.2.2 Table 3.2-2R Table 3.2-201	3a
COL 3.2(6)	The COL Applicant is to apply DCD methods of equipment classification and seismic categorization of risk-significant, nonsafety-related SSCs based on their safety role assumed in the PRA and treatment by the D-RAP.	3.2.2.5 Table 3.2-2R Table 3.2-201	3a
COL 3.3(1)	The COL Applicant is responsible for verifying the site-specific basic wind speed is enveloped by the determinations in this section.	3.3.1.1	3a
COL 3.3(2)	These requirements also apply to seismic category I structures provided by the COL Applicant. Similarly, it is the responsibility of the COL Applicant to establish the methods for qualification of tornado effects to preclude damage to safety-related SSCs.	3.3.2.2.4	3a
COL 3.3(3)	It is the responsibility of the COL Applicant to assure that site-specific structures and components not designed for tornado loads will not impact either the function or integrity of adjacent safety-related SSCs, or generate missiles having more severe effects than those discussed in Subsection 3.5.1.4.	3.3.2.3	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.3(4)	The COL Applicant is to provide the wind load design method and importance factor for site-specific category I and category II buildings and structures.	3.3.1.2	3a
COL 3.3(5)	The COL Applicant is to note the vented and unvented requirements of this subsection to the site-specific category I buildings and structures.	3.3.2.2.2	3a
COL 3.4(1)	The COL Applicant is to address the site-specific design of plant grading and drainage.	3.4.1.2	3a
COL 3.4(2)	The COL Applicant is to demonstrate the DBFL bounds their specific site, or is to identify and address applicable site conditions where static flood level exceed the DBFL and/or generate dynamic flooding forces.	3.4.1.4	3a
COL 3.4(3)	Site-specific flooding hazards from engineered features, such as from cooling water system piping, is to be addressed by the COL Applicant.	3.4.1.2	3a
COL 3.4(4)	The COL Applicant is to address any additional measures below grade to protect against exterior flooding and the intrusion of ground water into seismic category I buildings and structures.	3.4.1.2	3a
COL 3.4(5)	The COL Applicant is to identify and design, if necessary, any site-specific flood protection measures such as levees, seawalls, floodwalls, site bulkheads, revetments, or breakwaters per the guidelines of RG 1.102 (Reference 3.4-3), or dewatering system if the plant is not built above the DBFL.	3.4.1.2	3a
COL 3.4(6)	The COL Applicant is to identify any site-specific physical models used to predict prototype performance of hydraulic structures and systems.	3.4.2	3a
COL 3.4(7)	The COL Applicant is responsible for the protection from internal flooding for those site-specific SSCs that provide nuclear safety-related functions or whose postulated failure due to internal flooding could adversely affect the ability of the plant to achieve and maintain a safe shutdown condition.	3.4.1.3	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.5(1)	The COL Applicant is to have plant procedures in place prior to fuel load that specify unsecured equipment, including portable pressurized gas cylinders, located inside or outside containment and required for maintenance or undergoing maintenance is to be removed from containment prior to operation, moved to a location where it is not a potential hazard to SSCs important to safety, or seismically restrained to prevent it from becoming a missile.	3.5.1.1.4	2
COL 3.5(2)	The COL Applicant is to commit to actions to maintain P_1 within this acceptable limit as outlined in RG 1.115, "Protection Against Low-Trajectory Turbine Missiles" (Reference 3.5-6) and SRP Section 3.5.1.3, "Turbine Missiles" (Reference 3.5-7).	3.5.1.3.2	2
COL 3.5(3)	As described in DCD, Section 2.2, the COL Applicant is to establish the presence of potential hazards, except aircraft, which is reviewed in Subsection 3.5.1.6, and the effects of potential accidents in the vicinity of the site.	3.5.1.5	3a
COL 3.5(4)	It is the responsibility of the COL Applicant to verify the site interface parameters with respect to aircraft crashes and air transportation accidents as described in Section 2.2.	3.5.1.6	3a
COL 3.5(5)	The COL Applicant is responsible to evaluate site-specific hazards for external events that may produce missiles more energetic than tornado missiles, and assure that the design of seismic category I and II structures meet these loads.	3.5.2	3a
COL 3.5(6)	The COL Applicant is responsible to assess the orientation of the T/G of this and other unit(s) at multi-unit site for the probability of missile generation using the evaluation of Subsection 3.5.1.3.2.	3.5.1.3.1	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.6(1)	The COL Applicant is to identify the site-specific systems or components that are safety-related or required for safe shutdown that are located near high-energy or moderate-energy piping systems, and are susceptible to the consequences of these piping failures. The COL Applicant is to provide a list of site-specific high-energy and moderate-energy piping systems, which includes a description of the layout of all piping systems where physical arrangement of the piping systems provides the required protection, the design basis of structures and compartments used to protect nearby essential systems or components, or the arrangements to assure the operability of safety-related features where neither separation nor protective enclosures are practical. Additionally, the COL Applicant is to provide the failure modes and effect analyses that verifies the consequences of failures in site-specific high-energy and moderate-energy piping does not affect the ability to safely shut down the plant.	3.6.1.3	3a
COL 3.6(2)	Deleted from the DCD.		
COL 3.6(3)	Deleted from the DCD.		
COL 3.6(4)	The COL Applicant is to implement the criteria for defining break and crack locations and configurations for site-specific high-energy and moderate-energy piping systems. The COL Applicant is to identify the postulated rupture orientation of each postulated break location for site-specific high-energy and moderate-energy piping systems. The COL Applicant is to implement the appropriate methods to assure that as-built configuration of site-specific high-energy and moderate-energy piping systems is consistent with the design intent and provide as-built drawings showing component locations and support locations and types that confirms this consistency.	3.6.2.1	3a
COL 3.6(5)	Deleted from the DCD.		
COL 3.6(6)	Deleted from the DCD.		
COL 3.6(7)	Deleted from the DCD.		
COL 3.6(8)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.6(9)	Deleted from the DCD.		
COL 3.6(10)	The COL Applicant is to develop a milestone schedule for implementation of the operating and maintenance procedures for prevention of water hammer.	3.6.3.3.1	2
COL 3.7(1)	The COL Applicant is to confirm that the site-specific PGA at the basemat level control point of the CSDRS is less than or equal to 0.3 g.	3.7.1.1	3a
COL 3.7(2)	The COL Applicant is to perform an analysis of the US-APWR standard plant seismic category I design to verify that the site-specific FIRS at the basemat level control point of the CSDRS are enveloped by the site-independent CSDRS.	3.7.1.1 Figures 3.7-201–3.7-208 Figures 3.7-213–3.7-214	3a
COL 3.7(3)	It is the responsibility of the COL Applicant to develop analytical models appropriate for the seismic analysis of buildings and structures that are designed on a site-specific basis including, but not limited to, the following: • PSFSVs (seismic category I) • ESWPT (seismic category I) • UHSRS (seismic category I)	3.7.2.3.1 Appendix 3LL	3a
COL 3.7(4)	To prevent non-conservative results, the COL Applicant is to review the resulting level of seismic response and determine appropriate damping values for the site-specific calculations of ISRS that serve as input for the seismic analysis of seismic category I and seismic category II subsystems.	3.7.1.2 3.7.2.4.1	3a
COL 3.7(5)	The COL Applicant is to assure that the horizontal FIRS defining the site-specific SSE ground motion at the bottom of seismic category I or II basemats envelope the minimum response spectra required by 10 CFR 50, Appendix S, and the site-specific response spectra obtained from the response analysis.	3.7 3.7.1.1 Appendix 3OO Tables 3.7-201 and 3.7-202 Tables 3.7-201 through 3.7-204	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.7(6)	The COL Applicant is to develop site-specific GMRS and FIRS by an analysis methodology, which accounts for the upward propagation of the GMRS. The FIRS are compared to the CSDRS to assure that the US-APWR standard plant seismic design is valid for a particular site. If the FIRS are not enveloped by the CSDRS, the US-APWR standard plant seismic design is modified as part of the COLA in order to validate the US-APWR for installation at that site.	2.5.2 3.7 Figure 3.7-201 Appendix 3OO	3a
COL 3.7(7)	The COL Applicant is to determine the allowable static and dynamic bearing capacities based on site conditions, including the properties of fill concrete placed to provide a level surface for the bottom of foundation elevations, and to evaluate the bearing loads to these capacities.	2.5.4.10 3.7.1.3 Table 2.5-215 Table 3.8-202	3a
COL 3.7(8)	The COL Applicant is to evaluate the strain-dependent variation of the material dynamic properties for site materials.	3.7.2.4.1	3a
COL 3.7(9)	The COL Applicant is to assure that the design or location of any site-specific seismic category I SSCs, for example pipe tunnels or duct banks, will not expose those SSCs to possible impact due to the failure or collapse of non-seismic category I structures, or with any other SSCs that could potentially impact, such as heavy haul route loads, transmission towers, non safety-related storage tanks, etc.	3.7.2.8	3a
COL 3.7(10)	It is the responsibility of the COL Applicant to further address structure-to-structure interaction if the specific site conditions can be important for the seismic response of particular US-APWR seismic category I structures, or may result in exceedance of assumed pressure distributions used for the US-APWR standard plant design.	3.7.2.8	3a
COL 3.7(11)	Deleted from the DCD.		
COL 3.7(12)	It is the responsibility of the COL Applicant to design seismic category I below- or above-ground liquid-retaining metal tanks such that they are enclosed by a tornado missile protecting concrete vault or wall, in order to confine the emergency gas turbine fuel supply.	3.7.3.9 Appendix 3LL	3a
COL 3.7(13)	The COL Applicant is to set the value of the OBE that serves as the basis for defining the criteria for shutdown of the plant, according to the site specific conditions.	3.7.1.1 Table 3.7-201 Table 3.7-202	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.7(14)	The COL Applicant is to determine from the site-specific geological and seismological conditions if multiple US-APWR units at a site will have essentially the same seismic response, and based on that determination, choose if more than one unit is provided with seismic instrumentation at a multiple-unit site.	3.7.4.3	3a
COL 3.7(15)	Deleted from the DCD.		
COL 3.7(16)	The COL Applicant shall provide free-field seismic instrumentation in the vicinity of the power block area at surface grade which shall be used for shutdown determination, unless otherwise justified. Any such justification shall be based on conditions and requirements specific to the site, and shall include justification for evaluation of OBE exceedance using only measurements from instrumentation installed on the buildings and the structures of the US-APWR standard plant.	3.7.4.1 3.7.4.2	3a
COL 3.7(17)	Deleted from the DCD.		
COL 3.7(18)	Deleted from the DCD.		
COL 3.7(19)	The COL Applicant is to identify the implementation milestone for the seismic instrumentation implementation program based on the discussion in Subsections 3.7.4.1 through 3.7.4.5.	3.7.4.6	1b
COL 3.7(20)	The COL Applicant is to validate the site-independent seismic design of the standard plant for site-specific conditions, including geological, seismological, and geophysical characteristics, and to develop the site-specific GMRS.	2.5.2 3.7 3.7.2.2 3.7.2.4.1 Appendix 3NN	3a
COL 3.7(21)	The COL Applicant is responsible for the seismic design of those seismic category I and seismic category II SSCs that are not part of the US-APWR standard plant.	3.7 Appendix 3LL	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.7(22)	The COL Applicant is required to perform site-specific seismic analyses, including SSI analysis which may consider seismic wave transmission incoherence and analysis of the CAV of the seismic input motion, in order to determine if high-frequency exceedances of the CSDRS could be transmitted to SSCs in the plant superstructure with potentially damaging effects.	3.7.1.1	3a
COL 3.7(23)	The COL Applicant is to verify that the results of the site-specific SSI analysis for the broadened ISRS and basement walls lateral soil pressures are enveloped by the US-APWR standard design.	3.7 Appendix 3NN	3a
COL 3.7(24)	The COL Applicant is to verify that the site-specific ratios V/A and AD/V^2 (A, V, D, are PGA, ground velocity, and ground displacement, respectively) are consistent with characteristic values for the magnitude and distance of the appropriate controlling events defining the site-specific uniform hazard response spectra.	3.7.1.1 Appendix 3OO	3a
COL 3.7(25)	The COL Applicant referencing the US-APWR standard design is required to perform a site-specific SSI analysis for the R/B-PCCV-containment internal structure, and PS/B model, utilizing the program ACS-SASSI (Reference 3.7-17) which contains time history input incoherence function capability. The SSI analysis using SASSI is required in order to confirm that site-specific effects are enveloped by the standard design. After the SASSI analysis is first performed for a specific unit, subsequent COLAs for other units may be able to forego SASSI analyses if the FIRS and GMRS derived for those subsequent units are much smaller than the US-APWR standard plant CSDRS, and if the subsequent unit can also provide justification through comparison of site-specific geological and seismological characteristics.	3.7 Appendix 3NN	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.7(26)	SSI effects are also considered by the COL Applicant in site-specific seismic design of any seismic category I and II structures that are not included in the US-APWR standard plant. Consideration of structure-to-structure interaction is discussed in Subsection 3.7.2.8. The site-specific SSI analysis is performed for buildings and structures including, but not limited to, to the following: • Seismic category I ESWPT • Seismic category I PSFSV • Seismic category I UHSRS	3.7.2.4.1 Appendix 3LL	3a
COL 3.7(27)	It is the responsibility of the COL Applicant to perform any site-specific seismic analysis for dams that may be required.	3.7.2.13 3.7.3.8	3a
COL 3.7(28)	The overall basemat dimensions, basemat embedment depths, and maximum height of the US-APWR R/B, PCCV, and containment internal structure on their common basemat are given in Table 3.7.1-3 and as updated by the COL Applicant to include site-specific seismic category I structures.	3.7.1.3 Table 3.7.1-3R	3a
COL 3.7(29)	Table 3.7.2-1, as updated by the COL Applicant to include site-specific seismic category I structures, presents a summary of dynamic analysis and combination techniques including types of models and computer programs used, seismic analysis methods, and method of combination for the three directional components for the seismic analysis of the US-APWR standard plant seismic category I buildings and structures.	3.7.2.1 Table 3.7.2-1R Appendix 3LL	3a
COL 3.7(30)	The COL Applicant is to provide site-specific design ground motion time histories and durations of motion.	3.7.1.1 Appendix 3OO Figures 3.7-215 through 3.7-220	3a
COL 3.8(1)	Deleted from the DCD.		
COL 3.8(2)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.8(3)	It is the responsibility of the COL Applicant to assure that any material changes based on site-specific material selection for construction of the PCCV meet the requirements specified in ASME Code, Section III, Article CC-2000 of the code and supplementary requirements of RG 1.136 as well as SRP 3.8.1.	3.8.1.6	3a
COL 3.8(4)	Deleted from the DCD.		
COL 3.8(5)	Deleted from the DCD.		
COL 3.8(6)	Deleted from the DCD.		
COL 3.8(7)	It is the responsibility of the COL Applicant to determine the site-specific aggressivity of the ground water/soil and accommodate this parameter into the concrete mix design as well as into the site-specific structural surveillance program.	3.8.1.6 3.8.4.7	3a
COL 3.8(8)	Deleted from the DCD.		
COL 3.8(9)	Deleted from the DCD.		
COL 3.8(10)	The prestressing system is designed as a strand system, however the system material may be switched to a wire system at the choice of the COL Applicant. If this is done, the COL Applicant is to adjust the US-APWR standard plant tendon system design and details on a site-specific basis.	3.8.1.6	3a
COL 3.8(11)	Deleted from the DCD.		
COL 3.8(12)	Deleted from the DCD.		
COL 3.8(13)	Deleted from the DCD.		
COL 3.8(14)	It is the responsibility of the COL Applicant to establish programs for testing and ISI of the PCCV, including periodic inservice surveillance and inspection of the PCCV liner and prestressing tendons in accordance with ASME Code Section XI, Subsection IWL.	3.8.1.7	1a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.8(15)	The COL Applicant is responsible for the seismic design of those seismic category I and seismic category II SSCs not seismically designed as part of the US-APWR standard plant, including the following seismic category I structures: ESWPT UHSRS PSFSVs	3.8.4	3a
COL 3.8(16)	Deleted from the DCD.		
COL 3.8(17)	Deleted from the DCD.		
COL 3.8(18)	Deleted from the DCD.		
COL 3.8(19)	The design and analysis of the ESWPT, UHSRS, PSFSVs, and other site-specific structures are to be provided by the COL Applicant based on site-specific seismic criteria.	3.8.4.1.3 Figures 3.8-201–3.8-214	3a
COL 3.8(20)	The COL Applicant is to identify any applicable externally generated loads. Such site-specific loads include those induced by floods, potential non-terrorism related aircraft crashes, explosive hazards in proximity to the site, and projectiles and missiles generated from activities of nearby military installations.	3.8.4.3	3a
COL 3.8(21)	Deleted from the DCD.		
COL 3.8(22)	The COL Applicant is to establish a site-specific program for monitoring and maintenance of seismic category I structures in accordance with the requirements of NUMARC 93-01 (Reference 3.8-28) and 10 CFR 50.65 (Reference 3.8-29) as detailed in RG 1.160 (Reference 3.8-30). For seismic category I structures, monitoring is to include base settlements and differential displacements.	3.8.4.7	1b
COL 3.8(23)	The COL Applicant is to determine if the site-specific zone of maximum frost penetration extends below the depth of the basemats for the standard plant, and to pour fill concrete under any basemat above the frost line so that the bottom of fill concrete is below the maximum frost penetration level.	3.8.5.1	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.8(24)	Other non-standard seismic category I buildings and structures of the US-APWR are designed by the COL Applicant based on site-specific subgrade conditions.	3.8.5.1.3	3a
COL 3.8(25)	The site-specific COL are to assure the design criteria listed in Chapter 2, Table 2.0-1, is met or exceeded.	3.8.5.5 3.8.4.3.4.2 Table 3.8-202 Table 3.8-203	3a
COL 3.8(26)	Subsidence and differential displacement may therefore be reduced to less than 2 in. if justified by the COL Applicant based on site specific soil properties.	3.8.5.4.4	3a
COL 3.8(27)	The COL Applicant is to specify normal operating thermal loads for site-specific structures, as applicable.	3.8.4.3.7.1 Table 3.8-201	3a
COL 3.8(28)	The COL Applicant is to specify concrete strength utilized in non-standard plant seismic category I structures.	3.8.4.6.1.1	3a
COL 3.8(29)	The COL Applicant is to provide design and analysis procedures for the ESWPT, UHSRS, and PSFSVs.	3.8.4.4.3 Appendix 3LL	3a
COL 3.8(30)	When a coefficient of friction of 0.7 is used in calculating sliding resistance Fs, roughening of fill concrete is required per criteria given in Section 11.7.9 of ACI 349 (Reference 3.8-8). If a coefficient of friction of less than 0.7 is used by the COL Applicant, roughening of fill concrete is not required.	3.8.4.4.3 3.8.5.5.2	3a
COL 3.9(1)	The COL Applicant is to assure snubber functionality in harsh service conditions, including snubber materials (e.g., lubricants, hydraulic fluids, seals).	3.9.3.4.2.5	3a
COL 3.9(2)	The first COL Applicant is to complete the vibration assessment program, including the vibration test results, consistent with guidance of RG 1.20. Subsequent COL Applicant need only provide information in accordance with the applicable portion of position C.3 of RG 1.20 for Non-Prototype internals.	3.9.2.4.1	2
COL 3.9(3)	Deleted from the DCD.		
COL 3.9(4)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.9(5)	Deleted from the DCD.		
COL 3.9(6)	The COL Applicant is to provide the program plan for IST of dynamic restraints in accordance with Nonmandatory Appendix A of ASME OM Code.	3.9.6.4	1b
COL 3.9(7)	Deleted from the DCD.		
COL 3.9(8)	The COL Applicant is to administratively control the edition and addenda to be used for the IST program plan, and to provide a full description of their IST program plan for pumps, valves, and dynamic restraints.	3.9.6	3a
COL 3.9(9)	Deleted from the DCD.		
COL 3.9(10)	The COL Applicant is to identify the site-specific active pumps.	3.9.3.3.1 Table 3.9-201	3a
COL 3.9(11)	The COL Applicant is to provide site-specific, safety-related pump IST parameters and frequency.	3.9.6.2 Table 3.9-202	3a
COL 3.9(12)	The COL Applicant is to provide type of testing and frequency of site-specific valves subject to IST in accordance with the ASME Code.	3.9.6.3 Table 3.9-203	3a
COL 3.10(1)	The COL Applicant is to document and implement an equipment qualification program for seismic category I equipment and provide milestones and completion dates.	3.10.4.1	1a
COL 3.10(2)	Deleted from the DCD.		
COL 3.10(3)	The COL Applicant is to develop and maintain an equipment qualification file that contains a list of systems, equipment, and equipment support structures and summary data sheets referred to as an equipment qualification summary data sheet (EQSDS) of the seismic qualification for each piece of safety-related seismic category I equipment (i.e., each mechanical and electrical component of each system), which summarize the component's qualification.	3.10	1a
COL 3.10(4)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.10(5)	Components that have been previously tested to IEEE Std 344-1971 prior to submittal of the DCD are reevaluated to justify the appropriateness of the input motion and requalify the equipment, if necessary. The COL Applicant is to requalify the component using biaxial test input motion unless the applicant provides justification for using a single-axis test input motion.	3.10.2	1a
COL 3.10(6)	Deleted from the DCD.		
COL 3.10(7)	Deleted from the DCD.		
COL 3.10(8)	For design of seismic category I and II SSCs that are not part of the standard plant, the COL Applicant can similarly eliminate the OBE, or optionally set the OBE higher than 1/3 SSE, provided the design of the non-standard plant's SSCs are analyzed for the chosen OBE.	3.10.1	3a
COL 3.10(9)	The COL Applicant is to investigate if site-specific in-structure response spectra generated for the COL application may exceed the standard US-APWR design's in-structure response spectra in the high-frequency range. Accordingly, the COL Applicant is to consider the functional performance of vibration-sensitive components, such as relays and other instrument and control devices whose output could be affected by high frequency excitation.	3.10.2	3b
COL 3.10(10)	Deleted from the DCD.		
COL 3.11(1)	The COL Applicant is responsible for assembling and maintaining the environmental qualification document, which summarizes the qualification results for all equipment identified in Appendix 3D, for the life of the plant.	3.11	3a
COL 3.11(2)	The COL Applicant is to describe how the results of the qualification tests are to be recorded in an auditable file in accordance with requirements of 10 CFR 50.49 (j).	3.11.3	3a
COL 3.11(3)	The COL Applicant is to provide a schedule showing the EQ Program proposed implementation milestones.	3.11	4

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.11(4)	The COL Applicant is to describe periodic tests, calibrations, and inspections to be performed during the life of the plant, which verify the identified equipment remains capable of fulfilling its intended function.	3.11	3a
COL 3.11(5)	The COL Applicant is to identify the site-specific equipment to be addressed in the EQ Program, including locations and environmental conditions.	3.11.1.1 Table 3D-201	3a
COL 3.11(6)	The COL Applicant is to qualify site-specific electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment) using a qualification process that is equivalent to that delineated for the US-APWR Standard Plant, as described in Technical Report MUAP-08015.	3.11.4	3a
COL 3.11(7)	The COL Applicant is to identify chemical and radiation environmental requirements for site-specific qualification of electrical and mechanical equipment (including instrumentation and control, and certain accident monitoring equipment).	3.11.5	3a
COL 3.11(8)	The COL Applicant is to provide the site-specific mechanical equipment requirements.	3.11.6 Table 3D-201	3a
COL 3.11(9)	Optionally, the COL Applicant may revise the parameters based on site-specific considerations.	3.11.1.2	3a
COL 3.12(1)	Deleted from the DCD.		
COL 3.12(2)	If any piping is routed in tunnels or trenches in the yard, the COL Applicant is to generate site-specific seismic response spectra, which may be used for the design of these piping systems.	3.12.5.1	3a
COL 3.12(3)	If the COL Applicant finds it necessary to lay ASME Code, Section III (Reference 3.12-2), Class 2 or 3 piping exposed to wind or tornado loads, then such piping must be designed to the plant design basis loads.	3.12.5.3.6	3a
COL 3.12(4)	The COL Applicant is to screen piping systems that are sensitive to high frequency modes for further evaluation.	3.12.5.6	3a
COL 3.13(1)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 3.13(2)	Deleted from the DCD.		
COL 3.13(3)	The COL Applicant is to retain quality records including certified material test reports for all property test and analytical work performed on nuclear threaded fasteners in accordance with the requirements of 10 CFR 50.71.	3.13.1.5	3a
COL 3.13(4)	The COL Applicant is to address compliance with ISI requirements as summarized in Subsection 3.13.2.	3.13.2	1b
COL 3.13(5)	The COL Applicant is to commit to complying with the requirements of ASME Code, Section XI, IWA-5000 (Reference 3.13-14), and the requirements of 10 CFR 50.55a(b)(2)(xxvi) (Reference 3.13-11), Pressure Testing Class 1, 2, and 3 Mechanical Joints, and Paragraph (xxvii) Removal of Insulation.	3.13.2	3a
COL 4.4(1)	Deleted from the DCD.		
5.2(1)	ASME Code Cases that are approved in Regulatory Guide 1.84; The COL applicant addresses the addition of ASME Code Cases that are approved in Regulatory Guide 1.84.	5.2.1.2	3a
5.2(2)	ASME Code Cases that are approved in Regulatory Guide 1.147; The COL applicant addresses Code Cases invoked in connection with the inservice inspection program that are in compliance with Regulatory Guide 1.147.	5.2.1.2	3a
5.2(3)	ASME Code Cases that are approved in Regulatory Guide 1.192; The COL applicant addresses Code cases invoked in connection with the operation and maintenance that are in compliance with Regulatory Guide 1.192.	5.2.1.2	3a
5.2(4)	Inservice inspection and testing program for the RCPB The COL applicant provides and develops the implementation milestone of the inservice inspection and testing program for the RCPB, in accordance with Section XI of the ASME Code and 10 CFR 50.55a.	5.2.4.1 Table 13.4-201	1b

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
5.2(5)	Preservice inspection and testing program for the RCPB The COL applicant provides and develops the implementation milestone of the preservice inspection and testing program for the RCPB in accordance with Article NB-5280 of Section III, Division of the ASME Code.	5.2.4.2 Table 13.4-201	1b and 1a
COL 5.2(6)	Deleted from the DCD.		
COL 5.2(7)	Deleted from the DCD.		
COL 5.2(8)	Deleted from the DCD.		
COL 5.2(9)	Deleted from the DCD.		
COL 5.2(10)	Deleted from the DCD.		
5.2(11)	ASME Code Edition and Addenda The COL applicant addresses whether the ASME Code editions or addenda other than those specified in Table 5.2.1-1 will be used.	5.2.1.1	3a
5.2(12)	EPRI Primary Water Chemistry Guideline The COL applicant should specify the applicable version of the EPRI “Primary Water Chemistry Guideline” that will be implemented.	5.2.3.2.1	3a
5.2(13)	ISI accessibility The COL applicant addresses the discussion of the provisions to preserve accessibility to perform ISI for Class 1 components provided design of US-APWR Class 1 component is changed from the DCD design.	5.2.4.1.1	3a
5.2(14)	Procedures for conversion into common leakage rate The COL applicant addresses and develops a milestone schedule for preparation and implementation of the procedure.	5.2.5.9	2
5.2(15)	Procedures for operator response to prolonged low-level leakage The COL applicant addresses and develops a milestone schedule for preparation and implementation of the procedure.	5.2.5.9	2

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
5.3(1)	Pressure-Temperature Limit Curves; The COL applicant addresses the use of plant-specific reactor vessel P-T limit curves. Generic P-T limit curves for the US-APWR reactor vessel are shown in Figures 5.3-2 and 5.3-3, which are based on the conditions described in Subsection 5.3.2. However, for a specific US-APWR plant, these limit curves are plotted based on actual material composition requirements and the COL applicant addresses the use of these plant-specific curves.	5.3.2.1 5.3.2.2	3a
5.3(2)	Reactor Vessel Material Surveillance Program; The COL applicant provides a reactor vessel material surveillance program based on information in Subsection 5.3.1.6.	5.3.1.6	1a
5.3(3)	Surveillance Capsule Orientation and Lead Factors; The COL applicant addresses the orientation and resulting lead factors for the surveillance capsules of a particular US-APWR plant.	5.3.1.6.1	3a
5.3(4)	Reactor Vessel Material Properties Verification; The COL applicant verifies the USE and RT_{NDT} at EOL, including a PTS evaluation based on actual material property requirements of the reactor vessel material and the projected neutron fluence for the design-life objective of 60 years.	5.3.1.1(DCD) 5.3.2.3 5.3.2.4	3a
5.3(5)	Preservice and Inservice Inspection; The COL applicant provides the information for preservice and inservice inspection described in Subsection 5.2.4.	5.3.3.7	3a
COL 5.4(1)	Deleted from the DCD.		
COL 5.4(2)	Deleted from the DCD.		
COL 5.4(3)	Deleted from the DCD.		
COL 5.4(4)	Deleted from the DCD.		
COL 5.4(5)	Deleted from the DCD.		
COL 5.4(6)	Deleted from the DCD.		
COL 5.4(7)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 6.1(1)	Deleted from the DCD.		
COL 6.1(2)	Deleted from the DCD.		
COL 6.1(3)	Deleted from the DCD.		
COL 6.1(4)	Deleted from the DCD.		
COL 6.1(5)	Deleted from the DCD.		
COL 6.1(6)	Deleted from the DCD.		
COL 6.1(7)	The COL Applicant is responsible for identifying the implementation milestones for the coatings program.	6.1.2	2
COL 6.2(1)	Deleted from the DCD.		
COL 6.2(2)	Deleted from the DCD.		
COL 6.2(3)	Deleted from the DCD.		
COL 6.2(4)	Deleted from the DCD.		
COL 6.2(5)	Preparation of a cleanliness, housekeeping and foreign materials exclusion program is the responsibility of the COL applicant. This program addresses other debris sources such as latent debris inside containment. This program minimizes foreign materials in the containment.	6.2.2.3 Table 6.2.2-2R	2
COL 6.2(6)	Deleted from the DCD.		
COL 6.2(7)	Deleted from the DCD.		
COL 6.2(8)	The COL applicant is responsible for identifying the implementation milestone for the containment leakage rate testing program described under 10CFR50, Appendix J.	6.2.6.1	1b
COL 6.2(9)	Deleted from the DCD.		
COL 6.2(10)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 6.3(1)	Deleted from the DCD.		
COL 6.3(2)	Deleted from the DCD.		
COL 6.3(3)	Deleted from the DCD.		
COL 6.3(4)	Deleted from the DCD.		
COL 6.3(5)	Deleted from the DCD.		
COL 6.3(6)	Deleted from the DCD.		
COL 6.4(1)	The COL Applicant is responsible to provide details of specific toxic chemicals of mobile and stationary sources within the requirements of RG 1.78 (Ref 6.4-4) and evaluate the control room habitability based on the recommendation of RG 1.78 (Ref 6.4-4).	6.4.4.2 Table 6.4-201	3a
COL 6.4(2)	The COL Applicant is responsible to discuss the automatic actions and manual actions for the MCR HVAC system in the event of postulated toxic gas release.	6.4.3 6.4.4.2	3a
COL 6.4(3)	Deleted from the DCD.		
COL 6.4(4)	Deleted from the DCD.		
COL 6.4(5)	The number, locations, sensitivity, range, type, and design of the toxic gas detectors are COL items. Depending on proximity to nearby industrial, transportation, and military facilities, and the nature of the activities in the surrounding area, as well as specific chemicals onsite, the COL Applicant is responsible to specify the toxic gas detection requirements necessary to protect the CRE.	6.4.6	3a
COL 6.5(1)	Deleted from the DCD.		
COL 6.5(2)	Deleted from the DCD.		
COL 6.5(3)	Deleted from the DCD.		
COL 6.5(4)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 6.6(1)	The COL Applicant is responsible for identifying the implementation milestone for ASME Section XI inservice inspection program for ASME Code Section III Class 2 and 3 systems, components (pumps and valves), piping, and supports, consistent with the requirements of 10 CFR 50.55a (g).	6.6	1b
COL 6.6(2)	The COL Applicant is responsible for identifying the implementation milestone for the augmented inservice inspection program.	6.6.8	1b
COL 7.3(1)	Deleted from the DCD.		
COL 7.4(1)	The COL applicant is to provide a description of component controls and indications required for safe shutdown related to the UHS.	7.4.1.6 Table 7.4-201 Table 7.4-202	3a
COL 7.5(1)	The COL applicant is to provide a description of site-specific PAM variables.	7.5.1.1 Table 7.5-201	3a
COL 7.5(2)	The COL applicant is to provide a description of the site-specific EOF.	7.5.1.6.2	3a
COL 7.9(1)	The COL Applicant is to provide a description of cyber security provisions.	7.9.2.6	3a
COL 8.2(1)	The COL applicant is to address transmission system of the utility power grid and its interconnection to other grids.	8.1.2.1 8.2.1.1 8.2.1.2.3 Figure 8.2-203	3a
COL 8.2(2)	Deleted from the DCD.		
COL 8.2(3)	The COL applicant is to address the plant switchyard which includes layout, control system and characteristics of circuit breakers and buses, and lightning and grounding protection equipment.	8.1.5.3.5 8.2.1.2.1 8.2.1.2.2 8.2.2.1 Figure 8.2-201 Figure 8.2-202	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 8.2(4)	The COL applicant is to provide detail description of normal preferred power.	8.2.1.2 Figure 8.2-201	3a
COL 8.2(5)	The COL applicant is to provide detail description of alternate preferred power.	8.2.1.2 Figure 8.2-201	3a
COL 8.2(6)	Deleted from the DCD.		
COL 8.2(7)	The COL applicant is to address protective relaying for each circuit such as lines and buses.	8.2.1.2.1	3a
COL 8.2(8)	The COL applicant is to address switchyard dc power as part of switchyard design description.	8.2.1.2.1	3a
COL 8.2(9)	The COL applicant is to address switchyard ac power as part of switchyard design description.	8.2.1.2.1	3a
COL 8.2(10)	The COL applicant is to address transformer protection corresponded to site-specific scheme.	8.2.1.2	3a
COL 8.2(11)	The COL applicant is to address the stability and reliability study of the offsite power system. The stability study is to be conducted in accordance with BTP 8-3 (Reference 8.2-17). The study should address the loss of the unit, loss of the largest unit, loss of the largest load, or loss of the most critical transmission line including the operating range, for maintaining transient stability. A failure modes and effects analysis (FMEA) is to be provided.	8.2.2.2 8.2.2.3 8.2.3	3a
COL 8.2(12)	Deleted from the DCD.		
COL 8.3(1)	The COL applicant is to provide transmission voltages. This includes also MT and RAT voltage ratings.	8.3.1.1 Table 8.3.1-1R Figure 8.3.1-1R	3a
COL 8.3(2)	The COL applicant is to provide ground grid and lightning protection.	8.3.1.1.11 Figure 8.3.1-201	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 8.3(3)	The COL applicant is to provide short circuit analysis for ac power system, since the system contribution is site specific.	8.3.1.1.9 8.3.1.3.2	3a
COL 8.3(4)	Deleted from the DCD.		
COL 8.3(5)	Deleted from the DCD.		
COL 8.3(6)	Deleted from the DCD.		
COL 8.3(7)	Deleted from the DCD.		
COL 8.3(8)	The COL applicant is to provide short circuit analysis for dc power system.	8.3.2.1.1 8.3.2.1.2 8.3.2.3.2	3a
COL 8.3(9)	Deleted from the DCD.		
COL 8.3(10)	The COL applicant is to provide protective devise coordination.	8.3.1.3.4	3a
COL 8.3(11)	The COL applicant is to provide insulation coordination (surge and lightning).	8.3.1.3.5	3a
COL 9.1(1)	Deleted from the DCD.		
COL 9.1(2)	Deleted from the DCD.		
COL 9.1(3)	Deleted from the DCD.		
COL 9.1(4)	Deleted from the DCD.		
COL 9.1(5)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.1(6)	To assure proper handling of heavy loads during the plant life, the COL Applicant is to establish a heavy load handling program, including associated procedural and administrative controls, that satisfies commitments made in Subsection 9.1.5 of the DCD, and that meets the guidance of ANSI/ASME B30.2, ANSI/ASME B30.9, ANSI N14.6, ASME NOG-1, CMAA Specification 70-2000, NUREG-0554, NUREG-0612, and NUREG-0800, Section 9.1.5 and RG 1.206 C.I.9.1.5. During the operating life of the plant, it is anticipated that temporarily installed hoists and mobile cranes will also be used for plant maintenance. The heavy load handling program will include all cranes and hoists on site capable of handling heavy loads, including temporary cranes and hoists. The heavy load handling program will adopt a defense-in-depth strategy to enhance safety when handling heavy loads. For instance, the program will restrict lift heights to practical minimums and limit lifting activities as much as practical to plant modes in which load drops have the smallest potential for adverse consequences, particularly when critical loads are being handled. Further, prior to the lifting of heavy loads after initial fuel loading, the program will institute any additional reviews as necessary to assure that potential drops of these loads due to inadvertent operations or equipment malfunctions, separately or in combination, will not jeopardize safe shutdown functions, cause a significant release of radioactivity, a criticality accident, or inability to cool fuel within the reactor vessel or spent fuel pool. The COL Applicant will prepare a non-critical heavy load procedure that includes sections, on the Design Bases, System Descriptions, Safety Evaluation, Inspection and Testing Requirements, and Instrumentation Requirements for the program. The heavy load program will include requirements for sufficient operator training, system design, load handling instructions, and equipment inspections. Safe load paths will be defined so that heavy loads avoid being moved over or near irradiated fuel or critical equipment. Mechanical stops or electrical interlocks to prevent movement of heavy loads near irradiated fuel or safe shutdown equipment may also be employed.	9.1.5.1 9.1.5.3	3a
COL 9.1(7)	Deleted from the DCD.		
COL 9.1(8)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.1(9)	The COL applicant is to create a procedure that will instruct operators to perform formal inspection of the integrity of the spent fuel racks.	9.1.2.1	2
COL 9.2(1)	The COL Applicant is to provide the evaluation of the ESWP at the lowest probable water level of the UHS. The COL Applicant is to develop recovery procedures in the event of approaching low water level of UHS.	9.2.1.3	3a
COL 9.2(2)	The COL Applicant is to provide protection of the site-specific portions of the ESWS against adverse environmental, operating, and accident conditions that can occur, such as freezing, low temperature operation, and thermal overpressurization.	9.2.1.3	3a
COL 9.2(3)	The COL Applicant is to determine source and location of the UHS.	9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(4)	The COL Applicant is to determine location and design of the ESW intake structure.	9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(5)	The COL Applicant is to determine location and design of the ESW discharge structure.	9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(6)	The COL Applicant is to provide ESWP design details—required total dynamic head, with adequate margin, NPSH available, and the mode of cooling of the ESWP motor. The COL Applicant is to assure that the sum of the shut-off head of the selected ESW pumps and the static head will not result in system pressure that exceeds the ESWS design pressure at any location within the system. The COL Applicant is to evaluate the potential for vortex formation based on the most limiting assumptions that apply.	9.2.1.2.1 9.2.1.2.2 9.2.1.2.2.1 Table 9.2.1-1R	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.2(7)	The COL Applicant is to address the piping, valves, lining material specifications for piping and fittings as applicable, including those at the boundary between the safety-related and nonsafety-related portions, and other design of the ESWS related to the site specific conditions. The COL Applicant is also to design the pipes entering and exiting the pipe tunnel based on the location of the UHSRS.	9.2.1.2.1 9.2.1.2.2.5 9.2.1.2.3.1 9.2.1.3 Figure 9.2.1-1R	3a
COL 9.2(8)	The COL Applicant is to specify the following ESW chemistry requirements • A chemical injection system to provide non-corrosive, non-scale forming conditions to limit biological film formation. • Type of biocide, algaecide, pH adjuster, corrosion inhibitor, scale inhibitor and silt dispersant based on the site conditions.	9.2.1.2.1	3a
COL 9.2(9)	The COL Applicant is to confirm the storage capacity and usage of the potable water.	9.2.4 9.2.4.1 9.2.4.2.1 9.2.4.2.2.1 9.2.4.2.2.2 9.2.4.2.2.3 9.2.4.2.2.4 9.2.4.2.2.6 9.2.4.2.2.7 9.2.4.2.2.8 Figure 9.2.4-1R	3a
COL 9.2(10)	The COL Applicant is to confirm that all State and Local Department of Health and Environmental Protection Standards are applied and followed.	9.2.4.1 9.2.4.2.1	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.2(11)	The COL Applicant is to identify the potable water supply and describe the system operation.	9.2.4 9.2.4.1 9.2.4.2.1 9.2.4.2.3 9.2.4.4 9.2.4.5 Figure 9.2.4-1R	3a
COL 9.2(12)	The COL Applicant is to confirm that the sanitary waste is sent to the onsite plant treatment area or they will use the city sewage system.	9.2.4.1 9.2.4.2.1 Figure 9.2.4-1R	3a
COL 9.2(13)	Deleted from the DCD.		
COL 9.2(14)	The COL Applicant is to confirm Table 9.2.4-1 for required components and their values.	9.2.4.2.1 Table 9.2.4-1R	3a
COL 9.2(15)	The COL Applicant is to determine the total number of people at the site and identify the usage capacity. Based on these numbers the COL Applicant is to size the potable water tank and associated pumps.	9.2.4.1 Table 9.2.4-1R 9.2.4.2.1 9.2.4.2.2.1 9.2.4.2.2.2 9.2.4.2.2.3 9.2.4.2.2.4 9.2.4.2.2.6 9.2.4.2.2.7 9.2.4.2.2.8	3a
COL 9.2(16)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.2(17)	The COL Applicant is to determine the total number of sanitary lift stations and is to size the appropriate interfaces.	9.2.4.1 9.2.4.2.1 9.2.4.2.3 Table 9.2.4-1R Figure 9.2.4-1R	3a
COL 9.2(18)	The COL Applicant is to determine the type of the UHS based on specific site conditions and meteorological data.	9.2.5.1 9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(19)	The COL Applicant is to design the UHS to receive its electrical power supply, if required by the UHS design, from safety busses so that the safety functions are maintained during LOOP. The UHS also receives its standby electrical power from the onsite emergency power supplies during a LOOP.	9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(20)	The COL Applicant is to provide a detailed description and drawings of the UHS, including water inventory, temperature limits, heat rejection capabilities, instrumentation, and alarms.	9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3 Table 9.2.5-3R Figure 9.2.5-1R	3a
COL 9.2(21)	The COL Applicant is to determine the source of makeup water to the UHS inventory and the blowdown discharge location based on specific site conditions.	9.2.5.2 9.2.5.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(22)	The COL Applicant is to provide results of UHS capability and safety evaluation of the UHS based on specific site conditions and meteorological data. The COL Applicant is to use at least 30 years site specific meteorological data and heat loads data for UHS performance analysis per Regulatory Guide 1.27.	9.2.5.3 Table 9.2.5-4R	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.2(23)	The COL Applicant is to provide test and inspection requirements of the UHS. These is to include inspection and testing requirements necessary to demonstrate that fouling and degradation mechanisms are adequately managed to maintain acceptable UHS performance and integrity.	9.2.5.4	3a
COL 9.2(24)	The COL Applicant is to provide the required alarms, instrumentation and controls details based on the type of UHS to be provided.	9.2.5.5	3a
COL 9.2(25)	The COL Applicant is to develop system filling, venting, keeping full, and operational procedures to minimize the potential for water hammer; to analyze the system for water hammer impacts; to design the piping system to withstand potential water hammer forces; and to analyze water hammer events in accordance with NUREG-0927.	9.2.1.2.1	2
COL 9.2(26)	The COL Applicant is to specify appropriate sizes of piping and pipe fittings such as restriction orifices to prevent potential plugging due to debris buildup, and develop maintenance and test procedures to monitor debris build up and flush out debris.	9.2.1.2.1 9.2.1.3	2
COL 9.2(27)	The COL Applicant is to develop a milestone schedule for implementation of the operating and maintenance procedures for water hammer prevention.	9.2.2.2.2 9.2.7.2.1	2
COL 9.2(28)	The COL Applicant is to provide the piping, valves, materials specifications, and other design details related to the site-specific UHS.	9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(29)	The COL Applicant is to provide the safety evaluation of the capability of the ESWS to: (1) isolate its site-specific, nonsafety-related portions; and (2) provide measures to prevent long-term corrosion and organic fouling that may degrade its performance, per Generic Letter (GL) 89-13.	9.2.1.3	3a
COL 9.2(30)	The COL Applicant shall conduct periodic inspection, monitoring, maintenance, performance and functional testing of the ESWS and UHS piping and components, including the heat transfer capability of the CCW heat exchangers and essential chiller units, consistent with GL 89-13 and GL.89-13 Supplement 1. The COL Applicant is to develop operating procedures to periodically alternate the operation of the trains to ensure performance of all trains is regularly monitored.	9.2.4.1 9.2.5.4	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.2(31)	The COL Applicant is to verify the system layout of the ESWS and UHS and is to develop operating procedures to assure that the ESWS and UHS are above saturation conditions for all operating modes.	9.2.1.2.1 9.2.5.2.2 9.2.5.2.3	3a
COL 9.2(32)	The COL Applicant is to provide a void detection system with alarms to detect system voiding.	9.2.1.2.3.1	3a
COL 9.2(33)	The COL Applicant is to provide the design details of the strainer blowdown line, vent line, and their discharge locations.	9.2.1.2.2.2 Figure 9.2.1-1R	3a
COL 9.3(1)	The COL Applicant is to provide the high pressure nitrogen gas, low pressure nitrogen gas, the hydrogen gas, carbon dioxide, and oxygen supply systems.	9.3.1.2.1.3 9.3.1.2.2.3 Figure 9.3.1-201 9.5.8.3	3a
COL 9.3(2)	Deleted from the DCD.		
COL 9.3(3)	Deleted from the DCD.		
COL 9.3(4)	Deleted from the DCD.		
COL 9.3(5)	Deleted from the DCD.		
COL 9.3(6)	Deleted from the DCD.		
COL 9.3(7)	Deleted from the DCD.		
COL 9.4(1)	Deleted from the DCD.		
COL 9.4(2)	Deleted from the DCD.		
COL 9.4(3)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.4(4)	The COL Applicant is to determine the capacity of cooling and heating coils that are affected by site specific conditions.	9.4.1.2 9.4.3.2.1 9.4.3.2.2 9.4.3.2.3 9.4.3.2.4 9.4.5.2.2 9.4.5.2.3 9.4.5.2.4 9.4.5.2.5 9.4.6.2.4.1 9.4.6.2.4.2 Table 9.4-201	3a
COL 9.4(5)	Deleted from the DCD.		
COL 9.4(6)	The COL Applicant is to provide a system information and flow diagram of ESW pump area ventilation system if the ESW pump area requires the heating, ventilating and air conditioning.	9.4.5 9.4.5.1.1.6 9.4.5.2.6 9.4.5.3.6 9.4.5.4.6 9.4.5.5.6 Table 9.4-202 Table 9.4-203 Figure 9.4-201	3a
COL 9.5(1)	The COL applicant establishes a fire protection program, including organization, training and qualification of personnel, administrative controls of combustibles and ignition sources, firefighting procedures, and quality assurance.	9.5.1 9.5.1.2 9.5.1.6.1 9.5.1.6.3 Table 9.5.1-1R Table 9.5.1-2R	1a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.5(2)	The COL Applicant addresses the design and fire protection aspects of the facilities, buildings and equipments, such as cooling towers and a fire protection water supply system, which are site specific and/or are not a standard feature of the US-APWR.	9.5.1.2.1 9.5.1.2.2 9.5.1.2.3 9.5.1.2.4 9.5.1.5 Table 9.5.1-1R Table 9.5.1-2R Figure 9.5.1-201 Figure 9.5.1-202 Figure 9.5.1-203 Figure 9.5.1-204 Appendix 9A Appendix 11AA	3a
COL 9.5(3)	The COL Applicant describes the apparatus for plant personnel and fire brigades such as portable fire extinguishers and self contained breathing apparatus.	9.5.1.6.3 Table 9.5.1-2R	3a
COL 9.5(4)	The COL Applicant addresses all communication system interfaces external to the plant (offsite locations). These include interfaces to utility private networks, commercial carriers and the federal telephone system. The configuration of these connections will include consideration of the concerns raised in IE Bulletin 80-15.	9.5.2 9.5.2.2.2 9.5.2.2.2.2 9.5.2.2.5.1	3a
COL 9.5(5)	The COL Applicant addresses the emergency offsite communications including the crisis management radio system.	9.5.2.2.2 9.5.2.2.2.2 9.5.2.2.5.2	3a
COL 9.5(6)	The COL Applicant addresses connections to the Technical Support Center from where communications networks are provided to transmit information pursuant to the requirements delineated in 10 CFR 50 Appendix E, Part IV.E.9.	9.5.2.2.5.2	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 9.5(7)	The COL Applicant addresses a continuously manned alarm station required by 10 CFR 73.46(e)(5) and the communications requirements delineated in 10 CFR 73.45(g)(4)(i) and (ii). The COL Applicant addresses notification of an attempted unauthorized or unconfirmed removal of strategic special nuclear material in accordance with 10 CFR 73.45(e)(2)(iii).	9.5.2.2.5.2 9.5.2.3	3a
COL 9.5(8)	The COL Applicant addresses offsite communications for the onsite operations support center.	9.5.2.2.5.2	3a
COL 9.5(9)	The COL Applicant addresses the emergency communication system requirements delineate in 10 CFR 73.55(f) such that a single act cannot remove onsite capability of calling for assistance and also as redundant system during onsite emergency crisis.	9.5.2.2.5.2	3a
COL 9.5(10)	Deleted from the DCD.		
COL 9.5(11)	The COL Applicant is to specify that adequate and acceptable sources of fuel oil are available, including the means of transporting and recharging the fuel storage tank, following a design basis accident.	9.5.4.3	3a
COL 9.5(12)	The COL Applicant is to address the need for installing unit heaters in the Power Source Fuel Storage Vault during the winter for site locations where extreme cold temperature conditions exist.	9.5.4.2.2.1	3a
10.2(1)	Inservice Inspection The Combined License Applicant is to establish a turbine maintenance and inspection procedure prior to fuel load.	10.2.3.5	2
10.3(1)	FAC monitoring program The Combined License Applicant will provide a description of the FAC monitoring program for carbon steel portions of the steam and power conversion systems that contain water or wet steam and are susceptible to erosion-corrosion damage. The description will address consistency with Generic Letter 89-08 and NSAC-202L-R2 and will provide a milestone schedule for implementation of the program.	10.3.6.3	2
COL 10.3(2)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
10.3(3)	Operating and maintenance procedures for water hammer prevention The Combined License Applicant is to provide operating and maintenance procedures including adequate precautions to prevent water (steam) hammer, relief valve discharge loads and water entrainment effects in accordance with NUREG-0927 and a milestone schedule for implementation of the procedure.	10.3.2.4.3	2
COL 10.4(1)	Circulating Water System; The Combined License Applicant is to determine the site specific final system configuration and system design parameters for the CWS including makeup water and blowdown.	10.4.5	3a
COL 10.4(2)	Steam Generator Blowdown System; The Combined License applicant is to address the discharge to Waste Water System including site specific requirements.	10.4.8.1 10.4.8.2 10.4.8.5	3a
COL 10.4(3)	Deleted from the DCD.		
COL 10.4(4)	Deleted from the DCD.		
COL 10.4(5)	System Design for Steam Generator Drain; The Combined License applicant is to address the nitrogen or equivalent system design for Steam Generator Drain Mode. (This is dependent on Waste water system design)	10.4.8.2.2.4	3a
COL 10.4(6)	Operating and maintenance procedures for water hammer prevention The combined License Applicant is to provide operating and maintenance procedures in accordance with NUREG-0927 and a milestone schedule for implementation of the procedure.	10.4.5 10.4.7.7 10.4.9.2.2	2
COL 11.2(1)	The COL applicant is responsible for ensuring that mobile and temporary liquid radwaste processing equipment and its interconnection to plant systems conforms to regulatory requirements and guidance such as 10 CFR 50.34a (Ref. 11.2-5), 10 CFR 20.1406 (Ref.11.2-7) and RG 1.143 (Ref. 11.2-3), respectively.	11.2.1.6	3a
COL 11.2(2)	Site-specific information of the LWMS, e.g., radioactive release points, effluent temperature, shape of flow orifices, etc., is provided in the COLA.	11.2.2 11.2.3.1	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 11.2(3)	The COL applicant is responsible for the site-specific hydrogeological data for performing an analysis to demonstrate that the potential groundwater or surface water contamination concentration resulting from radioactive release due to liquid containing tank failure meets 10 CFR 20, Appendix B, Table 2 ECL.	11.2.3.2 Table 11.2-16R	3a
COL 11.2(4)	The COL applicant is to calculate doses to members of the public following the guidance of RG 1.109 (Ref 11.2-15) and RG 1.113 using site-specific parameters, and compares the doses due to the liquid effluents with the numerical design objectives of Appendix I to 10 CFR 50 (Ref 11.2-10) and compliance with requirements of 10 CFR 20.1302, 40 CFR 190.	11.2.3.1 Table 11.2-9R Table 11.2-10R Table 11.2-11R Table 11.2-12R Table 11.2-13R Table 11.2-14R Table 11.2-15R Table 11.2-201	3a
COL 11.2(5)	The COL applicant is to perform a site-specific cost benefit analysis to demonstrate compliance with the regulatory requirements.	11.2.1.5	3a
COL 11.2(6)	The COL applicant is to provide piping and instrumentation diagrams (P&IDs).	11.2.2 Figure 11.2-201	3a
COL 11.2(7)	The COL Applicant is responsible for identifying the implementation milestones for the coatings program used in the LWMS. The coatings program addresses RG 1.54 Revision 1, recognizing that more recent standards may be used if referenced in DCD Section 11.2.	11.2.4	2, 3a
COL 11.2(8)	The COL Applicant is to describe mobile/portable LWMS connections that are considered non-radioactive but later may become radioactive through contact or contamination with radioactive systems (i.e., a non-radioactive system becomes contaminated due to leakage, valving errors, or other operating conditions in the radioactive systems), and operational procedures of the mobile/portable LWMS connections. The COL Applicant is to prepare a plan to develop and use operating procedures so that the guidance and information in Inspection and Enforcement (IE) Bulletin 80-10 (Ref. 11.4-25) is followed.	11.2.1.6	1b, 2

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 11.3(1)	Deleted from the DCD.		
COL 11.3(2)	Deleted from the DCD.		
COL 11.3(3)	The COL applicant is to provide a discussion of the onsite vent stack design parameters and released point height.	11.3.2	3a
COL 11.3(4)	Deleted from the DCD.		
COL 11.3(5)	Deleted from the DCD.		
COL 11.3(6)	The COL applicant is to calculate doses to members of the public following the guidance of RG 1.109 (Ref. 11.3-19) and RG 1.111 (Ref. 11.3-22), and compare the doses due to the gaseous effluents with the numerical design objectives of 10 CFR 50, Appendix I (Ref. 11.3-3) and compliance with requirements of 10 CFR 20.1302 (Ref. 11.3-24), 40 CFR 190 (Ref. 11.3-25).	11.3.3.1 Table 11.3-6R Table 11.3-7R Table 11.3-8R Table 11.3-9R Table 11.3-201 Table 11.3-202 Table 11.3-203	3a
COL 11.3(7)	Deleted from the DCD.		3a
COL 11.3(8)	The COL applicant is to perform a site-specific cost benefit analysis to demonstrate compliance with the regulatory requirements.	11.3.1.5	3a
COL 11.3(9)	The COL applicant is to provide piping and instrumentation diagrams (P&IDs).	11.3.2 Figure 11.3-201	3a
COL 11.4(1)	The current design meets the waste storage requirements in accordance with ANSI/ANS-55.1. When the COL applicant desires additional storage capability beyond that which is discussed in this Tier 2 document, the COL applicant will identify plant-specific needs for on-site waste storage and provide a discussion of on-site storage of low-level waste.	11.4.2.1.1 11.4.2.3 Appendix 11AA 13.8	3a
COL 11.4(2)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 11.4(3)	The COL applicant is to prepare a plan for the process control program describing the process and effluent monitoring and sampling program. The plan should include the proposed implementation milestones.	11.4.3.2	1a
COL 11.4(4)	The COL applicant is to describe mobile/portable SWMS connections that are considered non-radioactive but later may become radioactive through contact or contamination with radioactive systems (i.e., a non-radioactive system becomes contaminated due to leakage, valving errors, or other operating conditions in the radioactive systems). The COL Applicant is to prepare a plan to develop and use operating procedures so that the guidance and information in Inspection and Enforcement (IE) Bulletin 80-10 (Ref. 11.4-29) is followed.	11.4.4.5	2, 3a
COL 11.4(5)	The current design provides collection and packaging of potentially contaminated clothing for offsite shipment and/or disposal. Depending on site-specific requirements, the COL applicant can send the wastes to an offsite laundry facility processing and/or bring in a mobile compaction unit for volume reduction. The laundry services, including contracted services and/or a temporary mobile compaction subsystem are COL items.	11.4.1.3 11.4.1.6	3a
COL 11.4(6)	The COL applicant is required to perform a site-specific cost benefit analysis to demonstrate compliance with the regulatory requirements.	11.4.1.5	3a
COL 11.4(7)	The SWMS design does not include solid waste processing facility (e.g. de-watering system, compactor for reducing waste volume) but provides the flexibility for the site-specific utilities to add compaction equipment or to adopt contract services from specialized facilities. This is the responsibility of the COL applicant.	11.4.1.6 11.4.4.5	3a
COL 11.4(8)	The COL applicant is to provide piping and instrumentation diagrams (P&IDs).	11.4.2.2.1 Figure 11.4-201	3a
COL 11.4(9)	The COL Applicant is responsible for identifying the implementation milestones for the coatings program used in the SWMS. The coatings program addresses RG 1.54 Revision 1, recognizing that more recent standards may be used if referenced in DCD Section 11.4.	11.4.6	1b

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 11.4(10)	The COL Applicant is responsible for ensuring that mobile and temporary solid radwaste processing and its interconnection to plant systems conforms to regulatory requirements and guidance such as 10 CFR 50.34a (Ref. 11.4-11), 10 CFR 20.1406 (Ref. 11.4-16) and RG 1.143 (Ref. 11.4-1).	11.4.1.6	3a
COL 11.5(1)	The COL applicant is responsible for the additional site-specific aspects of the process and effluent monitoring and sampling system beyond the standard design, in accordance with RGs 1.21, 1.33 and 4.15 (Ref. 11.5-12, 11.5-17, 11.5-14). Furthermore, the COL applicant is responsible for assuring the fulfillment of the guidelines issued in 10 CFR 50, Appendix I (Ref. 11.5-3) regarding the offsite doses released through gaseous and liquid effluent streams.	11.5.2.5.3 11.5.2.9 Table 11.5-201 Figure 11.5-201	3a
COL 11.5(2)	The COL applicant is to prepare an offsite dose calculation manual to provide specific administrative controls and liquid and gaseous effluent source terms to limit the releases to site-specific requirements containing a description of the methods and parameters that drive to arrive radiation instrumentation alarm setpoint. The COL applicant is to commit to follow the NEI generic template 07-09A (Ref. 11.5-30) as an alternative to providing the offsite dose calculation manual at the time of application.	11.5.2.7 11.5.2.9	1a
COL 11.5(3)	The COL applicant is to develop a radiological and environmental monitoring program taking into consideration local land use and census data in identifying all potential radiation exposure pathways. The program shall take into account associated radioactive materials present in liquid and gaseous effluents and direct external radiation from SSCs. The COL applicant is to follow the guidance outlined in NUREG-1301(Ref. 11.5-21), and NUREG-0133 (Ref. 11.5-18) when developing the radiological effluent monitoring program. The COL applicant is to commit to follow the NEI generic template 07-09A (Ref. 11.5-30) as an alternative to providing the radiological effluent monitoring program at the time of application.	11.5.2.10	1a
COL 11.5(4)	The COL applicant is to develop procedures which are of inspection, decontamination, and replacement related to radiation monitoring instruments.	11.5.2.6 11.5.2.8	2
COL 11.5(5)	The COL applicant is to provide analytical procedures and sensitivity for selected radioanalytical methods and type of sampling media for site-specific matter.	11.5.2.6 11.5.2.8	2

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 11.5(6)	The COL applicant is to perform a site-specific cost benefit analysis to demonstrate compliance with the regulatory requirements.	11.5.2.11	3a
COL 12.1(1)	The COL Applicant is to demonstrate that the policy considerations regarding plant operations are compliance with RG 1.8, 8.8 and 8.10 (Subsection 12.1.1.3).	12.1.1.3.1 12.1.1.3.2 12.1.1.3.3	1b
COL 12.1(2)	Deleted from the DCD.		
COL 12.1(3)	The COL Applicant is to describe how the plant follows the guidance of RG 8.2, 8.4, 8.6, 8.7, 8.9, 8.13, 8.15, 8.25, 8.27, 8.28, 8.29, 8.34, 8.35, 8.36 and 8.38.	12.1.3	1b
COL 12.1(4)	Deleted from the DCD.		
COL 12.1(5)	The COL Applicant is to describe the operational radiation protection program for ensuring that occupational radiation exposures are ALARA.	12.5 Table 12.5-201	1b
COL 12.1(6)	The COL applicant is to describe the periodic review of operational practices to ensure configuration management, personnel training and qualification update, and procedure adherence.	12.1.3 12.3.1.3.2	1b
COL 12.1(7)	The COL applicant is to describe implementation of requirements for record retention according to 10 CFR50.75(g) and 10 CFR70.25(g) as applicable.	12.1.3 12.3.1.3.2	1b
COL 12.1(8)	The COL Applicant is responsible for the development of the operational procedures, following the guidance of RG 4.21 (Reference 12.1-27), for the operation and handling of all structure, system, and components (SSC) which could be potential sources of contamination within the plant. These procedures will be developed according to the objective of limiting leakage and the spread of contamination within the plant.	12.1.3 12.3.1.3.2	1b
COL 12.2(1)	The COL Applicant is to list any additional contained radiation sources that are not identified in Subsection 12.2.1, including radiation sources used for instrument calibration or radiography.	12.2.1.1.10	3b

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 12.2(2)	The COL Applicant is to address the radiation protection aspects associated with additional storage space for radwaste and/or additional radwaste facilities for dry active waste.	12.2.1.1.10 12.5 Appendix 11AA	3a 1b
COL 12.2(3)	The COL Applicant is to include the conduct of regular surveillance activities and provisions to maintain the dose rate at 2 meters from the surface of both the RWSAT and PMWTs under 0.25 mrem/h in the Radiation Protection Program.	12.5	1b
COL 12.2(4)	The COL Applicant is to implement a method of ensuring that the radioactivity concentration in both the RWSAT and the PMWTs remain under the specified concentration level described in the DCD.	12.5	1b
COL 12.3(1)	The COL Applicant shall describe portable instruments, and the associated training and procedures, to accurately determine the airborne iodine concentration in areas within the facility where plant personnel may be present during an accident, in accordance with the requirements of 10 CFR 50.34(f)(2)(xxvii) and the criteria in Item III.D.3.3 of NUREG-0737.	12.3.4 12.5	1b
COL 12.3(2)	Deleted from the DCD.		
COL 12.3(3)	Deleted from the DCD.		
COL 12.3(4)	The COL Applicant is to provide the site radiation zones that is shown on the site-specific plant arrangement plan.	12.3.1.2.1.1 Figure 12.3-1R	3a
COL 12.3(5)	The COL Applicant is to discuss the administrative control of the fuel transfer tube inspection and the access control of the area near the seismic gap below the fuel transfer tube.	12.3.2.2.8 12.5	1b
COL 12.3(6)	If the COL Applicant adopts the Mobile Liquid Waste Processing System, the COL Applicant is to provide information about the radiation protection aspects of the system and to indicate how the system is consistent with the guidance in SRP Section 12.3-12.4, RG 1.206 C.I.12.3.2 and RG 1.69.	12.3.1.1.1.2	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 12.3(7)	If the COL Applicant adopts the Mobile Liquid Waste Processing System, the COL Applicant is to provide information about prevention and detection of contamination of the environment and minimization of decommissioning costs and to explain how the system meets the requirements of 10 CFR 20.1406 and RG 4.21.	12.3.1.1.1.2	3a
COL 12.3(8)	If the COL Applicant adopts the Mobile Liquid Waste Processing System, the COL Applicant is to confirm the radiation zone(s) where the system is installed in and to revise Figure 12.3-1, if necessary.	11.2.1.6 12.3.1.1.1.2	3a
COL 12.3(9)	In order to ensure that the B.A. evaporator room does not become a VHRA during the end of cycle, the COL Applicant is to stipulate a need for routine surveillance in the Radiation Protection Program. In the event that the routine surveillance shows an increase in dose level, the COL Applicant must provide an appropriate strategy to sufficiently reduce the dose rate below the criteria for a VHRA.	12.5	3a
COL 12.3(10)	The COL Applicant will address the site-specific design features, operational, post-construction objectives, and conceptual site model guidance of Regulatory Guide 4.21	12.3.1.3.1.1 12.3.1.3.2 Table 12.3-8R Table 12.3-201	3a
COL 12.4(1)	For multiunit plants, the COL Applicant is to provide estimated annual doses to construction workers in a new unit construction area, as a result of radiation from onsite radiation sources from the existing operating plant(s).	12.4.1.9	3a
COL 13.1(1)	The COL Applicant is to provide a description of the corporate or home office organization, its functions and responsibilities, and the number and qualifications of personnel. The COL Applicant directs attention to activities that include facility design, design review, design approval, construction management, testing, and operation of the plant.	13.1.1 13.1.2	3a
COL 13.1(2)	The COL Applicant is to develop a description of past experience in the design, construction, and operation of nuclear power plants and past experience in activities of similar scope and complexity.	13.1	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 13.1(3)	The COL Applicant is to describe its management, engineering, and technical support organizations. The description includes organizational charts for the current headquarters and engineering structure and any planned modifications and additions to those organizations that reflect the added functional responsibilities with the nuclear power plant.	13.1.1 13.1.1.2	3a
COL 13.1(4)	The COL Applicant is to develop a description of the organizational arrangement. This description shows how the added functional responsibilities associated with the addition of the nuclear power plant to the Applicant's power generation capacity are delegated and assigned (or expected to be assigned) to each of the working or performance-level organizational units to implement these responsibilities. The description includes organizational charts reflecting the current corporate structure and the specific working- or performance-level organizational units that provide technical support for the operation.	13.1.1 13.1.2	3a
COL 13.1(5)	The COL Applicant is to develop the description of the general qualification requirements in terms of educational background and experience for positions or classes of positions depicted in the organizational arrangement.	13.1.1 13.1.1.3 13.1.3.1	3a
COL 13.1(6)	The COL Applicant is to develop the organizational structure for the plant organization, its personnel responsibilities and authorities, and operating shift crews.	13.1.2	3a
COL 13.1(7)	The COL Applicant is to develop the description of education, training, and experience requirements established for management, operating, technical, and maintenance positions for the operating organization.	13.1.3 Figure 13.1-202	3a
COL 13.2(1)	The COL Applicant is to develop the training program description.	13.2	3a
COL 13.2(2)	The COL Applicant is to develop training programs for reactor operators in accordance with NUREG-0800, Section 13.2.1.I.3 (Ref. 13.2-4).	13.2	1a
COL 13.2(3)	The COL Applicant is to develop training programs for non-licensed plant staff in accordance with NUREG-0800, Section 13.2.2.I.3 (Ref. 13.2-4).	13.2	1b

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 13.2(4)	The COL Applicant is to develop training programs. These programs include a chart, which shows the schedule of each part of the training program for each functional group of employees in the organization in relation to the schedule for preoperational testing, expected fuel loading, and expected time for examinations prior to plant criticality for licensed operators.	13.2	3a
COL 13.2(5)	The COL Applicant is to determine the extent to which portions of applicable NRC guidance is used in the facility training program or the justification of exceptions.	13.2	3a
COL 13.3(1)	The COL Applicant is to develop interfaces of design features with site specific designs and site parameters.	13.3	3a
COL 13.3(2)	The COL Applicant is to develop a comprehensive emergency plan as a physically separate document.	13.3.1	3a
COL 13.3(3)	The COL Applicant is to develop an emergency classification and action level scheme.	13.3.1	3a
COL 13.3(4)	The COL Applicant is to develop the security-related aspects of emergency planning.	13.3.1	3a
COL 13.3(5)	The COL Applicant is to develop a multi-unit site interface plan depending on the location of the new reactor on, or near, an operating reactor site with an existing emergency plan.	13.3.2	3a
COL 13.3(6)	The COL Applicant is to develop an emergency planning inspections, tests, analyses, and acceptance criteria.	13.3.3	3a
COL 13.3(7)	The COL Applicant is to develop the description of the operation support center.	13.3	3a
COL 13.4(1)	The COL Applicant is to develop a description and schedule for the implementation of operational programs. The COL Applicant is to “fully describe” the operational programs as defined in SECY-05-0197 (Ref. 13.4-1) and provide commitments for the implementation of operational programs required by regulation. In some instances, programs may be implemented in phases. The COL Applicant is to include the phased implementation milestones in their submittal.	13.4 Table 13.4-201 FSAR sections referenced therein	1

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 13.4(2)	The COL Applicant is to develop a leakage monitoring and prevention program for the systems specified in TS 5.5.2. The leakage monitoring and prevention program will include the appropriate methods and acceptance criteria as defined in NUREG-0737 Item III.D.1.1 (Ref 13.4-2).	13.4	3a
COL 13.5(1)	The COL Applicant is to develop administrative procedures describing administrative controls over activities that are important to safety for the operation of a facility.	13.5 13.5.1	2
COL 13.5(2)	Deleted from the DCD.		
COL 13.5(3)	The COL Applicant is to develop procedures performed by licensed operators in the main control room. Operating procedures that are used by the operating organization to ensure routine operating, off-normal, and emergency activities are conducted in a safe manner are described. The plan includes the implementation of these procedures.	13.5 13.5.1	2
COL 13.5(4)	The COL Applicant is to describe the different classifications of procedures the operators will use in the main control room and locally in the plant for operations, the operating organization responsible for maintaining the procedures, and the general format and content of the different classifications.	13.5 13.5.2.1	3a
COL 13.5(5)	The COL Applicant is to describe the program for developing operating procedures.	13.5.2 13.5.2.1	3a
COL 13.5(6)	The COL Applicant is to describe the program for developing and implementing emergency operating procedures.	13.5.2.1.1.4 13.5.2.1.3	3a
COL 13.5(7)	The COL Applicant is to describe the classifications of maintenance and other operating procedures, the operating organization group or groups responsible for following each class of procedure, and the general objectives and character of each class and subclass.	13.5.2.2	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 13.6(1)	The COL Applicant is to develop and provide the plant overall security plan (consisting of the physical security plan, safeguards contingency plan, and the guard training and qualification plan) and the cyber security plan and the implementation schedule for security programs.	13.6 13.6.2.3	3a
COL 13.6(2)	The COL Applicant is to develop and provide as part of its physical security plan site specific physical security features and capabilities, such as (i) the physical barrier surrounding the protected area boundary; (ii) the isolation zone in areas adjacent to the protected area boundary, (iii) security lighting, or use of low-light technology, for the isolation zone and protected area; (iv) the vehicle barrier system, (v) controlled access points to control entry of personnel, vehicles and materials into the protected area, (vi) the intrusion detection system, and (vii) the closed circuit television camera and video assessment systems to provide monitoring and assessment of the protected area perimeter.	13.6.1 13.6.2 13.6.2.1 13.6.2.2 13.6.2.3 13.6.2.4 13.6.2.6 Physical Security Plan PSPSR	3a
COL 13.6(3)	The COL Applicant is to revise the non-standard plant vital area and vital equipment information contained in the US-APWR Design Certification, Physical Element Review to be consistent with its site-specific design.	13.6.2 13.6.2.2	3a
COL 13.6(4)	The COL Applicant is to make provision for the secondary alarm station in accordance with the requirements of 10 CFR 73.55(i)(4).	13.6.2.2	3a
COL 13.6(5)	The COL Applicant's physical security plan is to make provision for radio or microwave transmitted two-way voice communication) to communicate with the local law enforcement agencies.	13.6.2.5 Physical Security Plan PSPSR	3a
COL 13.7(1)	The COL Applicant is to develop the description of the operating and construction plant fitness-for-duty programs.	13.7	3a
COL 14.2(1)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 14.2(2)	The COL Applicant reconciles the site-specific organization, organizational titles, organizational responsibilities, and reporting relationships to be consistent with US-APWR Test Program Description Technical Report, MUAP-08009 (Reference 14.2-29).	14.2.2	3a
COL 14.2(3)	Deleted from the DCD.		
COL 14.2(4)	Deleted from the DCD.		
COL 14.2(5)	Deleted from the DCD.		
COL 14.2(6)	Deleted from the DCD.		
COL 14.2(7)	The COL applicant provides an event-based schedule, relative to fuel loading, for conducting each major phase of the test program, and a schedule for the development of plant procedures that assures required procedures are available for use during the preparation, review and performance of preoperational and startup testing. For multiunit sites, the COL applicant discusses the effects of overlapping initial test program schedules on organizations and personnel participating in each ITP. The COL applicant identifies and cross-references each test or portion of a test required to be completed prior to fuel load which satisfies ITAAC requirements.	14.2.9 14.2.11 Table 14.2-202 Appendix 14AA	4
COL 14.2(8)	Deleted from the DCD.		
COL 14.2(9)	Deleted from the DCD.		
COL 14.2(10)	The COL applicant is responsible for the testing outside scope of the certified design in accordance with the test criteria described in subsection 14.2.1.	14.2.12 Table 14.2-201 Table 14A-201 Appendix 14A	3a
COL 14.2(11)	The COL holder for the first plant is to perform the first plant only tests and prototype test. For subsequent plants, either these tests are performed, or the COL applicant provides a justification that the results of the first-plant only tests are applicable to the subsequent plant and are not required to be repeated.	14.2.8.1 14.2.8.2.1	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 14.2(12)	The COL holder makes available approved test procedures for satisfying testing requirements described in Section 14.2 to the NRC approximately 60 days prior to their intended use.	14.2.3	2
COL 14.3(1)	The COL applicant provides the ITAAC for the site specific portion of the plant systems specified in Subsection 14.3.5, Interface Requirements.	14.3.4.6 14.3.4.7	5
COL 14.3(2)	The COL applicant provides proposed ITAAC for the facility's emergency planning not addressed in the DCD in accordance with RG 1.206 (Reference 14.3-1) as appropriate.	14.3.4.10	5
COL 14.3(3)	The COL applicant provides ITAAC for the facility's physical security hardware not addressed in the DCD, in accordance with RG 1.206 (Reference 14.3-1) as appropriate, and provides abstracts describing the specific inspections, tests and analysis for the facility's physical security hardware ITAAC not addressed in the DCD.	14.3.4.12	5
COL 15.0(1)	In the COLA, if the site-specific χ/Q values exceed DCD χ/Q values, then the COL Applicant is to demonstrate how the dose reference values in 10 CFR 50.34 and 10 CFR 52.79 and the control room dose limits in 10 CFR 50, Appendix A, General Design Criterion 19 are met for affected events using site-specific χ/Q values. Additionally, the Technical Support Center (TSC) dose should be evaluated against the habitability requirements in Paragraph IV.E. 8 to 10 CFR Part 50, Appendix E, and 10 CFR 50.47(b)(8) and (b)(11).	15.0.3.3	3a
COL 16.1(1)	Adoption of RMTS is to be confirmed and the relevant descriptions are to be fixed.	16.1.1.2 COLA Part 4, Section A	N/A - program not utilized
COL 16.1 (2)	Adoption of SFCP is to be confirmed and the relevant descriptions are to be fixed.	16.1.1.2 COLA Part 4, Section A	N/A - program not utilized
COL 16.1(3)	Deleted from the DCD.		
COL 16.1_3.3.1(1)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 16.1_3.3.2(1)	Deleted from the DCD.		
COL 16.1_3.3.5(1)	The time delay values in SR 3.3.5.3 are to be confirmed based on the plant specific transmission system performance.	COLA Part 4, Section A	3a
COL 16.1_3.3.6(1)	Deleted from the DCD.		
COL 16.1_3.4.17(1)	Deleted from DCD		
COL 16.1_3.7.9(1)	LCO 3.7.9 and associated Bases for the Ultimate Heat Sink based on plant specific design, including required UHS water volume, lowest water level for ESW pumps and maximum water temperature of the UHS, are to be developed.	COLA Part 4, Section A	3a
COL 16.1_3.7.10(1)	LCO 3.7.10 and associated Bases for hazardous chemical are to be confirmed by the evaluation with site-specific condition.	COLA Part 4, Section A	3a
COL 16.1_3.8.4(1)	The battery float current values in required action A.2 is to be confirmed after selection of the plant batteries.	COLA Part 4, Section A	3a
COL 16.1_3.8.5(1)	The battery float current values in required action A.2 is to be confirmed after selection of the plant batteries.	COLA Part 4, Section A	3a
COL 16.1_3.8.6(1)	The battery float current values in condition B, required action B.2, and SR 3.8.6.1 are to be confirmed after selection of the plant batteries.	COLA Part 4, Section A	3a
COL 16.1_4.1(1)	The site specific information for site location is to be provided.	COLA Part 4, Section A	3a
COL 16.1_4.3.1(1)	Deleted from DCD		
COL 16.1_5.1.1(1)	The titles for members of the unit staff are to be specified.	COLA Part 4, Section A	3a
COL 16.1_5.1.2(1)	The titles for members of the unit staff are to be specified.	COLA Part 4, Section A	3a
COL 16.1_5.2.1(1)	The titles for members of the unit staff are to be specified.	COLA Part 4, Section A	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 16.1_5.2.2(1)	The titles and number for members of the unit staff are to be specified.	COLA Part 4, Section A	3a
COL 16.1_5.3.1(1)	Minimum qualification for unit staff is to be specified.	COLA Part 4, Section A	3a
COL 16.1_5.5.1(1)	The titles for members of the unit staff that approve the Offsite Dose Calculation Manual are to be specified.	COLA Part 4, Section A	3a
COL 16.1_5.5.9(1)	Deleted from DCD		
COL 16.1_5.5.20(1)	Control Room Envelope Habitability Program for hazardous chemical are to be confirmed by the evaluation with site-specific condition.	COLA Part 4, Section A	3a
COL 16.1_5.6.1(1)	In case of multiple unit site, the additional information for submittal of report is to be added.	COLA Part 4, Section A	3a
COL 16.1_5.6.1(2)	The format of the Annual Radiological Environmental Operating Report is to be specified based on “the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979” or another format.	COLA Part 4, Section A	3a
COL 16.1_5.6.2(1)	In case of multiple unit site, the additional information for submittal of report is to be added.	COLA Part 4, Section A	3a
COL 16.1_5.6.7(1)	Deleted from DCD		
COL 16.1_5.7(1)	The site specific information about High Radiation Area is to be provided.	COLA Part 4, Section A	3a

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 17.4(1)	The COL Applicant shall be responsible for the development and implementation of the Phases II and III of the D-RAP, including QA requirements. In the Phase II, the plant's site-specific information should be introduced to the D-RAP process and the site-specific risk-significant SSCs should be combined with the US-APWR design risk-significant SSCs into a list for the specific plant. Phase II is performed during the COL application phase and updated/maintained during the COL license holder phase. In the Phase III, procurement, fabrication, construction, and test specifications for the SSCs within the scope of the RAP should ensure that significant assumptions, such as equipment reliability, are realistic and achievable. The QA requirements should be implemented during the procurement, fabrication, construction, and pre-operation testing of the SSCs within the scope of the RAP. Phase III is performed during the COL license holder phase and prior to initial fuel loading. The COL applicant will propose a method by which it will incorporate the objectives of the reliability assurance program into other programs for design or operational errors that degrade nonsafety-related, risk-significant SSCs.	17.4.3 17.4.4 17.4.7 17.4.8	2

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 17.4(2)	The COL Applicant shall be responsible for the development and implementation of the O-RAP, in which the RAP activities should be integrated into the existing operational program (i.e., Maintenance Rule, surveillance testing, in-service inspection, in-service testing, and QA). The O-RAP should also include the process for providing corrective actions for design and operational errors that degrade non-safety-related SSCs within the scope of the RAP. A description of the proposed method for developing/integrating the operational RAP into operating plant programs (e.g., maintenance rule, quality assurance) is performed during the COL application phase. The development/integration of the operational RAP is performed during the COL license holder phase and prior to initial fuel loading. All SSCs identified as risk-significant within the scope of the D-RAP should be categorized as high-safety-significant (HSS) within the scope of initial Maintenance Rule. The integration of reliability assurance activities into existing operational programs will also address establishment of: 1) Reliability performance goals for risk-significant SSCs consistent with the existing maintenance and quality assurance processes on the basis of information from the DRAP (for example, implementation of the maintenance rule following the guidance contained in RG 1.160 is one acceptable method for establishing performance goals provided that SSCs are categorized as HSS within the scope of the Maintenance Rule program), and 2) Performance and condition monitoring requirements to provide reasonable assurance that risk-significant SSCs do not degrade to an unacceptable level during plant operations.	17.4.3 17.4.4 17.4.5 17.4.7	1b
COL 17.5(1)	The COL applicant shall develop and implement a Quality Assurance Program Description for site-specific design activities and for plant construction and operation.	17.0 17.1 17.2 17.3 17.5	3a
COL 17.6(1)	The COL applicant must provide in its FSAR a description of the maintenance rule program, and its for implementation, for monitoring the effectiveness of maintenance necessary to meet the requirements of 10 CFR 50.65.	17.6	1b

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 18.1(1)	Deleted from the DCD.		
COL 18.1(2)	Deleted from the DCD.		
COL 18.3(1)	Deleted from the DCD.		
COL 18.3(2)	Deleted from the DCD.		
COL 18.4(1)	Deleted from the DCD.		
COL 18.4(2)	Deleted from the DCD.		
COL 18.4(3)	Deleted from the DCD.		
COL 18.5(1)	Deleted from the DCD.		
COL 18.5(2)	Deleted from the DCD.		
COL 18.6(1)	Deleted from the DCD.		
COL 18.6(2)	Deleted from the DCD.		
COL 18.7(1)	Deleted from the DCD.		
COL 18.8(1)	Deleted from the DCD.		
COL 18.9(1)	Deleted from the DCD.		
COL 18.10(1)	Deleted from the DCD.		
COL 18.10(2)	Deleted from the DCD.		
COL 18.11(1)	Deleted from the DCD.		
COL 18.11(2)	Deleted from the DCD.		
COL 18.12(1)	Deleted from the DCD.		

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category
COL 19.3(1)	The COL Applicant who intends to implement risk-managed technical specifications continues to update Probabilistic Risk Assessment and Severe Accident Evaluation to provide PRA input for risk-managed technical specifications. Peer reviews for the updated PRA will be performed prior to the use of PRA to risk-informed applications.	19.1.7.6	NA
COL 19.3(2)	Deleted from the DCD.		
COL 19.3(3)	Deleted from the DCD.		
COL 19.3(4)	The Probabilistic Risk Assessment and Severe Accident Evaluation is updated as necessary to assess specific site information and associated site-specific external events (high winds and tornadoes, external floods, transportation, and nearby facility accidents).	19.1 19.2 19A	3a
COL 19.3(5)	Deleted from the DCD.		
COL 19.3(6)	The COL applicant develops an accident management program which includes severe accident management procedures that capture important operator actions. Training requirements are also included as part of the accident management program.	19.1 19.2.5	2

NAPS COL 1.8(2)

Table 1.8-201 Resolution of Combined License Items for Chapters 1–19

COL Item No.	COL Item	FSAR Section	Resolution Category

Note:

The designation of the resolution category indicates the resolution status of each COL item categorized to 1a, 1b, 2, 3a, 3b, 3c, 4, or 5

1. Operational programs

1a. Applicant item as License Condition for Operational program

1b. Applicant item as Commitment for Operational program

2. Plant procedures

3. Design information

3a. Applicant item Design information provided in FSAR

3b. Applicant item as Commitment for Design information to be provided before COL issuance

3c. Holder item

4. Detailed schedule information

5. The ITAAC

(See Subsection 1.8.1.2 for further discussion.)

NAPS COL 1.8(3)

Table 1.8-202 Departures from the Referenced Certified Design

Number	Subject	FSAR Section
NAPS DEP 02.0(1)	Maximum Non-Coincident Wet Bulb Temperature	2.0
NAPS DEP 02.3(1)	[Deleted]	
NAPS DEP 03.5(1)	PSFSVs Located in Turbine Missile Strike Zone	3.5
NAPS DEP 03.7(1)	Seismic Spectra Exceedance	2.0, 3.7, 3.8, Appendix 3LL, Appendix 3NN, Appendix 3OO, 6.2, 19.1
NAPS DEP 03.7(2)	Site Response Analysis	3.7
NAPS DEP 03.7(3)	[Deleted]	
NAPS DEP 03.7(4)	Temporary Departure Related to Technical Reports MUAP-10001 and 10006	3.7, 3.8, Appendix 3H, Appendix 3I, Appendix 3NN
NAPS DEP 03.7(5)	Continued Use of Regulatory Guide 1.165	1.9, 2.5, 3.7
NAPS DEP 08.2(1)	Clarification of GDC 2 and 4 Applicability for Offsite Power	1.9, 8.1, 8.2
NAPS DEP 09.2(1)	Replacement of Boron Recycle System with a Degasifier Subsystem	1.2, 3.2, Appendix 3E, 7.4, 9.2, 9.3, Appendix 9A, 10.4, 11.2, 11.3, 11.4, 11.5, 12.2, 12.3, 14.2, Appendix 14A, COLA Part 4, Section A
NAPS DEP 09.2(2)	Non-Essential Service Water System, Design Service Water Temperature	9.2
NAPS DEP 09.5(1)	[Deleted]	
NAPS DEP 10.2(1)	Main Turbine Type Change	3.5, 10.1, 10.2, 10.4
NAPS DEP 10.4(1)	Main Condenser Type Change	1.2, Appendix 9A, 10.1, 10.4, 11.5, 12.3
NAPS DEP 14.2(1)	Initial Test Program (ITP) Administration	14.2
NAPS DEP 14.2(2)	Separation of Startup Organization into Preoperational and Startup Testing Organizations	14.2, Appendix 14AA
NAPS DEP 14.2(3)	Initial Test Program Scope	6.2, 6.3, 6.5, 14.2

NAPS COL 1.8(2)

Table 1.8-203 Variances from the ESP and ESPA SSAR

Number	Subject	FSAR Section
NAPS ESP VAR 2.0-1	Long-Term Dispersion Estimates (χ/Q and D/Q)	2.0 2.3
NAPS ESP VAR 2.0-2	Hydraulic Conductivity	2.0 2.4.12
NAPS ESP VAR 2.0-3	Hydraulic Gradient	2.0 2.4.12
NAPS ESP VAR 2.0-4	Vibratory Ground Motion	2.0 2.5.2 3.7.1
NAPS ESP VAR 2.0-5	Distribution Coefficients (K_d)	2.0
NAPS ESP VAR 2.0-6	DBA Source Term Parameters and Doses	2.0 15.9
NAPS ESP VAR 2.0-7	Coordinates and Abandoned Mat Foundations	2.0
NAPS ESP VAR 2.3-1	Tornado Site Characteristics	2.0 2.3.1 19.1.5
NAPS ESP VAR 2.4-1	Void Ratio, Porosity, and Seepage Velocity	2.4.12
NAPS ESP VAR 2.4-2	NAPS Water Supply Well Information	2.4.12
NAPS ESP VAR 2.4-3	Well Reference Point Elevation	2.4.12
NAPS ESP VAR 2.4-4	Lake Level Increase	2.4
NAPS ESP VAR 2.5-1	Stability of Slopes	2.5.5
NAPS ESP VAR 11.2-1	Annual Liquid Effluent Releases	11.2
NAPS ESP VAR 11.3-1	Annual Gaseous Effluent Releases	11.3
NAPS ESP VAR 11.3-2	Total Site Doses	11.3

NAPS COL 1.8(3)

Table 1.8-204 Summary of FSAR Sections Where ESP COL Action Items and Permit Conditions Are Addressed

Item No.	Subject/Description of Item	FSAR Section
ESP 2.1-1	Provide Latitude, Longitude, and UTM Coordinates	2.1.1
ESP 2.1-2	Control of Lake in Exclusion Area	2.1.2
ESP 2.2-1	Evaluate Industrial Hazards Near the Site	2.2
ESP 2.2-2	Interactions between Existing Units	2.2
ESP 2.3-1	Cooling Towers Impacts	2.3
ESP 2.3-2	Dispersion to Control Room	2.3
ESP 2.3-3	Verify Long-Term Atmospheric Dispersion Characteristics	2.3
ESP 2.4-1	Layout of Intake and Discharge Tunnels (Plant Service Water and Circulating Water System)	1.10
ESP 2.4-2	Plant Shutdown Protocol for Minimum Lake Level	2.4.14
ESP 2.4-4	Grading for Drainage	2.4.2
ESP 2.4-5	Local Probable Maximum Precipitation (PMP) Flooding Protection Needs	2.4.2
ESP 2.4-6	Engineered Underground Ultimate Heat Sink (UHS) Design	2.4.4
ESP 2.4-7	Engineered Underground UHS Capacity	2.4.4 9.2.5.2
ESP 2.4-8	Address Safety-Related Withdrawals from Lake	2.4.8
ESP 2.4-9	Slope Embankment Protection for Intake Structure	2.4.10
ESP 2.4-10	Cooling Water Needs at Low Lake Levels	2.4.11
ESP 2.5-1	Perform Additional Borings	2.5.1
ESP 2.5-2	Plot Plans and Profiles	2.5.4
ESP 2.5-3	Provide Excavation and Backfill Plans	2.5.4
ESP 2.5-4	Groundwater Conditions	2.5.4
ESP 2.5-5	Perform Additional Soil Column Amplification and Attenuation Analyses	2.5.4

NAPS COL 1.8(3)

Table 1.8-204 Summary of FSAR Sections Where ESP COL Action Items and Permit Conditions Are Addressed

Item No.	Subject/Description of Item	FSAR Section
ESP 2.5-6	Safety-Related Facilities Stability Analysis	2.5.4
ESP 2.5-7	Design-Related Criteria for Structural Design	2.5.4
ESP 2.5-8	Provide Ground Improvement Plans	2.5.4
ESP 2.5-9	Average Shear Wave Velocity Under Reactor Containment	2.5.4
ESP 2.5-10	Dynamic Analysis of Slope Stability	2.5.5
ESP 2.5-11	Safety Related Slopes	2.5.5
ESP 11.1-1	Offsite Doses and Maintaining Doses ALARA	11.2 11.3
ESP 13.6-1	Design of Protected Area Barriers	13.6
Permit Condition 3.E(1)	Exclusion Area Control	2.1.2
Permit Condition 3.E(2)	Cooling for a Second New Unit	Not applicable to Unit 3
Permit Condition 3.E(3)	Accidental Releases	11.2
Permit Condition 3.E(4)	Weathered or Fractured Rock	2.5.1
Permit Condition 3.E(5)	Engineered Fill	2.5.1
Permit Condition 3.E(6)	NRC Notification	2.5.1 2.5.4
Permit Condition 3.E(7)	Improved Soils	2.5.4

1.9 Conformance with Regulatory Criteria

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 1.9(1) Replace the last paragraph of DCD Section 1.9 with the following.

Subsection 1.9.1 discusses the conformance with RGs for the operational aspects and portions of the facility design that are not included in the DCD.

Subsections 1.9.2 and 1.9.3 address an evaluation for the Standard Review Plan (SRP) revision and generic issues which are identified in the revision of NUREG-0933 in effect as of December 31, 2009. This evaluation contains the operational aspect and portions of the facility design that are not included in the DCD. The additional status for the Three Mile Island (TMI) requirements is also included in Subsection 1.9.3.

Subsection 1.9.4 provides the evaluation for the generic communications (i.e., generic letters and bulletins) and Japanese pressurized-water reactors (PWRs) operating experience. These experiences are evaluated up to March 2008.

1.9.1 Conformance with Regulatory Guides

NAPS COL 1.9(1) Add the following paragraphs at the end of DCD Subsection 1.9.1.

Table 1.9-202 evaluates conformance with Division 1, 4, and 8 RGs in effect as of December 31, 2009. Each issued Division 1 RG is evaluated. Issued Division 4 and 8 RGs identified in the SRP or the DCD as COL responsibility are also evaluated. (Conformance with Division 4 RGs is also addressed in COLA Part 3, Section 1.4.) Division 5 RGs apply to the Physical Security Plan, and those topics are addressed in COLA Part 8.

Table 1.9-202 does not re-address conformance with RGs for those portions of the facility design included in the referenced certified design. Similarly, Table 1.9-202 does not re-address SSAR conformance with the applicable RGs.

In the table, the term “Conforms” means that no exception is being taken to the guidance in the regulatory positions as they apply to site-specific design information, operational aspects of the facility, or siting information in the FSAR that supplements the SSAR. The term “Not applicable” means that the regulatory positions do not apply to the US-APWR or Unit 3.

1.9.2 Conformance with Standard Review Plan

NAPS COL 1.9(1)

Add the following paragraphs after the last paragraph in DCD Subsection 1.9.2.

Table 1.9-201 evaluates conformance with the SRP sections and BTPs in effect as of December 31, 2009. Table 1.9-201 does not re-address conformance with the SRP for those portions of the facility design included in the referenced certified design. Similarly, Table 1.9-201 does not re-address SSAR conformance with the applicable RS-002 sections.

In the table, the term “Conforms” means that no exception is being taken to the guidance in the SRP section/acceptance criteria as they apply to site-specific design information, operational aspects of the facility, or siting information in the FSAR that supplements the SSAR. The term “Not applicable” means that the SRP section/acceptance criteria do not apply to the US-APWR or Unit 3. Any differences with the SRP acceptance criteria are identified and justified, with references to the applicable FSAR section(s) that address the difference, as necessary.

1.9.3 Generic Issues

NAPS COL 1.9(1)

Add the following paragraphs after the last paragraph in DCD Subsection 1.9.3.

In the US-APWR DCD, NUREG-0933 (September 2007) was consulted for generic communications, and those issues were addressed in a way that is also appropriate for purposes of this COLA FSAR. The most current revision of NUREG-0933 (July 2008) does not identify additional generic safety issues. Therefore, there is no additional evaluation of generic safety issues in the FSAR. Subsection 1.9.4 provides the review for the recent generic communications (i.e., bulletins and generic letters) issued by the NRC in order to incorporate current operational experience.

The five TMI related requirements annotated in DCD Table 1.9.3-2 as being completely or partially the COL applicant’s responsibility are addressed in Table 1.9-206.

1.9.4 Operational Experience (Generic Communications)

NAPS COL 1.9(1)

Add the following after the first paragraph in DCD Subsection 1.9.4.

Generic communications (Bulletins and Generic Letters) issued after March 2007 that are applicable to the portions of the design not included in the design certification have been reviewed. Evaluations of those items are presented in Table 1.9-207. The table contains columns for the generic issue document (including number, title, and date), language excerpted from the document that communicates the substance of the issue, comments on applicability, and references to the relevant subject matter in the FSAR.

1.9.6 Combined License Information

Replace the content of DCD Subsection 1.9.6 with the following.

STD* COL 1.9(1)
NAPS COL 1.9(1)

1.9(1) ***Conformance with regulatory guidance***

This COL item is addressed in Section 1.9, Subsections 1.9.1 through 1.9.4, and Tables 1.9-201 through 1.9-207.

Table 1.9.2-8R US-APWR Conformance with Standard Review Plan Chapter 8 Electrical Power (sheet 1 of 15)

	SRP Section and Title	SRP Excerpt Indicating Acceptance Criteria for DCD	Status	Appears in DCD Chapter/Section
	8.1 Electric Power – Introduction	Specific SRP acceptance criteria are contained in SRP Sections 8.2, 8.3.1, 8.3.2, and 8.4. (This SRP does not contain any unique acceptance criteria, but references other SRP sections.)	Not applicable. SRP establishes no specific acceptance criteria.	N/A (Discussed, however, in 8.1.1)
NAPS DEP 8.2(1)	8.2 Offsite Power System	1. GDC 2 is satisfied as it relates to SSCs of the offsite power system being capable of withstanding the effects of natural phenomena such as high and low atmospheric temperatures, high wind, rain, lightning discharges, ice and snow conditions, and weather events causing regional effects as established in Chapter 3 of the SAR, and reviewed by the organizations with primary responsibility for the reviews of plant systems, civil engineering and geosciences, and mechanical engineering. 2. GDC 4 is satisfied as it relates to SSCs of the offsite power system being protected against dynamic effects, including the effects of missile that may result from equipment failures during normal operation, maintenance, testing, and postulated accidents, as established in Chapter 3 of the SAR and reviewed by the organizations with primary responsibility for the reviews of plant systems, materials, and chemical engineering. 3. GDC 5 is satisfied as it relates to: sharing of SSCs of the preferred power systems; guidelines of Regulatory Guide 1.32 as related to its endorsement of Section 7 of IEEE Std 308, relating to sharing of SSCs of the Class 1E power system at multi-unit stations; and guidance related to the sharing of SSCs of the offsite power system (preferred power supply) at multi-unit stations, previously addressed in the 1980 and earlier versions of IEEE Std 308, but now covered in the industry standard for preferred power supply (Reference 52). 4. GDC 17 is satisfied as it relates to the preferred power system's (i) capacity and capability to permit functioning of SSCs important to safety; (ii) provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies; (iii) physical independence; (iv) availability and the guidelines of Regulatory Guide 1.32 (see also IEEE Std 308) as related to the availability and number of immediate access circuits from the transmission	Conformance with ~~no exceptions identified~~ the following exception: GDC 2 and 4 are not applicable.	8.2

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
1.0	Introduction and Interfaces	Rev. 1	Nov-07	No Specific Acceptance Criteria	Conforms
2.0	Site Characteristics and Site Parameters	Initial Issuance	Mar-07	II.1, II.2, II.3, II.5	Not applicable
				II.4	Conforms
2.1.1	Site Location and Description	Rev. 3	Mar-07	II.1, II.2	Conforms
2.1.2	Exclusion Area Authority and Control	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
2.1.3	Population Distribution	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
2.2.1–2.2.2	Identification of Potential Hazards in Site Vicinity	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
2.2.3	Evaluation of Potential Accidents	Rev. 3	Mar-07	II.1, II.2	Conforms
2.3.1	Regional Climatology	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms
2.3.2	Local Meteorology	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
2.3.3	Onsite Meteorological Measurements Programs	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
2.3.4	Short Term Atmospheric Dispersion Estimates for Accident Releases	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
2.3.5	Long-Term Atmospheric Dispersion Estimates for Routine Releases	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
2.4.1	Hydrologic Description	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
2.4.2	Floods	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10	Conforms
2.4.3	Probable Maximum Flood (PMF) on Streams and Rivers	Rev. 4	Mar-07	II.1, II.2, II.3	Conforms
2.4.4	Potential Dam Failures	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
2.4.5	Probable Maximum Surge and Seiche Flooding	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
2.4.6	Probable Maximum Tsunami Hazards	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms
2.4.7	Ice Effects	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
2.4.8	Cooling Water Canals and Reservoirs	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
2.4.9	Channel Diversions	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
2.4.10	Flooding Protection Requirements	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
2.4.11	Low Water Considerations	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
2.4.12	Groundwater	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
2.4.13	Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
2.4.14	Technical Specifications and Emergency Operation Requirements	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
2.5.1	Basic Geologic and Seismic Information	Rev. 4	Mar-07	II.1, II.2	Conforms
2.5.2	Vibratory Ground Motion	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
2.5.3	Surface Faulting	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms
2.5.4	Stability of Subsurface Materials and Foundations	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12	Conforms
2.5.5	Stability of Slopes	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
3.2.1	Seismic Classification	Rev. 2	Mar-07	II.1	Conforms
3.2.2	System Quality Group Classification	Rev. 2	Mar-07	II.1	Conforms
3.3.1	Wind Loadings	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
3.3.2	Tornado Loadings	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
3.4.1	Internal Flood Protection for Onsite Equipment Failures	Rev. 3	Mar-07	II.1, II.2	Conforms
3.4.2	Analysis Procedures	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
3.5.1.1	Internally Generated Missiles (Outside Containment)	Rev. 3	Mar-07	II.1, II.2	Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
3.5.1.2	Internally-Generated Missiles (Inside Containment)	Rev. 3	Mar-07	II.1, II.2	Conforms
3.5.1.3	Turbine Missiles	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
3.5.1.4	Missiles Generated by Tornadoes and Extreme Winds	Rev. 3	Mar-07	II.1, II.2	Conforms
3.5.1.5	Site Proximity Missiles (Except Aircraft)	Rev. 4	Mar-07	II.1, II.2	Conforms
3.5.1.6	Aircraft Hazards	Rev. 3	Mar-07	II.1, II.2	Conforms
3.5.2	Structures, Systems, and Components to be Protected from Externally-Generated Missiles	Rev. 3	Mar-07		Conforms
3.5.3	Barrier Design Procedures	Rev. 3	Mar-07	II.1, II.2	Conforms
3.6.1	Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
3.6.2	Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping	Rev. 2	Mar-07	II.1, II.2, II.3	Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
3.6.3	Leak-Before-Break Evaluation Procedures	Rev. 1	Mar-07	II.1, II.2	Conforms
3.7.1	Seismic Design Parameters	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
3.7.2	Seismic System Analysis	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14	Conforms
3.7.3	Seismic Subsystem Analysis	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14	Conforms
3.7.4	Seismic Instrumentation	Rev. 2	Mar-07	II.1, II.2	Conforms
3.8.1	Concrete Containment	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
3.8.2	Steel Containment	Rev. 2	Mar-07		Not applicable
3.8.3	Concrete and Steel Internal Structures of Steel or Concrete Containments	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
3.8.4	Other Seismic Category I Structures	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms
3.8.5	Foundations	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
3.9.1	Special Topics for Mechanical Components	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
3.9.2	Dynamic Testing and Analysis of Systems, Structures, and Components	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
3.9.3	ASME Code Class 1, 2, and 3 Components, and Component Supports, and Core Support Structures	Rev. 2	Mar-07	II.1, II.2, II.3	Conforms
3.9.4	Control Rod Drive Systems	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
3.9.5	Reactor Pressure Vessel Internals	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
3.9.6	Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
				II.6	Exception. Acceptance Criteria II.6 states that the implementation milestone for the IST Program is prior to first electrical generation by nuclear heat. This conflicts with the requirements in the referenced ASME OM Code and in SRP 13.4, which identify the implementation milestone as after generator on-line on nuclear heat. Table 13.4-201 provides an implementation milestone consistent with the ASME OM Code and SRP 13.4.
3.9.7	Risk-Informed Inservice Testing	Rev. 0	Aug-98	II.A, II.B	Not applicable. Risk-informed inservice testing is not being used.
3.9.8	Risk-Informed Inservice Inspection of Piping	Rev. 0	Sep-03	II.1, II.2, II.3	Not applicable. Risk-informed inservice inspection of piping is not being used.

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
3.10	Seismic and Dynamic Qualification of Mechanical and Electrical Equipment	Rev. 3	Mar-07	II.1, II.2, II.3, II.5	Conforms
				II.4, II.6	Conforms
3.11	Environmental Qualification of Mechanical and Electrical Equipment	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14, II.15	Conforms
				II.16	Conforms
3.12	ASME Code Class 1, 2, and 3 Piping Systems, Piping Components and their Associated Supports	Initial Issuance	Mar-07	II.A, II.B, II.C, II.D	Conforms
3.13	Threaded Fasteners - ASME Code Class 1, 2, and 3	Initial Issuance	Mar-07	II.1, II.2	Conforms
BTP 3-1	Classification of Main Steam Components Other than the Reactor Coolant Pressure Boundary for BWR Plants	Rev. 2	Mar-07		Not applicable
BTP 3-2	Classification of BWR/6 Main Steam and Feedwater Components Other than the Reactor Coolant Pressure Boundary	Rev. 2	Mar-07		Not applicable

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 3-3	Protection Against Postulated Piping Failures in Fluid Systems Outside Containment	Rev. 3	Mar-07		Conforms
BTP 3-4	Postulated Rupture Locations in Fluid System Piping Inside and Outside Containment	Rev. 2	Mar-07		Conforms
4.2	Fuel System Design	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
4.3	Nuclear Design	Rev. 3	Mar-07	II.1, II.2, II.4	Conforms
				II.3	Conforms
4.4	Thermal and Hydraulic Design	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10	Conforms
4.5.1	Control Rod Drive Structural Materials	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
4.5.2	Reactor Internal and Core Support Structure Materials	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
4.6	Functional Design of Control Rod Drive System	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms
BTP 4-1	Westinghouse Constant Axial Offset Control (CAOC)	Rev. 3	Mar-07		Not applicable Addressed in DCD Table 1.9.2-4.

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
5.2.1.1	Compliance with the Codes and Standards Rule, 10 CFR 50.55a	Rev. 3	Mar-07	RG 1.26	Conforms
5.2.1.2	Applicable Code Cases	Rev. 3	Mar-07	RG 1.84, RG 1.147, RG 1.192	Conforms
5.2.2	Overpressure Protection	Rev. 3	Mar-07	II.1, II.3, II.4, II.5, II.6, II.7	Conforms
				II.2	Not applicable
5.2.3	Reactor Coolant Pressure Boundary Materials	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
5.2.4	Reactor Coolant Pressure Boundary Inservice Inspection and Testing	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.11	Conforms
				II.9, II.10	Not applicable. Addressed in DCD Table 1.9.2-5.
5.2.5	Reactor Coolant Pressure Boundary Leakage Detection	Rev. 2	Mar-07	II.1, II.2	Conforms
5.3.1	Reactor Vessel Materials	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
5.3.2	Pressure-Temperature Limits, Upper-Shelf Energy, and Pressurized Thermal Shock	Rev. 2	Mar-07	II.1, II.2, II.3	Conforms
5.3.3	Reactor Vessel Integrity	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
5.4	Reactor Coolant System Component and Subsystem Design	Rev. 2	Mar-07	I.1, I.2, I.3, I.4, I.5, I.7, I.9, I.10, I.11, I.12, I.13	Conforms
				I.6, I.8	Not applicable
5.4.1.1	Pump Flywheel Integrity (PWR)	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
5.4.2.1	Steam Generator Materials	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
5.4.2.2	Steam Generator Program	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms
5.4.6	Reactor Core Isolation Cooling System (BWR)	Rev. 4	Mar-07		Not applicable
5.4.7	Residual Heat Removal (RHR) System	Rev. 4	Mar-07	II.1, II.2, II.3, II.4	Conforms
5.4.8	Reactor Water Cleanup System (BWR)	Rev. 3	Mar-07		Not applicable
5.4.11	Pressurizer Relief Tank	Rev. 3	Mar-07	II.1, II.2	Conforms
5.4.12	Reactor Coolant System High Point Vents	Rev. 1	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14	Conforms
5.4.13	Isolation Condenser System (BWR)	Initial Issuance	Mar-07		Not applicable
BTP 5-1	Monitoring of Secondary Side Water Chemistry in PWR Steam Generators	Rev. 3	Mar-07		Conforms

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 5-2	Overpressurization Protection of Pressurized-Water Reactors While Operating at Low Temperatures	Rev. 3	Mar-07		Conforms. Refer to DCD Table 1.9.2-5.
BTP 5-3	Fracture Toughness Requirements	Rev. 3	Mar-07		Conforms
BTP 5-4	Design Requirements of the Residual Heat Removal System	Rev. 4	Mar-07		Conforms
6.1.1	Engineered Safety Features Materials	Rev. 2	Mar-07	II.1, II.2, II.3, II.4	Conforms
6.1.2	Protective Coating Systems (Paints) - Organic Materials	Rev. 3	Mar-07	II.1	Conforms
6.2.1	Containment Functional Design	Rev. 3	Mar-07		Conforms
6.2.1.1.A	PWR Dry Containments, Including Subatmospheric Containments	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10	Conforms
6.2.1.1.B	Ice Condenser Containments	Draft Rev. 3	Apr-96		Not applicable
6.2.1.1.C	Pressure-Suppression Type BWR Containments	Rev. 7	Mar-07		Not applicable

NAPS COL 1.9(1)

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
6.2.1.2	Subcompartment Analysis	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
6.2.1.3	Mass and Energy Release Analysis for Postulated Loss-of-Coolant Accidents (LOCAs)	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
6.2.1.4	Mass and Energy Release Analysis for Postulated Secondary System Pipe Ruptures	Rev. 2	Mar-07	II.1, II.2, II.3	Conforms
6.2.1.5	Minimum Containment Pressure Analysis for Emergency Core Cooling System Performance Capability Studies	Rev. 3	Mar-07	II.1, II.2	Conforms
6.2.2	Containment Heat Removal Systems	Rev. 5	Mar-07	II.1, II.2, II.3, II.5, II.6, II.7, II.8	Conforms
				II.4	Not applicable
6.2.3	Secondary Containment Functional Design	Rev. 3	Mar-07		Not applicable
6.2.4	Containment Isolation System	Rev. 3	Mar-07	II.1, II.2, II.3, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14, II.15, II.16, II.17, II.18, II.19, II.20, II.21, II.22	Conforms
				II.4	Not applicable
6.2.5	Combustible Gas Control in Containment	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
6.2.6	Containment Leakage Testing	Rev. 3	Mar-07		Conforms
6.2.7	Fracture Prevention of Containment Pressure Boundary	Rev. 1	Mar-07	II.1, II.2	Conforms
6.3	Emergency Core Cooling System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.10	Conforms
				II.9	Not applicable
6.4	Control Room Habitability System	Rev. 3	Mar-07	II.1, II.2, II.4, II.5, II.6	Conforms
				II.3	Exception: For differential pressure testing of the control room, the periodic verification interval of every 18 months in Acceptance Criteria II.3.a through II.3.c is increased to every 24 months to accommodate an operating cycle of up to two years for a US-APWR. The frequencies for testing the MCR HVAC system are defined by Technical Specifications 3.7.10 and 5.5.20.
				II.7	Exception: See evaluation in Section 6.4.4.2.
6.5.1	ESF Atmosphere Cleanup Systems	Rev. 3	Mar-07		Conforms
6.5.2	Containment Spray as a Fission Product Cleanup System	Rev. 4	Mar-07	II.1, II.2, II.3	Conforms. Requirements for containment spray chemical addition tanks are not applicable.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
6.5.3	Fission Product Control Systems and Structures	Rev. 3	Mar-07	II.1, II.4 (there is no II.3)	Conforms
				II.2	Not applicable
6.5.4	Ice Condenser as a Fission Product Cleanup System	Draft Rev. 4	Apr-96		Not applicable
6.5.5	Pressure Suppression Pool as a Fission Product Cleanup System	Rev. 1	Mar-07		Not applicable
6.6	Inservice Inspection and Testing of Class 2 and 3 Components	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11	Conforms
6.7	Main Steam Isolation Valve Leakage Control System (BWR)	Draft Rev. 3	Jun-96		Not applicable
BTP 6-1	pH For Emergency Coolant Water for Pressurized Water Reactors	Initial Issuance	Mar-07		Conforms
BTP 6-2	Minimum Containment Pressure Model for PWR ECCS Performance Evaluation	Rev. 3	Mar-07		Conforms
BTP 6-3	Determination of Bypass Leakage Paths in Dual Containment Plants	Rev. 3	Mar-07		Not applicable

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 6-4	Containment Purging During Normal Plant Operations	Rev. 3	Mar-07		Conforms
BTP 6-5	Currently the Responsibility of Reactor Systems Piping From the RWST (or BWST) and Containment Sump(s) to the Safety Injection Pumps	Rev. 3	Mar-07		Conforms
7.0	Instrumentation and Controls - Overview of Review Process	Rev. 5	Mar-07		Conforms
Appendix 7.0-A	Review Process for Digital Instrumentation and Control Systems	Rev. 5	Mar-07		Conforms
7.1	Instrumentation and Controls - Introduction	Rev. 5	Mar-07	II.1, II.2, II.3	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.
7.1-T	Table 7-1 Regulatory Requirements, Acceptance Criteria, and Guidelines for Instrumentation and Control Systems Important to Safety	Rev. 5	Mar-07		Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
Appendix 7.1-A	Acceptance Criteria and Guidelines for Instrumentation and Controls Systems Important to Safety	Rev. 5	Mar-07	1, 2, 3, 4, 5	Conforms
Appendix 7.1-B	Guidance for Evaluation of Conformance to IEEE Std 279	Rev. 5	Mar-07		Conforms
Appendix 7.1-C	Guidance for Evaluation of Conformance to IEEE Std 603	Rev. 5	Mar-07		Conforms
Appendix 7.1-D	Guidance for Evaluation of the Application of IEEE Std 7-4.3.2	Second Issuance	Mar-07	5, 6, 7, 8, 9	Conforms. Cyber security is addressed in Section 13.6.
7.2	Reactor Trip System	Rev. 5	Mar-07	II.1, II.2, II.3, II.4	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
7.3	Engineered Safety Features Systems	Rev. 5	Mar-07	II.1, II.2, II.3, II.4	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
7.4	Safe Shutdown Systems	Rev. 5	Mar-07	II.1, II.2, II.3	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
7.5	Information Systems Important to Safety	Rev. 5	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
7.6	Interlock Systems Important to Safety	Rev. 5	Mar-07	II.1, II.2, II.3	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
7.7	Control Systems	Rev. 5	Mar-07	II.1, II.2, II.3, II.4	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
7.8	Diverse Instrumentation and Control Systems	Rev. 5	Mar-07	II.1, II.2, II.3, II.4	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
7.9	Data Communication Systems	Rev. 5	Mar-07	II.1, II.2, II.3	Conforms. Addressed in DCD Section 7.1. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
Appendix 7-A	General Agenda, Station Site Visits (formerly Appendix 7-B)	Rev. 5	Mar-07		Not applicable. Provides guidance to the NRC to conduct site visits.
Appendix 7-B	Acronyms, Abbreviations, and Glossary	Rev. 5	Mar-07		Not applicable. Provides no specific acceptance criteria.
BTP 7-1	Guidance on Isolation of Low-Pressure Systems from the High-Pressure Reactor Coolant System	Rev. 5	Mar-07		Conforms
BTP 7-2	Guidance on Requirements of Motor-Operated Valves in the Emergency Core Cooling System Accumulator Lines	Rev. 5	Mar-07		Conforms
BTP 7-3	Guidance on Protection System Trip Point Changes for Operation with Reactor Coolant Pumps Out of Service	Rev. 5	Mar-07		Conforms
BTP 7-4	Guidance on Design Criteria for Auxiliary Feedwater Systems	Rev. 5	Mar-07		Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 7-5	Guidance on Spurious Withdrawals of Single Control Rods in Pressurized Water Reactors	Rev. 5	Mar-07		Conforms
BTP 7-6	Guidance on Design of Instrumentation and Controls Provided to Accomplish Changeover from Injection to Recirculation Mode	Rev. 5	Mar-07		Not applicable
HICB-7	Not Used				Not used
BTP 7-8	Guidance for Application of Regulatory Guide 1.22	Rev. 5	Mar-07		Conforms. Chapter 16 addresses Technical Specifications.
BTP 7-9	Guidance on Requirements for Reactor Protection System Anticipatory Trips	Rev. 5	Mar-07		Conforms
BTP 7-10	Guidance on Application of Regulatory Guide 1.97	Rev. 5	Mar-07		Conforms. Section 13.5 addresses procedures.
BTP 7-11	Guidance on Application and Qualification of Isolation Devices	Rev. 5	Mar-07		Conforms.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 7-12	Guidance on Establishing and Maintaining Instrument Setpoints	Rev. 5	Mar-07		Conforms. Section 13.5 addresses procedures.
BTP 7-13	Guidance on Cross-Calibration of Protection System Resistance Temperature Detectors	Rev. 5	Mar-07		Conforms
BTP 7-14	Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems	Rev. 5	Mar-07		Conforms. Cyber security is addressed in Section 13.6.
HCIB-15	Not Used				Not used
BTP 7-16	Withdrawn				Withdrawn
BTP 7-17	Guidance on Self-Test and Surveillance Test Provisions	Rev 5	Mar-07		Conforms. Section 13.5 addresses procedures. Chapter 16 addresses Technical Specifications.
BTP 7-18	Guidance on the Use of Programmable Logic Controllers in Digital Computer-Based Instrumentation and Control Systems	Rev. 5	Mar-07		Not applicable

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 7-19	Guidance for Evaluation of Diversity and Defense-in-Depth in Digital Computer-Based Instrumentation and Control Systems	Rev. 5	Mar-07		Conforms
HCIB-20	Not Used				Not used
BTP 7-21	Guidance on Digital Computer Real-Time Performance	Rev. 5	Mar-07		Conforms
8.1	Electric Power - Introduction	Rev. 3	Mar-07		Conforms
8.2 (NAPS DEP 8.2(1))	Offsite Power System	Rev. 4	Mar-07	II.3, II.4, II.5, II.6, II.7, II.8	Conforms
				II.1, II.2	Not applicable
8.3.1	AC Power Systems (Onsite)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10	Conforms
8.3.2	DC Power Systems (Onsite)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13	Conforms
8.4	Station Blackout	Initial Issuance	Mar-07	II.1, II.2	Conforms
				II.3	Conforms. Addressed in Sections 8.3 and 8.4.
				II.4, II.5	Conforms. Addressed in Section 17.6.
Appendix 8-A	General Agenda, Station Site Visits	Rev. 1	Mar-07		Not applicable. Provides guidance to NRC to conduct site visits.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 8-1	Requirements on Motor-Operated Valves in the ECCS Accumulator Lines	Rev. 3	Mar-07		Conforms
BTP 8-2	Use of Diesel-Generator Sets for Peaking	Rev. 3	Mar-07		Conforms
BTP 8-3	Stability of Offsite Power Systems	Rev. 3	Mar-07		Conforms. Stability studies were performed to investigate the loss of off-site generation.
BTP 8-4	Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves	Rev. 3	Mar-07		Conforms
BTP 8-5	Supplemental Guidance for Bypass and Inoperable Status Indication for Engineered Safety Features Systems	Rev. 3	Mar-07		Conforms
BTP 8-6	Adequacy of Station Electric Distribution System Voltages	Rev. 3	Mar-07		Conforms
BTP 8-7	Criteria for Alarms and Indications Associated with Diesel-Generator Unit Bypassed and Inoperable Status	Rev. 3	Mar-07		Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
9.1.1	Criticality Safety of Fresh and Spent Fuel Storage and Handling	Rev. 3	Mar-07	II.1	Conforms
9.1.2	New and Spent Fuel Storage	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms
9.1.3	Spent Fuel Pool Cooling and Cleanup System	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
				II.8	Conforms. EP-ITAAC are addressed in COLA Part 10.
9.1.4	Light Load Handling System (Related to Refueling)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.1.5	Overhead Heavy Load Handling Systems	Rev. 1	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.2.1	Station Service Water System	Rev. 5	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
9.2.2	Reactor Auxiliary Cooling Water Systems	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
9.2.3	Demineralized Water Makeup System				SRP withdrawn
9.2.4	Potable and Sanitary Water Systems	Rev. 3	Mar-07	II.1.A, II.1.B, II.1.C	Conforms
9.2.5	Ultimate Heat Sink	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
9.2.6	Condensate Storage Facilities	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms
9.3.1	Compressed Air System	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
9.3.2	Process and Post-accident Sampling Systems	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.3.3	Equipment and Floor Drainage System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
9.3.4	Chemical and Volume Control System (PWR) (Including Boron Recovery System)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
9.3.5	Standby Liquid Control System (BWR)	Rev. 3	Mar-07		Not applicable
9.4.1	Control Room Area Ventilation System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
9.4.2	Spent Fuel Pool Area Ventilation System	Rev. 3	Mar-07	II.1, II.2	Conforms
				II.3, II.4	Not applicable. Refer to DCD Table 1.9.2-9.
9.4.3	Auxiliary and Radwaste Area Ventilation System	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms. Refer to DCD Table 1.9.2-9.
9.4.4	Turbine Area Ventilation System	Rev. 3	Mar-07		Not applicable. Refer to DCD Table 1.9.2-9.
9.4.5	Engineered Safety Feature Ventilation System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
9.5.1.1	Fire Protection Program	Rev. 0	Feb-09	II.1, II.2, II.4	Not applicable
				II.3, II.5, II.6	Conforms
				II.7	Exception: The elements of the Fire Protection Program (FPP) required to be operational prior to receipt of new fuel are those elements necessary to protect buildings storing new fuel and adjacent fire areas that could affect the fuel storage area. Other required elements of the FPP will be fully operational prior to initial fuel loading. Refer to Section 13.4.
9.5.1.2	Risk-Informed, Performance-Based Fire Protection Program	Rev. 0	Dec-09		Not applicable. Performance based option is not used.
9.5.2	Communications Systems	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14	Conforms
9.5.3	Lighting Systems	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.5.4	Emergency Diesel Engine Fuel Oil Storage and Transfer System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.5.5	Emergency Diesel Engine Cooling Water System	Rev. 3	Mar-07		Not applicable
9.5.6	Emergency Diesel Engine Starting System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
9.5.7	Emergency Diesel Engine Lubrication System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.5.8	Emergency Diesel Engine Combustion Air Intake and Exhaust System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
10.2	Turbine Generator	Rev. 3	Mar-07	II.1.A, II.1.B	Conforms
				II.1.C	Exception—The Turbine Generator Set (TGS) has the capability to permit periodic testing of all components important to safety while the unit is at or above rated speed. However, some load reduction may be necessary before testing main stop and control valves (CVs), and reheat stop and intercept valves. Overspeed trip testing is performed at speed levels greater than or equal to rated speed with no electrical load. Thus, not all components are capable of being tested at rated load as required in the corresponding Acceptance Criterion.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.2	Turbine Generator (continued)				
				II.1.C (continued)	Load reduction for turbine valve testing is common in the existing fleet of power reactors and is considered acceptable. Testing at turbine loads below the rated load condition is considered an acceptable means of confirming that equipment relied on to prevent turbine overspeed related failures is available and capable of providing required functions. Further, component redundancies, as described in DCD Section 10.2.2.3, ensure that a single failure of any of the above valves important to safety will not disable the function of the overspeed protection system.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.2	Turbine Generator (continued)				
				II.2.A	Exception—Inservice inspection of main steam and reheat valves is discussed in DCD Sections 10.2.2.3 and 10.2.3.5. The first disassembly and visual inspection of all main stop valves, main CVs, reheat stop, and intercept valves are performed within the first three refueling shutdowns. However, the interval for subsequent inspections may be extended beyond the SRP interval of 3-1/3 years to an interval consistent with applicable industry guidance, subject to the requirements of the turbine missile probability analysis. The inspection interval may not exceed the requirements or assumptions in the turbine missile probability analysis. Further, inspection intervals are only extended if there are no significant findings in the initial (baseline) inspections. Thus, with the above provisions, extending the inspection interval beyond the SRP interval is considered acceptable.
				II.2.B, II.3	Conforms
10.2.3	Turbine Rotor Integrity	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.3	Main Steam Supply System	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
				II.8	Not applicable
10.3.6	Steam and Feedwater System Materials	Rev. 3	Mar-07	II.1, II.2	Conforms
10.4.1	Main Condensers	Rev. 3	Mar-07	II.1.A	Not applicable
				II.1.B	Conforms
10.4.2	Main Condenser Evacuation System	Rev. 3	Mar-07	II.1	Conforms
10.4.3	Turbine Gland Sealing System	Rev. 3	Mar-07		Conforms
10.4.4	Turbine Bypass System	Rev. 3	Mar-07	II.1, II.2	Conforms
				II.3	Not applicable
10.4.5	Circulating Water System	Rev. 3	Mar-07	II.1	Conforms
10.4.6	Condensate Cleanup System	Rev. 3	Mar-07	II.1	Not applicable
				II.2	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.4.7	Condensate and Feedwater System	Rev. 4	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
				II.7	Exception: This SRP acceptance criterion states that guidance for acceptable FAC inspection programs “is found in (NRC) Generic Letter 89-08 and in EPRI NP-3944.” EPRI document NSAC-202L, Rev. 2, supersedes EPRI NP-3944 and is therefore referenced in place of EPRI NP-3944 in DCD Section 10.3.6.3, for guidance regarding FAC (erosion corrosion) monitoring and related inspection programs. The more recent document, EPRI NSAC-202L, utilizes more extensive industry experience and improved inspection methods and modeling. The substitution of EPRI NSAC-202L, Rev. 2, in place of EPRI NP-3944 is therefore acceptable.
				II.8	Not applicable
10.4.8	Steam Generator Blowdown System	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
10.4.9	Auxiliary Feedwater System (PWR)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 10-1	Design Guidelines for Auxiliary Feedwater System Pump Drive and Power Supply Diversity for Pressurized Water Reactor Plants	Rev. 3	Mar-07		Conforms
BTP 10-2	Design Guidelines for Avoiding Water Hammers in Steam Generators	Rev. 4	Mar-07		Conforms. Addressed in DCD Sections 10.4.7.7 and 10.4.9.2.2.
11.1	Source Terms	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.6, II.7, II.8, II.9	Conforms
				II.5	Conforms. Addressed in Sections 11.2 and 11.3.
11.2	Liquid Waste Management System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
				II.6	Not applicable. Applies to ESP applications.
11.3	Gaseous Waste Management System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
				II.8	Not applicable. Applies to ESP applications.

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
11.4	Solid Waste Management System	Rev. 3	Mar-07	II.1, II.2, II.5, II.7, II.8, II.9, II.10, II.14	Conforms
				II.3, II.4, II.6, II.11. II.12, II.13	Conforms (addressed in DCD Section 11.4 and in Section 11.4; for Acceptance Criterion II.13, this is also addressed in Section 11.5) with the following exception: RG 1.206, Section 13.4 includes the PCP as an operational program, and only requires a program description in the COLA and a milestone for full program implementation. The FSAR provides a description of the PCP, along with the implementation milestone. Procedures for handling waste will be developed once the PCP is implemented.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
11.5	Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems	Rev. 4	Mar-07	II.2	Conforms (addressed in DCD Section 11.5.2) with the following exception: Procedural controls are based on NQA-1, rather than RG 1.33, as described in Section 13.5. Quality Assurance Program (QAP) requirements are addressed in Section 17.5.
				II.1, II.3, II.4, II.5	Conforms (addressed in DCD Sections 11.5.2 and 11.5.3, and in Section 11.5) with the following exceptions: 1) RG 1.206, Section 13.4 includes the ODCM (including the SREC) and PCP as operational programs, and only requires program descriptions in the COLA and milestones for full program implementation. The FSAR provides descriptions of the PCP and ODCM along with implementation milestones. 2) Procedural controls are based on NQA-1, rather than RG 1.33, as described in Section 13.5. QAP requirements are addressed in Section 17.5.
				II.6	Conforms

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 11-3	Design Guidance for Solid Radioactive Waste Management Systems Installed in Light-Water-Cooled Nuclear Power Reactor Plants	Rev. 3	Mar-07	B.1,B.3, B.5	Conforms
				B.2, B.4	Conforms (addressed in DCD Section 11.4 and in Section 11.4; for SRP 11.4 Acceptance Criterion II.13, this is also addressed in Section 11.5) with the following exception: RG 1.206, Section 13.4 includes the PCP as an operational program, and only requires a program description in the COLA and a milestone for full program implementation. The FSAR provides a description of the PCP, along with the implementation milestone. Procedures for handling waste will be developed once the PCP is implemented.
BTP 11-5	Postulated Radioactive Releases Due to a Waste Gas System Leak or Failure	Rev. 3	Mar-07		Conforms. Addressed in DCD Section 11.3.
BTP 11-6	Postulated Radioactive Releases Due to Liquid-containing Tank Failures	Initial Issuance	Mar-07		Conforms. Addressed in Sections 2.4.13, 11.2.3.2, and DCD Section 15.7.3.
12.1	Assuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable	Rev. 3	Mar-07	II.1, II.2, II.4	Conforms
				II.3	Exception. Procedural controls are based on NQA-1 rather than RG 1.33 as described in Section 17.5.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
12.2	Radiation Sources	Rev. 3	Mar-07		Conforms
12.3–12.4	Radiation Protection Design Features	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
12.5	Operational Radiation Protection Program	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.1.1	Management and Technical Support Organization	Rev. 5	Mar-07	II.1.A, B, D, II.2.A.i through II.2.A.v	Conforms
				II.1.C	Exception: The experience requirements of corporate staff are set by corporate policy and not provided in detail; however, the experience level of Dominion, as discussed in Section 13.1 and Appendix 13AA, in the area of nuclear plant development, construction, and management establishes that Dominion has the necessary capability and staff to ensure that design and construction of the facility will be performed in an acceptable manner. Resumes and/or other documentation of qualification and experience of initial appointees to management and supervisory positions are available for NRC inspection after position vacancies are filled. Design and construction responsibilities are not defined in numbers of persons required.
				II.2.A.vi, II.2.A.vii	Conforms. Addressed in Sections 13.1 and 14.2.
				II.2.A.viii	Not applicable. Only applies to applicants whose applications were pending as of February 16, 1982.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.1.2–13.1.3	Operating Organization	Rev. 6	Mar-07	General 1	Exception: SRP requires operational, onsite technical support, and maintenance groups to be under the direction and supervision of a plant manager. Dominion has organized much of its technical support with direct reporting to offsite/corporate organizations and dotted line reporting to the site executive in charge of plant management. This applies to such groups as training, security, emergency preparedness, QA, licensing, and projects.
				General 2, General 3	Conforms
				General 4	Not applicable. There are no requests for exemptions from the requirements of 10 CFR 50.54(m).
				II.1.A, II.1.B	Exception. Refer to Section 17.5.
				II.1.A.i through II.1.A.v, II.1.C, II.1.E, II.1.F, II.1.G, II.1.H	Conforms
				II.1.D	Not applicable
13.2.1	Reactor Operator Requalification Program; Reactor Operator Training	Rev. 3	Mar-07	II.1	Conforms. NEI 06-13A is incorporated by reference.
13.2.2	Non-Licensed Plant Staff Training	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11	Conforms. NEI 06-13A is incorporated by reference.

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.3	Emergency Planning	Rev. 3	Mar-07	II.1, II.2,	Conforms. Addressed in Section 13.4, COLA Part 5, and COLA Part 10.
				II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.17, II.18, II.30	Conforms. Addressed in COLA Part 5.
				II.14	Not applicable. Allows NRC to issue a license when applicant asserts that noncompliance with offsite EP requirements is because state or local government has declined to participate in emergency planning.
				II.15, II.16, II.19, II.20, II.21	Not applicable. Only applies to ESP applications.
				II.22	Not applicable. Only applies to design certification applications.
				II.23, II.24	Conforms. Addressed in COLA Part 10.
				II.25, II.26, II.27, II.28	Not applicable. Applies to previous applications for construction permits.
				II.29	Conforms. Addressed in COLA Part 5 and Security Plan.
				II.31	Conforms. Addressed in Section 13.4.
13.4	Operational Programs	Rev. 3	Mar-07		Conforms

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.5.1.1	Administrative Procedures - General	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12, II.13, II.14, II.15, II.16, II.17, II.18, II.19, II.20	Conforms
13.5.2.1	Operating and Emergency Operating Procedures	Rev. 2	Mar-07	II.1, II.2	Conforms
13.6	Physical Security	Rev. 3	Mar-07		Addressed in COLA Part 8.
13.6.1	Physical Security - Combined License	Initial Issuance	Mar-07		Addressed in COLA Part 8. Fitness for duty (FFD) is addressed in Section 13.7.
13.6.2	Physical Security - Design Certification	Initial Issuance	Mar-07		Not applicable. Applies to design certification applications.
13.6.3	Physical Security - Early Site Permit	Initial Issuance	Mar-07		Not applicable. Applies to ESP applications.
14.2	Initial Plant Test Program - Design Certification and New License Applicants	Rev. 3	Mar-07	1A, 1B, 1C, 2A, COL/OL Applicants: 3A, 3B, 3C, 3D, 3E, 3F, 3G, 3H, 4A, 4B, 5A, 5B, 5C, 5D, 6A, 6B, 6C	Conforms with the following exception: Refer to Table 1.9-202 for exceptions to RG 1.68.
				DC Applicants: 3A, 3B, 3C, 3D, 4A, 6A, 6B, 6C	Not applicable. Applies to DC applicants.
14.2.1	Generic Guidelines for Extended Power Uprate Testing Programs	Initial Issuance	Aug-06		Not applicable. Applies to power uprates.
14.3	Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2	Conforms
14.3.1	[Reserved]	[Reserved]	Mar-07		Not used

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
14.3.2	Structural and Systems Engineering - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, II.10, II. 11	Conforms
14.3.3	Piping Systems and Components - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2.A, II.2.B, II.2.C, II.2.D, II.2.E	Conforms
14.3.4	Reactor Systems - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
14.3.5	Instrumentation and Controls - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
14.3.6	Electrical Systems - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	Class 1E Equipment: II.1, II.2, II.3, II.4, II.5 Other Electrical Equipment Important to Safety: II.1, II.2, II.3, II.4, II.5	Conforms
14.3.7	Plant Systems - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II. 9	Conforms
14.3.8	Radiation Protection - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3	Conforms

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
14.3.9	Human Factors Engineering - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6	Conforms
14.3.10	Emergency Planning - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2	Conforms
14.3.11	Containment Systems - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
14.3.12	Physical Security Hardware - Inspections, Tests, Analyses, and Acceptance Criteria	Initial Issuance	Mar-07	II.1	Conforms
15	Introduction - Transient and Accident Analyses	Rev. 3	Mar-07	I.1, I.2, 1.3, I.4, I.5, I.6	Conforms
15.0.1	Radiological Consequence Analyses Using Alternative Source Terms	Rev. 0	Jul-00		Not applicable
15.0.2	Review of Transient and Accident Analysis Method	Rev. 0	Dec-05	II.1, II.2, II.3, II.4, II.5, II.6	Conforms

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.0.3	Design Basis Accident Radiological Consequence Analyses for Advanced Light Water Reactors	Initial Issuance	Mar-07	II.1, II.2, II.3	Conforms
15.1.1–15.1.4	Decrease in Feedwater Temperature, Increase in Feedwater Flow, Increase in Steam Flow, and Inadvertent Opening of a Steam Generator Relief or Safety Valve	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, 1, 2, 3, 4	Conforms
15.1.5	Steam System Piping Failures Inside and Outside of Containment (PWR)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	Conforms
15.1.5.A	Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR	Rev. 2	Jul-81		Not applicable. SRP 15.0.3 is applied.
15.2.1–15.2.5	Loss of External Load; Turbine Trip; Loss of Condenser Vacuum; Closure of Main Steam Isolation Valve (BWR); and Steam Pressure Regulator Failure (Closed)	Rev. 2	Mar-07	II.1, II.2, II.3	Conforms

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.2.6	Loss of Nonemergency AC Power to the Station Auxiliaries	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
15.2.7	Loss of Normal Feedwater Flow	Rev. 2	Mar-07	II.1, II.2, II.3	Conforms
15.2.8	Feedwater System Pipe Breaks Inside and Outside Containment (PWR)	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
15.3.1–15.3.2	Loss of Forced Reactor Coolant Flow Including Trip of Pump Motor and Flow Controller Malfunctions	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9	Conforms with SRP 15.3.1. SRP 15.3.2 is not applicable.
15.3.3–15.3.4	Reactor Coolant Pump Rotor Seizure and Reactor Coolant Pump Shaft Break	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8, II.9, 1, 2, 3, 4	Conforms
15.4.1	Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low Power Startup Condition	Rev. 3	Mar-07	II.1.A, II.1.B	Conforms
				II.1.C	Not applicable
15.4.2	Uncontrolled Control Rod Assembly Withdrawal at Power	Rev. 3	Mar-07	II.1.A, II.1.B	Conforms
				II.1.C	Not applicable

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.4.3	Control Rod Misoperation (System Malfunction or Operator Error)	Rev. 3	Mar-07	II.1, II.2	Conforms
				II.3	Not applicable
15.4.4–15.4.5	Startup of an Inactive Loop or Recirculation Loop at an Incorrect Temperature, and Flow Controller Malfunction Causing an Increase in BWR Core Flow Rate	Rev. 2	Mar-07		Not Applicable
15.4.6	Inadvertent Decrease in Boron Concentration in the Reactor Coolant System (PWR)	Rev. 2	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms
15.4.7	Inadvertent Loading and Operation of a Fuel Assembly in an Improper Position	Rev. 2	Mar-07	1, 2	Conforms
15.4.8	Spectrum of Rod Ejection Accidents (PWR)	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
15.4.8.A	Radiological Consequences of a Control Rod Ejection Accident (PWR)	Rev. 1	Jul-81		Not applicable. SRP 15.0.3 is applied.
15.4.9	Spectrum of Rod Drop Accidents (BWR)	Rev. 3	Mar-07		Not applicable

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.4.9.A	Radiological Consequences of Control Rod Drop Accident (BWR)	Rev 2	Jul-81		Not applicable
15.5.1–15.5.2	Inadvertent Operation of ECCS and Chemical and Volume Control System Malfunction that Increases Reactor Coolant Inventory	Rev. 2	Mar-07	1, 2, 3	Conforms
15.6.1	Inadvertent Opening of a PWR Pressurizer Pressure Relief Valve or a BWR Pressure Relief Valve	Rev. 2	Mar-07	1, 2, 3, A, B, C, D	Conforms
15.6.2	Radiological Consequences of the Failure of Small Lines Carrying Primary Coolant Outside Containment	Rev. 2	Jul-81	II.1, II.2	Conforms
15.6.3	Radiological Consequences of Steam Generator Tube Failure (PWR)	Rev. 2	Jul-81		Not applicable. SRP 15.0.3 is applied.
15.6.4	Radiological Consequences of Main Steam Line Failure Outside Containment (BWR)	Rev. 2	Jul-81		Not applicable

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.6.5	Loss-of-Coolant Accidents Resulting From Spectrum of Postulated Piping Breaks Within the Reactor Coolant Pressure Boundary	Rev. 3	Mar-07	II.1A, II.1B, II.1C, II.1D, II.1.E, II.2, II.3	Conforms.
15.6.5.A	Radiological Consequences of a Design Basis Loss-of-Coolant Accident Including Containment Leakage Contribution	Rev 1	Jul-81		Not Applicable. SRP 15.0.3 is applied.
15.6.5.B	Radiological Consequences of a Design Basis Loss-of-Coolant Accident: Leakage From Engineered Safety Feature Components Outside Containment	Rev 1	Jul-81		Not Applicable. SRP 15.0.3 is applied.
15.6.5.D	Radiological Consequences of a Design Basis Loss-of-Coolant Accident: Leakage From Main Steam Isolation Valve Leakage Control System (BWR)	Rev 1	Jul-81		Not Applicable

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.7.3	Postulated Radioactive Releases Due to Liquid-Containing Tank Failures	Rev. 2	Jul-81		Not applicable. BTP 11-6 is applied.
15.7.4	Radiological Consequences of Fuel Handling Accidents	Rev. 1	Jul-81		Not applicable. SRP 15.0.3 is applied.
15.7.5	Spent Fuel Cask Drop Accidents	Rev. 2	Jul-81	II.1, II.2, II.3, II.4, II.5	Conforms. A spent fuel cask drop exceeding 9.2 m (30 ft) is not postulated.
15.8	Anticipated Transients Without Scram	Rev. 2	Mar-07	II.1, II.3	Not applicable
				II.2	Conforms
15.9	Boiling Water Reactor Stability	Initial Issuance	Mar-07		Not applicable
16	Technical Specifications	Rev. 2	Mar-07		Conforms
16.1	Risk-informed Decision Making: Technical Specifications	Rev. 1	Mar-07		Not applicable
17.1	Quality Assurance During the Design and Construction Phases	Rev. 2	Jul-81		Not applicable. RG 1.206 refers the COL applicant to Section 17.5 for the format and content of a QA Program for design and construction of new plants.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
17.2	Quality Assurance During the Operations Phase	Rev. 2	Jul-81		Not applicable. RG 1.206 refers the COL applicant to Section 17.5 for the format and content of a QA Program for design and construction of new plants.
17.3	Quality Assurance Program Description	Rev. 0	Aug-90		Not applicable. RG 1.206 refers the COL applicant to Section 17.5 for the format and content of a QA Program for design and construction of new plants.
17.4	Reliability Assurance Program (RAP)	Initial Issuance	Mar-07	II.B.1, II.B.2, II.B.3, II.B.4, II.B.5, II.B.6, II.B.7, II.B.8, II.B.9	Conforms. Addressed in Sections 17.4 and 17.6.

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Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
17.5	Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants	Initial Issuance	Mar-07	II.A, II.B.1, II.B.2, II.B.3, II.B.4, II.B.5, II.B.6, II.B.7, II.C, II.D, II.E, II.F.1, II.F.2, II.F.3, II.F.4, II.F.5, II.F.6, II.F.7, II.F.9, II.F.12, II.G, II.H, II.I, II.J, II.K, II.L.1, II.L.2, II.L.3, II.L.4, II.L.5, II.L.6, II.L.7, II.M.1, II.M.2, II.M.3, II.M.4, II.M.5, II.N, II.O, II.P, II.Q, II.R.1, II.R.2, II.R.3.a, II.R.3.c, II.R.4, II.R.5, II.R.6, II.R.7, II.R.8, II.R.9, II.R.10, II.R.11, II.R.12, II.S, II.T, II.U.1.a, II.U.1.b, II.U.1.c, II.U.1.d, II.U.2.a, II.U.2.b, II.U.2.c, II.U.2.d, II.U.2.e, II.U.2.f, II.U.2.g, II.U.2.h, II.U.2.i, II.U.2.j, II.U.2.l, II.V	DOM-QA-1: Conforms DOM-QA-1 applies through 6/30/09.
				II.B.8	DOM-QA-1: Alternative language addresses the grace period (previously approved by NRC). DOM-QA-1 applies through 6/30/09.
				II.B.9, II.F.8, II.F.10, II.F.11, II.M.6, II.M.7, II.M.8, II.R.3.b, II.W	DOM-QA-1: Not applicable. DOM-QA-1 is not used during the operational phase.
				II.L.8	DOM-QA-1: Not applicable. This process for qualification of commercial-grade calibration services is not used. DOM-QA-1 applies through 6/30/09.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
17.5 *(continued)*	Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants	Initial Issuance	Mar-07	II.U.1.e	DOM-QA-1: Not a commitment in DOM-QA-1. Included in implementing procedure. DOM-QA-1 applies through 6/30/09.
				II.U.2.k	DOM-QA-1: Not applicable. On-line records not used. DOM-QA-1 applies through 6/30/09.
				II.A, II.B, II.C, II.D., II.E, II.F, II.G, II.H, II.I, II.J, II.K, II.L, II.M, II.N, II.O, II.P, II.Q, II.R, II.S, II.T, II.U, II.V, II.W Option II	Dominion QAPD (DOM-QA-2) (Appendix 17AA): Conforms. DOM-QA-2 applies after 6/30/09.
				II.W Option I	Dominion QAPD: Not applicable for North Anna. Option II chosen
17.6	Maintenance Rule	Initial Issuance	Mar-07	II.1, II.2	Conforms
18	Human Factors Engineering	Rev. 2	Mar-07	II.A	Conforms
				II.B, II.C	Not applicable. These acceptance criteria apply to changes to existing plants.
19.0	Probabilistic Risk Assessment and Severe Accident Evaluation for New Reactors	Rev. 2	Jun-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
				II.8, II.9	Not applicable. Only applies to Westinghouse AP 600 design.

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SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
19.1	Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities	Rev. 2	Jun-07		Not applicable. There are no plans for risk-informed activities.
19.2	Review of Risk Information Used to Support Permanent Plant Specific Changes to the Licensing Basis: General Guidelines	Rev. 0	Jun-07		Not applicable. There are no plans for risk-informed applications.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.1	Net Positive Suction Head for Emergency Core Cooling and Containment Heat Removal System Pumps	Rev. 0	Nov-70	General	Not applicable
1.3	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors	Rev. 2	Jun-74	General	Not applicable
1.4	Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Pressurized Water Reactors	Rev. 2	Jun-74	General	Not applicable. RG 1.183 is used.
1.5	Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors	Rev. 0	Mar-71	General	Not applicable
1.6	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems	Rev. 0	Mar-71	General	Conforms
1.7	Control of Combustible Gas Concentrations in Containment	Rev. 3	Mar-07	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.8	Qualification and Training of Personnel for Nuclear Power Plants	Rev. 3	May-00	C.1	Conforms.
				C.2	Exception. Refer to Technical Specifications, Section 5.3.1
1.9	Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants	Rev. 4	Mar-07	General	Conforms. Refer to DCD Table 1.9.1-1.
1.11	Instrument Lines Penetrating Primary Reactor Containment (Safety Guide 11) Supplement to Safety Guide 11, Backfitting Considerations	Rev. 0	Feb-72	C.1, C.2, E	Conforms
1.12	Nuclear Power Plant Instrumentation for Earthquakes	Rev. 2	Mar-97	C.1, C.4 – C.7	Conforms
				C.3, C.8	Conforms. The seismic monitoring program, including the necessary test and operating procedures, will be implemented prior to receipt of fuel on site.
1.13	Spent Fuel Storage Facility Design Basis	Rev. 2	Mar-07	General	Conforms
1.14	Reactor Coolant Pump Flywheel Integrity	Rev. 1	Aug-75	General	Exception. Refer to Technical Specifications, Section 5.5.7.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.16	Reporting of Operating Information–Appendix A Technical Specifications	Rev. 4	Aug-75	General	Withdrawn. Conforms with the following exceptions: Reporting per C.1.b(2) and C.1.b(3) is no longer required
1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing	Rev. 3	Mar-07	C.1	Conforms.
				C.2	Conforms
				C.3	Conforms
1.21	Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste	Rev. 2	Jun-09	General	Exception. PCP and ODCM follow NEI 07-10A and NEI 07-09A, respectively. These NEI templates reference RG 1.21, Rev. 1.
1.21	Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants	Rev. 1	Jun-74	General	Conforms. Sections 11.4.3.2 (NEI 07-10A) and 11.5.2.9 (NEI 07-09A) provide descriptions of the PCP and ODCM, respectively. Implementation milestones are provided in Section 13.4.
1.22	Periodic Testing of Protection System Actuation Functions	Rev. 0	Feb-72	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.23	Meteorological Monitoring Programs for Nuclear Power Plants	Rev. 1	Mar-07	General	Exception. Conform to Proposed Revision 1 to RG 1.23. See SSAR Section 1.8.2.
1.24	Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Radioactive Gas Storage Tank Failure	Rev. 0	Mar-72	General	Conforms
1.25	Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors	Rev. 0	Mar-72	General	Not applicable. RG 1.183 is used.
1.26	Quality Group Classifications and Standards for Water-, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants	Rev. 4	Mar-07	General	Conforms
1.27	Ultimate Heat Sink for Nuclear Power Plants	Rev. 2	Jan-76	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.28	Quality Assurance Program Requirements (Design and Construction)	Rev. 3	Aug-85	General	Exception: The QAPD identified in Section 17.5 addresses a QA program based on the newer NQA-1-1994, as provided for in SRP 17.5.
1.29	Seismic Design Classification	Rev. 4	Mar-07	General	Conforms
1.30	Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electric Equipment	Rev. 0	Aug-72	General	Exception: The QAPD identified in Section 17.5 addresses a QA program based on a newer NQA-1-1994, as discussed in SRP 17.5.
1.31	Control of Ferrite Content in Stainless Steel Weld Metal	Rev. 3	Apr-78	General	Conforms
1.32	Criteria for Power Systems for Nuclear Power Plants	Rev. 3	Mar-04	General	Conforms.
1.33	Quality Assurance Program Requirements (Operation)	Rev. 2	Feb-78	General	Exception. The QAPD topical report identified in Section 17.5 follows NQA-1 rather than the older standards referenced in RG 1.33.
1.34	Control of Electroslag Weld Properties	Rev. 0	Dec-72	General	Not applicable. Refer to DCD Table 1.9.1-1.
1.35	Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments	Rev. 3	Jul-90	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.35.1	Determining Prestressing Forces for Inspection of Prestressed Concrete Containments	Rev. 0	Jul-90	General	Conforms
1.36	Nonmetallic Thermal Insulation for Austenitic Stainless Steel	Rev. 0	Feb-73	General	Conforms
1.37	Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants	Rev. 1	Mar-07	General	Conforms. Addressed in Section 17.5 (QAPD).
1.38	Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants	Rev. 2	May-77	General	Withdrawn. Exception. Section 17.5 identifies equivalent QA standards.
1.39	Housekeeping Requirements for Water-Cooled Nuclear Power Plants	Rev. 2	Sep-77	General	Exception. Section 17.5 identifies equivalent QA standards.
1.40	Qualification of Continuous-Duty Safety-Related Motors for Nuclear Power Plants	Rev. 1	Feb-10	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.41	Preoperational Testing of Redundant On-Site Electric Power Systems to Verify Proper Load Group Assignments	Rev. 0	Mar-73	General	Conforms
1.43	Control of Stainless Steel Weld Cladding of Low-Alloy Steel Components	Rev. 0	May-73	General	Conforms
1.44	Control of the Use of Sensitized Stainless Steel	Rev. 0	May-73	General	Conforms
1.45	Guidance on Monitoring and Responding to Reactor Coolant System Leakage	Rev. 1	May-08	General	Conforms
1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems	Rev. 0	May-73	General	Conforms
1.50	Control of Preheat Temperature for Welding of Low-Alloy Steel	Rev. 0	May-73	General	Conforms
1.52	Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants	Rev. 3	Jun-01	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.53	Application of the Single-Failure Criterion to Safety Systems	Rev. 2	Nov-03	General	Conforms
1.54	Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants	Rev. 1	Jul-00	General	Conformance with exceptions. Industry standard revision levels may differ from RG 1.54 as specifically identified in DCD Sections 6.1.2, 6.2.2.3, 11.2, and 11.4.
1.56	Maintenance of Water Purity in Boiling Water Reactors	Rev. 1	Jul-78	General	Not applicable
1.57	Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components	Rev. 1	Mar-07	General	Not applicable
1.59	Design Basis Floods for Nuclear Power Plants (Errata Published 7/30/80)	Rev. 2	Aug-77	General	Conforms
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	Rev. 1	Dec-73	General	Conforms
1.61	Damping Values for Seismic Design of Nuclear Power Plants	Rev. 1	Mar-07	General	Conforms
1.62	Manual Initiation of Protective Actions	Rev. 0	Oct-73	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.63	Electric Penetration Assemblies in Containment Structures for Nuclear Power Plants	Rev. 3	Feb-87	General	Conforms
1.65	Materials and Inspections for Reactor Vessel Closure Studs	Rev. 0	Oct-73	General	Conforms
1.68	Initial Test Programs for Water-Cooled Nuclear Power Plants	Rev. 3	Mar-07	General	Conforms with the following exception: Equipment listed in Appendix A, Items 1.k(2) and 1.k(3) not included in the initial test program.
1.68.1	Preoperational and Initial Startup Testing of Feedwater and Condensate Systems for Boiling Water Reactor Power Plants	Rev. 1	Jan-77	General	Not applicable
1.68.2	Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants	Rev. 1	Jul-78	General	Conforms
1.68.3	Preoperational Testing of Instrument and Control Air Systems	Rev. 0	Apr-82	General	Conforms
1.69	Concrete Radiation Shields and Generic Shield Testing for Nuclear Power Plants	Rev. 1	May-09	General	Exception. Rev. 0 of RG 1.69 is used.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.69	Concrete Radiation Shields for Nuclear Power Plants	Rev. 0	Dec-73	General	Conforms
1.70	Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants LWR Edition	Rev. 3	Nov-78	—	Not applicable. RG 1.206 is used.
1.71	Welder Qualification for Areas of Limited Accessibility	Rev. 1	Mar-07	General	Conforms
1.72	Spray Pond Piping Made from Fiberglass-Reinforced Thermosetting Resin	Rev. 2	Nov-78	General	Not applicable
1.73	Qualification Tests of Electric Valve Operators Installed Inside the Containment of Nuclear Power Plants	Rev. 0	Jan-74	General	Conforms
1.75	Criteria for Independence of Electrical Safety Systems	Rev. 3	Feb-05	General	Conforms
1.76	Design Basis Tornado and Tornado Missiles for Nuclear Power Plants	Rev. 1	Mar-07	General	Conforms
1.77	Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors	Rev. 0	May-74	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.78	Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release	Rev. 1	Dec-01	General	Conforms
1.79	Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors	Rev. 1	Sep-75	General	Conforms
1.81	Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants	Rev. 1	Jan-75	General	Not applicable
1.82	Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident	Rev. 3	Nov-03	General	Conforms
1.83	Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes				Withdrawn
1.84	Design, Fabrication, and Materials Code Case Acceptability, ASME Section III	Rev. 34	Oct-07	General	Conforms
1.86	Termination of Operating Licenses for Nuclear Reactors	Rev. 0	Jun-74	General	This RG is outside the scope of the FSAR.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.87	Guidance for Construction of Class 1 Components in Elevated-Temperature Reactors (Supplement to ASME Section III Code Cases 1592, 1593, 1594, 1595, and 1596)	Rev. 1	Jun-75	General	Not applicable
1.89	Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants	Rev. 1	Jun-84	General	Conforms. Source terms from RG 1.183 used.
1.90	Inservice Inspection of Prestressed Concrete Containment Structures with Grouted Tendons	Rev. 1	Aug-77	General	Not applicable
1.91	Evaluations of Explosions Postulated to Occur on Transportation Routes Near Nuclear Power Plants	Rev. 1	Feb-78	General	Conforms
1.92	Combining Modal Responses and Spatial Components in Seismic Response Analysis	Rev. 2	Jul-06	General	Conforms
1.93	Availability of Electric Power Sources	Rev. 0	Dec-74	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.94	Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants	Rev. 1	Apr-76	General	Withdrawn. Exception. Section 17.5 identifies equivalent QA standards in NQA-1, Subpart 2.5.
1.96	Design of Main Steam Isolation Valve Leakage Control Systems for Boiling Water Reactor Nuclear Power Plants	Rev. 1	Jun-76	General	Not applicable
1.97	Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants	Rev. 4	Jun-06	General	Conforms
1.98	Assumptions Used for Evaluating the Potential Radiological Consequences of a Radioactive Offgas System Failure in a Boiling Water Reactor	Rev. 0	Mar-76	General	Not applicable
1.99	Radiation Embrittlement of Reactor Vessel Materials	Rev. 2	May-88	General	Conforms. Operational program implementation is described in Section 13.4.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.100	Seismic Qualification of Electrical and Active Mechanical Equipment and Functional Qualification of Active Mechanical Equipment for Nuclear Power Plants	Rev. 3	Sep-09	General	Conforms. Addressed in DCD Sections 3.9 and 3.10.
1.100	Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants	Rev. 2	Jun-88	General	Conforms. Described in DCD Section 8.3.
1.101	Emergency Response Planning and Preparedness for Nuclear Power Reactors	Rev. 5	Jun-05	General	Not applicable.
1.101	Emergency Planning and Preparedness for Nuclear Power Reactors	Rev. 4	Jul-03	General	Conforms. EALs for digital control systems are based on NEI 07-01.
1.102	Flood Protection for Nuclear Power Plants	Rev. 1	Sep-76	General	Conforms
1.105	Setpoints For Safety-Related Instrumentation	Rev. 3	Dec-99	General	Conforms
1.106	Thermal Overload Protection for Electric Motors on Motor-Operated Valves	Rev. 1	Mar-77	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.107	Qualifications for Cement Grouting for Prestressing Tendons in Containment Structures	Rev. 1	Feb-77	General	Not applicable
1.109	Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I	Rev. 1	Oct-77	General	Conforms
1.110	Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors	Rev. 0	Mar-76	General	Conforms
1.111	Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors	Rev. 1	Jul-77	General	Conforms
1.112	Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Nuclear Power Reactors	Rev. 1	Mar-07	General	Conforms

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	RG Number	Title	Revision	Date	RG Position	Evaluation
	1.113	Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I	Rev. 1	Apr-77	General	Conforms
	1.114	Guidance to Operators at the Controls and to Senior Operators in the Control Room of a Nuclear Power Unit	Rev. 3	Oct-08	General	Conforms
NAPS DEP 3.5(1)	1.115	Protection Against Low-Trajectory Turbine Missiles	Rev. 1	Jul-77	General	Conforms with the following exception. RG Position C2: All essential systems or structures are not located outside the low trajectory missile strike zone associated with the Unit 3 T/G.
	1.116	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems	Rev. 0	May-77	General	Withdrawn. Exception: Section 17.5 identifies equivalent QA standards in NQA-1, Subpart 2.8.
	1.117	Tornado Design Classification	Rev. 1	Apr-78	General	Conforms
	1.118	Periodic Testing of Electric Power and Protection Systems	Rev. 3	Apr-95	General	Conforms
	1.121	Bases for Plugging Degraded PWR Steam Generator Tubes	Rev. 0	Aug-76	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.122	Development of Floor Design Response Spectra for Seismic Design of Floor-Supported Equipment or Components	Rev. 1	Feb-78	General	Conforms
1.124	Service Limits and Loading Combinations for Class 1 Linear-Type Supports	Rev. 2	Feb-07	General	Conforms
1.125	Physical Models for Design and Operation of Hydraulic Structures and Systems for Nuclear Power Plants	Rev. 2	Mar-09	General	Not applicable. Physical models not applied to site-specific design.
		Rev. 1	Oct-78	General	Conforms
1.126	An Acceptable Model and Related Statistical Methods for the Analysis of Fuel Densification	Rev. 1	Mar-78	General	Conforms
1.127	Inspection of Water-Control Structures Associated with Nuclear Power Plants	Rev. 1	Mar-78	General	Conforms
1.128	Installation Design and Installation of Vented Lead-Acid Storage Batteries for Nuclear Power Plants	Rev. 2	Feb-07	General	Conforms.
1.129	Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants	Rev. 2	Feb-07	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.130	Service Limits and Loading Combinations for Class 1 Plate-and-Shell-Type Supports	Rev. 2	Mar-07	General	Conforms
1.131	Qualification Tests of Electric Cables, Field Splices, and Connections for Light-Water-Cooled Nuclear Power Plants				Withdrawn.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.132	Site Investigations for Foundations of Nuclear Power Plants	Rev. 2	Oct-03	C.1, C.2, C.3, C.4.1 – C.4.2, C.4.4, C.4.5, C.5 – C.7	Conforms
				C.4.3	Conforms with the following exceptions: The RG identifies that at least one continuously sampled boring should be used for each safety-related structure. For the Unit 3 investigation, the rock was continuously cored. Because all of the soil above the rock will be removed under major structures, continuous sampling was not performed in the soil. (Continuous sampling to 15 ft depth, and the CPTs in soil provides a continuous record.) The RG identifies that boreholes with depths greater than about 100 ft should be surveyed for deviation. *(continued)*

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.132 *(cont'd)*	Site Investigations for Foundations of Nuclear Power Plan	Rev. 2	Oct-03	C.4.3 *(cont'd)*	*(continued)* Deviation surveys were made in the five deepest boreholes in conjunction with the down-hole geophysical testing, but not in all holes deeper than 100 ft depth, since such deviation surveys serve no useful purpose. The RG identifies that color photographs of all cores should be taken soon after removal from the borehole to document the condition of the soils at the time of drilling. Color photos were taken of the rock cores but not the soil samples. The undisturbed soil samples are sealed in steel tubes. The disturbed soil samples have lost their structure and thus a photo serves little useful purpose.
1.133	Loose-Part Detection Program for the Primary System of Light-Water-Cooled Reactors	Rev. 1	May-81	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.134	Medical Evaluation of Licensed Personnel for Nuclear Power Plants	Rev. 3	Mar-98	General	Conforms. Although RG 1.134 is not specifically identified in the FSAR, equivalent requirements for medical evaluations for licensed personnel are embedded in policies and procedures of operations and training departments.
1.135	Normal Water Level and Discharge at Nuclear Power Plants				Withdrawn
1.136	Design Limits, Loading Combinations, Materials, Construction, and Testing of Concrete Containments	Rev. 3	Mar-07	General	Conforms
1.137	Fuel-Oil Systems for Standby Diesel Generators	Rev. 1	Oct-79	General	Conforms. Refer to DCD Table 1.9.1-1.
1.138	Laboratory Investigations of Soils and Rocks for Engineering Analysis and Design of Nuclear Power Plants	Rev. 2	Dec-03	General	Conforms
1.139	Guidance for Residual Heat Removal				Withdrawn.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.140	Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Normal Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants	Rev. 2	Jun-01	General	Conforms
1.141	Containment Isolation Provisions for Fluid Systems	Rev. 0	Apr-78	General	Conforms
1.142	Safety-Related Concrete Structures for Nuclear Power Plants (Other Than Reactor Vessels and Containments)	Rev. 2	Nov-01	General	Conforms
1.143	Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants	Rev. 2	Nov-01	General	Conforms. Operational program implementation is described in Section 13.4.
1.145	Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants	Rev. 1	Nov-82	General	Conforms
1.147	Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1	Rev. 15	Oct-07	General	Conforms. Operational program implementation is described in Section 13.4.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.148	Functional Specification for Active Valve Assemblies in Systems Important to Safety in Nuclear Power Plants				Withdrawn
1.149	Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations	Rev. 3	Oct-01	General	Conforms. Partial scope simulators are allowed for the initial licensed operator classes per NEI 06-13A.
1.150	Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations				Withdrawn
1.151	Instrument Sensing Lines	Rev. 0	Jul-83	General	Conforms
1.152	Criteria for Use of Computers in Safety Systems of Nuclear Power Plants	Rev. 2	Jan-06	General	Conforms
1.153	Criteria for Safety Systems	Rev. 1	Jun-96	General	Conforms
1.154	Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors	Rev. 0	Jan-87	General	Not applicable
1.155	Station Blackout	Rev. 0	Aug-88	General	Conforms
1.156	Environmental Qualification of Connection Assemblies for Nuclear Power Plants	Rev. 0	Nov-87	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.157	Best-Estimate Calculations of Emergency Core Cooling System Performance	Rev. 0	May-89	General	Conforms
1.158	Qualification of Safety-Related Lead Storage Batteries for Nuclear Power Plants	Rev. 0	Feb-89	General	Conforms
1.159	Assuring the Availability of Funds for Decommissioning Nuclear Reactors	Rev. 1	Oct-03	General	Conforms. The amount of funds for decommissioning and the method of financial assurance is described in COLA Part 1.
1.160	Monitoring the Effectiveness of Maintenance at Nuclear Power Plants	Rev. 2	Mar-97	General	Conforms. Operational program implementation is described in Section 13.4.
1.161	Evaluation of Reactor Pressure Vessels with Charpy Upper-Shelf Energy Less Than 50 Ft-Lb.	Rev. 0	Jun-95	General	Not applicable. The expected USE will be greater than 50 ft-lb throughout the RPV life.
1.162	Format and Content of Report for Thermal Annealing of Reactor Pressure Vessels	Rev. 0	Feb-96	General	This RG is outside the scope of the FSAR.
1.163	Performance-Based Containment Leak-Test Program	Rev. 0	Sep-95	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

	RG Number	Title	Revision	Date	RG Position	Evaluation
NAPS DEP 3.7(5)	1.165	Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion	Rev. 0	Mar-97	General	Conforms. See also SSAR Section 1.8.2. NRC withdrew RG 1.165 in April of 2010. However, RG 1.165 is the licensing basis of the North Anna Unit 3 Early Site Permit (ESP) with respect to the establishment of the Probabilistic Seismic Hazards Analysis which forms the technical bases for the development of the GMRS for the site and FIRS for Unit 3 Seismic Category I structures.
	1.166	Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Postearthquake Actions	Rev. 0	Mar-97	General	Conforms. The seismic monitoring program, including the necessary test and operating procedures, will be implemented prior to receipt of fuel on site.
	1.167	Restart of a Nuclear Power Plant Shut Down by a Seismic Event	Rev. 0	Mar-97	General	Conforms
	1.168	Verification, Validation, Reviews, and Audits for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	Rev. 1	Feb-04	General	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.169	Configuration Management Plans for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	Rev. 0	Sep-87	General	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.
1.170	Software Test Documentation for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	Rev. 0	Sep-97	General	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.
1.171	Software Unit Testing for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	Rev. 0	Sep-97	General	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.
1.172	Software Requirements Specifications for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	Rev. 0	Sep-97	General	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.
1.173	Developing Software Life Cycle Processes for Digital Computer Software Used in Safety Systems of Nuclear Power Plants	Rev. 0	Sep-97	General	Conforms. Procedures addressed in Section 13.5. ITAAC addressed in COLA Part 10.
1.174	An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis	Rev. 1	Nov-02	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.175	An Approach for Plant-Specific, Risk-Informed Decisionmaking: Inservice Testing	Rev. 0	Aug-98	General	Not applicable. Risk informed inservice testing is not being used.
1.176	An Approach for Plant-Specific, Risk-Informed Decisionmaking: Graded Quality Assurance				Withdrawn
1.177	An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications	Rev. 0	Aug-98	General	Not applicable. Risk informed Technical Specifications are not being used.
1.178	An Approach For Plant-Specific Risk-informed Decisionmaking for Inservice Inspection of Piping	Rev. 1	Sep-03	General	Not applicable. Risk informed inservice inspection is not being used.
1.179	Standard Format and Content of License Termination Plans for Nuclear Power Reactors	Rev. 0	Jan-99	General	This RG is outside the scope of the FSAR.
1.180	Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems	Rev. 1	Oct-03	General	Conforms
1.181	Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e)	Rev. 0	Sep-99	General	Conforms

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.182	Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants	Rev. 0	May-00	General	Conforms
1.183	Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors	Rev. 0	Jul-00	General	Conforms
1.184	Decommissioning of Nuclear Power Reactors	Rev. 0	Jul-00	General	Not applicable. The RG provides guidance on how to conduct decommissioning activities.
1.185	Standard Format and Content for Post-Shutdown Decommissioning Activities Report	Rev. 0	Jul-00	General	This RG is outside the scope of the FSAR.
1.186	Guidance and Examples for Identifying 10 CFR 50.2 Design Bases	Rev. 0	Oct-00	General	This RG is outside the scope of the FSAR.
1.187	Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments	Rev. 0	Nov-00	General	Conforms.
1.188	Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses	Rev. 1	Sep-05	General	This RG is outside the scope of the FSAR.

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RG Number	Title	Revision	Date	RG Position	Evaluation
1.189	Fire Protection for Nuclear Power Plants	Rev. 2	Oct-09	General	Exception. Rev. 1 of RG 1.189 is used.
		Rev. 1	Mar-07	General	Evaluation is provided in Table 9.5.1-1R.
1.190	Calculational and Dosimetry Methods for Determining Pressure Vessel Neutron Fluence	Rev. 0	Mar-01	General	Conforms. The reactor vessel material surveillance program is described in Section 5.3.1.6. Implementation of the program is described in Section 13.4.
1.191	Fire Protection Program for Nuclear Power Plants During Decommissioning and Permanent Shutdown	Rev. 0	May-01	General	This RG is outside the scope of the FSAR.
1.192	Operation and Maintenance Code Case Acceptability, ASME OM Code	Rev. 0	Jun-03	General	Conforms. Operational program implementation is described in Section 13.4.
1.193	ASME Code Cases Not Approved for Use	Rev. 2	Oct-07	General	Conforms
1.194	Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants	Rev. 0	Jun-03	General	Conforms

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.195	Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors	Rev. 0	May-03	General	Not applicable. RG 1.183 is used.
1.196	Control Room Habitability at Light-Water Nuclear Power Reactors	Rev. 1	Jan-07	General	Conforms
1.197	Demonstrating Control Room Envelope Integrity at Nuclear Power Plant Reactors	Rev. 0	May-03	General	Conforms
1.198	Procedures and Criteria for Assessing Seismic Soil Liquefaction At Nuclear Power Plant Sites	Rev. 0	Nov-03	General	Conforms
1.199	Anchoring Components and Structural Supports in Concrete	Rev. 0	Nov-03	General	Conforms
1.200	An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities	Rev. 2	Mar-09	General	Conforms. Risk-informed operational programs are not used.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.201	Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to Their Safety Significance	Rev. 1	May-06	General	Conforms. Refer to DCD Table 1.9.1-1.
1.202	Standard Format and Content of Decommissioning Cost Estimates for Nuclear Power Reactors	Rev. 0	Feb-05	General	Not applicable. The RG provides guidance for submitting decommissioning cost estimates to NRC prior to license termination.
1.203	Transient and Accident Analysis Methods	Rev. 0	Dec-05	General	Not applicable. Refer to DCD Table 1.9.1-1.
1.204	Guidelines for Lightning Protection of Nuclear Power Plants	Rev. 0	Nov-05	General	Conforms, with the following exception to regulatory position 1: NAPS switchyard is not designed in accordance with IEEE Std C62.23. Switchyard lightning protection is described in Section 8.2.1.2.1.
1.205	Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants	Rev. 1	Dec-09	General	Not applicable. Risk-informed, performance-based fire protection is not used.
1.206	Combined License Applications for Nuclear Power Plants (LWR Edition)	Rev. 0	Jun-07	General	Conforms with exceptions. See exception to RG 1.8, RG 1.33 and SRP 13.1.1.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.207	Guidelines for Evaluating Fatigue Analyses Incorporating the Life Reduction of Metal Components Due to the Effects of the Light-Water Reactor Environment for New Reactors	Rev. 0	Mar-07	General	Conforms
1.208	A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion	Rev. 0	Mar-07	C.1 C.2.1 C.2.3 C.3 C.3.1 C.3.2 C.3.3 C.4 C.4.1 C.4.2 C.5.2 C.5.3 C.5.4	Conforms. RG 1.165, NUREG/CR-6728, and DC/COL-ISG-1 are mainly used instead of RG 1.208 to define the GMRS and develop the FIRS. See Sections 2.5.2 and 3.7, and SSAR Section 2.5.2.
				C.2.2 C.3.4 C.3.5 C.4.3 C.5.1	Not Applicable
1.209	Guidelines for Environmental Qualification of Safety-Related Computer-Based Instrumentation and Control Systems in Nuclear Power Plants	Rev. 0	Mar-07	General	Conforms. Operational program implementation is described in Section 13.4.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.210	Qualification of Safety-Related Battery Chargers and Inverters for Nuclear Power Plants	Rev. 0	Jun-08	General	Exception. See DCD Section 8.1.
1.211	Qualification of Safety-Related Cables and Field Splices for Nuclear Power Plants	Rev. 0	Apr-09	General	Conforms. See DCD Section 3.11.2.1.
1.212	Sizing of Large Lead-Acid Storage Batteries	Rev. 0	Nov-08	General	Exception. See DCD Section 8.1.
1.213	Qualification of Safety-Related Motor Control Centers for Nuclear Power Plants	Rev. 0	May-09	General	Exception. See DCD Section 8.1.
1.215	Guidance for ITAAC Closure Under 10 CFR Part 52	Rev. 0	Oct-09	General	Conforms
4.7	General Site Suitability Criteria for Nuclear Power Stations	Rev. 2	Apr-98	General	Conforms. See Section 2.1.3 and SSAR Section 1.8.2.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
4.15	Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination) – Effluent Streams and the Environment	Rev. 2	Jul-07	General	Exception. Rev. 1 of RG 4.15 is used.
		Rev. 1	Feb-79	General	Conforms. Section 11.5.2.9 (NEI 07-09A) provides a description of the ODCM. The implementation milestone is provided in Section 13.4. Justification for referring to RG 4.15 Rev 1 instead of Rev 2: Dominion will extend the existing North Anna Units 1 and 2 program for QA of radiological effluent and environmental monitoring, that is based on RG 4.15, Revision 1, to apply to North Anna Unit 3. RG 4.15, Revision 1 is a proven methodology for QA of radiological effluent and environmental monitoring programs that is acceptable to the NRC staff as a method for demonstrating compliance with applicable requirements of (continued)

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
4.15 *(cont'd)*	Quality Assurance for Radiological Monitoring Programs (Inception Through Normal Operations to License Termination) – Effluent Streams and the Environment				10 CFR Parts 20, 50, 52, 61, and 72. Use of Revision 2 of RG 4.15 would necessitate conducting two separate programs involving the use of common staff, facilities, and equipment, which would create an undue burden and may lead to increased probability for human error. Therefore, Dominion commits to use RG 4.15, Revision 1 methodology for North Anna Unit 3 for optimal consistency, efficiency, and practicality.
4.21	Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning	Initial Issuance	Jun-08	General	Conforms
8.1	Radiation Symbol				Withdrawn
8.2	Guide for Administrative Practices in Radiation Monitoring	Rev. 0	Feb-73	General	Conforms. Operational program implementation is described in Section 13.4.
8.4	Direct-Reading and Indirect-Reading Pocket Dosimeters	Rev. 0	Feb-73	General	Conforms. Operational program implementation is described in Section 13.4.
8.5	Criticality and Other Interior Evacuation Signals				Withdrawn.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
8.6	Standard Test Procedure for Geiger-Muller Counters				Withdrawn.
8.7	Instructions for Recording and Reporting Occupational Radiation Dose Data	Rev. 2	Nov-05	General	Conforms. Operational program implementation is described in Section 13.4.
8.8	Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable	Rev. 3	Jun-78	General	Conforms. Operational program implementation is described in Section 13.4.
8.9	Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program	Rev. 1	Jul-93	General	Conforms. Operational program implementation is described in Section 13.4.
8.10	Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable	Rev. 1-R	May-77	General	Conforms. Operational program implementation is described in Section 13.4.
8.11	Applications of Bioassay for Uranium	Rev. 0	Jun-74	General	Not applicable. RG 8.11 has been superseded by RG 8.9, Rev 1.
8.13	Instruction Concerning Prenatal Radiation Exposure	Rev. 3	Jun-99	General	Conforms. Operational program implementation is described in Section 13.4.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
8.15	Acceptable Programs for Respiratory Protection	Rev. 1	Oct-99	General	Conforms. Operational program implementation is described in Section 13.4.
8.19	Occupational Radiation Dose Assessment in Light-Water Reactor Power Plants – Design Stage Man-Rem Estimates	Rev. 1	Jun-79	General	Conforms
8.20	Applications of Bioassay for I-125 and I-131	Rev. 1	Sep-79	General	Not applicable. Per NUREG-1736, RG 8.20 is outdated. RG 8.9 is used.
8.25	Air Sampling in the Workplace	Rev. 1	Jun-92	General	Conforms
8.26	Applications of Bioassay for Fission and Activation Products	Rev. 0	Sep-80	General	Not applicable. Per NUREG-1736, RG 8.26 is outdated. RG 8.9 is used.
8.27	Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants	Rev. 0	Mar-81	General	Conforms. Operational program implementation is described in Section 13.4.
8.28	Audible-Alarm Dosimeters	Rev. 0	Jul-81	General	Conforms. Operational program implementation is described in Section 13.4.
8.29	Instruction Concerning Risks from Occupational Radiation Exposure	Rev. 1	Feb-96	General	Conforms. Operational program implementation is described in Section 13.4.
8.32	Criteria for Establishing a Tritium Bioassay Program	Rev. 0	Jul-88	General	Not applicable. Per NUREG-1736, RG 8.32 is outdated. RG 8.9 is used.

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Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
8.33	Quality Management Program	Rev. 0	Oct-91	General	Not applicable to nuclear power plants. RG 8.33 applies to nuclear medicine.
8.34	Monitoring Criteria and Methods To Calculate Occupational Radiation Doses	Rev. 0	Jul-92	General	Conforms. Operational program implementation is described in Section 13.4.
8.35	Planned Special Exposures	Rev. 0	Jun-92	General	Conforms. Operational program implementation is described in Section 13.4.
8.36	Radiation Dose to the Embryo/Fetus	Rev. 0	Jul-92	General	Conforms. Operational program implementation is described in Section 13.4.
8.38	Control of Access to High and Very High Radiation Areas of Nuclear Plants	Rev. 1	May-06	General	Conforms. Operational program implementation is described in Section 13.4.

Table 1.9-203 [Deleted]

Table 1.9-204 [Deleted]

Table 1.9-205 [Deleted]

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Table 1.9-206 Location of Descriptions for Additional TMI-Related Requirements in the FSAR

50.34(f) Item	Action Plan Item	Requirement	Location in FSAR
(2)(i)	I.A.4.2	Provide a simulator capability that correctly models the control room and includes the capability to simulate small break loss-of-coolant accidents (LOCAs). (Applicable to construction permit applicants only)	13.2
(2)(ii)	I.C.9	Establish a program, to begin during construction and follow into operation, for integrating and expanding current efforts to improve plant procedures. The scope of the program shall include emergency procedures, reliability analyses, human factors engineering, crisis management, operator training, and coordination with [the Institute of Nuclear Power Operations (INPO)] and other industry efforts. (Applicable to construction permit applicants only)	13.5.2
(2)(xxv)	III.A.1.2	Provide an onsite Technical Support Center, an onsite Operational Support Center, and, for construction permit applications only, a near-site Emergency Operations Facility.	7.5.1.6.2 9.5.2 13.3
(3)(i)	I.C.5	Provide administrative procedures for evaluating operating, design, and construction experience and for ensuring that applicable important industry experiences will be provided in a timely manner to those designing and constructing the plant.	13.1 13.2 13.5.1
(3)(vii)	II.J.3.1	Provide a description of the management plan for design and construction activities, to include: (A) the organizational and management structure singularly responsible for direction of design and construction of the proposed plant; (B) technical resources director by the applicant; (C) details of the interaction of design and construction within the applicant's organization and the manner by which the applicant will ensure close integration of the architect engineer and the nuclear steam supply vendor; (D) proposed procedures for handling the transition to operation; (E) the degree of top-level management oversight and technical control to be exercised by the applicant during design and construction, including the preparation and implementation of procedures necessary to guide the effort.	1.4 13.1 13.5 17.5

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Table 1.9-207 Evaluations of NRC Generic Communications Issued Since March 2007 Revision of NUREG-0800

Document	Excerpts from Document	Comment	FSAR References
NRC Bulletin 2007-01: Security Officer Attentiveness December 12, 2007	Requested Action: 1. How do you identify, report, and document human performance issues involving inattentiveness, especially complicity among licensee security personnel including security contractors and subcontractors. 2. How do you ensure that all employees and contractors report security concerns and any perceived security conditions that reduce the safety or security of a licensee facility? How do you ensure that staff is aware that there is no retaliation for self-reporting of inattentiveness or complicity or for reporting others? 3. How do you ensure that managers and supervisors provide oversight of BOP adherence to ensure there is no complicity to circumvent the program or failure to report wrongdoing or careless disregard of the regulations? 4. What are the results of any self-assessments performed within the last 2 years associated with the items above? Specifically, what do you do to assess the effectiveness of your employee access authorization program? 5. How do you assess the effectiveness of your oversight of contractors and subcontractors?	This Bulletin is addressed to operating license holders and as such is not immediately applicable to the proposed Unit 3. Unit 3, however, does address the issue of security officer attentiveness in the Security Plan and related security training plans.	Not applicable for FSAR, but related material is found in the Security Plan and related security training plans.
NRC Generic Letter 2008-01: Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems January 11, 2008	See DCD Table 6.3-4		

NAPS SUP 1.10(1)

1.10 Hazards Posed by Construction to Operating Units

1.10.1 Introduction

Paragraph 10 CFR 52.79(a)(31) requires that the FSAR include the following information:

> For nuclear power plants to be operated on multi-unit sites, an evaluation of the potential hazards to the structures, systems, and components important to safety of operating units resulting from construction activities, as well as a description of the managerial and administrative controls to be used to provide assurance that the limiting conditions for operation are not exceeded as a result of construction activities at the multi-unit sites.

Accordingly, the evaluation of the potential impact of the construction of Unit 3 on Units 1 and 2 structures, systems, and components (SSCs) important to safety is summarized below, along with a description of the managerial and administrative controls used to provide assurance that Units 1 and 2 limiting conditions for operation (LCOs) are not exceeded as a result of Unit 3 construction activities. This evaluation involves several sequential steps:

- Identification of potential construction activity hazards
- Identification of SSCs important to safety
- Identification of LCOs
- Identification of impacted SSCs and LCOs
- Identification of applicable managerial and administrative controls

1.10.2 Potential Construction Activity Hazards

Unit 3 is located on the existing North Anna Power Station (NAPS) site on a parcel of land adjacent to and generally west of the two operating units, Units 1 and 2, as shown in Figure 2.1-201.

Based on experience from similar projects, the scope of work necessary to construct Unit 3 is well understood. In general, it includes, but is not necessarily limited to, activities such as site exploration, grading, clearing and installation of drainage and erosion control measures; boring, drilling, dredging, demolition and excavating; storage and warehousing of equipment; and construction, erection and fabrication of new facilities. These activities involve major standard plant and site-specific structures such as the R/B, Turbine Building, Power Source Buildings (PS/Bs), PSFSVs, ESWPT, Auxiliary Building, Access Building, IRSF, and Ultimate Heat Sink Related Structures; as well as related support facilities such as transformers, switchyard(s), transmission lines, cooling water structures and systems, water treatment facilities, storage tanks, etc.

The applicable time period for such activities starts when work is first performed under the COL for Unit 3 and ends for each Unit 3 SSC when responsibility for that SSC is transferred to the accountable operating organization.

Each of the types of construction activities necessary to build a new unit was examined to identify the potential hazards to the existing units. The resulting list of construction activities and potential hazards is shown in Table 1.10-201.

1.10.3 Structures, Systems and Components Important to Safety

Consistent with 10 CFR 50.34 and 10 CFR 50, Appendix A, Units 1 and 2 SSCs important to safety were identified in Chapter 3 of the NAPS Updated Final Safety Analysis Report (UFSAR) (Reference 1.10-201); additionally, information in Chapters 4, 5, 6, 7, 8 and 9 of the NAPS UFSAR was utilized.

1.10.4 Limiting Conditions for Operation

Pursuant to 10 CFR 50.36, LCOs are the lowest functional capability or performance levels of equipment required for safe operation of a facility and are established in operating unit technical specifications for each item meeting one or more of the following criteria:

- Criterion 1 – Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary (RCPB).
- Criterion 2 – A process variable, design feature, or operating restriction that is an initial condition of a design basis accident (DBA) or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.
- Criterion 3 – A SSC that is part of the primary success path and which functions or actuates to mitigate a DBA or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

- Criterion 4 – A SSC which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

The applicable LCOs are found in the Units 1 and 2 Technical Specifications (Reference 1.10-202).

1.10.5 Impacted Structures, Systems and Components and Limiting Conditions for Operation

The information described in Sections 1.10.2–1.10.4 was evaluated to identify Units 1 and 2 SSCs and LCOs that might be impacted by Unit 3 construction activities. For example, internal/in-plant Units 1 and 2 LCO parameters such as “Shutdown Bank Insertion Limits,” “RCS Minimum Temperature for Criticality” and “Secondary Specific Activity” were eliminated by examination. Similarly, SSCs both internal and specific to Units 1 and 2 are not affected. These include items such as the accumulators, fuel storage racks and rod cluster control assemblies.

For each of the potential hazards listed in Table 1.10-201, Table 1.10-202 presents the potential consequences to the SSCs of the existing units that were identified in the above process.

1.10.6 Managerial and Administrative Controls

Managerial and administrative controls are utilized to identify preventive and mitigative measures and provide notification of hazardous activity initiation in order to prevent or minimize exposure of SSCs to the identified hazards. Applicable managerial and administrative controls are listed in Table 1.10-203.

Specific hazards, impacted SSCs, and managerial and administrative controls will be developed and implemented as work progresses on site. For example, prior to construction activities that involve the use of large construction equipment such as cranes, managerial and administrative controls will be in place to prevent adverse impacts on Units 1 and 2 overhead power lines, switchyard, security boundary, etc., by providing the necessary restrictions on the use of large construction equipment.

NAPS ESP COL 2.4-1 The layout of the Unit 3 CWS intake and discharge piping and the construction techniques to be used for this piping will be provided to the NRC for review at least 60 days before the commencement of construction activities for this piping.

1.10.7 References

1.10-201 North Anna Power Station, Units 1 and 2, Updated Final Safety Analysis Report, Revision 38.

1.10-202 North Anna Power Station, Units 1 and 2, Technical Specifications.

NAPS SUP 1.10(1)

Table 1.10-201 Potential Hazards to Units 1 and 2 from Unit 3 Construction Activities

Construction Activity	Potential Hazards
Site Exploration, Grading, Clearing, Installation of Drainage and Erosion Control Measures, etc.	Impact on Overhead Power Lines
	Impact on Transmission Towers
	Impact on Underground Conduits, Piping, Tunnels, etc.
	Impact on Site Access and Egress
	Impact on Drainage Facilities and Structures
	Impact on Onsite Transportation Routes
	Impact on Slope Stability
	Impact of Increased Soil Erosion and Local Flooding
	Impact of Construction-Generated Dust and Equipment Exhausts
	Impact of Encroachment on Plant Protected or Vital Areas
	Impact of Encroachment on Structures and Facilities
Boring, Drilling, Pile Driving, Dredging, Demolition, Excavation, etc.	Impact on Underground Conduits, Piping, Tunnels, etc.
	Impact on Foundation Integrity
	Impact on Structural Integrity
	Impact on Slope Stability
	Impact of Ground Vibration
	Impact of Overpressure from Use of Explosives
Equipment Movement, Material Delivery, Vehicle Traffic. etc.	Impact on Overhead Power Lines
	Impact on Transmission Towers
	Impact on Underground Conduits, Piping, Tunnels, etc.
	Impact of Crane Load Drops
	Impact of Crane or Crane Boom Failures
	Impact of Vehicle Accidents
	Impact of Vehicle Runaways

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Table 1.10-201 Potential Hazards to Units 1 and 2 from Unit 3 Construction Activities

Construction Activity	Potential Hazards
Equipment And Material Laydown, Storage, Warehousing, etc.	Impact of Releases of Stored Flammable, Hazardous or Toxic Materials
	Impact of Increase Local Flooding
	Impact of Wind-Generated, Construction-Related Debris and Missiles
General Construction, Erection, Fabrication, etc.	Impact on Instrumentation and Control Systems and Components
	Impact on Electrical Systems and Components
	Impact on Cooling Water Systems and Components
	Impact on Radioactive Waste Release Points and Parameters
	Impact of Abandonment of SSCs
	Impact of Relocation of SSCs
Connection, Integration, Tie-In, Testing, etc.	Impact on Instrumentation and Control Systems and Components
	Impact on Electrical and Power Systems and Components
	Impact on Cooling Water Systems and Components
General Site Construction Activities	Impact on Site Security Systems

NAPS SUP 1.10(1)

Table 1.10-202 Potential Consequences to Units 1 and 2 Due to Potential Hazards Resulting from Unit 3 Construction Activities

Potential Hazard	Potential Consequences
Containment Structure	
Impact of Crane or Crane Boom Failures	Building Degradation Due to Crane Boom Failure
Impact of Wind-Generated Construction-Related Debris and Missiles	Effects of Construction-Related Debris or Missiles
Impact of Overpressure from Use of Explosives	Building Degradation Due to Structural Damage as a Result of Explosion
Control Room Emergency HVAC Systems	
Impact of Construction-Generated Dust and Equipment Exhausts	Effects of Construction-Generated Dust and Equipment Exhausts on Control Room Habitability Systems Air Intakes
Impact of Releases of Flammable, Hazardous or Toxic Materials	Effects of Releases of Flammable, Hazardous or Toxic Materials on Control Room Habitability Systems Design Basis
Impact of Vehicle Accidents	Effects of Releases of Flammable, Hazardous or Toxic Materials on Control Room Habitability Systems Design Basis
Diesel Generators	
Impact of Construction-Generated Dust and Equipment Exhausts	Effects of Construction-Generated Dust and Equipment Exhausts on Emergency Diesel Generator Combustion Air Intakes
Fire Protection System	
Impact on Underground Conduits, Piping, Tunnels, etc.	Degradation of FPS Availability or Capacity
Impact of the Relocation of SSCs	Degradation of FPS Availability or Capacity
Fuel Building	
Impact of Wind-Generated Construction-Related Debris and Missiles	Effects of Construction-Related Debris or Missiles
Gaseous Radioactive Waste Management System	
Impact on Radioactive Waste Release Points and Parameters	Building and Facility Effects on Gaseous Release χ/Q and D/Q Assumptions

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Table 1.10-202 Potential Consequences to Units 1 and 2 Due to Potential Hazards Resulting from Unit 3 Construction Activities

Potential Hazard	Potential Consequences
Offsite Power System	
Impact on overhead power lines	Transmission line disruptions due to grading or clearing, equipment movement, crane boom failures, etc.
Impact on transmission towers	Transmission line disruptions due to grading or clearing, equipment movement, crane boom failures, etc.
Impact of vibratory ground motion	Operability disruptions due to vibration induced spurious trips
Impact on electrical systems and components	Operability disruptions due to equipment movement, system interconnections, etc.
Onsite Power Systems	
Impact of vibratory ground motion	Operability disruptions due to vibration induced spurious trips
Impact on electrical systems and components	Operability disruptions due to vibration induced spurious trips, system interconnections, etc.
Service Building	
Impact of crane or crane boom failures	Building degradation due to crane boom failure
Impact of wind-generated construction-related debris and missiles	Construction-related debris or missile
Service Water System	
Impact on underground conduits, piping, tunnels, etc.	Degradation of Service Water System availability or capacity
Impact on cooling water systems and structures	Degradation of Service Water System availability or capacity
Impact of the relocation of SSCs	Degradation of Service Water System availability or capacity
Ultimate Heat Sink	
Impact on underground conduits, piping, tunnels, etc.	Degradation of UHS availability or capacity
Impact on cooling water systems and components	Degradation of UHS availability or capacity

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Table 1.10-203 Managerial and Administrative Controls for Unit 3 Construction Activity Hazards

Hazard	Control
Impact on overhead power lines	Administrative controls for appropriate standoff and/or installation of temporary support towers
Impact on transmission towers	Administrative controls for appropriate standoff and/or installation of temporary support towers
Impact on underground conduits, piping, tunnels, etc.	Administrative controls to identify potentially affected SSCs; evaluation to ensure structural integrity during construction; and/or temporary measures to mitigate impacts
Impact of construction-generated dust and equipment exhausts	Administrative controls to avoid or minimize construction dust (for example, use of water spray trucks) and/or enhanced monitoring of potentially affected system intakes, filters, etc.
Impact of overpressure from use of explosives	Administrative controls to coordinate transport, storage and use of explosives and/or temporary measures to mitigate impacts
Impact of vehicle accidents	Administrative controls to respond to site accidents (for example, construction fire brigade and/or hazardous materials response team)
Impact of ground vibration	Administrative controls to identify potentially affected SSCs, and/or temporary measures to mitigate impacts
Impact of crane or crane boom failures	Administrative controls for appropriate standoff and/or load limits (for example, minimum standoff distances and/or load limitations)
Impact of releases of flammable, hazardous or toxic materials	Administrative controls on quantities and types of flammable, hazardous or toxic materials
Impact of wind-generated, construction-related debris and missiles	Administrative controls on equipment and material storage and transport, and for reducing power or shutting down Units 1 and 2 during high winds or high wind warnings
Impact on electrical systems and components	Administrative controls to identify potentially affected SSCs; evaluation to ensure system and component integrity during construction; and/or temporary measures to mitigate impacts
Impact on cooling water systems and components	Administrative controls to identify potentially affected SSCs; evaluation to ensure system and component integrity during construction; and/or temporary measures to mitigate impacts

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Table 1.10-203 Managerial and Administrative Controls for Unit 3 Construction Activity Hazards

Hazard	Control
Impact on radioactive waste release points and parameters	Enhanced monitoring and control to ensure releases are within limits
Impact of relocation of SSCs	Administrative controls to identify potentially affected SSCs effects of releases of flammable, hazardous or toxic materials on control room habitability systems design basis evaluation to ensure system and component integrity during construction; and/or temporary measures to mitigate impacts
Impact on site security systems	Administrative controls to coordinate construction activities with Units 1 and 2 physical protection personnel and procedures

NAPS SUP 1AA(1)

Appendix 1AA ESP Information

SSAR Chapter 1 is incorporated here by reference for historical purposes.

2 Site Characteristics

2.0 Site Characteristics

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS SUP 2.0(1) Add the following at the beginning of the section.

2.0.1 Introduction

SSAR Sections 1.3 and 1.9 are incorporated by reference for historical purposes only.

Delete the second paragraph of DCD Section 2.0 and replace the third paragraph of DCD Section 2.0 with the following.

Chapter 2 provides information concerning the geological, seismological, hydrological, environmental, and meteorological characteristics of the site and vicinity, in conjunction with present and projected population distribution including land use relative to site activities and controls. DCD Table 2.0-1 is a summary table identifying specific site parameters for the US-APWR.

Add the following after the third paragraph of DCD Section 2.0.

ESP site characteristic values are identified in Appendix A of the ESP (Reference 2.0-203). The ESP design parameter values are identified as controlling values of parameters and design basis accident source term plant parameters in Appendix B of the ESP.

Table 2.0-201 identifies specific Unit 3 site characteristics and facility design values and provides several evaluations:

- Part 1 of Table 2.0-201 identifies each DCD site parameter value and the corresponding ESP and Unit 3 site characteristic values. In accordance with 10 CFR 52.79(b) and (d) and SRP Section 2.0, Part 1 of Table 2.0-201 evaluates, as applicable, whether:
  - ESP site characteristic values fall within DCD site parameter values
  - Unit 3 site characteristic values fall within DCD site parameter values

•• Unit 3 site characteristic values fall within ESP site characteristic values

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• Part 2 of Table 2.0-201 identifies those ESP site characteristics and design parameters for which there is no corresponding DCD site parameter value. In accordance with 10 CFR 52.79(b) and SRP Section 2.0, Part 2 of Table 2.0-201 evaluates whether the Unit 3 site characteristic or facility design value falls within the ESP site characteristic or ESP design parameter value.

NAPS SUP 2.0(3)

• Part 3 of Table 2.0-201 identifies those site characteristics and design parameters listed in SSAR Table 1.9-1 for which there is not already a comparison to a corresponding DCD or ESP value in Parts 1 and 2 of Table 2.0-201. In accordance with the commitment in SSAR Section 1.3, Part 3 of Table 2.0-201 evaluates whether the Unit 3 site characteristic or facility design value falls within the SSAR Table 1.9-1 site characteristic or design parameter value. (Some site characteristic and design parameter values listed in SSAR Table 1.9-1 are included in the evaluation in Parts 1 and 2 of Table 2.0-201.)

Information on Unit 3 site characteristics is provided in Sections 2.1 through 2.5, which incorporate by reference, the corresponding SSAR sections. This information addresses NRC guidance in NUREG-0800 and COL Items from Chapter 2 of the DCD.

2.0.2 **References**

2.0-201 [Deleted]

2.0-202 NUREG-1835, Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site, U.S. Nuclear Regulatory Commission, September 2005.

2.0-203 Early Site Permit (ESP) for the North Anna ESP Site, No. ESP-003, U.S. Nuclear Regulatory Commission, November 2007.

2.0.204 ASCE 7-05, Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers, 2006.

2.0.205 DC/COL-ISG-007, Interim Staff Guidance on Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures, U.S. Nuclear Regulatory Commission, June 2009.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology			
	Normal winter precipitation roof load(11)	50 lb/ft^2	**ESP** No value provided **Unit 3** 23.5 lb/ft^2	The Unit 3 site characteristic value for normal winter precipitation roof load is based on the highest ground-level weight from the following: • the 100-yr return period snowpack • the historical maximum snowpack • the 100-yr return period snowfall event • the historical maximum snowfall event For the North Anna site, the highest ground-level weight is the 100-yr return period snowpack, with a ground level weight of 30.5 lb/ft^2. The roof live load from snow pack that represents a 100-year return ground snow load of 30.5 lb/ft^2 that on the roof of each standard plant safety-related building is taken as 77% of that value based on exposure and thermal conditions per the ASCE 7-05, Chapter 7 (Reference 2.0.204) and DCD/COL-ISG-007 (Reference 2.0.205). Therefore, the roof snow load from the snow pack is no more than 23.5 lb/ft^2 for any Unit 3 standard plant safety-related building. The Unit 3 site characteristic value of 23.5 lb/ft^2 falls within (is lower than) the DCD site parameter value of 50 lb/ft^2.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology (continued)			
	Extreme winter precipitation roof load[12]	75 lb/ft^2	**ESP** No value provided **Unit 3** 49.5 lb/ft^2	The Unit 3 site characteristic value for the extreme winter roof load is based on the sum of site characteristic values for the highest winter ground-level precipitation (100-yr snow pack) plus the liquid 48-hr probable maximum winter precipitation (PMWP). The Unit 3-specific roof live load from antecedent snow pack represents a 100-year return ground snow load of 30.5 lb/ft^2 that on the roof of each standard plant safety-related building is taken as 77% of that value based on exposure and thermal conditions per the ASCE 7-05, Chapter 7 (Reference 2.0.204) and DC/COL-ISG-007 (Reference 2.0.205). Therefore, the roof snow load from the antecedent snowpack is no more than 23.5 lb/ft^2 for any Unit 3 standard plant safety-related building. These structures have sloped roofs to preclude roof ponding and therefore are designed to handle the liquid 48-hr PMWP with no water accumulation on the roof. For this evaluation, the added load from a 4 in accumulation is conservatively assumed, or no more than 21 lb/ft^2 for any standard plant safety-related Unit 3 building. During a liquid 48-hr PMWP event, the liquid flows through the 100-yr snowpack on the roof. A load of 5 lb/ft^2 is added to account for the rain-on-snow surcharge. Therefore, the total maximum roof load (snowpack plus rain) on a Unit 3 standard plant safety-related building is 49.5 lb/ft^2 (23.5 + 21 + 5). The Unit 3 site characteristic value of 49.5 lb/ft^2 falls within (is lower than) the DCD site parameter value of 75 lb/ft^2.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology (continued)			
	48-hr probable maximum winter precipitation (PMWP)	36 in.	**ESP and Unit 3** 52.7 cm (20.75 in) of water (48-hr PMWP for winter months)	The ESP site characteristic value for the 48-hr PMWP is defined as the PMP during any 48-hour period in the winter months. For the Unit 3 site, the months of December through February produce the 48-hr PMWP. The DCD site parameter value is for the month of March. The ESP site characteristic value falls within (is lower than) the DCD site parameter value. The Unit 3 site characteristic value for the winter months (December through February) falls within (is the same as) the ESP site characteristic value. SSAR Section 2.3.1.3.4 and SSAR Table 1.9-1 provide the same value as ESP, Appendix A.
			Unit 3 20.5 in of water (48-hr PMWP for March)	The Unit 3 site characteristic value for the month of March falls within (is less than) the DCD site parameter.
	Tornado Maximum Wind Speed	230 mph	**ESP** 116.2 m/s (260 mph)	The ESP site characteristic value for design basis tornado maximum wind speed is defined as the maximum wind speed resulting from passage of a tornado having a probability of occurrence of 10^{-7} per year. This value is 260 mph. The ESP site characteristic value does not fall within (is greater than) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.2, provides the same value as ESP, Appendix A.
NAPS ESP VAR 2.3-1			**Unit 3** 200 mph	The Unit 3 site characteristic value of 200 mph is from Section 2.3.1.3.2 and falls within (is lower than) the DCD site parameter value. The Unit 3 site characteristic value does not fall within (is lower than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology (continued)			
	Maximum Rotational Speed	184 mph	**ESP** 93.0 m/s (208 mph)	The ESP site characteristic value for design basis tornado maximum rotational speed is defined as the rotational component of the maximum tornado wind speed. This value is 208 mph. The ESP site characteristic value does not fall within (is greater than) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.2, provides the same value as ESP, Appendix A.
NAPS ESP VAR 2.3-1			**Unit 3** 160 mph	The Unit 3 site characteristic value of 160 mph is from Section 2.3.1.3.2 and falls within (is lower than) the DCD site parameter value. The Unit 3 site characteristic value does not fall within (is lower than) the ESP site characteristic value.
	Maximum Translational Speed	46 mph	**ESP** 23.2 m/s (52 mph)	The ESP site characteristic value for design basis tornado maximum translational speed is defined as the translational component of the maximum tornado wind speed. This value is 52 mph. The ESP site characteristic value does not fall within (is greater than) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.2, provides the same value as ESP, Appendix A.
NAPS ESP VAR 2.3-1			**Unit 3** 40 mph	The Unit 3 site characteristic value of 40 mph is from Section 2.3.1.3.2 and falls within (is lower than) the DCD site parameter value. The Unit 3 site characteristic value does not fall within (is lower than) the ESP site characteristic value.
	Radius of Maximum Rotational Speed	150 ft	**ESP and Unit 3** 45.7 m (150 ft)	The ESP site characteristic value for design basis tornado radius of maximum rotational speed is defined as the distance from the center of the tornado at which the maximum rotational wind speed occurs. The ESP site characteristic value falls within (is the same as) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.2, provides the same value as ESP, Appendix A. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[(17)]	DCD Site Parameter Value[(17)]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology (continued)			
	Tornado Maximum Pressure Drop	1.2 psi	**ESP** 10.3 kPa (1.5 psi)	The ESP site characteristic value for design basis tornado pressure drop is defined as the decrease in ambient pressure from normal atmospheric pressure resulting from passage of the tornado. This value is 1.5 psi. The ESP site characteristic value does not fall within (is greater than) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.2, provides the same value as ESP, Appendix A.
NAPS ESP VAR 2.3-1			**Unit 3** 0.9 psi	The Unit 3 site characteristic value of 0.9 psi is from Section 2.3.1.3.2 and falls within (is lower than) the DCD site parameter value. The Unit 3 site characteristic value does not fall within (is lower than) the ESP site characteristic value.
	Rate of Pressure Drop	0.5 psi/s	**ESP** 5.2 kPa/s (0.76 psi/s)	The ESP site characteristic value for design basis tornado maximum rate of pressure drop is defined as the rate of pressure drop resulting from the passage of the tornado. This value is 0.76 psi/s. The ESP site characteristic value does not fall within (is greater than) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.2, provides the same value as ESP, Appendix A.
NAPS ESP VAR 2.3-1			**Unit 3** 0.4 psi/s	The Unit 3 site characteristic value of 0.4 psi/s is from Section 2.3.1.3.2 and falls within (is lower than) the DCD site parameter value. The Unit 3 site characteristic value does not fall within (is lower than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology (continued)			
	Tornado generated missile spectrum and associated velocities	15 ft long schedule 40 steel pipe moving horizontally at 135 ft/s[1] 4,000 lb automobile moving horizontally at 135 ft/s[1] 1 in diameter steel sphere moving horizontally at 26 ft/s[1] at full building height (see DCD Section 3.5.1.4)	**ESP** No value provided **Unit 3** RG 1.76, Rev. 1, Table 2 for Region II, applied to full building height	The DCD site parameter for tornado missile spectrum is based on Table 2 of RG 1.76, Rev. 1, for Region I applied to full building height as described in DCD Section 3.5.1.4. The Unit 3 site characteristic for tornado missile spectrum is that provided in Table 2 of RG 1.76, Rev. 1, for Region II, applied to full building height. This spectrum fully addresses variations in grade levels at the Unit 3 site, and because Region II missiles have lower velocities than those for Region I, the Unit 3 site characteristic value falls within (is less than) the DCD site parameter value for tornado missile spectrum.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(1)

Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorology (continued)			
Extreme Wind Speed (other than in tornado)	155 mph for 3-second gusts at 33 ft above ground level based on 100-yr return period, with importance factor of 1.15 for seismic category I and II structures	**ESP and Unit 3** 42.9 m/s (96 mph), 3-second gust	The ESP site characteristic value for basic wind speed is defined as the 3-second gust wind speed at 10 m (33 ft) above the ground that has a 1 percent annual probability of being exceeded (100-year mean recurrence interval). The ESP site characteristic value for basic wind speed falls within (is lower than) the DCD site parameter value. SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.1, provides the same value as ESP, Appendix A. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
Ambient Design Air Temperature (1% Annual Exceedance Maximum)	100°F dry bulb 77°F coincident wet bulb	**ESP** No value provided	
		Unit 3 35°C (95°F) dry bulb with 25°C (77°F) wet bulb (mean coincident) (0.4% annual exceedance value)	The Unit 3 site characteristic values are the ESP site characteristic values for the maximum dry bulb temperature with mean coincident wet bulb temperature for 0.4% annual exceedance. These values are the ambient dry-bulb temperature (and mean coincident wet-bulb temperature) that will be exceeded 0.4% of the time annually. These values are 35°C (95°F) dry bulb with 25°C (77°F) wet bulb (mean coincident) and fall within (are less than or equal to) the DCD site parameter values for 1% exceedance. Because the 1% site characteristic values are even lower than the 0.4% values, the site's 1% values also fall within (are the same as or lower than) the DCD site parameter values for 1% annual exceedance. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same 0.4% values as ESP, Appendix A.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(1)

Parameter Description(17)	DCD Site Parameter Value(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorology (continued)			
Ambient Design Air Temperature (1% Annual Exceedance Maximum) (continued)	81°F non-coincident wet bulb	**ESP** No value provided	
		Unit 3 26.1°C (79°F) wet-bulb (non-coincident) (0.4% annual exceedance value)	The Unit 3 site characteristic value is the ESP site characteristic value for the maximum wet bulb temperature (non-coincident) for 0.4% annual exceedance. This value is defined as the ambient wet-bulb temperature that will be exceeded 0.4% of the time annually. This value is 26.1°C (79°F) wet bulb (non-coincident) and falls within (is less than) the DCD site parameter value for 1% annual exceedance. Because the 1% site characteristic value is even lower than the 0.4% value, the site's 1% value also falls within (is lower than) the DCD site parameter value for 1% annual exceedance. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same 0.4% value as ESP, Appendix A.
Ambient Design Air Temperature (0% Annual Exceedance Maximum)	115°F dry bulb 80°F coincident wet bulb (historical limit excluding peaks < 2 hr)	**ESP** No value provided	
		Unit 3 42.8°C (109°F) dry-bulb with 24.4°C (76°F) wet bulb coincident (100-year return values excluding peaks <1 hr)	The Unit 3 site characteristic values for maximum dry bulb with coincident wet bulb temperatures are the maximum dry bulb temperature for a 100-year return period as provided in SSAR Tables 2.3-18 and 1.9-1, and its corresponding wet bulb temperature (using a correlation between dry bulb and wet bulb temperatures). As shown in Section 2.3.1.2, these values are 42.8°C (109°F) dry-bulb with 24.4°C (76°F) wet bulb coincident and fall within (are less than) the DCD site parameter values for 0% exceedance.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorology (continued)			
NAPS DEP 2.0(1)	Ambient Design Air Temperature (0% Annual Exceedance Maximum) (continued)	86°F non-coincident wet bulb (historical limit excluding peaks < 2 hr)	**ESP** No value provided. **Unit 3** 31.1°C (88°F) wet-bulb (non-coincident) (100-year return value excluding peaks < 1 hr)	The Unit 3 site characteristic value for maximum wet bulb temperature (non-coincident) is the 100-year return period temperature as provided in SSAR Tables 2.3-18 and 1.9-1. This value is 31.1°C (88°F) wet bulb non-coincident and does not fall within (is greater than) the DCD site parameter value for 0% exceedance.
	Ambient Design Air Temperature (1% Annual Exceedance Minimum)	–10°F dry bulb	**ESP and Unit 3** –7.8°C (18°F) (99% annual exceedance value)	The ESP site characteristic value for minimum dry-bulb temperature 99% annual exceedance is defined as the ambient dry-bulb temperature below which dry-bulb temperatures will fall 1% of the time annually. The ESP site characteristic value falls within (is higher than) the DCD site parameter value. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same value as ESP, Appendix A. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
	Ambient Design Air Temperature (0% Annual Exceedance Minimum)	–40°F dry bulb (historical limit excluding peaks <2 hr)	**ESP** No value provided **Unit 3** –29.4°C (–21°F) (historic minimum)	The Unit 3 site characteristic value for minimum 0% exceedance value temperature is the historic minimum dry bulb temperature as provided in SSAR Table 2.3-5. This value is –29.4°C (–21°F) and falls within (is higher than) the DCD site parameter value for 0% exceedance.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(1)

Parameter Description[(17)]	DCD Site Parameter Value[(17)]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Atmospheric Dispersion Factors (χ/Q Values) for Onsite Locations			
Exclusion Area Boundary (EAB) 0–2 hr	5.0×10^{-4} s/m^3	**ESP and Unit 3** 2.26×10^{-4} s/m^3	The ESP site characteristic value for short-term (accident release) atmospheric dispersion for 0–2 hr χ/Q value at the EAB is defined as the 0–2 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the EAB. The ESP site characteristic value falls within (is lower than) the DCD site parameter value. SSAR Table 2.3-3 and SSAR Table 1.9-1 provide the same value as the ESP. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
EAB Annual Average	1.6×10^{-5} s/m^3	**ESP** 3.7×10^{-6} s/m^3, annual average, undepleted/no decay, EAB, east-southeast, 1.4 km (0.88 mi) **Unit 3** 3.0×10^{-6} s/m^3, annual average, undepleted/no decay, EAB, east-southeast, 1.4 km (0.88 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average EAB undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value is provided inTable 2.3-16R and falls within (is lower than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Onsite Locations (continued)			
	EAB Annual Average	1.6 x 10^{-5} s/m^3	**ESP** 3.7 × 10^{-6} s/m^3, annual average, undepleted/2.26-day decay, EAB, east-southeast, 1.4 km (0.88 mi) **Unit 3** 3.0 × 10^{-6} s/m^3, annual average, undepleted/2.26-day decay, EAB, east-southeast, 1.4 km (0.88 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average EAB undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value is provided in Table 2.3-16R and falls within (is lower than) the ESP site characteristic value.
	EAB Annual Average	1.6 x 10^{-5} s/m^3	**ESP** 3.3 × 10^{-6} s/m^3, annual average, depleted/8.00-day decay, EAB, east-southeast, 1.4 km (0.88 mi) **Unit 3** 2.6 × 10^{-6} s/m^3, annual average, depleted/8.00-day decay, EAB, east-southeast, 1.4 km (0.88 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average EAB depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value is provided in Table 2.3-16R and falls within (is lower than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations			
	Low Population Zone (LPZ) Boundary			
	0–8 hours	2.1E-04 s/m^3	**ESP and Unit 3** 2.05E-05 s/m^3	The ESP site characteristic value for short-term (accident release) atmospheric dispersion for 0–8 hr χ/Q value at the LPZ is defined as the 0–8 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ. The ESP site characteristic value falls within (is lower than) the DCD site parameter value. SSAR Table 2.3-3 and SSAR Table 1.9-1 provide the same value as the ESP. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
	8–24 hours	1.3E-04 s/m^3	**ESP and Unit 3** 1.36E-05 s/m^3	The ESP site characteristic value for short-term (accident release) atmospheric dispersion for 8–24 hr χ/Q value at the LPZ is defined as the 8–24 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ. The ESP site characteristic value falls within (is lower than) the DCD site parameter value. SSAR Table 2.3-3 and SSAR Table 1.9-1 provide the same value as the ESP. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
	1–4 days	6.9E-05 s/m^3	**ESP and Unit 3** 5.58E-06 s/m^3	The ESP site characteristic value for short-term (accident release) atmospheric dispersion for 1–4 day χ/Q value at the LPZ is defined as the 1–4 day atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ. The ESP site characteristic value falls within (is lower than) the DCD site parameter value. SSAR Table 2.3-3 and SSAR Table 1.9-1 provide the same value as the ESP. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations (continued)			
	Low Population Zone (LPZ) Boundary (continued)			
	4–30 days	2.8E-05 s/m^3	**ESP and Unit 3** 1.55E-06 s/m^3	The ESP site characteristic value for short-term (accident release) atmospheric dispersion for 4–30 day χ/Q value at the LPZ is defined as the 4–30 day atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ. The ESP site characteristic value falls within (is lower than) the DCD site parameter value. SSAR Table 2.3-3 and SSAR Table 1.9-1 provide the same value as the ESP. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Long-Term (Routine Release) Atmospheric Dispersion			
			ESP The ESP site characteristic values for long term (routine release) atmospheric dispersion estimates are based on the maximally exposed individual (MEI) for each pathway.	The ESP site characteristic values for long term (routine release) atmospheric dispersion estimates are defined based on type of sensitive receptor (MEI) and decay time. Each of these values is compared with the appropriate DCD site parameter values, χ/Q or D/Q, below. As shown below, every ESP site characteristic value falls within (is less than) the DCD site parameter value.
			Unit 3 The Unit 3 site characteristic values assume conservatively, that each sensitive receptor (meat animal, vegetable garden, residence) is at the location of the closest receptor.	As shown further below, every Unit 3 site characteristic value also falls within (is less than) the DCD site parameter value. Because the site characteristic values for both the ESP and Unit 3 are defined based on releases from the plant parameter envelope as shown in Figure 2.0-205, there is a single χ/Q and D/Q value for each type of sensitive receptor (MEI) and decay time, which is compared to the value for releases from each release point.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations			
	Nearest Resident Annual Average	1.6 x 10^{-5} s/m^3 (at EAB per DCD Table 11.3-8)	**ESP** 2.4 × 10^{-6} s/m^3, annual average, undepleted/no decay, nearest resident, north-northeast, 1.5 km (0.96 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average resident undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1a			**Unit 3** 3.9 × 10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	Nearest Resident Annual Average	1.6 x 10^{-5} s/m^3 (at EAB per DCD Table 11.3-8)	**ESP** 2.4 × 10^{-6} s/m^3, annual average, undepleted/2.26-day decay, nearest resident, north-northeast, 1.5 km (0.96 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average resident undepleted/2.26 day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1b			**Unit 3** 3.9 × 10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. This Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations (continued)			
	Nearest Resident Annual Average	1.6×10^{-5} s/m^3 (at EAB per DCD Table 11.3-8)	**ESP** 2.1×10^{-6} s/m^3, annual average, depleted/8.00-day decay, nearest resident, north-northeast, 1.5 km (0.96 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average resident depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1c			**Unit 3** 3.5×10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	Food Production Area, Annual Average	5.0×10^{-6} s/m^3	**ESP** 1.4×10^{-6} s/m^3, annual average, undepleted/ no decay, nearest meat animal, southeast, 2.2 km (1.37 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average meat animal undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1e			**Unit 3** 3.9×10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations (continued)			
	Food Production Area, Annual Average	5.0×10^{-6} s/m^3	**ESP** 1.4×10^{-6} s/m^3, annual average, undepleted/2.26-day decay, nearest meat animal, southeast, 2.2 km (1.37 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average meat animal undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. This ESP site characteristic value is 1.4×10^{-6} s/m^3 and falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1f			**Unit 3** 3.9×10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	Food Production Area, Annual Average	5.0×10^{-6} s/m^3	**ESP** 1.2×10^{-6} s/m^3, annual average, depleted/8.00-day decay, nearest meat animal, southeast, 2.2 km (1.37 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average meat animal depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1g			**Unit 3** 3.5×10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations (continued)			
	Food Production Area, Annual Average	5.0 x 10^{-6} s/m^3	**ESP** 2.0 × 10^{-6} s/m^3, annual average, undepleted/no decay, nearest vegetable garden, northeast, 1.5 km (0.94 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average vegetable garden undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1i			**Unit 3** 3.9 × 10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	Food Production Area, Annual Average	5.0 x 10^{-6} s/m^3	**ESP** 2.0 × 10^{-6} s/m^3, annual average, undepleted/2.26-day decay, nearest vegetable garden, northeast, 1.5 km (0.94 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average vegetable garden undepleted 2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1j			**Unit 3** 3.9 × 10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Offsite Locations (continued)			
	Food Production Area, Annual Average	5.0 x 10^{-6} s/m^3	**ESP** 1.8 × 10^{-6} s/m^3, annual average, depleted/8.00-day decay, nearest vegetable garden, northeast, 1.5 km (0.94 mi)	The ESP site characteristic value for this long term dispersion estimate is defined as the maximum annual average vegetable garden depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1k			**Unit 3** 3.5 × 10^{-6} s/m^3 east-southeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific concentrations and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	Food Production Area, Annual Average	5.0 x 10^{-6} s/m^3	**ESP and Unit 3** No value provided for annual average, nearest cow-milk, undepleted/no decay χ/Q value; annual average undepleted/2.26-day decay χ/Q value; and annual average depleted/8.00-day decay	The ESP and Unit 3 site characteristic values for each of these long term χ/Q dispersion coefficients is “No value provided.” The milk exposure pathway was not considered because there are no reported cows or goats used for milk production in the near vicinity of the site, within 5 miles. The ESP and Unit 3 site characteristic value falls within (is smaller than) the DCD site parameter value. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Deposition Factor (D/Q Value) for Onsite and Offsite Locations			
	EAB Annual Average	4.0×10^{-8} 1/m^2	**ESP** 1.2×10^{-8} 1/m^2, annual average, D/Q value, EAB, east-southeast*, 1.4 km (0.88 mi) **Unit 3** 1.1×10^{-8} 1/m^2, annual average, D/Q value, EAB, south, 1.0 km (0.62 mi)	The ESP site characteristic value for this long term relative deposition estimate is defined as the maximum annual average EAB D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific dose analysis inputs and results. The Unit 3 site characteristic value is provided in Table 2.3-16R and falls within (is lower than) the ESP site characteristic value. * The direction is south and the distance is 1 km (0.62 mi) as shown in ESP-ER Table 2.7-16 and in Table 2.3-16R.
	Nearest Resident Annual Average	4.0×10^{-8} 1/m^2 (at EAB per DCD Table 11.3-8)	**ESP** 7.2×10^{-9} 1/m^2, annual average, nearest resident, north-northeast, 1.5 km (0.96 mi)	The ESP site characteristic value for this long term relative deposition estimate is defined as the maximum annual average resident D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1d			**Unit 3** 1.1×10^{-8} 1/m^2 north-northeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term relative deposition estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site-specific dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Deposition Factor (D/Q Value) for Onsite and Offsite Locations (continued)			
	Nearest Meat Animal Annual Average	4.0 x 10^{-8} 1/m^2	**ESP** 3.1 x 10^{-9} 1/m^2, annual average nearest meat animal, southeast	The ESP site characteristic value for this long term relative deposition estimate is defined as the maximum annual average meat animal D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1h			**Unit 3** 1.1 x 10^{-8} 1/m^2 north-northeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term relative deposition estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site specific dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	Vegetable Garden Annual Average	4.0 x 10^{-8} 1/m^2	**ESP** 3.1 x 10^{-9} 1/m^2, annual average nearest meat animal, southeast	The ESP site characteristic value for this long term relative deposition estimate is defined as the maximum annual average meat animal D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
NAPS ESP VAR 2.0-1l			**Unit 3** 1.1 x 10^{-8} 1/m^2 north-northeast, 1.2 km (0.74 mi)	The Unit 3 site characteristic value for this long term relative deposition estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value falls within (is less than) the DCD site parameter value. See Section 11.3 for the site specific dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Deposition Factor (D/Q Value) for Onsite and Offsite Locations (continued)			
	Milk Animal Annual Average	4.0×10^{-8} 1/m^2	**ESP and Unit 3** No value provided for annual average, nearest cow-milk	The ESP and Unit 3 site characteristic value for this long term relative dispersion estimate is “No value provided.” The milk exposure pathway was not considered because there are no reported cows or goats used for milk production in the near vicinity of the site, within 5 miles. The ESP and Unit 3 site characteristic value falls within (is smaller than) the DCD site parameter value. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points[2]			
	Plant Vent[5]			
	0–8 hours	1.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.1E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
	8–24 hours	6.6E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
	1–4 days	4.2E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.6E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
	4–30 days	2.8E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.0E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points[2] (continued)			
	Ground-Level Containment Releases[4]			
	0–8 hours	2.2E-03 s/m^3	**ESP** No value provided	
			Unit 3 8.7E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.3E-03 s/m^3	**ESP** No value provided	
			Unit 3 3.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	1–4 days	8.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	4–30 days	5.5E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(1)

Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Atmospheric Dispersion Factors (χ/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points[2] (continued)			
Main Steam Relief Valve and Safety Valve Releases[6]			
0–8 hours	5.3E-03 s/m^3	**ESP** No value provided	
		Unit 3 3.5E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
8–24 hours	3.1E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.2E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
1–4 days	2.0E-03 s/m^3	**ESP** No value provided	
		Unit 3 8.8E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
4–30 days	1.3E-03 s/m^3	**ESP** No value provided	
		Unit 3 7.1E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points[2] (continued)			
	Steam Line Break Releases[8]			
	0–8 hours	1.9E-02 s/m^3	**ESP** No value provided	
			Unit 3 1.2E-02 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.1E-02 s/m^3	**ESP** No value provided	
			Unit 3 3.5E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	1–4 days	7.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.4E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	4–30 days	4.7E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.2E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points[2] (continued)			
	Fuel Handling Area (FH/A) Releases[7]			
	0–8 hours	1.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 8.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value
	8–24 hours	6.4E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.6E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	1–4 days	4.1E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	4–30 days	2.7E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for MCR Inleak for Specified Release Points[3]			
	Plant Vent[9]			
	0–8 hours	1.3E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.0E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
	8–24 hours	7.8E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.7E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
	1–4 days	4.9E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
	4–30 days	3.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for MCR Inleak for Specified Release Points[3] (continued)			
	Plant Vent[10]			
	0–8 hours	1.4×10^{-3} s/m^3	**ESP** No value provided	
			Unit 3 1.0×10^{-3} s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
	8–24 hours	8.0×10^{-4} s/m^3	**ESP** No value provided	
			Unit 3 3.7×10^{-4} s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
	1–4 days	5.1×10^{-4} s/m^3	**ESP** No value provided	
			Unit 3 2.9×10^{-4} s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
	4–30 days	3.3×10^{-4} s/m^3	**ESP** No value provided	
			Unit 3 2.3×10^{-4} s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for MCR Inleak for Specified Release Points[3] (continued)			
	Ground-Level Containment Releases[4]			
	0–8 hours	2.4E-03 s/m^3	**ESP** No value provided	
			Unit 3 8.8E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.4E-03 s/m^3	**ESP** No value provided	
			Unit 3 3.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
	1–4 days	9.1E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheets 1 and 4, and falls within (is less than) the DCD site parameter value.
	4–30 days	6.0E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheets 1, 4, and 5, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for MCR Inleak for Specified Release Points[3] (continued)			
	Main Steam Relief Valve and Safety Valve Releases[6]			
	0–8 hours	5.3E-03 s/m^3	**ESP** No value provided	
			Unit 3 3.6E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
	8–24 hours	3.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.3E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
	1–4 days	2.0E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.0E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
	4–30 days	1.3E-03 s/m^3	**ESP** No value provided	
			Unit 3 7.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for MCR Inleak for Specified Release Points[3] (continued)			
	Steam Line Break Releases[8]			
	0–8 hours	1.9E-02 s/m^3	**ESP** No value provided	
			Unit 3 1.2E-02 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.1E-02 s/m^3	**ESP** No value provided	
			Unit 3 3.5E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	1–4 days	7.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.4E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	4–30 days	4.7E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.2E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for MCR Inleak for Specified Release Points[3] (continued)			
	Fuel Handling Area Releases[7]			
	0–8 hours	1.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.0E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
	8–24 hours	6.7E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.8E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
	1–4 days	4.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
	4–30 days	2.8E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.0E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Technical Support Center (TSC) HVAC Intake for Specified Release Points[2]			
	Plant Vent[5]			
	0–8 hours	1.4E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	8–24 hours	8.0E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.2E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	1–4 days	5.1E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	4–30 days	3.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Technical Support Center (TSC) HVAC Intake for Specified Release Points[2] (continued)			
	Ground-Level Containment Releases[4]			
	0–8 hours	1.9E-03 s/m^3	**ESP** No value provided	
			Unit 3 7.2E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	1–4 days	7.2E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	4–30 days	4.8E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Technical Support Center (TSC) HVAC Intake for Specified Release Points[2] (continued)			
	Main Steam Relief Valve and Safety Valve Releases[6]			
	0–8 hours	1.7E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.2E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	8–24 hours	9.9E-04 s/m^3	**ESP** No value provided	
			Unit 3 4.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	1–4 days	6.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.2E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	4–30 days	4.2E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheets 6 and 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Technical Support Center (TSC) HVAC Intake for Specified Release Points[2] (continued)			
	Steam Line Break Releases[8]			
	0–8 hours	1.4E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	8–24 hours	8.4E-04 s/m^3	**ESP** No value provided	
			Unit 3 4.1E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	1–4 days	5.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.0E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	4–30 days	3.5E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for Technical Support Center (TSC) HVAC Intake for Specified Release Points[2] (continued)			
	Fuel Handling Area Releases[7]			
	0–8 hours	6.7E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	8–24 hours	3.9E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	1–4 days	2.5E-04 s/m^3	**ESP** No value provided	
			Unit 3 9.4E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	4–30 days	1.7E-04 s/m^3	**ESP** No value provided	
			Unit 3 8.3E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for TSC Inleak for Specified Release Points[3]			
	Plant Vent[5]			
	0–8 hours	1.4E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	8–24 hours	8.0E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.2E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	1–4 days	5.1E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	4–30 days	3.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for TSC Inleak for Specified Release Points[3] (continued)			
	Ground-Level Containment Releases[4]			
	0–8 hours	1.9E-03 s/m^3	**ESP** No value provided	
			Unit 3 7.2E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.1E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	1–4 days	7.2E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	4–30 days	4.8E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for TSC Inleak for Specified Release Points[3] (continued)			
	Main Steam Relief Valve and Safety Valve Releases[6]			
	0–8 hours	1.7E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.2E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	8–24 hours	9.9E-04 s/m^3	**ESP** No value provided	
			Unit 3 4.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	1–4 days	6.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.2E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	4–30 days	4.2E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheets 6 and 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for TSC Inleak for Specified Release Points[3] (continued)			
	Steam Line Break Releases[8]			
	0–8 hours	1.4E-03 s/m^3	**ESP** No value provided	
			Unit 3 9.9E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	8–24 hours	8.4E-04 s/m^3	**ESP** No value provided	
			Unit 3 4.1E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	1–4 days	5.3E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.0E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.
	4–30 days	3.5E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.3E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 6, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Atmospheric Dispersion Factors (χ/Q Values) for TSC Inleak for Specified Release Points(3) (continued)			
	Fuel Handling Area Releases(7)			
	0–8 hours	6.7E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.5E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	8–24 hours	3.9E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.4E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	1–4 days	2.5E-04 s/m^3	**ESP** No value provided	
			Unit 3 9.4E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.
	4–30 days	1.7E-04 s/m^3	**ESP** No value provided	
			Unit 3 8.3E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 7, and falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Hydrologic Engineering			
	Maximum Flood (or Tsunami) Level	1 ft below plant grade		The DCD site parameter of maximum flood (or tsunami) water level of 1 ft below plant grade is provided in DCD Table 2.0-1. The design plant grade elevation identified in DCD Figure 1.2-12 is at 2'-7", which corresponds to 290 ft NAVD88 (290.86 ft NGVD29) for the Unit 3 site as shown in Figure 2.1-201. Therefore, the DCD site parameter value of 1 ft below plant grade corresponds to a maximum flood water level below 289 ft NAVD88 (289.86 ft NGVD29) for the Unit 3 site.
			ESP 82.3 m (270 ft) msl (which corresponds to 269.14 NAVD88 (270 ft NGVD29)) based on PMF	The ESP site characteristic value for maximum flood water level is defined as the maximum flood level at the ESP site due to a probable maximum flood (PMF) in Lake Anna's watershed, simultaneous failure of upstream storage reservoirs, and coincident wind-wave action. This value is 269.14 ft NAVD88 (270 ft NGVD29) at the Unit 3 site based on the PMF and remains the same value after the increase in design plant grade for Unit 3 to 290 ft NAVD88 (290.86 ft NGVD29). The ESP site characteristic value falls within (is lower than) the DCD site parameter value.
			Unit 3 1.1 ft below design plant grade based on PMP	The Unit 3 site characteristic value for PMF of 266.53 ft NAVD88 (267.39 ft NGVD29) is provided in SSAR Section 2.4.3 and SSAR Table 1.9-1, and falls within (is less than) the DCD site parameter value and the ESP site characteristic value. The Unit 3 site characteristic value for maximum flood water level below design plant grade is due to the local PMP flood. As described in Section 2.4.2, this value is 1.1 ft below design plant grade in the power block area based on the local PMP flood water elevation of 288.9 ft NAVD88 (289.8 ft NGVD29) in this area. Therefore, the Unit 3 site characteristic value for maximum flood water level below design plant grade falls within (is lower than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Hydrologic Engineering (continued)			
	Maximum Rainfall Rate (Hourly)	19.4 in/hr for seismic category I/II structures	**ESP** 46.5 cm (18.3 in/hr)	The ESP site characteristic value for local intense precipitation is defined as the maximum potential rainfall at the immediate ESP site in inches of rain in an hour. This value is 46.5 cm (18.3 in)/hr. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
			Unit 3 46.5 cm/hr (18.3 in/hr)	The Unit 3 site characteristic value of 46.5 cm/hr (18.3 in/hr) is from SSAR Table 2.4-3 and SSAR Table 1.9-1, and falls within (is the same as) the ESP site characteristic value.
	Maximum Rainfall Rate (Short-Term), 5 min	6.3 in. for seismic category I/II structures	**ESP** 15.5 cm (6.1 in) in 5 min	The ESP site characteristic value for local intense precipitation is defined as the maximum potential rainfall at the immediate ESP site in inches of rain in five minutes. This value is 15.5 cm (6.1 in) inches in 5 minutes. The ESP site characteristic value falls within (is less than) the DCD site parameter value.
			Unit 3 15.5 cm (6.1 in) in 5 min	The Unit 3 site characteristic value of 15.5 cm (6.1 in) in 5 min is from SSAR Table 2.4-3 and SSAR Table 1.9-1, and falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Hydrologic Engineering (continued)			
	Maximum Groundwater Level	1 ft below plant grade		The DCD site parameter of maximum groundwater level of 1 ft below plant grade is provided in DCD Table 2.0-1. The design plant grade elevation identified in DCD Figure 1.2-12 is at 2'7", which corresponds to 290 ft NAVD88 (290.86 ft NGVD29) for the Unit 3 site as shown in Figure 2.1-201. Therefore, the DCD site parameter value of 1 ft below plant grade corresponds to a maximum groundwater level no higher than 289 ft NAVD88 (289.86 ft NGVD29) for the Unit 3 site.
			ESP 82.3 m (270 ft) msl (which corresponds to 269.14 ft NAVD88 (270 ft NGVD29)) or 1 ft below the free surface, whichever is higher	The ESP site characteristic value for maximum groundwater level is defined in ESP, Appendix A, as the maximum elevation of groundwater at the ESP site. The ESP value of 269.14 ft NAVD88 (270 ft NGVD29) is based on the proposed site grade in the SSAR of 271.0 ft msl (which corresponds to 270.14 ft NAVD88 (271 ft NGVD29)). With design plant grade for Unit 3 at 290 ft NAVD88 (290.86 ft NGVD29), the operative ESP site characteristic value becomes 1 ft below the free surface which is higher than 269.14 ft NAVD88 (270 ft NGVD29). With a free surface at 290 ft NAVD88 (290.86 ft NGVD29), the ESP site characteristic corresponds to 289 ft NAVD88 (289.86 ft NGVD29) which falls within (is the same as) the value established by the DCD site parameter. SSAR Table 1.9-1 provides a value of< 270 ft msl (which corresponds to < 269.14 NAVD88 (270 ft NGVD29)) from SSAR Section 2.4.12.4 which is based on the proposed site grade in the SSAR of 270.14 ft NAVD88 (271 ft NGVD29).

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Hydrologic Engineering (continued)			
	Maximum Groundwater Level (continued)		**Unit 3** 5.6 ft below design plant grade	The Unit 3 site characteristic value for maximum groundwater level below design plant grade is 5.6 ft in the power block area (at the UHSRS) based on the maximum groundwater elevation of 284.4 ft NAVD88 (285.26 ft NGVD29) from Section 2.4.12 and the design plant grade elevation of 290 ft NAVD88 (290.86 ft NGVD29). Therefore, the Unit 3 site characteristic value for maximum groundwater level below design plant grade falls within (is lower than) the DCD site parameter value. The maximum groundwater level in the power block area is 5.6 ft below design plant grade, which meets the DCD site parameter limit of not higher than 1 ft below design plant grade. The Unit 3 site characteristic value falls within (is lower than) the ESP site characteristic value. Figure 2.4-216 contains a table showing the maximum groundwater levels at selected points in the power block area.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Geology, Seismology, and Geotechnical Engineering			
	Maximum slope for foundation-bearing stratum	20 degrees from horizontal in untruncated strata	**ESP** No value provided	
			Unit 3 20 degrees from horizontal in untruncated strata	Because the bearing strata are undulating (due to uneven weathering processes), no fixed slope is present. The Unit 3 site characteristic value for maximum slope for foundation bearing stratum is 20 degrees from horizontal (maximum average due to the undulating bearing strata). As shown in Figures 2.5-229 through 2.5-234 for the US-APWR standard plant Seismic Category I structures, the Unit 3 site characteristic falls within (is the same as) the DCD site parameter value.
NAPS DEP 3.7(1)	Safe-shutdown earthquake (SSE) ground motion	0.3 g peak ground acceleration	**ESP** No value provided	Safe-shutdown earthquake (SSE) ground motion is the value of peak ground acceleration (PGA), which along with the response spectra, characterize the magnitude of the design basis earthquake. The DCD value for the safe-shutdown earthquake (SSE) ground motion is 0.3g peak ground acceleration.
			Unit 3 > 0.3g	As described in Section 3.7.1.1, the Unit 3 site characteristic for SSE ground motion is a PGA > 0.3g. The Unit 3 site characteristic value does not fall within (is greater than) the DCD site parameter value. See Sections 3.7.2 and 3.8 for site-specific analysis of standard plant Seismic Category I structures.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Geology, Seismology, and Geotechnical Engineering (continued)			
NAPS DEP 3.7(1)	SSE (Certified Seismic Design) Horizontal Ground Response Spectra	RG 1.60, enhanced spectra in high frequency range (see DCD Figure 3.7.1-1)	**ESP** No values provided	The DCD site parameter values for site-independent SSE response spectra at foundation level are identified as the Certified Seismic Design Response Spectra (CSDRS). The CSDRS for the US-APWR standard plant Seismic Category I structures are shown in DCD Figure 3.7.1-1 (horizontal) and in DCD Figure 3.7.1-2 (vertical).
NAPS DEP 3.7(1)	SSE (Certified Seismic Design) Vertical Ground Response Spectra	RG 1.60, enhanced spectra in high frequency range (see DCD Figure 3.7.1-2)	**Unit 3** See Figures 3.7-201, 3.7-202, 3.7-203, and 3.7-204	The Unit 3 site characteristic values are identified as the FIRS for the standard Seismic Category I structures. The horizontal FIRS are shown in Figures 3.7-201 and 3.7-203. The vertical FIRS are shown in Figures 3.7-202 and 3.7-204. The comparisons of the DCD site parameter values (CSDRS) and Unit 3 site characteristic values (FIRS for the R/B-PCCV and PS/Bs) are also provided in Figures 3.7-201 and 3.7-203 for the horizontal spectra and in Figures 3.7-202 and 3.7-204 for the vertical spectra. These comparisons demonstrate that the Unit 3 site characteristic values do not fall within (are greater than) the values established by the DCD site parameters. See Sections 3.7.2 and 3.8 for the site-specific seismic analysis of these standard plant structures.
	Potential for Surface Tectonic Deformation at the Site	None within the EAB	**ESP and Unit 3** No fault displacement potential within the investigative area	The ESP site characteristic value is defined as no fault displacement potential within the investigative area. The Unit 3 site characteristic value is provided in SSAR Sections 2.5.1.2.4 and 2.5.3.2.2, as identified in SSAR Table 1.9-1. The ESP site characteristic value falls within (is the same as) the DCD site parameter value for the area within the EAB. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description(17)	DCD Site Parameter Value(17)	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Geology, Seismology, and Geotechnical Engineering (continued)			
	Subsurface Stability—Minimum Allowable Static Bearing Capacity	15,000 lb/ft^2		The DCD site parameter of minimum static bearing capacity underlying the standard plant seismic category I structure foundations is determined by the minimum static bearing capacity for any layer of material under this foundation. As shown in Figures 2.5-229 through 2.5-232, concrete fill, Zone III-IV, and Zone IV materials are under the R/B-PCCV and PS/B foundations for Unit 3. Of these, the Zone III-IV material has the lowest minimum static bearing capacity value, as shown in Table 2.5-214.
			ESP and Unit 3 3830 kPa (80,000 lb/ft^2) for Zone III-IV material	The ESP site characteristic value for minimum bearing capacity of Zone III-IV material is defined as the allowable load-bearing capacity of this layer for supporting plant structures. This value is 3830 kPa (80,000 lb/ft^2) and falls within (is greater than) the DCD site parameter value. SSAR Section 2.5.4 provides the same value as ESP, Appendix A. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
	Subsurface Stability—Minimum Allowable Dynamic Bearing Capacity, Normal Conditions Plus SSE	60,000 lb/ft^2	**ESP** No values provided	
			Unit 3 214,000 lb/ft^2	The Unit 3 site characteristic value for minimum allowable dynamic bearing capacity for the standard plant seismic category I structures is from Table 2.5-214 for concrete and falls within (is greater than) the DCD site parameter minimum allowable value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(1)

Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Geology, Seismology, and Geotechnical Engineering (continued)			
Subsurface Stability—Minimum Shear Wave Velocity at SSE Input at Ground Surface	1000 ft/s	**ESP** 3300 ft/s	The ESP site characteristic value for minimum shear wave velocity is defined as the propagation of shear waves through foundation materials. The ESP site characteristic value for shear wave velocity for Zone III-IV material is 3300 ft/sec, which is included in SSAR Table 1.9-1, which refers to SSAR Table 2.5-45 and FSER Section 2.5.4.1.7 (Reference 2.0-202). The ESP site characteristic value falls within (is greater than) the DCD site parameter value.
		Unit 3 Minimum shear wave velocity for material under standard plant seismic category I structures 4500 ft/s	The Unit 3 site characteristic value for minimum shear wave velocity under standard plant seismic category I structures is 4500 ft/s for Zone III–IV material. The value for this material falls within (is greater than) the DCD site parameter minimum value. The Unit 3 site characteristic value falls within (is greater than) the ESP site characteristic value.
Subsurface Stability—Liquefaction Potential	None (for Seismic Category I structures)	**ESP** No value provided	
		Unit 3 None at site-specific SSE under Seismic Category I structures	The Unit 3 site characteristic value for liquefaction falls within (is the same as) the DCD site parameter. As described in Section 2.5.4.8, there is no potential for liquefaction under Unit 3 seismic category I structures at the site-specific SSE ground motion. SSAR Table 1.9-1 states that safety-related structures would be founded on rock with no liquefaction potential, or on soil with a factor of safety against liquefaction equal to or greater than 1.1 at the SSE ground motion.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(1)

Parameter Description(17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Geology, Seismology, and Geotechnical Engineering (continued)			
Total Settlement of R/B Complex Foundation(14)(15)	6.0 in	**ESP** No value provided	
		Unit 3 0.042 in	The Unit 3 site characteristic value for total (average) structure settlement for the R/B complex foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.
Differential Settlement Across R/B Complex Foundation(14)(15)	2.0 in	**ESP** No value provided	
		Unit 3 0.033 in	The Unit 3 site characteristic value for the maximum differential settlement across the R/B complex foundation is the difference between the estimated center settlement (0.052 in) and the estimated corner settlement (0.019 in). These values are provided in Table 2.5-216. The Unit 3 differential settlement value falls within (is less than) the DCD site parameter value.
Maximum Differential Settlement Between Buildings(14)((16)	0.5 in	**ESP** No value provided	
		Unit 3 0.036 in	The Unit 3 site characteristic value for the maximum differential settlement between Seismic Category I and II structures is conservatively estimated as the maximum edge settlement of any such structure. As indicated in Table 2.5-216, the maximum estimated edge settlement for any structure is 0.036 in, which falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description[17]	DCD Site Parameter Value[17]	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	**Part 1 – Evaluation of DCD Site Parameters**			
	Geology, Seismology, and Geotechnical Engineering (continued)			
	Maximum Tilt of R/B Complex Foundation Generated During Operational Life of the Plant[14][16]	1/2000	**ESP** No value provided	
			Unit 3 < 1/12,000	The Unit 3 site characteristic value for maximum tilt is the maximum settlement of the R/B between the center and the edge, which is less than 0.1 in (i.e., less than any R/B settlement value), divided by the shortest distance from the R/B center to an edge, which is greater than 100 ft (as shown in DCD Tier 1 Figure 2.2-1). With these values, the tilt would be less than 0.1 in/100 ft or less than 1/12,000. The Unit 3 site characteristic falls within (is less than) the DCD site parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Site Characteristic			
EAB	No value provided	**ESP** Perimeter of a 1524 m (5000 ft) radius circle from the center of the abandoned Unit 3 containment **Unit 3** 10 CFR 100.21(a) Meets requirement	The ESP site characteristic value is defined as the area surrounding the reactor, in which the reactor licensee has the authority to determine all activities including exclusion or removal of personnel and property from the area. The Unit 3 site characteristic is presented as a criterion and the value is described in SSAR Table 1.9-1 as: "The exclusion area boundary is the perimeter of a 5000-ft-radius circle from the center of the abandoned Unit 3 containment." The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
Low Population Zone	No value provided	**ESP** 9.7 km (6 mi) radius circle centered at the Unit 1 containment building. **Unit 3** 10 CFR 100.21(a) Meets requirement	The ESP site characteristic value is defined as the area immediately surrounding the exclusion area which contains residents. The Unit 3 site characteristic is presented as a criterion and the value is described in SSAR Table 1.9-1 as: "The low population zone is a 6-mile radius circle centered at the Unit 1 containment building." The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Site Characteristic (continued)			
Population Center Distance	No value provided	**ESP** Minimum of 12.9 km (8 mi) **Unit 3** 10 CFR 100.21(b) Meets requirement	The ESP site characteristic value is defined as the minimum allowable distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents. The Unit 3 site characteristic is presented as a criterion and the value is described in SSAR Table 1.9-1 as: “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.” The Unit 3 site characteristic criterion equates to a minimum of 12.9 km (8 mi) because the Unit 3 LPZ is a 9.7 km (6 mi) radius circle. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value. Unit 3 meets this criterion because, as stated in SSAR Section 2.1.3.5, the nearest population center to Unit 3 with more than 25,000 residents is the City of Charlottesville and the closest point of this city to Unit 3 is 36 miles west.
Ambient Design Temperature			
Maximum Dry/Wet Bulb Temperature (coincident) 2% Annual Exceedance	No value provided	**ESP and Unit 3** 90°F dry bulb with 75°F wet bulb (mean coincident) (2% annual exceedance values)	The ESP site characteristic values for maximum dry-bulb temperature with mean coincident wet-bulb temperature for 2% annual exceedance are the ambient dry-bulb temperature (and mean coincident wet-bulb temperature) that will be exceeded 2% of the time annually. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same values as ESP, Appendix A. The Unit 3 site characteristic values fall within (are the same as) the ESP site characteristic values.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Ambient Design Temperature (continued)			
Maximum Dry-Bulb Temperature 100-year return period	No value provided	**ESP and Unit 3** 42.8°C (109°F)	The ESP site characteristic value is defined as the ambient dry-bulb temperature that has a 1% annual probability of being exceeded (100-year mean recurrence interval). The Unit 3 site characteristic value is provided in SSAR Table 2.3-18 and SSAR Table 1.9-1; and falls within (is the same as) the ESP site characteristic value.
Minimum Dry-Bulb Temperature 99.6% annual exceedance	No value provided	**ESP and Unit 3** -10°C (14°F)	The ESP site characteristic value is defined as the ambient dry-bulb temperature below which dry-bulb temperature will fall 0.4% of the time annually. The Unit 3 site characteristic value is provided as the 0.4% annual exceedance value for minimum dry bulb temperature in SSAR Table 2.3-18 and SSAR Table 1.9-1; and falls within (is the same as) the ESP site characteristic value.
Minimum Dry-Bulb Temperature 100-year return period	No value provided	**ESP and Unit 3** –28.3°C (–19°F)	The ESP site characteristic value is defined as the ambient dry-bulb temperature for which a 1% annual probability of a lower dry-bulb temperature exists (100-year mean recurrence interval). The Unit 3 site characteristic value is provided in SSAR Tables 2.3-18 and 1.9-1, and falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Ambient Design Temperature (continued)			
Maximum Wet-Bulb Temperature (non-coincident) 0.4% Annual Exceedance	No value provided	**ESP and Unit 3** 26.1ºC (79ºF) wet-bulb (non-coincident) (0.4% annual exceedance value)	The Unit 3 site characteristic value is the ESP site characteristic value for the maximum wet bulb temperature (non-coincident) for 0.4% annual exceedance. This value is defined as the ambient wet-bulb temperature that will be exceeded 0.4% of the time annually. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same 0.4% value as ESP, Appendix A. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic.
Maximum Wet-Bulb Temperature 100-year return period	No value provided	**ESP and Unit 3** 31.1°C (88°F)	The ESP site characteristic value is defined as the ambient wet-bulb temperature that has a 1 percent annual probability of being exceeded (100-year mean recurrence interval). The Unit 3 site characteristic value is provided in SSAR Table 2.3-18 and SSAR Table 1.9-1; and falls within (is the same as) the ESP site characteristic value.
Winter Precipitation			
100-Yr Snowpack	No value provided	**ESP and Unit 3** 30.5 lb/ft^2 (100-yr recurrence)	The ESP site characteristic value for maximum ground snow load is defined as the weight of the 100-yr return period snowpack (to be used in determining extreme winter precipitation loads for roofs). SSAR Section 2.3.1.3.4 and SSAR Table 1.9-1 provide the same value as ESP, Appendix A. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Ultimate Heat Sink Ambient Air Temperature and Humidity			
	Meteorological Conditions Resulting in the Minimum Water Cooling During Any 1 Day	No value provided	**ESP and Unit 3** 26.1°C (78.9°F) wet-bulb temperature with coincident 30.9°C (87.7°F) dry-bulb temperature	The ESP site characteristic value is defined as the historic worst 1-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures. The Unit 3 site characteristic value is provided in SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.8, and falls within (is the same as) the ESP site characteristic value.
	Meteorological Conditions Resulting in the Minimum Water Cooling During Any Consecutive 5 days	No value provided	**ESP and Unit 3** 25.3ºC (77.6ºF) wet-bulb temperature with coincident 27.2ºC (80.9ºF) dry-bulb temperature	The ESP site characteristic value is defined as the historic worst 5-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures resulting in minimum water cooling. The Unit 3 site characteristic value is provided in SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.8, and falls within (is the same as) the ESP site characteristic value.
	Meteorological Conditions Resulting in the Maximum Evaporation and Drift Loss During Any Consecutive 30 Days	No value provided	**ESP and Unit 3** 24.6°C (76.3°F) wet-bulb temperature with coincident 26.4°C (79.5°F) dry-bulb temperature	The ESP site characteristic value is defined as the historic worst 30-day daily average of wet-bulb temperatures and coincident dry-bulb temperatures. The Unit 3 site characteristic value is provided in SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.8, and falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Ultimate Heat Sink Ambient Air Temperature and Humidity (continued)			
Meteorological Conditions Resulting in the Maximum Water Freezing in the UHS Water Storage Facility	No value provided	**ESP and Unit 3** 179 degree (C)-days (322 degree (F)-days) below freezing	The ESP site characteristic value is defined as the historic maximum cumulative degree-days below freezing. The Unit 3 site characteristic value is provided in SSAR Table 1.9-1, which refers to SSAR Section 2.3.1.3.8, and falls within (is the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Hydrology			
Proposed Facility Boundaries	No value provided	**ESP** Proposed facility boundary as shown in ESP, Appendix A, Figure 1. (Reference 2.0-203) Figure 1 shows the proposed facility boundary using the boundary corners numbered 1-8. Notes 1 and 2 apply. **Unit 3** Figure 2.0-205, which shows that the Unit 3 power block buildings which could have postulated accidental fission product releases are located within the Figure 1 proposed facility boundary.	The ESP site characteristic value is defined as the ESP site boundary map. The Unit 3 site characteristic value, as shown in Figure 2.0-205, falls within (power block buildings which could have postulated accidental fission product releases are located within) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Hydrology (continued)			
NAPS ESP VAR 2.0-7a	Proposed Facility Boundaries (continued)		Coordinates of the proposed facility boundaries are shown in Figure 2.0-205.	ESP, Appendix A, Figure 1, Note 1 states: “North Anna Site and State NAD 83 (South Zone) coordinates are shown as noted.” There are two sets of values given as Coordinates (NAPS GRID) and Coordinates (State NAD 83 South Zone). The Unit 3 site characteristics are two sets of values given in Figure 2.0-205 as COORDINATES (NAPS U1 & U2 GRID) and COORDINATES (STATE PLANE NAD 83 VA SOUTH ZONE). The Unit 3 values for the COORDINATES (NAPS U1 & U2 GRID) fall within (are the same as) the ESP Coordinates (NAPS GRID) values. The Unit 3 values for the COORDINATES (STATE PLANE NAD 83 VA SOUTH ZONE) do not fall within (are different from) the ESP Coordinates (State NAD 83 South Zone) values.
NAPS ESP VAR 2.0-7b			No removal of abandoned mat foundations unless a Unit 3 seismic category I or II structure would be located above a foundation.	ESP, Appendix A, Figure 1, Note 2 states: “Abandoned Unit 3 and 4 Reactor Building Mat Foundations are to be removed.” The Unit 3 Site characteristic is no removal of abandoned mat foundations unless a Unit 3 seismic category I or II structure would be located above a foundation. The Unit 3 site characteristic does not fall within (is not the same as) the ESP site characteristic.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Hydrology (continued)			
Minimum Lake Water Level	No value provided	**ESP and Unit 3** 242 ft msl which corresponds to 241.14 ft NAVD88 (242 ft NGVD29)	The ESP site characteristic value is defined as the low water surface shutdown elevation for operation of NAPS Units 1 and 2, and Unit 3. The Unit 3 site characteristic value is provided in Section 2.4.14 and falls within (is the same as) the ESP site characteristic value.
Frazil and Anchor Ice	No value provided	**ESP and Unit 3** Potential for formation of frazil and anchor ice	The ESP site characteristic value is defined as the accumulated ice formation in a turbulent flow condition. The Unit 3 site characteristic value is provided in SSAR Table 1.9-1, which refers to SSAR Section 2.4.7.4, and falls within (is the same as) the ESP site characteristic value.
Maximum Ice Thickness	No value provided	**ESP and Unit 3** 43.4 cm (17.1 in.) thick	The ESP site characteristic value is defined as the ice sheet thickness at Lake Anna (based on maximum cumulative degree-days below freezing of 178.8°C (321.8°F)). The Unit 3 site characteristic value is provided in SSAR Section 2.4.7 and falls within (is the same as) the ESP site characteristic value.
Max Cumulative Degree-Days Below Freezing	No value provided	**ESP** 178.8 degree(C)-days (321.8 degree(F)-days) **Unit 3** 179 degree(C)-days (322 degree(F)-days)	The ESP site characteristic value is defined as the measure of severity of winter weather conditions conducive to ice formation (computed using air temperature data from the Piedmont Research Station). The Unit 3 site characteristic value is provided in SSAR Section 2.3.1.3.8 and falls within (is greater than–essentially the same as) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Hydrology (continued)			
	Hydraulic Conductivity	No value provided	**ESP** 1.0 m/d (3.4 ft/d)	The ESP site characteristic value is defined as the groundwater flow rate per unit hydraulic gradient. SSAR Table 1.9-1 identifies the hydraulic conductivity as 1.0 m/d (3.4 ft/d).
NAPS ESP VAR 2.0-2			**Unit 3** 3.0 m/d (9.9 ft/d)	The Unit 3 site characteristic value is provided in Section 2.4.12 and does not fall within (is greater than) the ESP site characteristic value.
	Hydraulic Gradient	No value provided	**ESP** 0.03 m/m (0.03 ft/ft)	The ESP site characteristic value is defined as the slope of groundwater surface under unconfined conditions or slope of hydraulic pressure head under confined conditions. SSAR Table 1.9-1 identifies the hydraulic gradient as 0.03 m/m (0.03 ft/ft).
NAPS ESP VAR 2.0-3			**Unit 3** 0.05 ft/ft	The Unit 3 site characteristic value is provided in Section 2.4.12 and does not fall within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Vibratory Ground Motion			
	Design Response Spectra	No value provided	**ESP** ESP, Appendix A, Figure 2	The ESP site characteristic values are the horizontal and vertical response spectra provided in ESP, Appendix A, Figure 2. SSAR Table 1.9-1 states that the site-specific response spectra are provided in SSAR Section 2.5.2.6. That section includes SSAR Figure 2.5-48A which is the same as ESP, Appendix A, Figure 2.
NAPS ESP VAR 2.0-4			**Unit 3** Figure 2.5-201	The Unit 3 site characteristic values are the horizontal and vertical ground motion response spectra (GMRS) defined at Elevation 250 ft NAVD88 (250.86 ft NGVD29) (as tabulated in Table 2.5-201 and plotted in Figure 2.5-201). The Unit 3 site characteristic values at Elevation 250 ft NAVD88 (250.86 ft NGVD29) (response spectra) do not fall within (are not lower than) the ESP site characteristic values (response spectra) at a few frequencies less than 6 Hz. Figure 2.0-206 and Table 2.0-202 compare the ESP and Unit 3 horizontal response spectra. Figure 2.0-207 and Table 2.0-203 compare the ESP and Unit 3 vertical response spectra. While the figures are essentially overlapping curves at low frequencies, the tables show where the Unit 3 spectra exceed the ESP spectra.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Stability of Subsurface Materials and Foundations			
Zone III Weathered Rock			
Minimum Bearing Capacity	No value provided	**ESP** 766 kPa (16 ksf) **Unit 3** 958 kPa (20 ksf)	The ESP site characteristic value is defined as the allowable load-bearing capacity of layer supporting plant structures. The Unit 3 site characteristic value is provided in Table 2.5-214 and falls within (is greater than) the ESP site characteristic value. SSAR Table 1.9-1 refers to the value in SSAR Table 2.5-47, which is 766 kPa (16 ksf).
Minimum Shear Wave Velocity	No value provided	**ESP** 610 m/sec (2000 ft/sec) **Unit 3** 914 m/sec (3000 ft/sec)	The ESP site characteristic value is defined as the propagation of shear waves through foundation materials. The Unit 3 site characteristic value is the best estimate (BE) shear wave velocity in Table 2.5-212. This corresponds to the BE ESP shear wave velocity in SSAR Table 1.9-1, which refers to SSAR Table 2.5-45, and FSER Section 2.5.4.1.7 (Reference 2.0-202). The Unit 3 site characteristic value falls within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Stability of Subsurface Materials and Foundations (continued)			
	Zone III–IV			
	Minimum Bearing Capacity	No value provided	**ESP and Unit 3** 3830 kPa (80 ksf)	The ESP site characteristic value is defined as the allowable load-bearing capacity of layer supporting plant structures. The Unit 3 site characteristic value is provided in Table 2.5-214 falls within (is the same as) the ESP site characteristic value. SSAR Table 1.9-1 refers to the value in SSAR Table 2.5-47, which is 3830 kPa (80 ksf).
	Minimum Shear Wave Velocity	No value provided	**ESP** 1006 m/sec (3300 ft/sec) **Unit 3** See the DCD site parameter "Subsurface Stability— Minimum Shear Wave Velocity at SSE Input at Ground Surface" under Part 1 of the table.	The ESP site characteristic value is defined as the propagation of shear waves through foundation materials.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(2)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Stability of Subsurface Materials and Foundations (continued)			
Zone IV Bedrock (188ft–298ft)			
Minimum Bearing Capacity	No value provided	**ESP and Unit 3** 7661 kPa (160 ksf)	The ESP site characteristic value is defined as the allowable load-bearing capacity of layer supporting plant structures. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value. Minimum bearing capacities are provided in Table 2.5-214. SSAR Table 1.9-1 refers to the value in SSAR Table 2.5-47, which is 7661 kPa (160 ksf).
Minimum Shear Wave Velocity	No value provided	**ESP** 1920 m/sec (6300 ft/sec) **Unit 3** 2743 m/sec (9000 ft/s)	The ESP site characteristic value is defined as the propagation of shear waves through foundation materials. The Unit 3 site characteristic value is the BE shear wave velocity in Table 2.5-212. This corresponds to the BE ESP shear wave velocity in SSAR Table 1.9-1, which refers to SSAR Table 2.5-45, and FSER Section 2.5.4.1.7 (Reference 2.0-202). The Unit 3 site characteristic value falls within (is greater than) the ESP site characteristic value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Bounding Parameters		In the rows below, this column contains ESP Design Parameters and Unit 3 Design Characteristics	
	Maximum Cooling Water Flow Rate – Unit 3	No value provided	**ESP Table B-1 and Unit 3** 5056.3 m^3/h (49.6 cfs)	The ESP bounding design parameter value is defined as the maximum instantaneous withdrawal rate from the North Anna reservoir. The Unit 3 design characteristic value is provided in SSAR Section 2.4.1 and falls within (is the same as) the ESP bounding design parameter value.
	Minimum Site Grade	No value provided	**ESP, Table B-1** 82.6 m (271 ft) msl which corresponds to 270.14 ft NAVD88 (271 ft NGVD29) **Unit 3** 290 ft NAVD88 (290.86 ft NGVD29)	The ESP bounding design parameter value is defined as the finished site grade. The Unit 3 design characteristic value is provided in Figure 2.1-201 and falls within (is greater than) the ESP bounding design parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [(17)]	DCD Site Parameter Value [(17)]	Site Characteristic	Evaluation
NAPS SUP 2.0(2)	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
NAPS ESP VAR 2.0-6	**Source Term**			
	Gaseous (Post Accident)	No value provided	**ESP** Values in ESP Appendix B tables	ESP (design) controlling parameters superseded.
			SSAR Table 1.9-1 Values in SSAR Section 15.4 tables (maximum values)	Design basis accident (DBA) analyses evaluated in SSAR Chapter 15 were based on accidents and associated source terms for the AP1000, ABWR, and the ESBWR plant designs. The source terms for the DBAs evaluated for the US-APWR in DCD Chapter 15 are not bounded by the ESP source terms (included in ESP-003, Appendix B) in all cases. This is variance NAPS ESP VAR 2.0-6.
			Unit 3 Values in DCD Chapter 15	Calculated doses are shown in DCD Chapter 15 to be within limits set by regulatory guidance documents and applicable regulations. Unit 3 site-specific short term (accident) meteorological dispersion values (χ/Q) are demonstrated in Part 1 of this table to fall within the associated DCD site parameter values. Therefore, the doses for the accidents evaluated in DCD Chapter 15 are bounding for Unit 3 and are within limits set by regulatory guidance documents and applicable regulations.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(3)	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	Winter Precipitation			
	100-year Snowpack plus 48-hour Maximum Snowfall	No value provided	**SSAR Table 1.9-1** 2.18 kPa (45.5 lb/sq ft) **Unit 3** See the DCD site parameter "Extreme Winter Precipitation Roof Load" under Part 1 of this table.	SSAR Table 1.9-1 specifies a value of 2.18 kPa (45.5 lb/sq ft) as the 48-hour maximum snowfall (72.4 cm (28.5 inches), at 0.72 kPa (15 lb/sq ft)) on top of a 100-year return snowpack (1.46 kPa (30.5 lb/sq ft)).
	Distribution Coefficients (K_d)			
	Mn-54	No value provided	**SSAR Table 1.9-1** 50 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20.
NAPS ESP VAR 2.0-5			**Unit 3** 4.5 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value and does not fall within (is less than) the SSAR site characteristic value. See Section 2.4.13 for the radionuclide transport analysis.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(3)	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	Distribution Coefficients (K_d) (continued)			
	Fe-55	No value provided	**SSAR Table 1.9-1** 165 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20.
			Unit 3 4504 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value and falls within (is greater than) the SSAR site characteristic value. See Section 2.4.13 for the radionuclide transport analysis.
	Co-60 Co-58	No value provided	**SSAR Table 1.9-1** 60 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20.
NAPS ESP VAR 2.0-5			**Unit 3** 6.5 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value and does not fall within (is less than) the SSAR site characteristic value. See Section 2.4.13 for the radionuclide transport analysis.
	Sr-90 Y-90	No value provided	**SSAR Table 1.9-1** 15 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20.
NAPS ESP VAR 2.0-5			**Unit 3** 3.6 cm^3/g	The Unit 3 site characteristic value for Sr-90 listed in Table 2.4-207 is the minimum measured K_d value and does not fall within (is less than) the SSAR site characteristic value. The K_d value for Y-90 is assumed to be the same as the parent radionuclide, Sr-90. See Section 2.4.13 for the radionuclide transport analysis.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(3)

Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value			
Distribution Coefficients (K_d) (continued)			
Ru-106	No value provided	**SSAR Table 1.9-1** 55 cm^3/g **Unit 3** 272 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20. The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value and falls within (is greater than) the SSAR site characteristic value. See Section 2.4.13 for the radionuclide transport analysis.
Te-127m Te-127	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 0.61 cm^3/g	SSAR Table 1.9-1 does not identify distribution coefficients for these radionuclides. The Unit 3 site characteristic value listed in Tables 2.4-206 and 2.4-206a for Te-127m was conservatively assigned to the tenth percentile of its distribution based on data published in NUREG/CR-6697. The K_d values for Te-127 are assumed to be the same as the parent radionuclide, Te-127m. See Section 2.4.13 for the radionuclide transport analysis.
Cs-134	No value provided	**SSAR Table 1.9-1** 30 cm^3/g **Unit 3** 64.9 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20. The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value and falls within (is greater than) the SSAR site characteristic value. See Section 2.4.13 for the radionuclide transport analysis.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(3)

Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value			
Distribution Coefficients (K_d) (continued)			
Cs-137	No value provided	**SSAR Table 1.9-1** 30 cm^3/g **Unit 3** 64.9 cm^3/g	The SSAR Table 1.9-1 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is consistent with SSAR Table 2.4-20. The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value and falls within (is greater than) the SSAR site characteristic value. See Section 2.4.13 for the radionuclide transport analysis.
Ce-144 Pr-144m Pr-144	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 329.1 cm^3/g	SSAR Table 1.9-1 does not identify distribution coefficients for these radionuclides. The Unit 3 site characteristic value listed in Table 2.4-207 is the minimum measured K_d value for Ce-144. The K_d value for Pr-144m and Pr-144 are assumed to be the same as the parent radionuclide, Ce-144. See Section 2.4.13 for the radionuclide transport analysis.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
NAPS SUP 2.0(3)	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	Dose Consequences			
NAPS ESP VAR 2.0-6	Post Accident	No value provided	**SSAR Table 1.9-1** 10 CFR 50.34(a)(1) and 10 CFR 100 dose limits **Unit 3** 10 CFR 50.34(a)(1) and 10 CFR 100 dose limits	The Unit 3 site characteristic criteria fall within (are the same as) the SSAR Table 1.9-1 site characteristic criteria. SSAR Table 1.9-1 states that the radiological dose consequences due to gaseous releases from postulated plant accidents are addressed in SSAR Sections 15.2 and 15.4. SSAR Section 15.2 provides the site-specific χ/Q values for accident evaluations. The Unit 3 values are provided under Meteorological Dispersion (χ/Q) in Part 1 of this table above and the values fall within (are the same as) the SSAR Table 1.9-1 (SSAR Section 15.2) values. SSAR Section 15.4 provides dose estimates for three reactors. The estimates for the ABWR, AP-1000, and ESBWR do not apply to Unit 3. The Unit 3 dose from each DBA is provided in DCD Chapter 15, which conservatively assumes DCD χ/Q values rather than the Unit 3 site-specific χ/Q values. The DCD χ/Q values bound the Unit 3 values as shown under Meteorological Dispersion (χ/Q) in Part 1 of this table above. Unit 3 doses do not fall within (are larger than) the SSAR Table 1.9-1 (SSAR Section 15.4) values. While the Unit 3 doses based on the DCD values are below the regulatory limits, this is NAPS ESP VAR 2.0-6.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(3)	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	Release Point			
	Minimum Distance to Site Boundary	No value provided	**SSAR Table 1.9-1** 870.17 m (2854.9 ft) **Unit 3** 870.17 m (2854.9 ft)	The Unit 3 site characteristic value falls within (is the same as) the SSAR Table 1.9-1 site characteristic value. SSAR Figure 2.1-1 identifies this distance as the closest point from the proposed facility boundary to the EAB. The facility boundary is the basis for estimating values for χ/Q values used in the SSAR and remains the basis for the Unit 3 site-specific χ/Q values. Figure 2.0-205 shows that Unit 3 power block buildings which could have postulated accidental fission product releases are located within that boundary. Because the buildings are within the boundary, the minimum distance to the site boundary is conservatively estimated. DCD Figure 2.3-2 shows the potential release points for the Unit 3 power block buildings.
	Population Density			
	Population density at the time of initial site approval and within about 5 years thereafter	No value provided	**SSAR Table 1.9-1** Population density meets the guidance of RS-002, Section 2.1.3 for RG 4.7, Regulatory Position C.4 **Unit 3** Population density meets the guidance of RS-002, Section 2.1.3 for RG 4.7, Regulatory Position C.4	Based on SSAR Table 1.9-1, the Unit 3 site characteristic criterion is that 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. The Unit 3 site characteristic criterion falls within (is the same as) the SSAR Table 1.9-1 criterion. Time dependent population densities are provided in SSAR Section 2.1.3.6 which refers to SSAR Figure 2.1-14. That figure shows the projected population density at 2040 (i.e., much later than 5 years after expected initial site approval) meets the requirement.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(3)

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value			
Population Density (continued)			
Population density at the time of initial operation	No value provided	**SSAR Table 1.9-1** Population density meets the guidance of RS-002, Section 2.1.3 **Unit 3** Population density meets the guidance of RS-002, Section 2.1.3	Based on SSAR Table 1.9-1, the Unit 3 site characteristic criterion is that 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. The Unit 3 site characteristic criterion falls within (is the same as) the SSAR Table 1.9-1 criterion. Time dependent population densities are provided in SSAR Section 2.1.3.6 which refers to SSAR Figure 2.1-14. That figure shows the projected population density at 2040 (i.e., much later than the expected time of initial operation) meets the requirement.
Population density over the lifetime of the new units until 2065	No value provided	**SSAR Table 1.9-1** Population density meets the guidance of RS-002, Section 2.1.3 **Unit 3** Population density meets the guidance of RS-002, Section 2.1.3	Based on SSAR Table 1.9-1, the Unit 3 site characteristic criterion is that 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 Unit 3. The Unit 3 site characteristic criterion falls within (is the same as) the SSAR Table 1.9-1 criterion. Time dependent population densities are provided in SSAR Section 2.1.3.6 which refers to SSAR Figure 2.1-14. That figure shows the projected population density over the lifetime of Unit 3 operation meets the requirement.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

NAPS SUP 2.0(3)

Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value			
Population Density (continued)			
Site is Away from Very Densely Populated Centers	No value provided	**SSAR Table 1.9-1** 10 CFR 100.21(h) Meets requirement **Unit 3** 10 CFR 100.21(h) Meets requirement	Based on SSAR Table 1.9-1, the Unit 3 site characteristic criterion is that reactor sites should be located away from very densely populated centers. Areas of low population density are, generally, preferred. However, in determining the acceptability of a particular site located away from a very densely populated center but not in an area of low density, consideration will be given to safety, environmental, economic, or other factors, which may result in the site being found acceptable. The Unit 3 site characteristic criterion falls within (is the same as) the SSAR Table 1.9-1 criterion. SSAR Section 2.1.3.5 identifies that the nearest population center with more than 25,000 residents is the City of Charlottesville which is 36 miles away.
Design Parameter	In the following rows, values for Unit 3 design characteristics presented in the DCD are identified in the Evaluation column	In the following rows, this column contains SSAR Table 1.9-1, Design Parameters and Unit 3 Design Characteristics	
Structure Height	See Evaluation column	**SSAR Table 1.9-1** ≤ 71.3 m (234 ft) **Unit 3** 229.42 ft	The tallest power block structure is the containment portion of the R/B (see Figure 1.2-6R) at 229.42 ft above finished grade. The height of 229.42 ft is based on the highest structural elevation of 519.42 ft NAVD88 (520.28 ft NGVD29) and a finished ground level grade of 290 ft NAVD88 (290.86 ft NGVD29), yielding a height of 229.42 ft. This is the Unit 3 design characteristic value. The Unit 3 design characteristic value falls within (is less than) the SSAR Table 1.9-1 design parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(3)	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	Structure Foundation Embedment	See Evaluation column	**SSAR Table 1.9-1** ≤ 42.7 m (140 ft) **Unit 3** 42.25 ft Nominal	The Unit 3 design characteristic value for structure foundation embedment is based on the bottom of the deepest power block structure basemat, which is the turbine building at 42.25 ft nominal, below finished grade of 290 ft NAVD88 (290.86 ft NGVD29), as shown in Figure 1.2-47R. The turbine pedestal is at El. 247.75 ft NAVD88 (248.61 ft NGVD29). The Unit 3 design characteristic falls within (is less than) the ESP design parameter value identified in ESP Table D-1.
	Normal Plant Heat Sink **Unit 3 Closed-Cycle, Dry and Wet Towers**			
ESP COR	Make-Up Flow Rate	No value provided	**SSAR Table 1.9-1** ≤ 84.29 m^3/m (22,268 gpm) maximum (EC mode) **Unit 3** 84.29 m^3/m (22,268 gpm) maximum (EC mode)	The Unit 3 design characteristic value for the make-up flow rate includes the hybrid cooling tower make-up flow and the Ultimate Heat Sink (UHS) cooling tower make-up flow. The make-up flow rate for the hybrid cooling towers is the expected rate of water withdrawal from Lake Anna to replace water lost from the operation of the hybrid cooling tower system during EC mode. The make-up flow rate for the UHS cooling towers is the expected rate of water withdrawal from Lake Anna to replace water lost from the operation of the UHS cooling tower system during normal plant operation. The losses are from evaporation, blowdown, and drift. The Unit 3 design characteristic value is provided in Table 10.4.5-1R and falls within (is the same as) the SSAR Table 1.9-1 design parameter value.

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

Parameter Description (17)	DCD Site Parameter Value (17)	Site Characteristic	Evaluation
Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value			
Blowdown Flow Rate	No value provided	**SSAR Table 1.9-1** ≤ 21.1 m^3/m (5565 gpm) maximum (EC mode) **Unit 3** 21.1 m^3/m (5565 gpm) maximum (EC mode)	The Unit 3 design characteristic value for the blowdown flow rate includes the hybrid cooling tower blowdown flow and the UHS cooling tower blowdown flow. The blowdown flow rate for the hybrid cooling tower is the expected rate at which water is lost through blowdown flow from the hybrid cooling tower system to the WHTF during EC mode. The blowdown flow rate for the UHS cooling towers is the expected rate at which water is lost through blowdown flow from the UHS cooling tower system during normal operation. The Unit 3 design characteristic value falls within (is the same as) the SSAR Table 1.9-1 design parameter value.
Unit 4 Dry Cooling Towers			
Evaporation Rate	No value provided	**SSAR Table 1.9-1** None or negligible (on the order of 1 gpm, average) **Unit 3** Not applicable	This design parameter is not applicable because a Unit 4 is not included in this FSAR.
Make-Up Flow Rate	No value provided	**SSAR Table 1.9-1** None or negligible (on the order of 1 gpm, average) **Unit 3** Not applicable	This design parameter is not applicable because a Unit 4 is not included in this FSAR.

NAPS SUP 2.0(3)

Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics

	Parameter Description [17]	DCD Site Parameter Value [17]	Site Characteristic	Evaluation
NAPS SUP 2.0(3)	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	Release Point			
	Elevation (Post Accident)	No value provided	**SSAR Table 1.9-1** Ground level **Unit 3** Ground level	The Unit 3 design characteristic value is an assumed ground level release point elevation for radiological consequences for accident releases. The Unit 3 design characteristic value falls within (is the same as) the SSAR Table 1.9-1 design parameter value.
	Plant Characteristics			
	Megawatts Thermal	See Evaluation column	**SSAR Table 1.9-1** ≤4500 MWt **Unit 3** 4451 MWt	This Unit 3 design characteristic value of 4451 MWt is the rated reactor thermal power, as described in DCD Section 1.1.4. The Unit 3 design characteristic value falls within (is less than) the SSAR Table 1.9-1 design parameter value.

NAPS SUP 2.0(1) **Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

1. The specified missiles are assumed to have a vertical speed component equal to 2/3 of the horizontal speed.
2. These dispersion factors are chosen as the maximum values at all intake points.
3. These dispersion factors are chosen as the maximum values at all inleak points.
4. These dispersion factors are used for a LOCA and a rod ejection accident.
5. These dispersion factors are used for a LOCA, a rod ejection accident, a failure of small lines carrying primary coolant outside containment and a fuel-handling accident inside the containment.
6. These dispersion factors are used for a steam generator tube rupture, a steam system piping failure, a reactor coolant pump (RCP) rotor seizure and a rod ejection accident.
7. These dispersion factors are used for a fuel handling accident occurring in the fuel storage and handling area.
8. These dispersion factors are used for a steam system piping failure.
9. These dispersion factors are used for a LOCA.
10. These dispersion factors are used for a rod ejection accident, a failure of small lines carrying primary coolant outside containment and a fuel-handling accident inside the containment.
11. Normal winter precipitation roof load is determined by converting ground snow load p_g in accordance with ASCE 7-05. The ground snow load p_g is based on the highest ground-level weight of:
    - the 100-year return period snowpack,
    - the historical maximum snowpack,
    - the 100-year return period snowfall event, or
    - the historical maximum snowfall event in the site region.
12. The extreme winter precipitation roof load is based on the sum of the normal ground level winter precipitation plus the highest weight at ground level resulting from either the extreme frozen winter precipitation event or the extreme liquid winter precipitation event. The extreme frozen winter precipitation event is assumed to accumulate on the roof on top of the antecedent normal winter precipitation event. The extreme liquid winter precipitation event will not accumulate on the roof of a Unit 3 plant safety-related SSC, as discussed in DCD Section 3.4.1.2. The extreme winter precipitation roof load is included as live load in extreme loading combinations using the applicable load factor indicated in DCD Section 3.8.
13. Deleted.
14. Acceptable parameters for settlement without further evaluation.

NAPS SUP 2.0(1) **Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

15. Settlements occurring during construction and operational life.
16. Settlements occurring during operational life only.
17. Information in this column and notes (1) through (16), except note (12), are from DCD Table 2.0-1.

NAPS ESP VAR 2.0-4

Table 2.0-202 Comparison of Horizontal Spectra for ESP Top of Zone III-IV SSE and Unit 3 GMRS at Elevation 250 feet NAVD88

Freq. (Hz)	Unit 3 SA (g)(a)	ESP SA (g)(b)(c)	Controlling ESP or Unit 3(c)
0.1	0.00414	0.00382	Unit 3 Spectrum
0.125	0.00598	—	—
0.15	0.00807	—	—
0.2	0.01295	0.01298	ESP Spectrum
0.3	0.0230	0.0233	ESP Spectrum
0.4	0.0339	0.0343	ESP Spectrum
0.5	0.0451	0.0429	Unit 3 Spectrum
0.6	0.0502	0.0488	Unit 3 Spectrum
0.7	0.0545	—	—
0.8	0.0585	0.0576	Unit 3 Spectrum
0.9	0.0622	—	—
1	0.0659	0.0677	ESP Spectrum
1.25	0.0833	—	—
1.5	0.1026	—	—
2	0.1499	0.142	Unit 3 Spectrum
2.5	0.1821	0.179	Unit 3 Spectrum
3	0.210	0.214	ESP Spectrum
4	0.284	0.287	ESP Spectrum
5	0.382	0.376	Unit 3 Spectrum
6	0.453	0.481	ESP Spectrum
7	0.522	—	—
8	0.595	0.717	ESP Spectrum
9	0.667	—	—
10	0.744	0.945	ESP Spectrum
12.5	0.935	—	—
15	1.116	—	—

NAPS ESP VAR 2.0-4

Table 2.0-202 Comparison of Horizontal Spectra for ESP Top of Zone III-IV SSE and Unit 3 GMRS at Elevation 250 feet NAVD88

Freq. (Hz)	Unit 3 SA (g)[a]	ESP SA (g)[b][c]	Controlling ESP or Unit 3[c]
20	1.337	1.446	ESP Spectrum
25	1.328	1.476	ESP Spectrum
30	1.233	1.470	ESP Spectrum
35	1.143	—	—
40	1.101	—	—
45	1.077	—	—
50	1.049	1.195	ESP Spectrum
60	0.886	—	—
70	0.752	—	—
80	0.648	—	—
90	0.579	—	—
100	0.535	0.555	ESP Spectrum

(a) Values from Table 2.5-201
(b) Values from SSAR Table 2.5-27A
(c) “—” denotes not applicable: SA(g) value was not calculated for the ESPA SSAR

NAPS ESP VAR 2.0-4 **Table 2.0-203 Comparison of Vertical Spectra for ESP Top of Zone III-IV SSE and Unit 3 GMRS at Elevation 250 feet NAVD88**

Freq. (Hz)	Unit 3 SA (g)(a)	ESP SA (g)(b)(c)	Controlling ESP or Unit 3(c)
0.1	0.00311	0.00286	Unit 3 Spectrum
0.125	0.00448	—	—
0.15	0.00605	—	—
0.2	0.00971	0.00973	ESP Spectrum
0.3	0.01727	0.0174	ESP Spectrum
0.4	0.0254	0.0257	ESP Spectrum
0.5	0.0339	0.0321	Unit 3 Spectrum
0.6	0.0376	0.0366	Unit 3 Spectrum
0.7	0.0409	—	—
0.8	0.0439	0.0432	Unit 3 Spectrum
0.9	0.0467	—	—
1	0.0494	0.0507	ESP Spectrum
1.25	0.0625	—	—
1.5	0.0769	—	—
2	0.1124	0.106	Unit 3 Spectrum
2.5	0.1366	0.134	Unit 3 Spectrum
3	0.1574	0.160	ESP Spectrum
4	0.213	0.215	ESP Spectrum
5	0.286	0.282	Unit 3 Spectrum
6	0.340	0.360	ESP Spectrum
7	0.391	—	—
8	0.446	0.537	ESP Spectrum
9	0.500	—	—
10	0.558	0.708	ESP Spectrum
12.5	0.721	—	—
15	0.879	—	—

NAPS ESP VAR 2.0-4

Table 2.0-203 Comparison of Vertical Spectra for ESP Top of Zone III-IV SSE and Unit 3 GMRS at Elevation 250 feet NAVD88

Freq. (Hz)	Unit 3 SA (g)[a]	ESP SA (g)[b][c]	Controlling ESP or Unit 3[c]
20	1.104	1.20	ESP Spectrum
25	1.169	1.29	ESP Spectrum
30	1.155	1.38	ESP Spectrum
35	1.121	—	—
40	1.148	—	—
45	1.187	—	—
50	1.180	1.33	ESP Spectrum
60	1.007	—	—
70	0.848	—	—
80	0.706	—	—
90	0.600	—	—
100	0.535	0.555	ESP Spectrum

(a) Values from Table 2.5-201
(b) Values from SSAR Table 2.5-27A
(c) "—" denotes not applicable: SA(g) value was not calculated for the ESPA SSAR

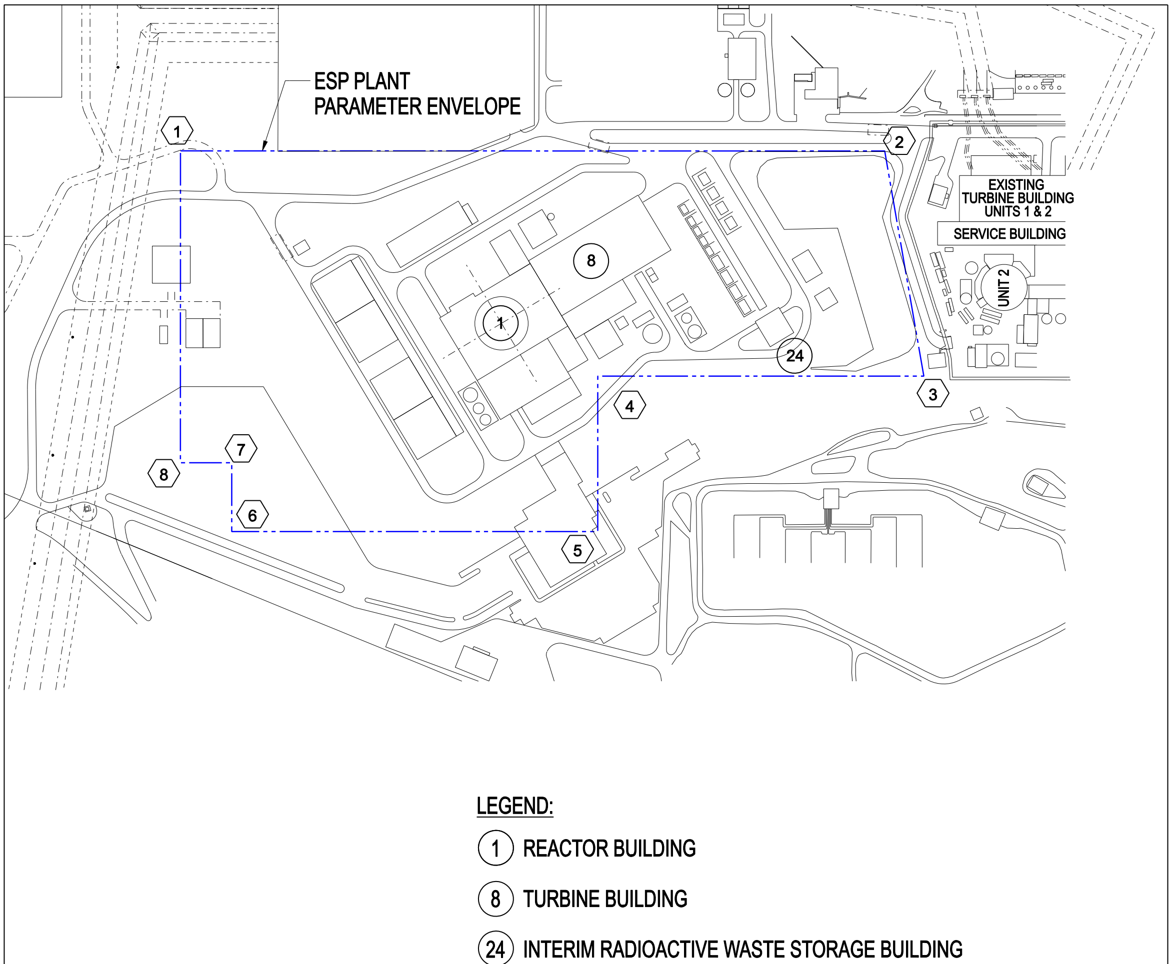
Figure 2.0-201 [Deleted]

Figure 2.0-202 [Deleted]

Figure 2.0-203 [Deleted]

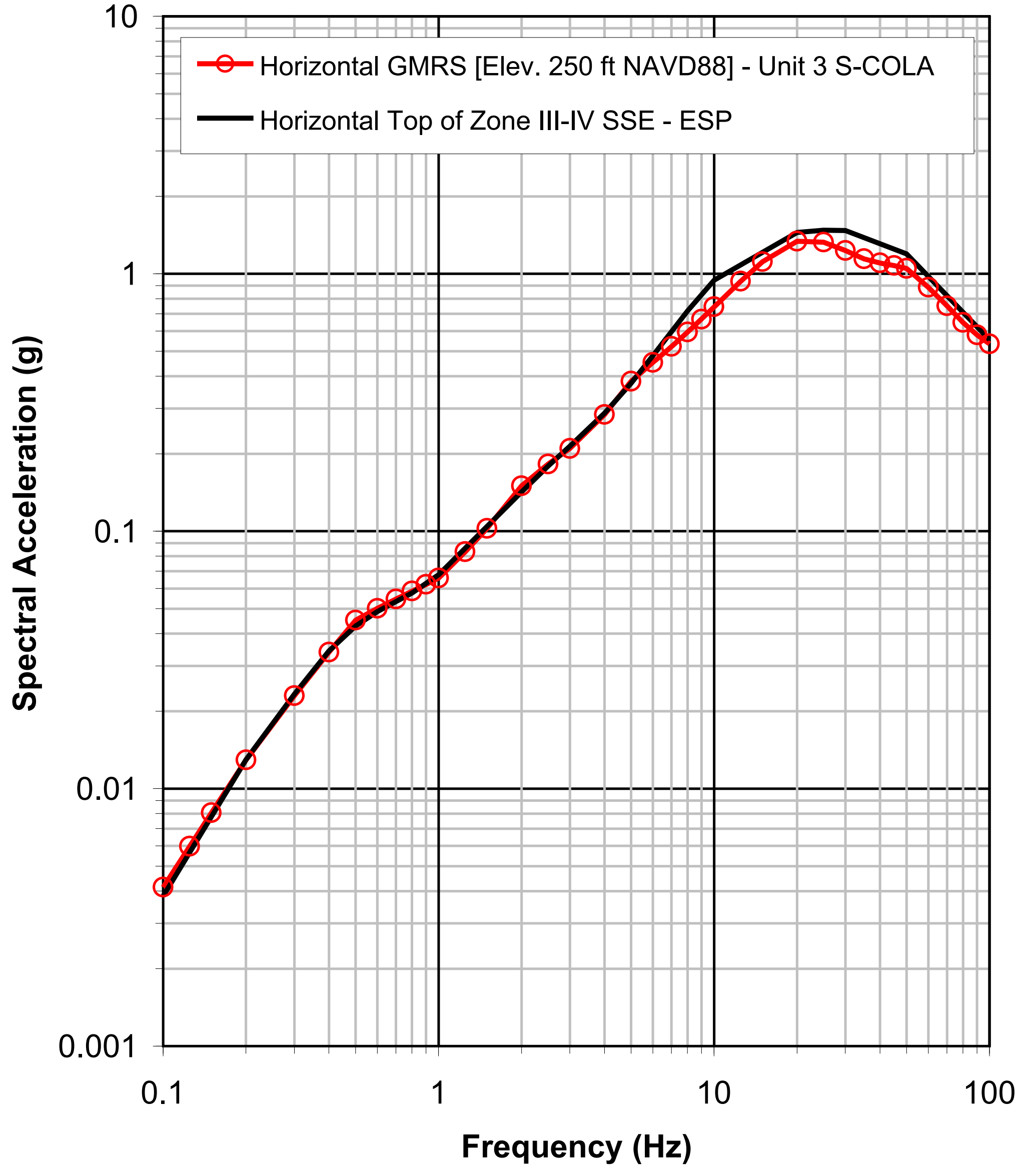
Figure 2.0-204 [Deleted]

NAPS SUP 2.0(1) **Figure 2.0-205 Unit 3 Power Block Building Locations Within the ESP Proposed Facility Boundary**

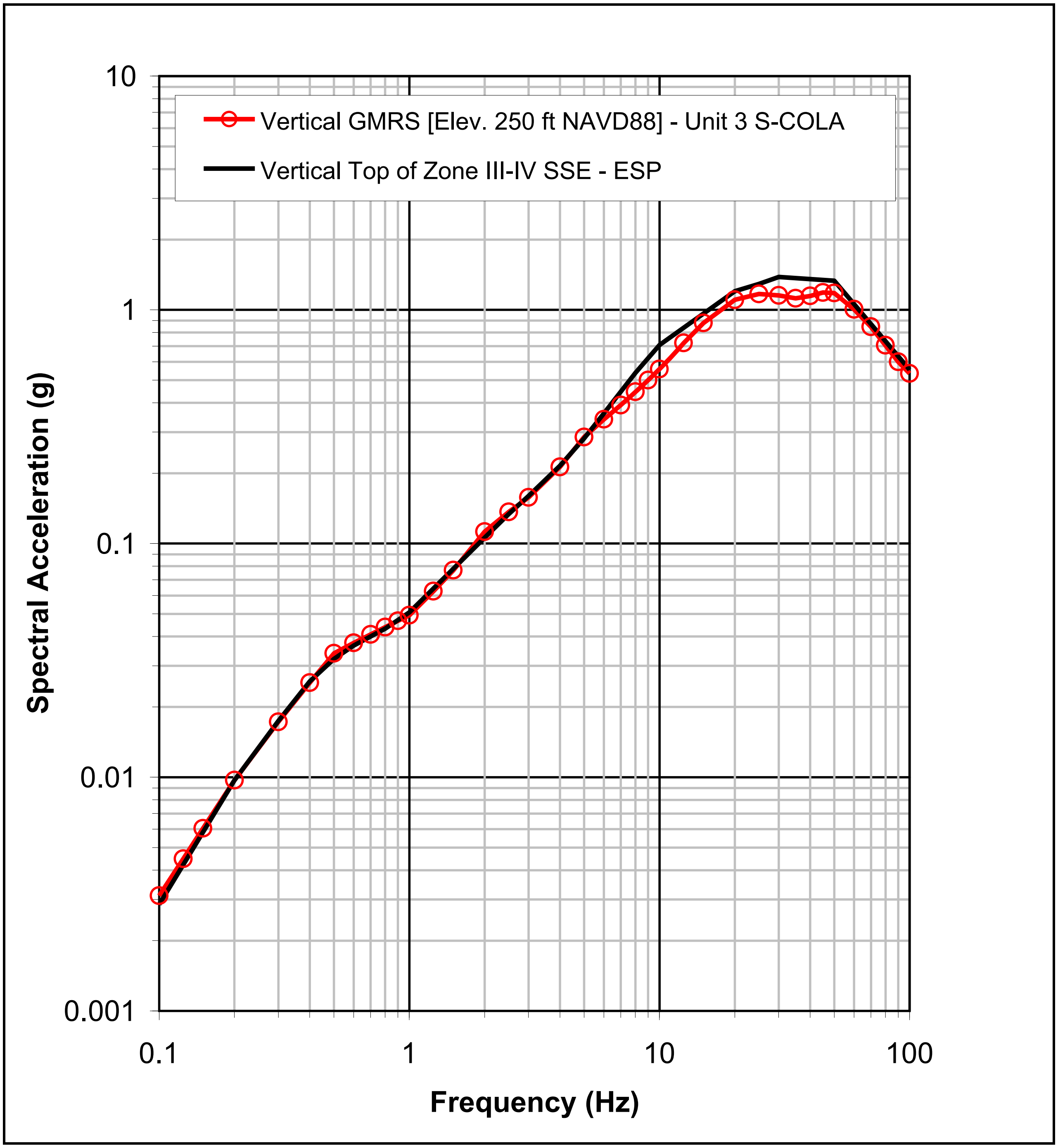


	COORDINATES (NAPS U1 & U2 GRID		COORDINATES (STATE PLANE NAD 83 VA SOUTH ZONE)	
POINT	PLANT NORTH (FEET)	PLANT EAST (FEET)	NORTHING (FEET)	EASTING (FEET)
1	5400.00	7320.00	3909903.70	11684870.43
2	5400.00	9378.00	3910657.08	11686785.57
3	4741.66	9492.26	3910086.27	11687132.90
4	4741.66	8539.65	3909737.54	11686246.42
5	4287.00	8539.65	3909314.44	11686412.86
6	4287.00	7470.00	3908922.87	11685417.46
7	4488.00	7470.00	3909109.92	11685343.88
8	4488.00	7320.00	3909055.00	11685204.29

NAPS ESP VAR 2.0-4 **Figure 2.0-206 Comparison of Horizontal ESP SSE and Unit 3 GMRS Design Response Spectra**



NAPS ESP VAR 2.0-4 **Figure 2.0-207 Comparison of Vertical ESP SSE and Unit 3 GMRS Design Response Spectra**



2.1 Geography and Demography

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Replace the content of DCD Section 2.1 with the following.

STD COL 2.1(1)

This section of the Final Safety Analysis Report (FSAR) provides information regarding the site location and description including the distribution of infrastructure, natural features, and population in the plant area. The discussion below is provided to address the guidance in NUREG-0800 (Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants) and Regulatory Guide 1.206 (Combined License Applications for Nuclear Power Plants (LWR Edition)). Radius distances defined by NUREG-1555 (Standard Review Plans for Environmental Reviews for Nuclear Power Plants) are used for the population analysis, rather than the distances described in RG 1.206 as an alternative method. The alternative method is used to ensure consistency of the population data between the FSAR and Environmental Report (ER). No other exceptions to the regulatory documents noted or alternative methods are used in the development of this section.

2.1.1 Site Location and Description

Replace the content of DCD Subsection 2.1.1 with the following.

NAPS COL 2.1(1)

The information needed to address DCD COL Item 2.1(1) is included in SSAR Section 2.1.1, which is incorporated by reference with the following supplements.

2.1.1.1 Site Location

The first paragraph of this SSAR section is supplemented as follows with information on the location of Unit 3 at the NAPS site.

NAPS COL 2.1(1)

The Unit 3 site plan is shown in Figure 2.1-201 and remains within the ESP proposed facility boundary (ESP plant parameter envelope) as shown in Figure 2.0-205. The center of the Unit 3 R/B is approximately 450 m (1476 ft) southwest of the center of the Unit 2 Containment Building.

NAPS ESP COL 2.1-1 The coordinates of the Unit 3 R/B are:

- Latitude 38 Degrees 03 Minutes 31.01 Seconds (38.058614)
- Longitude 77 Degrees 47 Minutes 41.80 Seconds (77.794944)

The corresponding Universal Transverse Mercator (UTM) coordinates are:

- NAD83, Zone 18-78W to 72W (US ft), N13832016.995/E835901.295

2.1.1.2 Site Description

The last paragraph of this SSAR section is supplemented as follows with information on ownership and control.

NAPS COL 2.1(1) Since the ESP Application was submitted by Dominion Nuclear North Anna, LLC, the Commonwealth of Virginia has passed legislation re-regulating the electric power industry in Virginia, and the State Corporation Commission has determined that Dominion should be the COL applicant. In addition, Old Dominion Electric Cooperative (ODEC) has sold to Dominion its interest in the portion of NAPS on which Unit 3 will be located, while retaining its 11.6 percent undivided interest in common in the remainder of NAPS. As a result, rather than Dominion Nuclear North Anna, LLC, purchasing or leasing the ESP Site, Dominion will own the Unit 3 site, and Dominion will continue to control the existing NAPS exclusion area as a single exclusion area and single restricted area for all reactor units located within the NAPS property, including Unit 3.

2.1.2 Exclusion Area Authority and Control

Replace the content of DCD Subsection 2.1.2 with the following.

NAPS COL 2.1(1) The information needed to address DCD COL Item 2.1(1) is included in SSAR Section 2.1.2, which is incorporated by reference with the following supplements.

2.1.2.1 Authority

The first four paragraphs in this SSAR section are supplemented as follows with information to address the authority of the COL applicant.

NAPS COL 2.1(1) Since the ESP Application was submitted by Dominion Nuclear North Anna, LLC, the Commonwealth of Virginia has passed legislation re-regulating the electric power industry in Virginia, and the State Corporation Commission has determined that Dominion should be the COL applicant. In addition, ODEC has sold to Dominion its interest in the portion of NAPS on which Unit 3 will be located. As a result, rather than Dominion Nuclear North Anna, LLC, purchasing or leasing the ESP Site, Dominion will own the entire Unit 3 site, and Dominion will continue to maintain sole control of the existing exclusion area as a single exclusion area and single restricted area for all of the reactor units located within the NAPS property, including Unit 3. Dominion currently controls the NAPS site and exclusion area under its existing agreement with ODEC, and no approvals are required by state law for shared control of the exclusion area.

NAPS ESP PC 3.E(1)

As the owner of the Unit 3 site and entity in control of NAPS, Dominion possesses the right to implement the site redress plan.

The last paragraph in this SSAR section is supplemented as follows with information to address recreational use of the lake.

NAPS COL 2.1(1)

The lake access and control practices in effect for Units 1 and 2 are maintained for Unit 3.

2.1.2.2 Control of Activities Unrelated to Plant Operation

The third paragraph in this SSAR section is supplemented as follows with information to address arrangements with appropriate agencies for emergencies.

NAPS ESP COL 2.1-2

Under the Commonwealth of Virginia's Radiological Emergency Response Plan (COVRERP) (Reference 2.1-201), the Virginia Department of Game and Inland Fisheries is responsible for warning people in boats and assisting in traffic control of boats on Lake Anna in the vicinity of NAPS. This arrangement is documented in the COVRERP, Appendix 1.

2.1.3 Population Distribution

Replace the content of DCD Subsection 2.1.3 with the following.

NAPS COL 2.1(1)

The information needed to address DCD COL Item 2.1(1) is included in SSAR Section 2.1.3, which is incorporated by reference.

2.1.4 Combined License Information

Replace the content of DCD Subsection 2.1.4 with the following.

STD COL 2.1(1)
NAPS COL 2.1(1)

2.1(1) ***Geography and demography***

This COL item is addressed in Subsections 2.1.1, 2.1.2, and 2.1.3 and the associated figure.

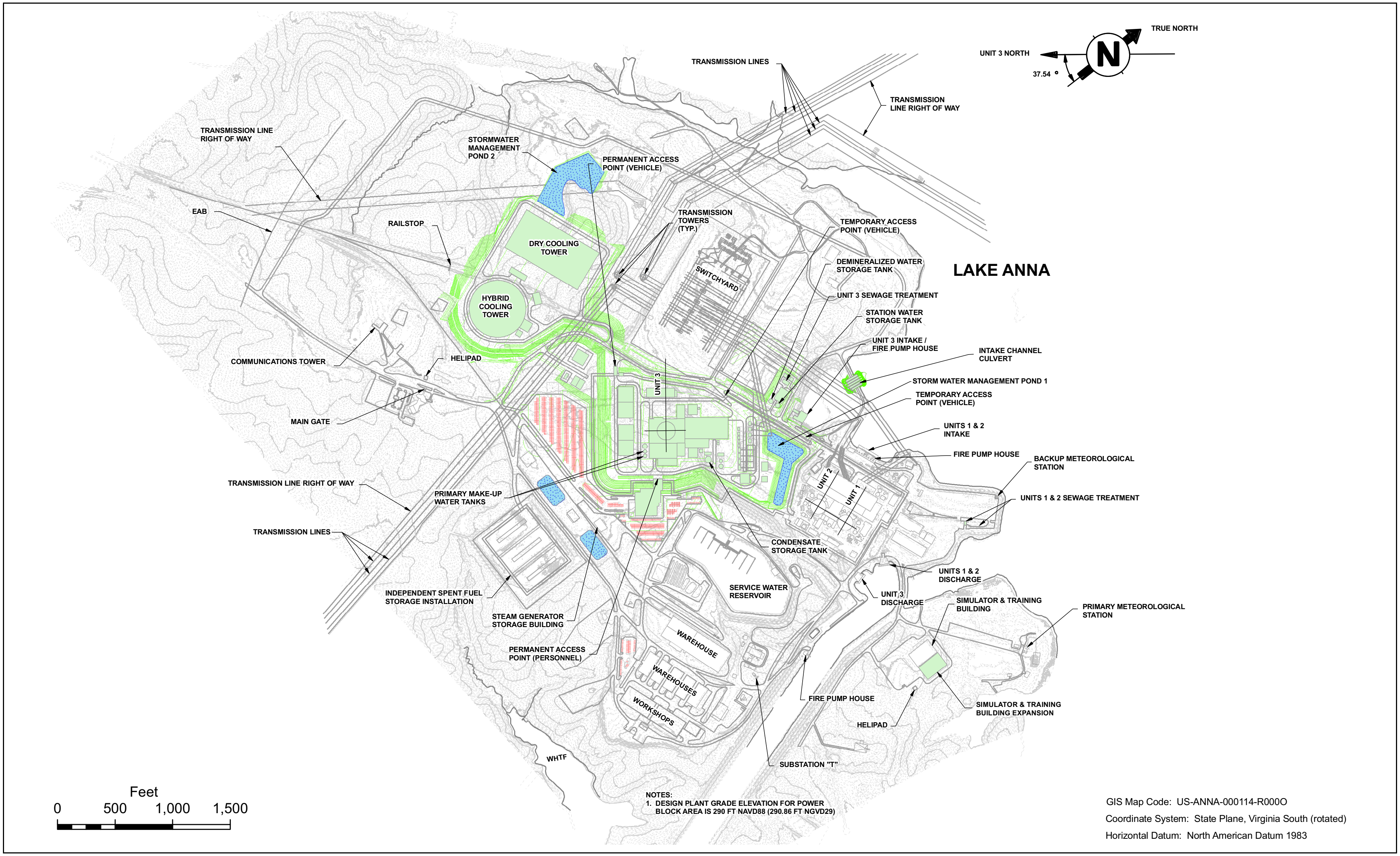
2.1.5 References

Replace the content of DCD Subsection 2.1.5 with the following.

2.1-201 Commonwealth of Virginia's Radiological Emergency Response Plan (COVRERP), May 2007.

NAPS COL 2.1(1)

Figure 2.1-201 Site Plan with Topography



2.2 Nearby Industrial, Transportation, and Military Facilities

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 2.2(1)

Replace the content of DCD Subsection 2.2 (including 2.2.1, 2.2.2 and 2.2.3) with the following.

The information needed to address DCD COL Item 2.2(1) is included in SSAR Sections 2.2.1 and 2.2.2, which are incorporated by reference with the following supplements.

2.2.2.1 Industrial Facilities

NAPS ESP COL 2.2-1

The first paragraph of this SSAR section is supplemented as follows with information on nearby industrial facilities.

Since the SSAR was submitted, no hazardous industrial facilities have been added at the 2.51 km^2 (620 acres) industrial development near the Unit 3 EAB. The industrial site poses no hazard to Unit 3.

2.2.2.6.1 Airports

The first paragraph of this SSAR section is supplemented as follows with information to identify an additional airport in the vicinity of Unit 3.

A third airport within 16.1 km (10 mi) of the Unit 3 site opened in 2007. Table 2.2-201 provides operations-related information. The location is shown with other nearby airports in Figure 2.2-201. Because this is a small private airport, it is not expected to grow substantially in the foreseeable future.

After the fourth paragraph of this SSAR section, a new paragraph is added to describe the additional airport in the vicinity of Unit 3.

Seven Gables, a private landing strip with an unlighted 457 m (1500 ft) turf runway, is approximately 12.2 km (7.6 mi) north-northwest of the site. It is not licensed for commercial use and with only three small aircraft based on the field (one single-engine airplane, one helicopter, and one ultralight), the expected volume of traffic is very light. (Reference 2.2-201)

2.2.2.6.2 Airways

The first paragraph of this SSAR section is supplemented as follows with information to identify an additional military training flight in the vicinity of NAPS.

One civil airway (V223) and four military training routes (IR714, IR760/VR1754, IR720, and VR1755) pass near the Unit 3 site as shown in Figure 2.2-201, which is based on the Washington Sectional Aeronautical Chart issued in 2007 (Reference 2.2-202). The U.S. Department of the Navy identifies a total of 341 flight operations in the year 2006 for the four routes (Reference 2.2-203), as compared to the SSAR assumption of 6000 flights per year. As a result, the number of military training flights assumed in the SSAR remains bounding.

The second paragraph of this SSAR section is supplemented as follows with information on distances from military training flight routes to Unit 3.

The centerlines of two of the military training routes IR714 and IR760/VR1754, which are 10 nautical miles (11.5 statute miles) across, lie within 1 statute mile of the Unit 3 site. The centerline of the other military training routes, VR1755 and IR720 are more than 8 statute miles from Unit 3.

2.2.3 Evaluation of Potential Accidents

The information needed to address DCD COL Item 2.2(1) is included in SSAR Section 2.2.3, which is incorporated by reference with the following supplements.

2.2.3.1.1 Truck Traffic

Add the following at the end of this section.

Gasoline tanker truck explosion hazards due to local deliveries on-site are addressed by considering the likelihood of an accident leading to a significant overpressure. According to RG 1.91, the risk from potential explosion hazards can be shown to be sufficiently low on the basis of low probability of an explosion when the rate of exposure to a peak overpressure in excess of 7 kPa (1 psi) is less than 10^{-6} per year using conservative assumptions. Per RG 1.91, the following equation was used:

$$r = n_1 \times n_2 \times f \times s \tag{2.2.3.1.1-1}$$

where,

r = exposure rate (the probability of an explosion occurring)

n_1 = accidents per km (mi) for the transportation mode (truck transport)

n_2 = cargo explosion per accident for the transportation mode

f = frequency of shipment for the substance, in shipments per year

s = exposure distance in km (mi)

The number of accidents per km (mi) for truck transport, n_1, is 1.25×10^{-6}/km (2×10^{-6}/mi) based on an average value for large trucks (References 2.2-213 and 2.2-214). This is comparable to the 2006 accident rate per mile for all vehicle types for the Commonwealth of Virginia. The national average accident rate includes accidents at highway speeds and those involving multiple vehicles. Whereas, under the controlled conditions on the NAPS site; specifically, supervised truck movements and low speed limits, the accident rate per mile would be much lower. Therefore, the use of 1.25×10^{-6}/km (2×10^{-6}/mi) as an estimate of the accident rate for tractor-trailers carrying hazardous materials is very conservative.

The probability of a release and cargo explosion per accident, n_2, is determined using the assumption that 20 percent of highway truck crashes result in releases/spills, 20 percent of those releases involve a complete release of total cargo (Reference 2.2-213), and the probability of ignition given a release is 1. This results in an overall number of cargo explosions per accident of 0.04 or 4 percent.

The frequency of shipment, f, for on-site delivery of gasoline to the North Anna site is two to three times per year. Conservatively assuming that there are two deliveries per unit per year, the addition of a third unit would increase the number of gasoline deliveries per year to six. Therefore, a value of six deliveries per year is used to determine the accident rate for onsite gasoline delivery by truck.

Considering the portions of on-site delivery truck routes within 580 m (1900 ft) of Unit 3 safety-related structures, the exposure distance, s, would be 3.48 mi. However, using 580 m (1900 ft) is conservative in comparison with the methodology described in Section 2.2.3.1.3 for determining the safe separation distance. Therefore, the exposure distance of 3.48 mi is also conservative.

Using the conservative inputs to Equation 2.2.3.1.1-1 as described above, an annual exposure rate of 1.67×10^{-6} was obtained, which is on the order of magnitude of 10^{-6} per year, so there is a sufficiently low risk from explosion during on-site gasoline tanker truck deliveries.

While the calculated rate of occurrence is greater than 10^{-6} per year guidance in RG 1.91, the expected rate of occurrence, 1.67×10^{-6} per year, which is on the order of magnitude of 10^{-6} per year, is acceptable, as stated in RG 1.206, when combined with reasonable, qualitative arguments that demonstrate that the realistic probability can be shown to be lower. The following conservatisms in the assumptions and inputs were used in the analysis:

1. The basis in determining the safe distance of greater than 1,900 feet calculated with the TNT equivalent yield formula was very conservative. In calculating this separation distance, the mass of the total liquid volume was assumed to explode in the postulated accident.

2. It is expected that once construction on Unit 3 is complete, the existing vehicle maintenance garage at the north end of the site will no longer be in operation, reducing the number of tanks requiring service from 3 to 2. As a result, the route through the central portion of the NAPS site will not be used, decreasing that portion of the exposure distance (which accounts for more than 50 percent of the calculated onsite transit distance). Therefore, the routes chosen, and the resultant exposure distance, are conservative.

NAPS ESP COL 2.2-2

2.2.3.1.3 On-Site Chemicals

The chemical materials stored on-site at Units 1, 2, and 3 are identified in Table 2.2-202. This table also identifies storage locations and the quantity of each chemical/material. Properties relative to the hazards of each chemical and the results of a screening analysis based on these hazardous properties are provided in Table 2.2-203. The on-site chemicals with the potential to be flammable or explosive are evaluated for possible effects on Unit 3 safety-related SSCs.

Table 2.2-203 shows that the majority of the chemicals are not toxic. For chemicals with immediately dangerous to life or health (IDLH) values listed in this table, the effects of toxic vapors or gases and their potential for incapacitating Unit 3 control room operators are evaluated and the results presented in Section 6.4.

Table 2.2-203 also shows that less than one-third of the chemicals present a flammability or explosive hazard. As shown by the table column labeled “Flammable/Explosive?”, identifies materials that have flammability and explosive properties that need analysis. The analysis of these materials is described below.

For each of these materials, minimum safe separation distances for flammable materials and explosive materials were determined for comparison with the actual distance from the storage location to the nearest Unit 3 safety-related SSC. For flammable materials, there are two minimum safe separation distances based on whether the material vaporizes and burns (thermal exposure hazard) or whether the material vaporizes and detonates (explosion overpressure hazard).

The safe separation distance for the storage of explosive materials is determined according to RG 1.91 and FM Global Guidelines for Evaluating the Effects of Vapor Cloud Explosions Using a TNT Equivalency Method (Reference 2.2-204).

Per RG 1.91, 7 kPa (1 psi) is a conservative value of peak positive incident overpressure, below which no significant damage to safety-related SSCs would be expected. The minimum safe separation distance for an explosive hazard is the distance from the location of storage to the point where an explosion results in less than a 7 kPa (1 psi) peak incident pressure. In determining this distance for each material, the following conservative assumptions were also used. A volume of vapor equal to the empty volume of the largest storage vessel was considered available for combustion and an explosion yield factor of 100 percent was used to address the possibility of an in-vessel confined explosion. This is conservative because only that small portion of the vapor within the flammability limits would be available for combustion and potential explosion.

The two minimum safe separation distances for a flammable material (thermal exposure hazard and/or explosion overpressure hazard) were determined based on the following model. Flammable materials in the liquid state can evaporate and form an unconfined vapor cloud. Such a vapor cloud is assumed to drift towards Unit 3 before ignition occurs. Because a vapor cloud disperses as it travels downwind, there may be parts of a cloud where the vapor concentration is in the flammable range. These portions of a vapor cloud, between the lower flammability limit (LFL) and upper flammability limit (UFL), are assumed to burn when the cloud reaches an ignition source. The speed of the flame front through the vapor cloud determines whether the event is a deflagration or a detonation.

When a deflagration occurs, the hazard is from thermal exposure of the nearby surfaces from heat generated by the fire. A deflagration is assumed to be possible up to the point where the vapor cloud reaches the lower flammability limit of the material. The minimum safe separation distance for flammability hazard (thermal exposure) is the maximum distance from the storage site (the spill site) to the location where the vapor cloud can exist and still be between the UFL and the LFL.

Because a detonation would generate an explosive force, the possibility of a detonation is evaluated for each flammable material. The RG 1.91 limit of 7 kPa (1 psi) is again used as a conservative value of peak positive incident overpressure, below which no significant damage to safety-related SSCs would be expected. The minimum safe separation distance for a flammability hazard (explosion overpressure) is the distance from the storage site (the spill site) to the location where the assumed detonation of the traveled vapor cloud results in a peak incident pressure of no more than 7 kPa (1 psi).

In determining these distances for each material, the following model and conservative assumptions were also used. The on-site chemicals in Table 2.2-202 with an identified flammability range were modeled using the Areal Locations of Hazardous Atmospheres (ALOHA) air dispersion model (Reference 2.2-205). ALOHA determined the distances where the vapor cloud may exist between the LFL and the UFL, presenting the possibility of ignition, detonation, and potential overpressure effects. Using the ALOHA model, a meteorological sensitivity analysis was performed by varying meteorological conditions (wind speed, time of day, and percent cloud cover) based on a range of Pasquill meteorological stability classes. The analysis includes stability class F which is the most stable meteorological class available in the ALOHA model. For each chemical analyzed, the model conservatively assumed that the maximum volume of the storage vessel leaked to form a 1 cm (0.4 inch) thick puddle in cases where a berm is not present. This provides a significant surface area to maximize evaporation and the formation of a vapor cloud.

Table 2.2-204 provides the safe separation distances for flammable and explosive materials and compares them to the actual distance to the nearest safety-related Unit 3 SSC. The results indicate that a fire or explosion from the identified hazardous chemicals and materials would not adversely affect the safe operation or shutdown of Unit 3.

2.2.3.2.1 Airports

After the first paragraph of this SSAR section, a new paragraph is added to describe the additional airport (Seven Gables) in the vicinity of Unit 3.

The Seven Gables Airport, presented in Section 2.2.2.6.1 and Table 2.2-201, does not support operations in excess of the threshold criteria specified in NUREG-0800 Section 3.5.1.6.

2.2.3.2.2 Airways

The second and subsequent paragraphs of this SSAR section are supplemented as shown in Section 3.5.1.6.

2.2.3.4 Fires

An accident in the vicinity of Unit 3 could lead to a fire, but the absence of industrial facilities, pipelines, and commercial navigation in the Unit 3 vicinity results in a low probability of chemical explosions and fires. Similarly, land transportation routes are some distance from the Unit 3 site and are unlikely to start a fire that affects Unit 3. The potential for off-site wildfires exists due to the rural nature of the NAPS site and presence of off-site vegetation to the west and south of the site.

The analysis of a wildfire near Unit 3 was performed using the methodology in NUREG-1805 (Reference 2.2-206) to determine the incident heat flux on Unit 3. The conservative assumptions in the analysis included the following:

- The wildfire is assumed to occur at plant elevation.
- The closest forest area with a significant fire line is true southwest of the Unit 3 UHSRS. The fire line is modeled as 360 ft wide at a distance of 927 ft from the nearest safety-related structure, the Unit 3 UHSRS.

- The wildfire burns through the forest toward Unit 3 in a uniform fire line perpendicular to the line of closest separation between the 360 ft wide fire line and the Unit 3 UHSRS. While more of the forested area could burn toward the true south, using a wider fire line would increase the separation distance from the Unit 3 safety-related structures. The forest area that is burning is assumed to continuously and simultaneously burn at peak output.

The maximum incident heat flux from a wildfire at the Unit 3 UHSRS is 0.76 kW/m^2. For comparison, this level of thermal radiation is about that of incident radiation from the sun on the earth, which is approximately 0.7 to 1.0 kW/m^2. Given the conservatism in the assumptions and the large separation distances to safety-related structures, a wildfire originating offsite would not affect the safe operation or shutdown of Unit 3.

In addition to a potential fire in the vicinity of Unit 3, a fire involving chemicals stored on the NAPS site was considered. Table 2.2-203 lists the chemicals and shows those which are potentially flammable or explosive. The stored chemicals identified in Table 2.2-203 as potential flammability hazards were evaluated using ALOHA. The ALOHA analyses show that these materials are sufficiently separated from safety-related SSCs that further analysis is not required. Table 2.2-203 and the ALOHA results in Table 2.2-204 demonstrate that significant effects are not expected due to a fire involving onsite chemicals and fuels.

2.2.3.5 Collisions with the Unit 3 Intake Structure

The Unit 3 intake structure is located on Lake Anna in a cove behind a cofferdam that is northeast of the Unit 3 power block area as shown in Figure 2.1-201. Lake Anna has small pleasure boats used solely for recreation. There are no large boats or barges on the lake. The area around the Unit 3 intake structure is managed by Dominion as a part of the exclusion area. Due to the presence of the cofferdam, there is no potential for a collision between a boat on Lake Anna and the Unit 3 intake structure. Also, because the Unit 3 intake structure is not a safety-related structure, such a collision could not affect the safe operation or shutdown of Unit 3.

2.2.3.6 Liquid Spills Near the Intake Structure

An accidental spill of an oil or liquid in Lake Anna near the Unit 3 intake structure that may be corrosive, cryogenic, or a coagulant was considered and determined to not be credible or have a low probability of occurrence and have no consequences for the safety of Unit 3. Lake Anna has small pleasure boats for recreational use. There are no large boats or barges. The only liquids with the potential to be spilled are motor oil and gasoline fuel from a small pleasure boat. The quantities in such spills would be very small. The oil or gasoline from a spill would float on the Lake Anna surface while the openings in the Unit 3 intake channel culverts through the cofferdam are underwater. Therefore, such spills could not affect the safe operation or shutdown of Unit 3.

2.2.3.7 Effects of Design Basis Events

As concluded in the previous sections, no events are identified that are likely to occur and have potential consequences that affect the safety of Unit 3. The potential consequences associated with the on-site hazards of stored chemicals are not significant. None of the scenarios are serious enough to affect the safety of Unit 3 to the extent that the guidelines in 10 CFR 100 could be exceeded. Thus, there are no accidents associated with nearby industrial, transportation, or military facilities, nor associated with on-site stored chemicals that are considered design basis events which require steps to mitigate consequences beyond the design features addressed in the evaluations summarized above, e.g., separation distances.

2.2.4 Combined License Information

Replace the content of DCD Subsection 2.2.4 with the following.

NAPS COL 2.2(1)

2.2(1) ***Description of nearby facilities, establishment of hazards, and determination of accidents***

This COL item is addressed in Section 2.2.

Section 2.2 References

2.2-201 Seven Gables Airport, AirNav.com
http://www.airnav.com/airport/2VG7
accessed October 20, 2007

2.2-202 Federal Aviation Administration, FAA Sectional Aeronautical Charts - Washington North and Washington South, 82nd Edition, Volume 0711, October 2007

2.2-203 U.S. Department of the Navy, Office of the Chief of Naval Operations, Washington, D.C., Letter from S. G. Riley, Captain, to Mr. Marvin Smith, Dominion Resources Services, Inc., Glen Allen, VA., June 8, 2007, 5720, Ser N885F/7U181687

2.2-204 FM Global Guidelines for Evaluating the Effects of Vapor Cloud Explosions Using a TNT Equivalency Method, Data Sheet 7-42

2.2-205 National Oceanic and Atmospheric Administration, Areal Locations of Hazardous Atmospheres (ALOHA®), Version 5.4.1, February 2007

2.2-206 NUREG-1805, Fire Dynamics Tools (FDTs) Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program

2.2-207 NFPA, “Guide for Aircraft Accident/Incident Response Assessment,” B6.3 and B6.4, 2004 Edition.

2.2-208 United States Coast Guard, Commandant Instruction 16465.12C, 1999. “Chemical Hazards Response Information System, Hazard Chemical Data Manual.”

2.2-209 NALCO Company, Material Safety Data Sheets, H-130 issued December 30, 2005, 3D TRASAR® 3DT177 - issued February 14, 2007, and 3D TRASAR® 3DT104 - issued February 15, 2007.

2.2-210 Perry, R. H., D. W. Green. (1977) Perry’s Chemical Engineer’s Handbook (7th Edition) (Table 2-5). McGraw-Hill.

2.2-211 Mallinckrodt Baker, Inc., Material Safety Data Sheets, Sodium Bromide - effective date October 19, 2005, Sodium Bisulfate - effective date March 16, 2006, Trisodium Phosphate -effective date November 10, 2005, Sodium Sulfite - effective date June 16, 2005, Disodium Phosphate - effective date May 9, 2005, Sand - effective date August 2, 2006, and Sodium Carbonate - effective date August 17, 2006.

2.2-212 National Institute for Occupational Safety and Health (NIOSH), Center for Disease Control and Prevention (CDC), November 2007.

2.2-213 Federal Emergency Management Agency, U.S. Department of Transportation and U.S. EPA, Handbook of Chemical Hazard Analysis Procedures, Section 11.3, Bulk Transportation of Hazardous Materials by Highway, 1989.

2.2-214 NUREG/CR-6624, Recommendations for Revision of Regulatory Guide 1.78, U.S. Nuclear Regulatory Commission, November 1999.

2.2-215 Virginia Department of Motor Vehicles, 2006 Virginia Traffic Crash Facts.

NAPS COL 2.2(1)

Table 2.2-201 Airports Within 15 Miles of the Unit 3 Site Since the SSAR

				Number of Flight Operations			Longest Runway		
Airport	**Type**	**Distance**	**Sector**	**Commercial**	**Total[(a)]**	**kd^2 [(b)]**	**Orientation**	**Length**	**Comments**
Seven Gables	Private	7.6 miles	NNW	None	Few	28,880	NNW-SSE	1500 ft	Privately owned and operated. Turf runway. No facilities. 1 single-engine plane, 1 helicopter, 1 ultralight based there.

Source: Reference 2.2-201

a. Year 2007

b. RG 1.206: d < 10 miles, k = 500; d >10 miles, k = 1000; where d is the distance in miles from the site, and k is a constant.

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Container) (2)
Unit 3		
Acetone	Access Building	50 lb
Alum (50%)	PRTP(3)	20,000 gal
Alum (48%)	Water Treatment Building (Inside)	300 gal
Ammonium Acetate	Access Building	310 gal
Ammonium Hydroxide (19%)	Turbine Building (Inside)	4 x 250 gal
Ammonium Molybdate (crystal)	Access Building	40 lb
Boric Acid Solution (7,000 ppm B)	R/B	2 x 66,000 gal
Carbon Dioxide	CO_2 Storage Area	26 Tube Trailer @ 2,640 psig 57,598 SCF
Diesel Fuel Class 1E GTG	South Side of Each PS/B	4 x 131,000 gal
	Inside PS/B	4 x 870 gal
Diesel Fuel AAC GTG	South Side of Each PS/B	2 x 120,000 gal
	Inside PS/B	2 x 800 gal
Dimethylamine (40%)	Turbine Building (Inside)	400 gal
Dimethylamine (2%)	Turbine Building (Inside)	1,000 gal
Disodium Phosphate (0.18%)	Aux. Boiler Building	555 gal
Ethanol	Access Building	200 gal
Ferric Sulfate (20%)	PRTP(3)	20,000 gal
Fuel Oil No. 2	Adjacent to Aux. Boiler	1 x 300,000 gal 1 x 10,000 gal Day tank
Glycerol	Access Building	10 gal
Hydrated Lime (93%)	PRTP(3)	40 ton
Hydrazine (20%)	Turbine Building (Inside)	400 gal

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Container) (2)
Unit 3 (continued)		
Hydrazine (1.5%)	Turbine Building (Inside)	400 gal
Hydrazine (85%)	Access Building	10 gal
Hydrochloric Acid	Access Building	120 gal
Hydrogen	Hydrogen Storage Area	36 Tube Trailer @ 2,640 psig 51,913 SCF
Hydrogen Peroxide (30%)	Access Building	50 gal
Hydrogen Peroxide (35%)	Water Treatment Building (Inside)	300 gal
Lithium Hydroxide (50%)	Access Building	10 gal
Oil, Lubricating Oil	PS/B (Inside)	6 x 100 gal
	Near Turbine Building (Outside)	1,000 gal
Mixture of Sodium tetraborate decahydrate and Sodium dihydrogen phosphate dehydrate	Access Building	200 gal
Morpholine (40%)	Adjacent to Turbine Building (East Side)	10,000 gal
Morpholine (20%)	Turbine Building (Inside)	1,000 gal
NALCO 3D TRASAR 3DT177 (Phosphoric Acid)	Hybrid Cooling Tower (Adjacent)	1,056 gal
	UHS (Inside)	300 gal
	Water Treatment Building (Inside)	55 gal
NALCO 3D TRASAR 3DT104 (Sodium Hydroxide)	Hybrid Cooling Tower (Adjacent)	5,812 gal
	UHS (Inside)	400 gal
NALCO H-130 (Ethanol)	Hybrid Cooling Tower (Adjacent)	3 x 400 gal
	UHS (Outside)	300 gal
Nitrogen	Nitrogen Storage Area	49 Tube Trailer @ 2,640 psig 119,484 SCF

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Container) (2)
NOVEC 1230	MCR	2 x 141 lb
	Staff Room	2 x 141 lb
Oxalic Acid	Access Building	30 lb
p-Dimethylamino-benz-aldehyde	Access Building	40 lb
Phenol	Access Building	410 lb
Polyalkylene Glycols (PAGs)	Auxiliary Building	Unknown(4)
	PS/Bs	Unknown(4)
Polymer A (Dimethylamine 1% - 5%)	PRTP(3)	400 gal
Polymer B (Dimethylamine 1% - 5%)	PRTP(3)	400 gal
Potassium Chloride (pH inside liquid of an electrode)	Access Building	20 gal
R-134a (1,1,1,2-Tetrafluoroethane)	Auxiliary Building	4 x 2,120 lb/chiller
	PS/Bs	4 x 891 lb/chiller(5)
Sodium Bicarbonate (12%)	Water Treatment Building (Inside)	200 gal
Sodium Bisulfite (10%)	Unit 3 Discharge (Inside)	1,056 gal
Sodium Bromide (44.7%)	Hybrid Cooling Tower (Adjacent)	2,378 gal
	UHS (Inside)	300 gal
Sodium Hydroxide	Access Building	90 lb
Sodium Hydroxide (25%)	Water Treatment Building (Inside)	180 gal
Sodium Hypochlorite	Access Building	10 gal
Sodium Hypochlorite (12%)	Hybrid Cooling Tower (Adjacent)	15,870 gal
	Station Water Intake	2,113 gal
	UHS (Inside)	1,057 gal
	Adjacent to Unit 3 Sewage Treatment Plant	2 x 330 gal
Sodium Sulfite (2.2%)	Aux. Boiler Building	555 gal

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Container) (2)
Sodium Tetraborate Decahydrate	Access Building	200 gal
Sulfuric Acid	Access Building	10 gal
Sulfuric Acid (96%)	PRTP(3)	5,000 gal
Trisodium Phosphate (0.72%)	Aux. Boiler Building	555 gal
Urea (40% $(NH_2)_2CO$)	Outside each PS/B	2 x 12,800 gal
Units 1 & 2		
Acetone	Drum Storage adjacent to Warehouse #2	55 gal
Ammonium Hydroxide (30%)	Turbine Building, Warehouse #7	55 gal
Blasting Sand	Paint Shop, Warehouse #7	99,999 lb (1)
Boric Acid	Auxiliary Building, Warehouse #7	7,500 gal
Calgon CL-14 (Sodium Hexametaphosphate)	Service Water Pumphouse	500 gal
Carbon Dioxide	Turbine Building, Auxiliary Building, Records Building, Decontamination Building, Fuel Oil Pump House	34,000 lb
Diesel Fuel	Communications Shelter	1,000 gal
Fuel Oil No. 2	South Corner inside Protected Area, Service Building, Fire Pump House, Service Water Pump House, Vehicle Maintenance Garage, Lake Anna Spillway, Spent Fuel Storage Area	210,000 gal
Gasoline	Near Emergency Vehicle Building, Vehicle Maintenance Garage	Below Ground Tank
NALCO H-130 (Ethanol)	SW Chemical Addition Bldg	2,000 gal
Halon 1301 (Bromotrifluoromethane)	Turbine Building, Control Room, Security, Training Center	400 lb

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Container) (2)
Hydrazine (35%)	Turbine Building, Warehouse #7	345 gal
Hydrochloric Acid (31%)	GE Water System	55 gal
Hydrogen	N of Turbine Building	4 x 37 lbs/tube Tube Bank (146.4 lbs)
Hydrogen Peroxide (35%)	GE Water System, Warehouse #7	55 gal
Ion Exchange Resin	Warehouse #7, Turbine Building, Intake Structure	99,999 lb (1)
Isothiazolin Biocide (4.5%)	Bearing Cooling Tower	400 gal
	Warehouse #7	55 gal
Lead-Acid Batteries with Sulfuric Acid	Warehouse #7, Service Building, SBO Diesel, Security Block House, PBX Building, Switchyard, Information Center, Lake Anna Spillway, Turbine Building, Training Building	99,999 lb (1)
Liquid Alum, Aluminum Sulfate Solution	GE Water System, Warehouse #7	99,999 lb (1)
Monoethanolamine	Turbine Building, Warehouse #7	345 gal
Nitrogen, liquid	North of Clarifier Building, Admin. Annex Alleyway, Bottle Shed beside Oil Storage Shed, Service Building	4,500 lb
NOVEC 1230	Communications Shelter	304 lb
Oil, Hydraulic Fluid	Warehouse #5, Oil Storage Shed, Vehicle Maintenance Garage	1,320 gal
Oil, Lubricating Oil	Warehouse #5, Vehicle Maintenance Garage, Oil Storage Shed, Turbine Building	16,000 gal
Oil, Mineral Oil-Dielectric Fluid	Main Transformers (MTs), Switchyard, Misc. Electrical Equipment	11,205 gal

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Container) (2)
Paint Thinner (Carboline #2)	Thinner Reprocessing Facility	55 gal
Paint Thinner (Carboline #33)	Thinner Reprocessing Facility	55 gal
Paint Thinner (Keeler & Long 700)	Thinner Reprocessing Facility	55 gal
Paint Thinner (Keeler & Long 1638)	Thinner Reprocessing Facility	55 gal
Paint Thinner (Keeler & Long 3700 Kolor Poxy Thinner)	Thinner Reprocessing Facility	55 gal
Soda Ash (Sodium Carbonate)	Warehouse #7, Bearing Cooling Tower	99,999 lb (1)
Sodium Bromide (30-60%)	Bearing Cooling Tower, Warehouse #7	400 gal
Sodium Hydroxide (50%)	Warehouse #7, Next to Units 1 & 2 Containment, GE Water System	55 gal
Sodium Hypochlorite (15%)	Warehouse #7, Bearing Cooling Tower	400 gal
Sodium Chloride	Warehouse #7, Storage Bay at NE Corner of SCOBN Bldg, GE Water Treatment System (S of Intake Structure)	99,999 lb (1)
Sulfuric Acid	Warehouse #7	60 gal
TRC-256 Sodium Molybdate	Chemical Addition Building	4,000 gal
Zinc Chloride (65%)	Turbine Building	1,100 gal

(1) Maximum quantities from (Superfund Amendments and Reauthorization Act) SARA Report

(2) If more than 1 container

(3) Phosphate Removal Treatment Plant

(4) PAGs are additives to the R-134a refrigerant. The quantity of PAGs in the refrigerants is unknown.

(5) Total number of chillers, evenly divided between the East and West PS/Bs.

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
Unit 3				
Acetone	2,500 ppm	180 mmHg @ 68°F [7]	Yes (2.6%–12.8%)	Toxicity/ Flammability/ Explosion Analysis
Alum (50%)	None listed	Solid in solution	No	No further analysis required[2]
Alum (48%)	None listed	Solid in solution	No	No further analysis required[2]
Ammonium Acetate	None listed	NA/Solid	No	No further analysis required[2]
Ammonium Hydroxide (19%)	300 ppm	8.5 atm @ 68°F[6,7]	Yes (16% - 25%)	Toxicity/ Flammability/ Explosion Analysis
Ammonium Molybdate (crystal)	None listed	NA/Solid	No	No further analysis required[2]
Boric Acid Solution (7,000 ppm B)	2 mg/m^3 TLV-TWA[3]	Solid in solution	No	No further analysis required[1,2]
Carbon Dioxide	40,000 ppm	56.5 atm@ 68°F[7]	No	Toxicity Analysis
Diesel Fuel Class 1E GTG	None listed	5 mmHg @ 100°F	Yes (1% - 5%)	No further analysis required [2]
Diesel Fuel AAC GTG	None listed	5 mmHg @ 100°F	Yes (1% - 5%)	No further analysis required[2]
Dimethylamine (40%)	500 ppm	1,270 mmHg @ 68°F [6,7,9]	Yes (2.8% - 14.4%)	Toxicity/ Flammability/ Explosion Analysis
Dimethylamine (2%)	500 ppm	1,270 mmHg @ 68°F [6,7,9]	Yes (2.8% - 14.4%)	Toxicity/ Flammability/ Explosion Analysis
Disodium Phosphate (0.18%)	None listed	Solid in solution	No	No further analysis required[2]

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
Ethanol	3,300 ppm	44 mmHg @ 68°F (7)	Yes (3.3% - 19%)	Toxicity/ Flammability/ Explosion Analysis
Ferric Sulfate (20%)	1 mg/m^3 TLV-TWA(3)	Solid in solution	No	No further analysis required(2)
Fuel Oil No. 2	100 mg/m^3 TLV-TWA(3, 10)	5 mmHg @ 100°F	Yes (1% - 5%)	No further analysis required(2)
Glycerol	10 mg/m^3 TLV-TWA(3) (mist)	0.05 mmHg @ 150°F	No	No further analysis required(2)
Hydrated Lime (93%)	5 mg/m^3 TLV-TWA(3)	NA/Solid	No	No further analysis required(2)
Hydrazine (20%)	50 ppm	10 mmHg @ 68°F (6,7)	Yes (4.7% – 100%)	Toxicity/ Flammability/ Explosion Analysis
Hydrazine (1.5%)	50 ppm	10 mmHg @ 68°F (6,7)	Yes (4.7% – 100%)	Bounded by the 20% hydrazine solution analysis above
Hydrazine (85%)	50 ppm	10 mmHg @ 68°F (6,7)	Yes (4.7% – 100%)	Toxicity/ Flammability/ Explosion Analysis
Hydrochloric Acid	50 ppm	160 mmHg @ 68°F (6,7)	No	Toxicity Analysis
Hydrogen	Asphyxiant	1,588 mmHg @ –418°F	Yes (4.0% - 75%)	Toxicity/ Flammability/ Explosion Analysis
Hydrogen Peroxide (30%)	75 ppm	7.4 mmHg@ 80°F (6)	No	No further analysis required(2)
Hydrogen Peroxide (35%)	75 ppm	7.4 mmHg @ 80°F (6)	No	No further analysis required(2)

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
Lithium Hydroxide (50%)	None listed	Solid in Solution	No	No further analysis required(2)
Oil, Lubricating Oil	5 mg/m^3 TLV-TWA(3, 10)	5 mmHg @ 100°F	Yes (1% - 5% fuel oil)	No further analysis required(2)
Mixture of Sodium tetraborate decahydrate and Sodium dihydrogen phosphate dehydrate	6 mg/m^3	Solid in Solution	No	No further analysis required(2)
Morpholine (40%)	1,400 ppm	11 mmHg @ 80°F(6)	Yes (1.8% - 10.8%)	Toxicity/ Flammability/ Explosion Analysis
Morpholine (20%)	1,400 ppm	11 mmHg @ 80°F(6)	Yes (1.8% - 10.8%)	Bounded by the 40% morpholine analysis
NALCO 3D TRASAR 3DT177 (Phosphoric Acid)	3 mg/m^3 STEL(4)	Solid in Solution	No	No further analysis required(2)
NALCO 3D TRASAR 3DT104 (Sodium Hydroxide)	10 mg/m^3	Solid in Solution	No	No further analysis required(2)
NALCO H-130 (Ethanol)	3,300 ppm as ethanol	44 mmHg @ 68°F (6,7,9)	Yes (3.3% - 19% as ethanol)	Toxicity/ Flammability/ Explosion Analysis
Nitrogen	Asphyxiant	3,405 mmHg @ -294°F	No	Toxicity Analysis
NOVEC 1230	100,000 ppm	303 mmHg @ 77°F	No	Toxicity Analysis
Oxalic Acid	None listed	NA/Solid	No	No further analysis required(2)

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
p-Dimethylaminobenzaldehyde	None listed	NA/Solid	No	No further analysis required(2)
Phenol	None listed	NA/Solid	Yes (1.7% - 8.6%)	No further analysis required(2)
Polyalkylene Glycols (PAGs)	None Listed	None Listed	No	No further analysis required(2)
Polymer A (Dimethylamine 1% - 5%)	500 ppm	1,270 mmHg @ 68°F (6,7,9)	Yes (2.8% - 14.4%)	Bounded by dimethylamine in turbine building
Polymer B (Dimethylamine 1% - 5%)	500 ppm	1,270 mmHg @ 68°F (6,7,9)	Yes (2.8% - 14.4%)	Bounded by dimethylamine in turbine building
Potassium Chloride (pH inside liquid of an electrode)	None listed	Solid in solution	No	No further analysis required(2)
R-134a (1,1,1,2-Tetrafluoroethane)	50,000 ppm	85.7 psia @ 70°F(9)	No	Toxicity Analysis(11)
Sodium Bicarbonate (12%)	None listed	Solid in solution	No	No further analysis required(2)
Sodium Bisulfite (10%)	5 mg/m^3 TLV-TWA(3)	Solid in solution	No	No further analysis required(2)
Sodium Bromide (44.7%)	None listed	Solid in solution	No	No further analysis required(2)
Sodium Hydroxide	10 mg/m^3	NA/Solid	No	No further analysis required(2)
Sodium Hydroxide (25%)	10 mg/m^3	Solid in solution	No	No further analysis required(2)
Sodium Hypochlorite	10 ppm as chlorine	17.5 mmHg @ 68°F(8,9)	No	Toxicity Analysis
Sodium Hypochlorite (12%)	10 ppm as chlorine	17.5 mmHg @ 68°F(8,9)	No	Toxicity Analysis
Sodium Sulfite (2.2%)	None listed	Solid in solution	No	No further analysis required(2)

NAPS ESP COL 2.2-2 **Table 2.2-203 North Anna On-Site Chemicals, Disposition**

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
Sodium Tetraborate Decahydrate	6 mg/m^3	NA/Solid	No	No further analysis required[2]
Sulfuric Acid	15 mg/m^3	0.001 mmHg @ 68°F[6,7]	No	No further analysis required[1,2]
Sulfuric Acid (96%)	15 mg/m^3	0.001 mmHg @ 68°F[6,7]	No	No further analysis required[1,2]
Trisodium Phosphate (0.72%)	None listed	Solid in solution	No	No further analysis required[2]
Urea (40% $(NH_2)_2CO$)	None listed	Solid in solution	No	No further analysis required[2]
Units 1 & 2				
Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive Yes/No	Disposition
Acetone	2500 ppm	180 mmHg @ 68°F	Yes (2.6% - 12.8%)	Toxicity/ Flammability/ Explosion Analysis
Ammonium Hydroxide (30%)	300 ppm	8.5 atm @ 68°F[6]	Yes (16% - 25%)	Toxicity/ Flammability/ Explosion Analysis
Blasting Sand	50 mg/m^3 as Silica	NA/Solid	No	No further analysis required [2]
Boric Acid	2 mg/m^3 TLV-TWA[3]	Solid in solution	No	No further analysis required [1,2]
Calgon CL-14 (Sodium Hexam-etaphosphate)	None Listed	Not established	No	No further analysis required
Carbon Dioxide	40,000 ppm	56.5 atm @ 68°F	No	Toxicity Analysis
Fuel Oil No. 2	100 mg/m^3 TLV-TWA[3]	5 mmHg @ 100°F	Yes (1% to 5%)	No further analysis required [2]

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
Gasoline	300 ppm TLV-TWA[3]	383 mmHg @ 68°F	Yes (1.4% to 7.6%)	No further analysis required [5]
NALCO H-130 (Ethanol)	3,300 ppm as ethanol	44 mmHg @ 68°F[6]	Yes (3.3% to 19% as ethanol)	Toxicity/ Flammability/ Explosion Analysis
Halon 1301 (Bromotrifluoromethane)	40,000 ppm	> 1 atm @ 68°F	No	Toxicity Analysis
Hydrazine (35%)	50 ppm	10 mmHg @ 68°F[6]	Yes (4.7% to 100%)	Toxicity/ Flammability/ Explosion Analysis
Hydrochloric Acid (31%)	50 ppm	160 mmHg @ 68°F[6]	No	Toxicity Analysis
Hydrogen	Asphyxiant	1,588 mmHg @ –418°F	Yes (4.0% to 75%)	Toxicity/ Flammability/ Explosion Analysis
Hydrogen Peroxide (35%)	75 ppm	7.4 mmHg @ 80°F[6]	No	No further analysis required [2]
Ion Exchange Resin	None Listed	17.5 mmHg @ 68°F (Water)	No	No further analysis required
Isothiazolin Biocide (4.5%)	None Listed	0.0998 mmHg @ 68°F[6]	No	No further analysis required[2]
Lead-Acid Batteries with Sulfuric Acid	15 mg/m^3	0.001 mmHg @ 68°F	No	No further analysis required [1,2]
Liquid Alum, Aluminum Sulfate Solution	2 mg/m^3 TLV-TWA[3]	Solid in solution	No	No further analysis required
Carboline Thinner #2 (as Methyl Ethyl Ketone)	3,000 ppm	23.4 mmHg[12]	Yes (1.8–10%)	Flammability/ Explosion Analysis

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition
Monoethanolamine	30 ppm	0.4 mmHg @ 68°F	Yes (3% to 23.5%)	No further analysis required [2)]
Nitrogen, liquid	Asphyxiant	3405 mmHg @ -294°F	No	Toxicity Analysis
Oil, Hydraulic Fluid	5mg/ m^3 TLV-TWA[(3)]	0.01 mmHg @ 68°F	No limits available	No further analysis required [2)]
Oil, Lubricating Oil	5 mg/m^3 TLV-TWA[(3)]	5 mmHg @ 100 °F	Yes (1%-5% fuel oil)	No further analysis required[(2)]
Oil, Mineral Oil – Dielectric Fluid	5 mg/m^3 TLV-TWA[(3)]	<0.5mmHg @ 68 °F	No limits available	No further analysis required[(2)]
Soda Ash (Sodium Carbonate)	None Listed	NA/Solid	No	No further analysis required[(2)]
Sodium Bromide (30-60%)	None Listed	Solid in solution	No	No further analysis required [2)]
Sodium Hydroxide (50%)	10 mg/m^3	Solid in solution	No	No further analysis required [2)]
Sodium Hypochlorite (15%)	10 ppm as chlorine	17.5 mmHg @ 68°F[(8,9)]	No	Toxicity Analysis
Sodium Chloride	NA	1.0 mmHg at 1589°F	No	No further analysis required[(2)]
Sulfuric Acid	15 mg/m^3	0.001 mmHg @ 68°F[(6)]	No	No further analysis required [(1,2)]
Carboline Thinner #2 (as Toluene)	500 ppm	16.7 mmHg[(13)]	Yes (1.2–7.1%)	Flammability/ Explosion Analysis
TRC-256 Sodium Molybdate	10 mg/m^3	NA/Solid	No	No further analysis required[(2)]
Zinc Chloride (65%)	50 mg/m^3	Solid in solution	No	No further analysis required[(2)]

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna On-Site Chemicals, Disposition

Chemical/ Chemical Product	Toxicity Limit (IDLH)	Vapor Pressure	Flammable/ Explosive? Yes/No	Disposition

Notes:

(1) There are no isolation and protective action distances for spills listed in the Emergency Response Guidebook (ERG). The ERG doesn't predict that large amounts of toxic-by-inhalation gases will be produced if this material is spilled in water.

(2) Chemicals with very low vapor pressures (including solids/solids in solution) were not analyzed due to there being a low likelihood of vapor cloud formation—an air dispersion hazard resulting from the formation of a toxic vapor cloud is not a likely route of exposure.

(3) TLV-TWA: Threshold Limit Value – Time Weighted Average

(4) STEL: Short Term Exposure Limit

(5) Gasoline is stored in an underground tank, therefore formation of a vapor cloud is unlikely. Hazards associated with transport are discussed in Section 2.2.3.1.1.

(6) Vapor pressure of solution presented as the vapor pressure of the pure substance.

(7 Vapor pressure corrected to 68°F to maintain consistency with Units 1 & 2 values.

(8) Sodium hypochlorite Vapor Pressure presented for representative sodium hypochlorite solutions.

(9) Temperature corrected to °F for consistency

(10) TLV-TWA value from Units 1 & 2 analysis used to maintain consistency.

(11) R-134a analyzed for both asphyxiation and toxicity hazards.

(12) Partial vapor pressure of 25% solution presented.

(13) Partial vapor pressure of 80% solution presented.

NAPS ESP COL 2.2-2

Table 2.2-204 Design Basis Events, Explosions, Flammable Vapor Clouds (Delayed Ignition) and Vapor Cloud Explosions

Chemical Evaluated	Distance to Nearest Safety- Related Structure for Unit 3 (ft)	Quantity	Distance for Explosion to have less than 1 psi of Peak Incident Pressure (ft)	Safe Distance for Vapor Cloud Explosions (ft)	Distance to Lower Flammability Limit (ft)
Unit 3					
Acetone (4) (Access Building)	105(8)	50 pounds	22	105	<33
Ammonium Hydroxide(4) (Inside Turbine Building)	240	250 gallons	54	No Detonation(1)	<33
Dimethylamine (40%) (4) (Turbine Building)	245(7)	400 gallons	125(3)	243(2)	87
Dimethylamine (2%) (4) (Inside Turbine Building)	240	1,000 gallons	125	234(2)	51
Ethanol (4) (Access Building)	94	200 gallons	71	No Detonation(1)	Limits not Exceeded
Hydrazine (20%)(4) (Inside Turbine Building)	240	400 gallons	123	No Detonation(1)	<33
Hydrazine (85%) (4) (Access Building)	94	10 gallons	36	No Detonation(1)	<33
Hydrogen (5) (Hydrogen Storage Area)	355	8 pounds	263	207	180
Morpholine (40%) (5) (Adjacent to Turbine Building)	169	10,000 gallons	No Detonation(9)	No Detonation(1)	114
NALCO H-130 (Ethanol) (5) (Hybrid Cooling Tower)	998	400 gallons	89(11)	No Detonation(1)	42
NALCO H-130 (Ethanol) (5) (ESWS/UHS Cooling Tower)	33 (6)	300 gallons	No Detonation(10)	No Detonation(1)	<33

NAPS ESP COL 2.2-2

Table 2.2-204 Design Basis Events, Explosions, Flammable Vapor Clouds (Delayed Ignition) and Vapor Cloud Explosions

Chemical Evaluated	Distance to Nearest Safety- Related Structure for Unit 3 (ft)	Quantity	Distance for Explosion to have less than 1 psi of Peak Incident Pressure (ft)	Safe Distance for Vapor Cloud Explosions (ft)	Distance to Lower Flammability Limit (ft)
Units 1 & 2					
Acetone (5) (Drum Storage Area)	2,032	55 gallons	44	132	36
Ammonium Hydroxide(5) (Turbine Building)	1,046	55 gallons	32	75	39
NALCO H-130 (Ethanol) (5) (SW Chem. Add Bldg)	1,252	2,000 gallons	152	No Detonation(1)	51
Hydrazine (5) (Turbine Building)	1,046	345 gallons	117	No Detonation(1)	<33
Hydrogen (5) (N of Turbine building)	1,046	37 pounds	439	447	387
Carboline Thinner #2 (Methyl Ethyl Ketone)(5) (Thinner Reprocessing Facility)	1,646	14 gallons	45.3(12)	72	< 33
Carboline Thinner #2 (Toluene)(5) (Thinner Reprocessing Facility)	1,646	44 gallons	48.2(13)	< 33	< 33

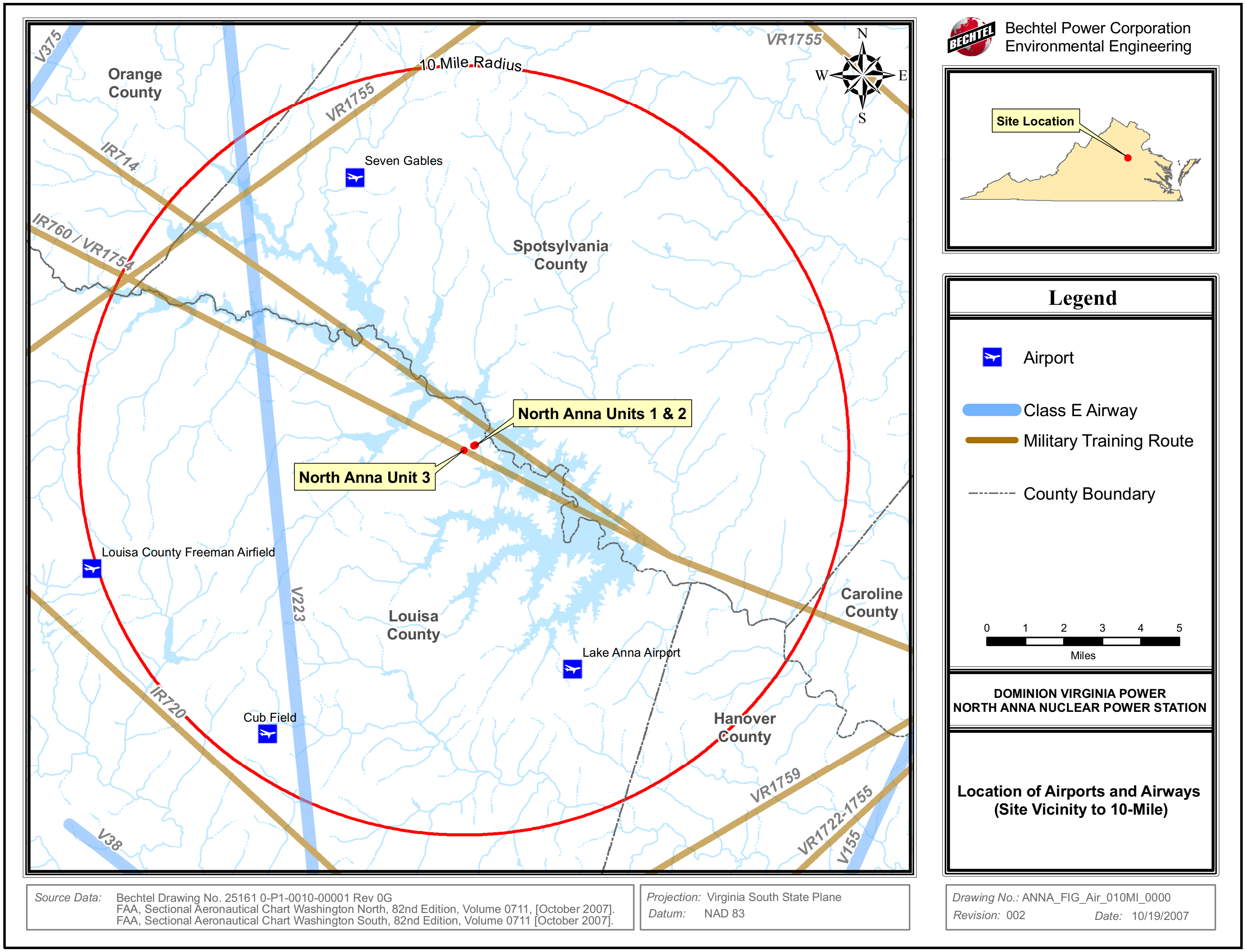
NAPS ESP COL 2.2-2

Table 2.2-204 Design Basis Events, Explosions, Flammable Vapor Clouds (Delayed Ignition) and Vapor Cloud Explosions

1. “No Detonation” is listed when ALOHA reports that there is not a detonation of the formed vapor cloud – (e.g., no part of the vapor cloud is above the LFL at any time).
2. Dimethylamine analysis results use a correction for solution’s vapor pressure.
3. Because concentration was not considered in TNT equivalence analysis, the 1000 gallon 2% Dimethylamine tank analysis is bounding for 400 gallon 40% Dimethylamine tank.
4. Urban or Forest Terrain Input.
5. Open Country Terrain Input.
6. NALCO H-130 must be stored outside of the UHS structures and at least 33 feet from the nearest safety-related structure.
7. The 40% dimethylamine solution must be stored within the chemical storage room in the Turbine Building such that the area of confinement is at most 20 m^2 and the distance to the nearest safety-related structure is at least 245 feet.
8. The acetone must be stored within the designated area in the Access Building such that the safe distance to the NSRS is 105 feet.
9. In a 40% solution, the partial vapor pressure of morpholine is below 10 torr (mm Hg), as such, the vapor concentration above the liquid surface would be too lean to detonate.
10. The partial vapor pressure of ethanol in NALCO H-130 is sufficiently low such that the vapor concentration above the liquid surface would be too lean to detonate as supported by the MSDS which states that combustible mixtures may only form above the flashpoint of 109°F.
11. Analysis performed using 100% ethanol.
12. Analysis performed using 100% methyl ethyl ketone.
13. Analysis performed using 100% toluene.

NAPS COL 2.2(1)

Figure 2.2-201 Civilian and Military Airway Routes in NAPS Vicinity



2.3 Meteorology

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS SUP 2.3(1)

Replace the content of DCD Section 2.3 with the following.

This section provides a description of the meteorology of the site and its surrounding areas. Table 2.0-201 gives a comparison of the Unit 3 site meteorological characteristics with the DCD key site parameters.

2.3.1 Regional Climatology

NAPS COL 2.3(1)

Replace the content of DCD Section 2.3.1 with the following.

The information needed to address the DCD COL Item 2.3(1) is included in SSAR Section 2.3.1, which is incorporated by reference with the following supplement.

2.3.1.2 General Climate

Add the following after the second paragraph of this SSAR section to address temperature extremes.

The Unit 3 site characteristic value for the minimum dry bulb temperature is –21°F (SSAR Table 2.3-5) from the Louisa Cooperative observing site (SSAR Reference 10). This is the most severe minimum temperature that has been observed in the site region and is used as the Unit 3 site characteristic value for the minimum 0 percent annual exceedance value because it is more extreme than the calculated 100-year return value of –19°F (SSAR Table 2.3-18) at Richmond, Virginia (SSAR References 42, 43, and 44).

Using the International Station Meteorological Climate Summary for Richmond (Reference 2.3-207), dry-bulb temperatures ranging from –31.6°C (-25°F) to 38.3°C (101°F), were plotted in 1.1°C (2°F) intervals with their maximum observed coincident wet-bulb temperatures to obtain a corresponding curve. Extrapolating the curve to 42.8°C (109°F), which is the 100-year return value for maximum dry-bulb temperature, the 100-year return value for coincident wet-bulb temperature was determined to be 24.4°C (76°F). That is, 24.4°C (76°F) is the coincident wet-bulb temperature corresponding to the 100-year return period value for maximum dry-bulb temperature.

2.3.1.3.2 Tornadoes

Add the following after the last paragraph of this SSAR section to address Unit 3 site tornado characteristics.

NAPS ESP VAR 2.3-1

The site characteristics that apply to Unit 3 structures designed to withstand tornado loads are provided in Table 2.3-219. These Unit 3 site characteristic values for tornadoes are based on Revision 1 to RG 1.76. Unit 3 is located in Region II.

2.3.1.3.4 Precipitation Extremes

After the fourth paragraph of this SSAR section, a new paragraph is added to address the site snowfall characteristics.

Table 2.3-216 summarizes maximum snowfall event depths, maximum snowpack depths, and estimated 100-year return values for snowfall event depths for selected stations in the Unit 3 site area. For the available periods of record, Piedmont Research Station and Fredericksburg logged the maximum snowfall event amounts which measured 25.5 inches for both sites for January 8, 1996, and January 28, 1922 respectively (Reference 2.3-208). Using the same reference, comparable maxima were observed at the other area stations ranging from 19.0 to 24.0 inches, many associated with the same snowstorm (January 8, 1996). The estimated 100-year return value for the maximum snowfall event amount is 26.5 inches in the Unit 3 site area. This estimate is based on the higher snowfall amount from either the 1-day total. or from the 2- day snowfall total. Two-day totals account for events that persist across calendar days. However, if the 1-day total was higher, it was used instead.

The seventh paragraph of this SSAR section is supplemented as follows with information to address the 48-hour PMWP event.

The highest 48-hour PMWP values for the Unit 3 site area occur in December (SSAR Reference 47); however, the US-APWR DCD 48-hour PMWP is defined for the month of March. While March is inconsistent with the timing of the extreme snow climate of the Unit 3 site area, for comparison with the DCD site parameter value, the March 48-hour PMWP value was determined to be 20.5 inches. This precipitation was estimate based on a linear interpolation from the 24-hour and 72-hour, 10-square-mile area, values shown in Figures 37, and 47, respectively, for March (SSAR Reference 47).

The last paragraph in this SSAR section is supplemented as follows with information to address ice and winter precipitation for Unit 3 safety-related structures.

As Section 2.4.7.6 indicates, the design features that demonstrate acceptable roof structure performance are described in DCD Section 3.8.4.3.4.2 and Section 3.8.4.3.4.2.

2.3.2 Local Meteorology

NAPS COL 2.3(1) Replace the content of DCD Section 2.3.2 with the following.

The information needed to address the DCD COL Item 2.3(1) is included in SSAR Section 2.3.2, which is incorporated by reference with the following supplements.

2.3.2.3 Potential Influence of the Plant and the Facilities on Local Meteorology

The fourth paragraph of this SSAR section is revised as follows with information to address the impacts of cooling tower operations.

The convective and conductive heat losses to the atmosphere resulting from the operation of the Unit 3 closed cycle, hybrid and dry cooling tower system dissipate rapidly through continuous mixing with the surrounding moving air mass. Therefore, any increase in overall ambient temperature is very localized to the NAPS site and does not affect the ambient atmospheric and ground temperature beyond the NAPS site.

The sixth paragraph of this SSAR section is revised to address the engineering performed to consider potential impacts of Unit 3 cooling tower operations as follows.

NAPS ESP COL 2.3-1 The impact on the design and operation of Unit 3 from any cooling-tower-induced increase in the local ambient air temperature, or moisture and salt content, has been considered in the location and separation of wet cooling towers relative to electrical transmission lines and electrical equipment, including transformers and switchyard. Also, the separation of the wet and dry towers from Unit 3 buildings considered potential effects on air ambient conditions at HVAC air intakes, including consideration of prevailing winds. The site layout shown in Figure 2.1-201 ensures minimal impacts on Unit 3 operation from local increases in ambient air temperature, moisture content, and moisture and salt deposition resulting from the operation of the Unit 3 cooling towers, including wet cooling tower drift and plume condensation.

2.3.2.3.1 Salt Deposition and Moisture

The potential impacts on Unit 3 plant design and operation due to salt deposition, fogging, and icing from the CWS hybrid cooling tower and from the Ultimate Heat Sink (UHS) cooling towers were assessed using the Seasonal/Annual Cooling Tower Impact (SACTI) computer code (Reference 2.3-202). See Section 10.4.5.2.2.2 for further description of the hybrid cooling tower design and see Section 9.2.5.2 for the UHS cooling tower design.

a. **Salt Deposition**

Normal operations with two UHS cooling towers and the CWS hybrid cooling tower were evaluated using the SACTI model. Results of this modeling indicate that the UHS towers produce higher salt deposition rates than the CWS hybrid cooling tower. However, the effects of salt deposition from all three towers on the Unit 3 electrical equipment were analyzed based on the combined outputs of the model runs. The following assumptions were made in the SACTI model for all three cooling towers:

- Drift loss is 0.001 percent.
- Total dissolved solids concentration of the cooling water is 9.0×10^{-4} g salt/cm^3.
- Salt density is 2.17 g/cm^3.

Salt deposition from evaporative cooling towers has the potential to build up on bushings of electrical equipment such as Unit 3 transformers, switchyard equipment, and transmission lines (see Figure 8.2-202). A highest deposition rate of 0.0021 mg/cm^2-month is predicted to occur near the Unit 3 transformers during the winter season. The transmission lines and switchyard have lower predicted maximum deposition rates than the transformers. Several months of buildup at this rate would be needed before such deposits would accumulate to 0.08 mg/cm^2, which is the upper end of the “Light Contamination Level” range defined by the applicable IEEE standard (Reference 2.3-203). However, due to the UHS cooling tower location with respect to prevailing wind directions, and natural wash off from local precipitation, total deposits are not expected to reach a level requiring attention. Therefore, cooling tower plume generated salt deposits are not expected to adversely affect any electrical equipment at the North Anna Site.

b. **Moisture**

Added humidity and potential moisture impacts due to CWS hybrid cooling tower and UHS cooling towers operation are predicted by the hours of fogging and icing produced by each tower as determined in the SACTI analysis. The following assumptions were used in the analysis:

- Plume abatement is not accounted for in the SACTI model.
- Total airflow for wet and dry sections of the CWS hybrid cooling tower is considered.
- The CWS hybrid cooling tower is modeled as one cell with a combined flow rate of all fans.
- One tower out of each set (A or B from A & B; C or D from C & D) of towers was modeled using the heat loading specified in the USAPWR DCD for the appropriate train.
- Each of the two-cell UHS towers was modeled as an individual linear mechanical draft tower. The modeled airflow rate was the aggregate of the flow rate from both fans (cells).

A maximum of 0.5 hours of fogging per year at any location due to cooling tower operation is predicted for both the CWS hybrid cooling tower and UHS cooling towers. Because the HVAC intakes, onsite transmission lines, switchyard equipment, and transformers are designed for outdoor operations, which include environmental conditions such as rain, fog and snow, added fog and moisture from cooling tower plumes are not expected to have an adverse affect on these plant features. The CWS hybrid cooling tower incorporates plume-limiting technology; therefore, predicted annual hours of fogging due to cooling tower operation are conservative. Further, the SACTI analysis predicted no fogging from either of the UHS cooling tower scenarios. Additionally, the SACTI analysis predicts no icing will occur.

2.3.2.3.2 Ambient Air Temperature Increases

In addition to the CWS hybrid cooling tower and UHS cooling towers, the CWS dry cooling tower was considered when evaluating the potential for local ambient air temperature increases. The evaluation was based on the following assumptions:

- CWS hybrid cooling tower height is 180 ft.
- CWS dry cooling tower height is 65 ft.
- UHS cooling tower height (including the basin) is 91 ft.
- The top of the MCR HVAC air intakes are approximately 65 ft above plant grade. The MCR HVAC System, the Class 1E Electrical Room HVAC System, and the Emergency Feedwater (EFW) Pump Area HVAC System on the plant east and west sides of the R/B have outside air intakes that are close to each other at this elevation.
- The intakes for the UHS ESW Pump House Ventilation System are less than 60 ft above plant grade in the UHSRS (as shown in Figure 1.2-210).
- The top of the Gas Turbine Generator (GTG) Air Supply air intakes are less than 50 ft above plant grade on the plant north and south sides of each PS/B.
- Exhaust plume temperatures of the CWS hybrid and dry cooling towers are no greater than the maximum inlet water temperature of 123°F.
- Exhaust plume temperatures of the UHS cooling towers are no greater than the maximum inlet water temperature of 95.4°F.

The Unit 3 site characteristic 0 percent exceedance (100-year return period) value for ambient design temperature is 109°F dry bulb. As shown in DCD Table 3.2-2 and Table 3.2-201, the following systems are classified as Safety Class 3 and have external air intakes that could draw in thermal plumes from the cooling towers:

- MCR HVAC System
- Class 1E Electrical Room HVAC System
- EFW Pump Area HVAC System
- GTG Air Supply System
- UHS ESW Pump House Ventilation System

Design of these systems is to footnote (a) in DCD Table 9.4-1, which shows that the 0 percent exceedance temperature (i.e., the limiting outside air design condition temperature for the intakes) is 115°F dry bulb.

A cooling tower plume would need to raise the local ambient temperature associated with the surrounding air mass at the Safety Class 3 intakes for the R/B and PS/B by more than 6°F to exceed the design value. However, cooling tower plume temperatures are higher than the local ambient air temperatures, so buoyancy causes the thermal plume to rise under low wind conditions; whereas, high wind conditions that could direct a plume towards the intakes, would result in rapid air dispersion and mixing that cools the plume. Because these Unit 3 intakes are at a lower elevation than the exhaust plenums of the hybrid and dry cooling towers, and because the intakes are located more than 1000 ft from the CWS towers, the thermal plumes from the towers are not expected to raise the local ambient air temperatures at the intakes above the design value. The maximum inlet water temperature of 95.4°F for the UHS cooling towers is lower than the limiting outside air design condition temperature of 115°F for Safety Class 3 systems for the R/B and PS/B. Therefore, exhaust from the UHS cooling towers will not adversely affect Safety Class 3 systems due to increases in surrounding ambient air temperature.

Cooling tower plumes from the CWS towers are also more than 1000 ft away from the UHS ESW Pump House Ventilation system intakes. These intakes are at even lower elevations than the RIB Safety Class 3 intakes. Therefore, exhaust from the CWS plumes will not adversely affect these systems. Because the exhaust plumes for the UHS towers rise from the UHSRS, the plumes could not enter the UHS ESW Pump House Ventilation system intakes which are below the exhaust release points.

Similarly, the exhausts from the cooling towers are not expected to affect local ambient air temperatures near Unit 3 electrical equipment, including the transformers and switchyard equipment, which are at lower elevations than the Unit 3 Safety Class 3 HVAC intakes. As with the HVAC intakes, high wind conditions that could direct a plume towards the outdoor electrical equipment would result in rapid air dispersion and mixing that cools the plume. Therefore, exhausts from the cooling towers will not adversely affect such Unit 3 electrical equipment due to increases in surrounding ambient air temperature.

2.3.3 Onsite Meteorological Measurements Program

NAPS COL 2.3(1)

Replace the content of DCD Subsection 2.3.3 with the following.

The information needed to address the DCD COL Item 2.3(1) is included in SSAR Section 2.3.3, which is incorporated by reference with the following supplement.

2.3.3.1.2 Location, Elevation, and Exposure of Instruments

The second paragraph of this SSAR section is supplemented as follows with information to address the acceptability of distances from Unit 3 to the wind measurement towers.

The highest building at the Unit 3 site is the Containment portion of the R/B at 229.4 ft above design plant grade level of 290 ft NAVD88 (290.86 ft NGVD29). The primary meteorological measurements tower is located about 733.4 m (2406 ft) true east of the plant facility boundary. Since the primary tower is located more than 10 building heights away from the tallest building at the Unit 3 site, the highest Unit 3 building does not influence the meteorological measurements. The backup meteorological tower is located about 744 m (2440 ft) away from the highest building. Therefore, the Containment portion of the R/B also does not influence the meteorological measurements taken at the backup meteorological measurements tower.

2.3.4 Short-Term (Accident) Diffusion Estimates

NAPS COL 2.3(2)

Replace the content of DCD Subsection 2.3.4 with the following.

The information needed to address the DCD COL Item 2.3(2) is included in SSAR Section 2.3.4, which is incorporated by reference with the following supplements.

2.3.4.1 Basis

The eighth paragraph of this SSAR section is supplemented as follows with information to address the wake influence zone of tall buildings at the Unit 3 site.

As described in SSAR Section 2.1, the EAB is the perimeter of a 5000-foot-radius circle from the center of the containment of the third of the four originally proposed units. The highest building at the Unit 3 site is the Containment portion of the R/B which is 229.4 ft above design plant grade level. Therefore, the closest point on the EAB is more than 10 building heights away from the Unit 3 power block buildings which could have postulated fission product releases. As a result, the entire EAB is located beyond the wake influence zone that can be induced by tall buildings, e.g., the Unit 3 Turbine Building or R/B.

NAPS ESP COL 2.3-2

2.3.4.3 Atmospheric Dispersion Factors for On-Site Doses

Onsite χ/Q values for use in evaluating potential doses from Unit 3 postulated release locations (sources) to on-site receptor locations are based on the Unit 3 plant layout shown in DCD Figure 2.3-2. The meteorological data used in evaluating on-site doses is the same data used for the accident condition dose calculations in SSAR Section 2.3.4. The χ/Q values for the control room and technical support center were calculated using the ARCON96 computer code in accordance with guidance as documented in RG 1.194. Necessary inputs to calculate χ/Q values for the MCR and TSC using ARCON96 are shown in Table 2.3-1R, and DCD Tables 2.3-2 and 2.3-3. The horizontal distances and directions for the source and receptor combinations are shown in DCD Tables 2.3.4-1 through 2.3.4-7. Directions shown in these tables are adjusted by the difference in angle (142.46° clockwise) between the US-APWR plant north and true north. DCD Figure 2.3-2 shows the locations of postulated accidental releases from Unit 3 and the Unit 3 receptor locations.

These release locations are considered ground level releases and are treated as point sources except for a release from the containment shell which is considered as a diffuse area source. MCR and TSC χ/Qs for the 95% time averaging periods of 0 to 2 hours, 2 to 8 hours, 8 to 24 hours, 1 to 4 days and 4 to 30 days which were obtained from the ARCON96 modeling results are summarized in Table 2.3-218 Sheets 1 through 7 for given source receptor pairs. Table 2.3-218 presents: intake χ/Qs for the MCR in Sheets 1 and 2, inleak χ/Qs in sheets 1 through 5, and both inleak and intake χ/Qs for the TSC in sheets 6 and 7. The DCD provides χ/Qs for the 95% time averaging period of 0 to 8 hours. In order to compare χ/Q values to the DCD values, χ/Qs for the 0 to 8 hour time period were calculated from the ARCON96 output using the methodology described in NUREG/CR-6331 (Reference 2.3-209) and are provided in Table 2.3-218.

2.3.5 Long-Term (Routine) Diffusion Estimates

NAPS COL 2.3(3) Replace the content of DCD Section 2.3.5 with the following.

The information needed to address DCD COL Item 2.3(3) is included in SSAR Section 2.3.5, which is incorporated by reference with the following supplements and variances.

2.3.5.1 Basis

The third through sixth paragraphs of this SSAR section are supplemented as follows with information to address the receptors near the Unit 3 site.

NAPS ESP COL 2.3-3 The following input data and assumptions were used in the XOQDOQ modeling:

- Meteorological Data: Three-year combined (1996–1998) onsite joint frequency distribution of wind speed, wind direction, and atmospheric stability.
- Type of Release: Ground level.
- Wind Sensor Height: 10 m (33 ft).
- Vertical Temperature Difference: 10 m (33 ft) – 48.4 m (158.9 ft).
- Number of Wind Speed Categories: 7.
- Release Height: 10 m (33 ft) (default height).
- Containment portion of the R/B Height: 229.4 ft.
- Minimum R/B Cross-Sectional Area: 3092 m^2 (33,282 ft^2).
- Distances from the release point to the nearest residence, nearest site boundary, milk cow, vegetable garden, milk goat, meat animal: See Table 2.3-15R.
- Receptor analysis found no milk cows or goats within five miles of NAPS.

For the dispersion analysis, the Containment portion of the R/B, which has a height of 229.4 ft, is used to determine the minimum building cross-sectional area for evaluating building downwash effects. Conservatively, only the Containment was considered in the calculation of the effective height and cross-sectional area inputs to the XOQDOQ model. The effective height was based on a Containment width of 156 ft (47.7 m). Because of its complex geometry, the cross-section of the

Containment area was broken into 2 pieces: an upper portion formed by part of an ellipse and a lower rectangle. The area of the upper portion was calculated to be 9623 ft^2 (894 m^2) and that of the lower rectangle was determined to be 23,659 ft^2 (2198 m^2). Adding these 2 areas generated a gross cross-sectional area of 33,282 ft^2 (3092 m^2). Dividing the cross-sectional area by the Containment width of 156 ft (47.7 m) results in an equivalent, effective height of 213.3 ft (64.8 m). Both the cross-sectional area and effective height were used as inputs to the XOQDOQ model. For the NAPS site, the χ/Q and D/Q values were found to depend on building height but not cross-sectional area.

The annual Radiological Environmental Monitoring Program (Reference 2.3-201) was reviewed to determine if the distances of any of the nearest receptors modeled for the SSAR have changed. The results are documented in Table 2.3-15R based on a subsequent field survey and plotting of receptor locations using Geographic Information System (GIS) technology. This process provided improved distance accuracy for these receptors. The results show the closest receptor to be a residence in the NW direction at a distance of 1.28 km (4207 ft). The evaluation assumed conservatively, that each receptor (meat animal, vegetable garden, residence) is at the location of the closest receptor and that the closest receptor is the residence in the NW direction at the previously determined distance of 1.20 km (3930 ft). Therefore, for the purposes of the atmospheric dispersion analysis and the subsequent dose evaluations, one of each type of receptor was assumed to be at 1.20 km (3930 ft) in each compass direction. The maximum annual average χ/Q value calculated for the nearest residence, vegetable garden, and meat animal, all assumed at 1.20 km (3930 ft), is 3.90 E-6 sec/m^3 in the ESE direction.

The maximum D/Q for these receptors is 1.10E-8 m^{-2} in the NNE direction. In the evaluation performed for this FSAR, the maximum annual χ/Q (no decay, undepleted) at the EAB is 3.0×10^{-6} sec/m^3; based on a distance of 1.42 km (0.88 mi) to the ESE of the plant facility boundary from Table 2.3-15R and a minimum R/B cross-sectional area of 3092 m^2.

NAPS ESP VAR 2.0-1a to 2.0-1l

The results are summarized in Table 2.3-16R and Table 2.3-17R. These tables present the maximum calculated χ/Qs and D/Qs at receptors and at various distances from the site.

Add the following at the end of this SSAR section to address annual average χ/Q and D/Q estimates.

Long-term (annual average) χ/Q and D/Q estimates generated by the XOQDOQ model are also presented for each directional sector at twenty-two specific distances, as well as for ten distance segments. Table 2.3-208 presents the no decay and undepleted χ/Q estimates at various downwind distances between 0.4 km (0.25 mi) and 80.5 km (50 mi). Table 2.3-209 presents the no decay and undepleted χ/Q estimates for various distance segments out to 80.5 km (50 mi).

Table 2.3-210 presents the 2.26 day decay (for short-lived noble gases) and undepleted χ/Q estimates at the same downwind distances. Table 2.3-211 presents the 2.26 day decay and undepleted χ/Q estimates for the same distance segments.

Table 2.3-212 presents the 8 day decay (for all iodines released to the atmosphere) and depleted χ/Q estimates at the same downwind distances. Table 2.3-213 presents the 8 day decay and depleted χ/Q estimates for the same distance segments.

Table 2.3-214 presents the D/Q estimates for the same downwind distances. Table 2.3-215 presents the D/Q estimates for the same distance segments.

2.3.6 Combined License Information

NAPS COL 2.3(1)

2.3(1) ***Site Meteorology***

This COL item is addressed in Subsections 2.3.1, 2.3.2, and 2.3.3, and associated tables.

NAPS COL 2.3(2)

2.3(2) ***Short term atmospheric transport and diffusion***

This COL item is addressed in Subsection 2.3.4 and associated tables.

NAPS COL 2.3(3)

2.3(3) ***Long term atmospheric transport and diffusion***

This COL item is addressed in Subsection 2.3.5 and associated tables.

2.3.7 References

2.3-201 Dominion North Anna Power Station 2006 Annual Radiological Environmental Operating Report, prepared by Dominion North Anna Power Station, January 2006-December 2006.

2.3-202 SACTI User's Manual: Cooling-Tower-Plume Prediction Code, EPRI CS-3403-CCM, April 1984.

2.3-203 Institute of Electrical and Electronics Engineers, Std C57.19.100-1995 (2003), "IEEE Guide for Application of Power Apparatus Bushings."

2.3-204 [Deleted]

2.3-205 [Deleted]

2.3-206 [Deleted]

2.3-207 International Station Meteorological Climate Summary, Fleet Numerical Meteorology and Oceanography Detachment, National Climatic Data Center, and USAFETAC OL-A, Version 4.0, September 1996.

2.3-208 U.S. Department of Commerce, "United States Snow Climatology," National Climatic Data Center, NOAA, available at http://www.ncdc.noaa.gov/ussc/index.jsp accessed on March 16, 2010.

2.3-209 "Atmospheric Relative Concentrations in Building Wakes," NUREG/CR 6331, Revision 1, May 1997.

NAPS COL 2.3(2)

Table 2.3-1R Common Input Parameters for χ/Q Calculation of MCR and TSC

Common parameter for ARCON96	
Building area (m^2)	~~2000~~ 1200(1)
Plant vent vertical velocity (m/s)	NA(2)
Stack flow (m^3/s)	0(3)
Stack radius (m)	0(4)
Elevation difference (m)	0

Notes:

(1) ~~According to the RG 1.194, the default value (2000 m^2) is used to reasonably calculate.~~
The default value (2000 m^2) as described in RG 1.194, is not used for site-specific calculations.

(2) The plant vent vertical velocity is not used due to ground release.

(3) The stack flow is conservatively set to zero. (See ~~the~~ RG 1.194.)

(4) The stack radius is set to zero according to ~~the~~ RG 1.194 due to zero stack flow.

NAPS ESP COL 2.3-3 **Table 2.3-15R Source to Receptor Distances**

Type[3]	Direction from Unit 3	Distance from Plant Facility Boundary (ft)[1]	Distance from Plant Facility Boundary (miles/km)[1]
Vegetation			
Veg	S	5605	~~1.11~~ 1.06/~~1.79~~ 1.71
Veg	SSW	22877	~~1.50~~ 4.33/~~2.41~~ 6.97
Veg	SW	17254	~~2.78~~ 3.27/~~4.47~~ 5.26
Veg	WSW	No Receptor	~~1.52/2.45~~No Receptor
Veg	W	14891	~~4.80~~ 2.82/~~7.72~~ 4.54
Veg	WNW	7608	~~None~~ 1.44/~~None~~ 2.32
Veg	NW	No Receptor	~~0.98/1.58~~ No Receptor
Veg	NNW	11399	~~1.13~~ 2.16/~~1.82~~ 3.47
Veg	N	13672	~~1.78~~ 2.59/~~2.86~~ 4.17
Veg	NNE	17318	~~1.66~~ 3.28/~~2.67~~ 5.28
Veg	NE	5029	~~0.94~~ 0.95/~~1.51~~ 1.53
Veg	ENE	13272	~~2.18~~ 2.51/~~3.51~~ 4.05
Veg	E	8519	~~1.38~~ 1.61/~~2.22~~ 2.60
Veg	ESE	11826	~~3.57~~ 2.24/~~5.74~~ 3.60
Veg	SE	4658	~~1.37~~ 0.88/~~2.20~~ 1.42
Veg	SSE	4609	~~1.21~~ 0.87/~~1.95~~ 1.40
Meat Animal			
Meat	S	8712	~~None~~ 1.65/~~None~~ 2.66
Meat	SSW	9476	~~1.90~~ 1.79/~~3.06~~ 2.89
Meat	SW	6468	~~None~~ 1.23/~~None~~ 1.97
Meat	WSW	No Receptor	~~1.22/1.96~~ No Receptor
Meat	W	20424	~~4.20~~ 3.87/~~6.76~~ 6.23
Meat	WNW	21339	~~3.98~~ 4.04/~~6.40~~ 6.50
Meat	NW	No Receptor	~~None/None~~ No Receptor
Meat	NNW	No Receptor	~~1.93/3.11~~ No Receptor

NAPS ESP COL 2.3-3

Table 2.3-15R Source to Receptor Distances

Type[3]	Direction from Unit 3	Distance from Plant Facility Boundary (ft)[1]	Distance from Plant Facility Boundary (miles/km)[1]
		Meat Animal *(continued)*	
Meat	N	11441	~~2.18~~ 2.17/~~3.51~~ 3.49
Meat	NNE	7868	~~1.56~~ 1.49/~~2.51~~ 2.40
Meat	NE	7940	~~1.44~~ 1.50/~~2.32~~ 2.42
Meat	ENE	14428	~~2.58~~ 2.73/~~4.15~~ 4.40
Meat	E	19631	~~3.58~~ 3.72/~~5.76~~ 5.98
Meat	ESE	7058	~~None~~ 1.34/~~None~~ 2.15
Meat	SE	7711	~~1.37~~ 1.46/~~2.20~~ 2.35
Meat	SSE	10445	~~2.71~~ 1.98/~~4.36~~ 3.18
		Resident	
Res	S	4339	~~1.01~~ 0.82/~~1.63~~ 1.32
Res	SSW	4575	~~1.1~~ 0.87/~~1.77~~ 1.39
Res	SW	6468	~~2.78~~ 1.23/~~4.47~~ 1.97
Res	WSW	6107	~~1.22~~ 1.16/~~1.96~~ 1.86
Res	W	5263	~~1.30~~ 1.00/~~2.09~~ 1.60
Res	WNW	5421	~~0.98~~ 1.03/~~1.58~~ 1.65
Res	NW	4207	~~0.88~~ 0.80/~~1.42~~ 1.28
Res	NNW	4587	~~0.93~~ 0.87/~~1.50~~ 1.40
Res	N	4846	~~1.48~~ 0.92/~~2.38~~ 1.48
Res	NNE	5695	~~0.96~~ 1.08/~~1.54~~ 1.74
Res	NE	5029	~~0.94~~ 0.95/~~1.51~~ 1.53
Res	ENE	8748	~~2.18~~ 1.66/~~3.51~~ 2.67
Res	E	7158	~~1.38~~ 1.36/~~2.22~~ 2.18
Res	ESE	7506	~~1.77~~ 1.42/~~2.85~~ 2.29
Res	SE	4830	~~1.37~~ 0.91/~~2.20~~ 1.47
Res	SSE	4394	~~0.91~~ 0.83/~~1.46~~ 1.34

NAPS ESP COL 2.3-3

Table 2.3-15R Source to Receptor Distances

Type[3]	Direction from Unit 3	Distance from Plant Facility Boundary (ft)[1]	Distance from Plant Facility Boundary (miles/km)[1]
Site Boundary (Exclusion Area Boundary)			
EAB	S	3274	0.62/0.99
EAB	SSW	3009	0.57/0.92
EAB	SW	2851	0.54/087
EAB	WSW	2903	0.55/0.88
EAB	W	2851	0.54/0.87
EAB	WNW	2956	0.56/0.90
EAB	NW	3274	0.62/0.99
EAB	NNW	3802	0.72/1.16
EAB	N	4593	0.87/1.40
EAB	NNE	4646	0.88/1.42
EAB	NE	4751	0.90/1.45
EAB	ENE	4806	0.91/1.47
EAB	E	4698	0.89/1.43
EAB	ESE	4646	0.88/1.42
EAB	SE	4383	0.83/1.34
EAB	SSE	3855	0.73/1.17

Notes:
1. Distances are from the plant facility boundary. See Figure 2.0-205.
2. Not used.
3. No milk cows or goats within a 5-mile radius of NAPS.

NAPS ESP COL 2.3-3
NAPS ESP VAR 2.0-1a to 2.0-1l

Table 2.3-16R XOQDOQ Predicted Maximum χ/Q and D/Q Values at Specific Points of Interest

Type of Location	Direction from Site	Distance (miles)	χ/Q (No Decay, Undepleted)	χ/Q (2.26 Day Decay, Undepleted)	χ/Q (8 Day Decay, Depleted)	D/Q
Residence	~~NNE~~ ESE	~~0.96~~ 0.74	~~2.4E-06~~ 3.9E-06	~~2.4E-06~~ 3.9E-06	~~2.1E-06~~ 3.5E-06	~~7.2E-09~~ 1.1E-08[b]
EAB	ESE	0.88	~~3.7E-06~~ 3.0E-06	~~3.7E-06~~ 3.0E-06	~~3.3E-06~~ 2.6E-06	~~1.2E-08[a]~~ 1.1E-08[a]
Meat Animal	~~SE~~ ESE	~~1.37~~ 0.74	~~1.4E-06~~ 3.9E-06	~~1.4E-06~~ 3.9E-06	~~1.2E-06~~ 3.5E-06	~~3.1E-09[b]~~ 1.1E-08[b]
Veg. Garden	~~NE~~ ESE	~~0.94~~ 0.74	~~2.0E-06~~ 3.9E-06	~~2.0E-06~~ 3.9E-06	~~1.8E-06~~ 3.5E-06	~~6.0E-09~~ 1.1E-08[b]

Notes:

χ/Q – sec/m^3

D/Q – 1/m^2

a: direction ~~= south~~ South and distance of 0.62 mi for maximum D/Q for EAB

b: direction ~~= north-northeast~~ North-Northeast for maximum D/Q for residence, meat animal, and vegetable garden

NAPS ESP
COL 2.3-3

Table 2.3-17R XOQDOQ Predicted Maximum Annual Averages (Ground-Level Release)

No Decay Undepleted

	Distance In Miles from Site										
ESE	0.25	0.5	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
X/Q (s/m^3)	~~2.685E-5~~ 2.550E-05	~~8.740E-6~~ 7.554E-06	~~4.697E-6~~ 3.855E-06	~~3.103E-6~~ 2.480E-06	~~1.742E-6~~ 1.393E-06	~~1.163E-6~~ 9.311E-07	~~8.527E-7~~ 6.981E-07	~~6.634E-7~~ 5.521E-07	~~5.373E-7~~ 4.529E-07	~~4.482E-7~~ 3.816E-07	~~3.822E-7~~ 3.281E-07
	Distance In Miles from Site										
ESE	5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
X/Q (s/m^3)	~~3.317E-7~~ 2.867E-07	~~1.934E-7~~ 1.710E-07	~~1.325E-7~~ 1.188E-07	~~7.833E-8~~ 7.129E-08	~~5.418E-08~~ 4.976E-08	~~4.079E-8~~ 3.770E-08	~~3.239E-8~~ 3.008E-08	~~2.668E-8~~ 2.487E-08	~~2.257E-8~~ 2.109E-08	~~1.948E-8~~ 1.825E-08	~~1.709E-8~~ 1.604E-08
	Segment Boundaries In Miles from Site										
ESE	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50	
X/Q (s/m^3)	~~4.887E-6~~ 4.066E-06	~~1.787E-6~~ 1.429E-06	~~8.596E-7~~ 7.018E-07	~~5.394E-7~~ 4.541E-07	~~3.831E-7~~ 3.286E-07	~~1.971E-7~~ 1.735E-07	~~7.964E-8~~ 7.227E-08	~~4.100E-8~~ 3.787E-08	~~2.675E-8~~ 2.492E-08	~~1.951E-8~~ 1.828E-08	
2.26 Day Decay Undepleted	**Distance In Miles from Site**										
ESE	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
X/Q (s/m^3)	~~2.681E-5~~ 2.546E-05	~~8.712E-6~~ 7.530E-06	~~4.674E-6~~ 3.837E-06	~~3.083E-6~~ 2.464E-06	~~1.725E-6~~ 1.379E-06	~~1.148E-6~~ 9.192E-07	~~8.388E-7~~ 6.869E-07	~~6.504E-7~~ 5.415E-07	~~5.251E-7~~ 4.427E-07	~~4.365E-7~~ 3.718E-07	~~3.711E-7~~ 3.186E-07
	Distance In Miles from Site										
ESE	5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
X/Q (s/m^3)	~~3.210E-7~~ 2.775E-07	~~1.841E-7~~ 1.628E-07	~~1.241E-7~~ 1.112E-07	~~7.095E-8~~ 6.462E-08	~~4.750E-8~~ 4.366E-08	~~3.462E-8~~ 3.203E-08	~~2.662E-8~~ 2.474E-08	~~2.124E-8~~ 1.981E-08	~~1.740E-8~~ 1.628E-08	~~1.455E-8~~ 1.365E-08	~~1.237E-8~~ 1.163E-08

NAPS ESP COL 2.3-3

Table 2.3-17R XOQDOQ Predicted Maximum Annual Averages (Ground-Level Release)

	Segment Boundaries In Miles from Site										
ESE	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50	
X/Q (s/m^3)	~~4.864E-6~~ 4.047E-06	~~1.770E-6~~ 1.416E-06	~~8.458E-7~~ 6.907E-07	~~5.272E-7~~ 4.439E-07	~~3.719E-7~~ 3.191E-07	~~1.878E-7~~ 1.654E-07	~~7.233E-8~~ 6.566E-08	~~3.485E-8~~ 3.222E-08	~~2.131E-8~~ 1.988E-08	~~1.459E-8~~ 1.368E-08	
8 Day Decay Depleted	**Distance In Miles from Site**										
ESE	0.25	0.5	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
X/Q (s/m^3)	~~2.540E-5~~ 2.412E-05	~~7.974E-6~~ 6.892E-06	~~4.180E-6~~ 3.431E-06	~~2.711E-6~~ 2.167E-06	~~1.475E-6~~ 1.179E-06	~~9.592E-7~~ 7.682E-07	~~6.875E-7~~ 5.629E-07	~~5.240E-7~~ 4.362E-07	~~4.166E-7~~ 3.511E-07	~~3.415E-7~~ 2.908E-07	~~2.866E-7~~ 2.460E-07
	Distance In Miles from Site										
ESE	5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
X/Q (s/m^3)	~~2.450E-7~~ 2.118E-07	~~1.344E-7~~ 1.189E-07	~~8.739E-8~~ 7.832E-08	~~4.735E-8~~ 4.310E-08	~~3.047E-8~~ 2.799E-08	~~2.153E-8~~ 1.991E-08	~~1.614E-8~~ 1.500E-08	~~1.261E-8~~ 1.176E-08	~~1.015E-8~~ 9.489E-09	~~8.357E-9~~ 7.833E-09	~~7.007E-9~~ 6.581E-09
	Segment Boundaries In Miles from Site										
ESE	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50	
X/Q (s/m^3)	~~4.370E-6~~ 3.638E-06	~~1.521E-6~~ 1.216E-06	~~6.945E-7~~ 5.669E-07	~~4.187E-7~~ 3.524E-07	~~2.874E-7~~ 2.466E-07	~~1.381E-7~~ 1.215E-07	~~4.874E-8~~ 4.421E-08	~~2.176E-8~~ 2.010E-08	~~1.268E-8~~ 1.182E-08	~~8.388E-9~~ 7.860E-09	
Relative Deposition	**Distance In Miles from Site**										
NNE	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
D/Q (1/m^2)	6.257E-08	2.116E-08	1.086E-08	6.671E-09	3.326E-09	2.017E-09	1.364E-09	9.882E-10	7.514E-10	5.920E-10	4.793E-10
	Distance In Miles from Site										
NNE	5	7.5	10	15	20	25	30	35	40	45	50
D/Q (1/m^2)	3.964E-10	1.943E-10	1.219E-10	6.161E-11	3.729E-11	2.500E-11	1.792E-11	1.345E-11	1.046E-11	8.355E-12	6.820E-12

NAPS ESP
COL 2.3-3

Table 2.3-17R XOQDOQ Predicted Maximum Annual Averages (Ground-Level Release)

	Segment Boundaries In Miles from Site									
NNE	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
D/Q ($1/m^2$)	1.129E-08	3.487E-09	1.388E-09	7.583E-10	4.820E-10	2.070E-10	6.420E-11	2.544E-11	1.359E-11	8.410E-12

Table 2.3-201 [Deleted]

Table 2.3-202 [Deleted]

Table 2.3-203 [Deleted]

Table 2.3-204 [Deleted]

Table 2.3-205 [Deleted]

Table 2.3-206 [Deleted]

Table 2.3-207 [Deleted]

NAPS COL 2.3(3)

Table 2.3-208 Long-Term χ/Q (sec/m³) for Routine Releases at Distances Between 0.25 to 50 Miles, No Decay, Undepleted

Ground Level Release - No Purge Releases

	Distance in Miles from the Site										
Sector	0.250	0.500	0.750	1.000	1.500	2.000	2.500	3.000	3.500	4.000	4.500
S	7.936E-06	2.667E-06	1.470E-06	9.587E-07	5.238E-07	3.403E-07	2.443E-07	1.864E-07	1.483E-07	1.217E-07	1.023E-07
SSW	6.238E-06	2.089E-06	1.158E-06	7.579E-07	4.163E-07	2.714E-07	1.952E-07	1.492E-07	1.189E-07	9.764E-08	8.211E-08
SW	5.612E-06	1.864E-06	1.032E-06	6.758E-07	3.721E-07	2.431E-07	1.752E-07	1.340E-07	1.069E-07	8.794E-08	7.403E-08
WSW	5.282E-06	1.742E-06	9.589E-07	6.269E-07	3.455E-07	2.258E-07	1.630E-07	1.249E-07	9.971E-08	8.208E-08	6.916E-08
W	6.621E-06	2.147E-06	1.165E-06	7.589E-07	4.192E-07	2.749E-07	1.993E-07	1.533E-07	1.229E-07	1.015E-07	8.575E-08
WNW	5.800E-06	1.846E-06	1.006E-06	6.560E-07	3.626E-07	2.379E-07	1.724E-07	1.326E-07	1.062E-07	8.773E-08	7.412E-08
NW	5.853E-06	1.845E-06	1.020E-06	6.708E-07	3.744E-07	2.472E-07	1.799E-07	1.388E-07	1.115E-07	9.231E-08	7.814E-08
NNW	5.012E-06	1.552E-06	8.643E-07	5.715E-07	3.223E-07	2.141E-07	1.562E-07	1.208E-07	9.719E-08	8.054E-08	6.825E-08
N	1.274E-05	3.952E-06	2.214E-06	1.467E-06	8.285E-07	5.508E-07	4.013E-07	3.099E-07	2.491E-07	2.062E-07	1.746E-07
NNE	1.622E-05	5.050E-06	2.796E-06	1.845E-06	1.042E-06	6.926E-07	5.049E-07	3.900E-07	3.136E-07	2.597E-07	2.200E-07
NE	1.323E-05	4.134E-06	2.287E-06	1.509E-06	8.510E-07	5.654E-07	4.126E-07	3.190E-07	2.567E-07	2.127E-07	1.803E-07
ENE	8.376E-06	2.562E-06	1.389E-06	9.129E-07	5.189E-07	3.471E-07	2.551E-07	1.984E-07	1.605E-07	1.336E-07	1.136E-07
E	1.656E-05	4.952E-06	2.603E-06	1.700E-06	9.750E-07	6.575E-07	4.884E-07	3.831E-07	3.121E-07	2.613E-07	2.235E-07
ESE	2.550E-05	7.554E-06	3.855E-06	2.480E-06	1.393E-06	9.311E-07	6.981E-07	5.521E-07	4.529E-07	3.816E-07	3.281E-07
SE	1.793E-05	5.376E-06	2.752E-06	1.763E-06	9.741E-07	6.446E-07	4.811E-07	3.793E-07	3.103E-07	2.609E-07	2.239E-07
SSE	8.971E-06	2.850E-06	1.524E-06	9.863E-07	5.407E-07	3.536E-07	2.575E-07	1.990E-07	1.601E-07	1.326E-07	1.124E-07

NAPS COL 2.3(3)

Table 2.3-208 Long-Term χ/Q (sec/m^3) for Routine Releases at Distances Between 0.25 to 50 Miles, No Decay, Undepleted

Ground Level Release - No Purge Releases

	Distance in Miles from the Site										
Sector	**5.000**	**7.500**	**10.000**	**15.000**	**20.000**	**25.000**	**30.000**	**35.000**	**40.000**	**45.000**	**50.000**
S	8.754E-08	4.828E-08	3.174E-08	1.767E-08	1.171E-08	8.531E-09	6.593E-09	5.307E-09	4.401E-09	3.732E-09	3.222E-09
SSW	7.035E-08	3.890E-08	2.562E-08	1.428E-08	9.469E-09	6.896E-09	5.329E-09	4.288E-09	3.555E-09	3.014E-09	2.602E-09
SW	6.349E-08	3.524E-08	2.327E-08	1.303E-08	8.662E-09	6.324E-09	4.896E-09	3.947E-09	3.276E-09	2.782E-09	2.404E-09
WSW	5.936E-08	3.307E-08	2.190E-08	1.231E-08	8.211E-09	6.011E-09	4.664E-09	3.767E-09	3.133E-09	2.664E-09	2.305E-09
W	7.379E-08	4.154E-08	2.772E-08	1.576E-08	1.061E-08	7.816E-09	6.099E-09	4.949E-09	4.133E-09	3.527E-09	3.062E-09
WNW	6.379E-08	3.595E-08	2.401E-08	1.368E-08	9.233E-09	6.819E-09	5.331E-09	4.332E-09	3.622E-09	3.095E-09	2.689E-09
NW	6.735E-08	3.812E-08	2.553E-08	1.458E-08	9.843E-09	7.269E-09	5.681E-09	4.615E-09	3.858E-09	3.295E-09	2.862E-09
NNW	5.888E-08	3.344E-08	2.244E-08	1.285E-08	8.676E-09	6.409E-09	5.009E-09	4.069E-09	3.401E-09	2.904E-09	2.522E-09
N	1.506E-07	8.526E-08	5.710E-08	3.258E-08	2.195E-08	1.619E-08	1.263E-08	1.025E-08	8.555E-09	7.298E-09	6.332E-09
NNE	1.897E-07	1.076E-07	7.212E-08	4.122E-08	2.781E-08	2.053E-08	1.604E-08	1.302E-08	1.088E-08	9.285E-09	8.062E-09
NE	1.555E-07	8.834E-08	5.928E-08	3.393E-08	2.292E-08	1.693E-08	1.323E-08	1.075E-08	8.985E-09	7.673E-09	6.665E-09
ENE	9.837E-08	5.660E-08	3.833E-08	2.222E-08	1.514E-08	1.126E-08	8.846E-09	7.220E-09	6.058E-09	5.191E-09	4.523E-09
E	1.944E-07	1.138E-07	7.800E-08	4.595E-08	3.166E-08	2.374E-08	1.878E-08	1.542E-08	1.300E-08	1.119E-08	9.785E-09
ESE	2.867E-07	1.710E-07	1.188E-07	7.129E-08	4.976E-08	3.770E-08	3.008E-08	2.487E-08	2.109E-08	1.825E-08	1.604E-08
SE	1.954E-07	1.161E-07	8.045E-08	4.819E-08	3.361E-08	2.546E-08	2.031E-08	1.679E-08	1.425E-08	1.233E-08	1.084E-08
SSE	9.703E-08	5.529E-08	3.723E-08	2.146E-08	1.460E-08	1.086E-08	8.534E-09	6.969E-09	5.851E-09	5.018E-09	4.376E-09

NAPS COL 2.3(3)

Table 2.3-209 Long-Term χ/Q (sec/m^3) for Routine Releases Along Various Distance Segments, No Decay, Undepleted

Ground Level Release - No Purge Releases

	Segment Boundaries in Miles from the Site									
Direction From Site	**0.5-1**	**1-2**	**2-3**	**3-4**	**4-5**	**5-10**	**10-20**	**20-30**	**30-40**	**40-50**
S	1.509E-06	5.389E-07	2.467E-07	1.491E-07	1.026E-07	4.966E-08	1.815E-08	8.605E-09	5.329E-09	3.741E-09
SSW	1.187E-06	4.278E-07	1.971E-07	1.194E-07	8.235E-08	3.999E-08	1.466E-08	6.955E-09	4.306E-09	3.022E-09
SW	1.058E-06	3.822E-07	1.768E-07	1.074E-07	7.425E-08	3.620E-08	1.336E-08	6.376E-09	3.963E-09	2.788E-09
WSW	9.855E-07	3.548E-07	1.645E-07	1.002E-07	6.936E-08	3.395E-08	1.262E-08	6.059E-09	3.782E-09	2.670E-09
W	1.203E-06	4.305E-07	2.011E-07	1.234E-07	8.598E-08	4.257E-08	1.613E-08	7.873E-09	4.966E-09	3.534E-09
WNW	1.037E-06	3.724E-07	1.739E-07	1.067E-07	7.433E-08	3.683E-08	1.400E-08	6.867E-09	4.347E-09	3.101E-09
NW	1.048E-06	3.838E-07	1.814E-07	1.120E-07	7.834E-08	3.902E-08	1.491E-08	7.320E-09	4.631E-09	3.301E-09
NNW	8.869E-07	3.296E-07	1.575E-07	9.759E-08	6.842E-08	3.421E-08	1.313E-08	6.453E-09	4.083E-09	2.910E-09
N	2.268E-06	8.469E-07	4.046E-07	2.502E-07	1.751E-07	8.725E-08	3.330E-08	1.630E-08	1.028E-08	7.313E-09
NNE	2.874E-06	1.065E-06	5.090E-07	3.149E-07	2.206E-07	1.101E-07	4.213E-08	2.067E-08	1.307E-08	9.304E-09
NE	2.352E-06	8.704E-07	4.159E-07	2.578E-07	1.807E-07	9.036E-08	3.467E-08	1.705E-08	1.079E-08	7.688E-09
ENE	1.438E-06	5.301E-07	2.570E-07	1.611E-07	1.139E-07	5.776E-08	2.265E-08	1.133E-08	7.242E-09	5.201E-09
E	2.724E-06	9.950E-07	4.914E-07	3.131E-07	2.239E-07	1.158E-07	4.672E-08	2.387E-08	1.546E-08	1.121E-08
ESE	4.066E-06	1.429E-06	7.018E-07	4.541E-07	3.286E-07	1.735E-07	7.227E-08	3.787E-08	2.492E-08	1.828E-08
SE	2.896E-06	1.003E-06	4.840E-07	3.112E-07	2.243E-07	1.179E-07	4.888E-08	2.557E-08	1.683E-08	1.234E-08
SSE	1.580E-06	5.566E-07	2.597E-07	1.607E-07	1.127E-07	5.654E-08	2.192E-08	1.093E-08	6.990E-09	5.027E-09

NAPS COL 2.3(3)

Table 2.3-210 Long-Term χ/Q (sec/m^3) for Routine Releases at Distances Between 0.25 to 50 Miles, 2.260 Day Decay, Undepleted

Ground Level Release - No Purge Releases

	Distance in Miles from the Site										
Sector	**0.250**	**0.500**	**0.750**	**1.000**	**1.500**	**2.000**	**2.500**	**3.000**	**3.500**	**4.000**	**4.500**
S	7.928E-06	2.661E-06	1.465E-06	9.548E-07	5.206E-07	3.375E-07	2.418E-07	1.841E-07	1.462E-07	1.197E-07	1.003E-07
SSW	6.230E-06	2.085E-06	1.154E-06	7.546E-07	4.136E-07	2.690E-07	1.931E-07	1.472E-07	1.170E-07	9.588E-08	8.044E-08
SW	5.605E-06	1.859E-06	1.028E-06	6.726E-07	3.695E-07	2.408E-07	1.731E-07	1.321E-07	1.051E-07	8.626E-08	7.244E-08
WSW	5.275E-06	1.738E-06	9.553E-07	6.238E-07	3.429E-07	2.236E-07	1.609E-07	1.230E-07	9.794E-08	8.042E-08	6.758E-08
W	6.612E-06	2.141E-06	1.160E-06	7.550E-07	4.160E-07	2.720E-07	1.967E-07	1.509E-07	1.206E-07	9.937E-08	8.374E-08
WNW	5.793E-06	1.841E-06	1.002E-06	6.528E-07	3.599E-07	2.355E-07	1.702E-07	1.306E-07	1.044E-07	8.596E-08	7.244E-08
NW	5.846E-06	1.840E-06	1.016E-06	6.675E-07	3.717E-07	2.448E-07	1.777E-07	1.368E-07	1.096E-07	9.047E-08	7.638E-08
NNW	5.005E-06	1.547E-06	8.607E-07	5.683E-07	3.196E-07	2.117E-07	1.541E-07	1.188E-07	9.528E-08	7.873E-08	6.653E-08
N	1.272E-05	3.941E-06	2.205E-06	1.459E-06	8.217E-07	5.447E-07	3.958E-07	3.048E-07	2.443E-07	2.017E-07	1.703E-07
NNE	1.620E-05	5.037E-06	2.785E-06	1.836E-06	1.034E-06	6.854E-07	4.983E-07	3.839E-07	3.079E-07	2.543E-07	2.148E-07
NE	1.322E-05	4.124E-06	2.279E-06	1.502E-06	8.444E-07	5.596E-07	4.073E-07	3.141E-07	2.521E-07	2.083E-07	1.761E-07
ENE	8.364E-06	2.555E-06	1.383E-06	9.077E-07	5.145E-07	3.431E-07	2.515E-07	1.950E-07	1.573E-07	1.305E-07	1.107E-07
E	1.653E-05	4.937E-06	2.591E-06	1.689E-06	9.660E-07	6.494E-07	4.809E-07	3.761E-07	3.054E-07	2.549E-07	2.173E-07
ESE	2.546E-05	7.530E-06	3.837E-06	2.464E-06	1.379E-06	9.192E-07	6.869E-07	5.415E-07	4.427E-07	3.718E-07	3.186E-07
SE	1.791E-05	5.359E-06	2.739E-06	1.752E-06	9.650E-07	6.365E-07	4.735E-07	3.721E-07	3.034E-07	2.543E-07	2.175E-07
SSE	8.959E-06	2.842E-06	1.518E-06	9.813E-07	5.366E-07	3.500E-07	2.542E-07	1.959E-07	1.571E-07	1.298E-07	1.098E-07

NAPS COL 2.3(3)

Table 2.3-210 Long-Term χ/Q (sec/m^3) for Routine Releases at Distances Between 0.25 to 50 Miles, 2.260 Day Decay, Undepleted

Ground Level Release - No Purge Releases

	Distance in Miles from the Site										
Sector	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	8.571E-08	4.676E-08	3.040E-08	1.654E-08	1.073E-08	7.639E-09	5.773E-09	4.544E-09	3.685E-09	3.057E-09	2.581E-09
SSW	6.876E-08	3.758E-08	2.445E-08	1.331E-08	8.617E-09	6.128E-09	4.624E-09	3.634E-09	2.942E-09	2.436E-09	2.054E-09
SW	6.197E-08	3.397E-08	2.215E-08	1.209E-08	7.841E-09	5.582E-09	4.214E-09	3.313E-09	2.682E-09	2.221E-09	1.872E-09
WSW	5.785E-08	3.180E-08	2.078E-08	1.137E-08	7.386E-09	5.264E-09	3.977E-09	3.128E-09	2.533E-09	2.098E-09	1.768E-09
W	7.186E-08	3.991E-08	2.627E-08	1.453E-08	9.510E-09	6.818E-09	5.176E-09	4.087E-09	3.321E-09	2.758E-09	2.331E-09
WNW	6.218E-08	3.458E-08	2.279E-08	1.265E-08	8.315E-09	5.982E-09	4.555E-09	3.607E-09	2.938E-09	2.446E-09	2.072E-09
NW	6.566E-08	3.669E-08	2.425E-08	1.350E-08	8.878E-09	6.389E-09	4.866E-09	3.853E-09	3.140E-09	2.614E-09	2.214E-09
NNW	5.723E-08	3.204E-08	2.120E-08	1.179E-08	7.741E-09	5.558E-09	4.223E-09	3.336E-09	2.712E-09	2.252E-09	1.903E-09
N	1.464E-07	8.176E-08	5.399E-08	2.996E-08	1.963E-08	1.408E-08	1.069E-08	8.439E-09	6.855E-09	5.692E-09	4.807E-09
NNE	1.847E-07	1.033E-07	6.833E-08	3.801E-08	2.497E-08	1.794E-08	1.364E-08	1.079E-08	8.779E-09	7.300E-09	6.175E-09
NE	1.515E-07	8.490E-08	5.622E-08	3.133E-08	2.061E-08	1.483E-08	1.129E-08	8.934E-09	7.276E-09	6.055E-09	5.126E-09
ENE	9.555E-08	5.417E-08	3.615E-08	2.035E-08	1.346E-08	9.721E-09	7.420E-09	5.884E-09	4.797E-09	3.995E-09	3.383E-09
E	1.884E-07	1.086E-07	7.327E-08	4.184E-08	2.794E-08	2.032E-08	1.559E-08	1.241E-08	1.015E-08	8.480E-09	7.198E-09
ESE	2.775E-07	1.628E-07	1.112E-07	6.462E-08	4.366E-08	3.203E-08	2.474E-08	1.981E-08	1.628E-08	1.365E-08	1.163E-08
SE	1.892E-07	1.106E-07	7.537E-08	4.368E-08	2.949E-08	2.162E-08	1.670E-08	1.337E-08	1.099E-08	9.215E-09	7.849E-09
SSE	9.446E-08	5.308E-08	3.524E-08	1.975E-08	1.306E-08	9.440E-09	7.213E-09	5.727E-09	4.676E-09	3.900E-09	3.307E-09

NAPS COL 2.3(3)

Table 2.3-211 Long-Term χ/Q (sec/m^3) for Routine Releases Along Various Distance Segments, 2.260 Day Decay, Undepleted

Direction From Site	Ground Level Release - No Purge Releases									
	Segment Boundaries in Miles from the Site									
	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.504E-06	5.357E-07	2.442E-07	1.469E-07	1.006E-07	4.814E-08	1.704E-08	7.716E-09	4.568E-09	3.067E-09
SSW	1.183E-06	4.251E-07	1.949E-07	1.176E-07	8.069E-08	3.867E-08	1.370E-08	6.190E-09	3.653E-09	2.444E-09
SW	1.055E-06	3.796E-07	1.747E-07	1.057E-07	7.266E-08	3.494E-08	1.244E-08	5.637E-09	3.330E-09	2.228E-09
WSW	9.819E-07	3.523E-07	1.624E-07	9.841E-08	6.778E-08	3.269E-08	1.169E-08	5.315E-09	3.144E-09	2.105E-09
W	1.198E-06	4.273E-07	1.985E-07	1.212E-07	8.397E-08	4.095E-08	1.491E-08	6.879E-09	4.106E-09	2.767E-09
WNW	1.033E-06	3.697E-07	1.718E-07	1.048E-07	7.265E-08	3.548E-08	1.298E-08	6.033E-09	3.623E-09	2.453E-09
NW	1.044E-06	3.810E-07	1.792E-07	1.101E-07	7.659E-08	3.760E-08	1.384E-08	6.444E-09	3.871E-09	2.622E-09
NNW	8.833E-07	3.269E-07	1.553E-07	9.568E-08	6.670E-08	3.282E-08	1.208E-08	5.606E-09	3.352E-09	2.259E-09
N	2.259E-06	8.401E-07	3.991E-07	2.454E-07	1.708E-07	8.379E-08	3.071E-08	1.421E-08	8.479E-09	5.709E-09
NNE	2.863E-06	1.057E-06	5.024E-07	3.092E-07	2.153E-07	1.059E-07	3.895E-08	1.810E-08	1.084E-08	7.321E-09
NE	2.343E-06	8.639E-07	4.106E-07	2.531E-07	1.765E-07	8.695E-08	3.209E-08	1.495E-08	8.975E-09	6.073E-09
ENE	1.432E-06	5.257E-07	2.533E-07	1.579E-07	1.110E-07	5.536E-08	2.080E-08	9.798E-09	5.909E-09	4.006E-09
E	2.711E-06	9.861E-07	4.839E-07	3.063E-07	2.178E-07	1.106E-07	4.265E-08	2.046E-08	1.246E-08	8.501E-09
ESE	4.047E-06	1.416E-06	6.907E-07	4.439E-07	3.191E-07	1.654E-07	6.566E-08	3.222E-08	1.988E-08	1.368E-08
SE	2.883E-06	9.939E-07	4.764E-07	3.043E-07	2.179E-07	1.124E-07	4.442E-08	2.175E-08	1.342E-08	9.235E-09
SSE	1.574E-06	5.525E-07	2.564E-07	1.578E-07	1.100E-07	5.435E-08	2.022E-08	9.515E-09	5.751E-09	3.910E-09

NAPS COL 2.3(3)

Table 2.3-212 Long-Term χ/Q (sec/m^3) for Routine Releases at Distances Between 0.25 to 50 Miles, 8.000 Day Decay, Depleted

Ground Level Release - No Purge Releases

	Distance in Miles from the Site										
Sector	**0.250**	**0.500**	**0.750**	**1.000**	**1.500**	**2.000**	**2.500**	**3.000**	**3.500**	**4.000**	**4.500**
S	7.509E-06	2.434E-06	1.309E-06	8.383E-07	4.441E-07	2.811E-07	1.973E-07	1.475E-07	1.152E-07	9.298E-08	7.690E-08
SSW	5.901E-06	1.907E-06	1.031E-06	6.626E-07	3.529E-07	2.242E-07	1.576E-07	1.180E-07	9.233E-08	7.457E-08	6.172E-08
SW	5.309E-06	1.701E-06	9.186E-07	5.908E-07	3.154E-07	2.007E-07	1.414E-07	1.060E-07	8.304E-08	6.714E-08	5.563E-08
WSW	4.997E-06	1.590E-06	8.536E-07	5.480E-07	2.928E-07	1.865E-07	1.315E-07	9.875E-08	7.741E-08	6.265E-08	5.195E-08
W	6.264E-06	1.959E-06	1.037E-06	6.633E-07	3.552E-07	2.269E-07	1.608E-07	1.212E-07	9.539E-08	7.744E-08	6.440E-08
WNW	5.487E-06	1.684E-06	8.955E-07	5.734E-07	3.073E-07	1.964E-07	1.392E-07	1.049E-07	8.248E-08	6.696E-08	5.568E-08
NW	5.537E-06	1.683E-06	9.081E-07	5.863E-07	3.173E-07	2.041E-07	1.452E-07	1.098E-07	8.660E-08	7.046E-08	5.870E-08
NNW	4.742E-06	1.416E-06	7.693E-07	4.995E-07	2.730E-07	1.768E-07	1.261E-07	9.548E-08	7.542E-08	6.143E-08	5.123E-08
N	1.205E-05	3.606E-06	1.970E-06	1.282E-06	7.020E-07	4.546E-07	3.238E-07	2.450E-07	1.933E-07	1.573E-07	1.311E-07
NNE	1.534E-05	4.608E-06	2.489E-06	1.613E-06	8.829E-07	5.718E-07	4.075E-07	3.084E-07	2.434E-07	1.982E-07	1.652E-07
NE	1.252E-05	3.773E-06	2.036E-06	1.319E-06	7.212E-07	4.668E-07	3.330E-07	2.523E-07	1.993E-07	1.623E-07	1.354E-07
ENE	7.924E-06	2.338E-06	1.236E-06	7.978E-07	4.396E-07	2.865E-07	2.058E-07	1.569E-07	1.245E-07	1.019E-07	8.528E-08
E	1.566E-05	4.518E-06	2.316E-06	1.485E-06	8.259E-07	5.425E-07	3.939E-07	3.027E-07	2.420E-07	1.992E-07	1.677E-07
ESE	2.412E-05	6.892E-06	3.431E-06	2.167E-06	1.179E-06	7.682E-07	5.629E-07	4.362E-07	3.511E-07	2.908E-07	2.460E-07
SE	1.697E-05	4.905E-06	2.449E-06	1.541E-06	8.251E-07	5.319E-07	3.880E-07	2.996E-07	2.406E-07	1.988E-07	1.679E-07
SSE	8.487E-06	2.600E-06	1.357E-06	8.621E-07	4.582E-07	2.919E-07	2.079E-07	1.573E-07	1.242E-07	1.012E-07	8.442E-08

NAPS COL 2.3(3)

Table 2.3-212 Long-Term χ/Q (sec/m^3) for Routine Releases at Distances Between 0.25 to 50 Miles, 8.000 Day Decay, Depleted

Ground Level Release - No Purge Releases

	Distance in Miles from the Site										
Sector	5.000	7.500	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000
S	6.487E-08	3.373E-08	2.106E-08	1.078E-08	6.670E-09	4.573E-09	3.347E-09	2.562E-09	2.027E-09	1.644E-09	1.361E-09
SSW	5.210E-08	2.716E-08	1.699E-08	8.704E-09	5.383E-09	3.689E-09	2.698E-09	2.064E-09	1.632E-09	1.323E-09	1.094E-09
SW	4.700E-08	2.459E-08	1.542E-08	7.929E-09	4.917E-09	3.376E-09	2.473E-09	1.894E-09	1.499E-09	1.217E-09	1.007E-09
WSW	4.393E-08	2.306E-08	1.449E-08	7.481E-09	4.652E-09	3.202E-09	2.350E-09	1.803E-09	1.429E-09	1.161E-09	9.616E-10
W	5.459E-08	2.895E-08	1.834E-08	9.574E-09	6.003E-09	4.159E-09	3.068E-09	2.364E-09	1.881E-09	1.534E-09	1.275E-09
WNW	4.721E-08	2.507E-08	1.589E-08	8.318E-09	5.233E-09	3.634E-09	2.687E-09	2.075E-09	1.653E-09	1.350E-09	1.123E-09
NW	4.984E-08	2.658E-08	1.690E-08	8.870E-09	5.581E-09	3.876E-09	2.866E-09	2.212E-09	1.762E-09	1.439E-09	1.197E-09
NNW	4.354E-08	2.329E-08	1.484E-08	7.796E-09	4.904E-09	3.405E-09	2.516E-09	1.941E-09	1.545E-09	1.260E-09	1.048E-09
N	1.113E-07	5.940E-08	3.775E-08	1.978E-08	1.242E-08	8.607E-09	6.351E-09	4.893E-09	3.892E-09	3.172E-09	2.635E-09
NNE	1.403E-07	7.498E-08	4.772E-08	2.504E-08	1.575E-08	1.093E-08	8.074E-09	6.228E-09	4.958E-09	4.044E-09	3.362E-09
NE	1.151E-07	6.158E-08	3.923E-08	2.062E-08	1.298E-08	9.018E-09	6.667E-09	5.146E-09	4.099E-09	3.345E-09	2.783E-09
ENE	7.272E-08	3.941E-08	2.533E-08	1.347E-08	8.548E-09	5.972E-09	4.435E-09	3.436E-09	2.746E-09	2.247E-09	1.873E-09
E	1.436E-07	7.917E-08	5.148E-08	2.782E-08	1.784E-08	1.256E-08	9.390E-09	7.313E-09	5.870E-09	4.821E-09	4.033E-09
ESE	2.118E-07	1.189E-07	7.832E-08	4.310E-08	2.799E-08	1.991E-08	1.500E-08	1.176E-08	9.489E-09	7.833E-09	6.581E-09
SE	1.444E-07	8.072E-08	5.306E-08	2.914E-08	1.891E-08	1.344E-08	1.012E-08	7.936E-09	6.407E-09	5.289E-09	4.444E-09
SSE	7.178E-08	3.853E-08	2.462E-08	1.303E-08	8.260E-09	5.771E-09	4.287E-09	3.324E-09	2.658E-09	2.177E-09	1.817E-09

NAPS COL 2.3(3)

Table 2.3-213 Long-Term χ/Q (sec/m^3) for Routine Releases Along Various Distance Segments, 8.000 Day Decay, Depleted

	Ground Level Release - No Purge Releases									
	Segment Boundaries in Miles from the Site									
Direction From Site	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	1.350E-06	4.593E-07	1.997E-07	1.160E-07	7.721E-08	3.502E-08	1.124E-08	4.642E-09	2.582E-09	1.653E-09
SSW	1.062E-06	3.645E-07	1.595E-07	9.291E-08	6.196E-08	2.818E-08	9.068E-09	3.744E-09	2.081E-09	1.330E-09
SW	9.467E-07	3.256E-07	1.431E-07	8.355E-08	5.585E-08	2.549E-08	8.255E-09	3.426E-09	1.909E-09	1.223E-09
WSW	8.814E-07	3.022E-07	1.331E-07	7.788E-08	5.215E-08	2.389E-08	7.782E-09	3.248E-09	1.816E-09	1.166E-09
W	1.076E-06	3.667E-07	1.626E-07	9.594E-08	6.463E-08	2.993E-08	9.935E-09	4.214E-09	2.381E-09	1.541E-09
WNW	9.277E-07	3.172E-07	1.407E-07	8.296E-08	5.588E-08	2.591E-08	8.630E-09	3.682E-09	2.089E-09	1.356E-09
NW	9.374E-07	3.268E-07	1.468E-07	8.708E-08	5.890E-08	2.745E-08	9.194E-09	3.927E-09	2.227E-09	1.445E-09
NNW	7.930E-07	2.806E-07	1.273E-07	7.582E-08	5.140E-08	2.403E-08	8.075E-09	3.449E-09	1.954E-09	1.266E-09
N	2.028E-06	7.209E-07	3.272E-07	1.944E-07	1.316E-07	6.132E-08	2.050E-08	8.721E-09	4.928E-09	3.186E-09
NNE	2.570E-06	9.068E-07	4.117E-07	2.448E-07	1.658E-07	7.739E-08	2.595E-08	1.107E-08	6.272E-09	4.063E-09
NE	2.103E-06	7.410E-07	3.364E-07	2.004E-07	1.359E-07	6.353E-08	2.136E-08	9.135E-09	5.182E-09	3.360E-09
ENE	1.286E-06	4.512E-07	2.077E-07	1.251E-07	8.554E-08	4.055E-08	1.392E-08	6.044E-09	3.459E-09	2.257E-09
E	2.436E-06	8.465E-07	3.971E-07	2.431E-07	1.681E-07	8.118E-08	2.864E-08	1.270E-08	7.357E-09	4.840E-09
ESE	3.638E-06	1.216E-06	5.669E-07	3.524E-07	2.466E-07	1.215E-07	4.421E-08	2.010E-08	1.182E-08	7.860E-09
SE	2.591E-06	8.538E-07	3.910E-07	2.415E-07	1.684E-07	8.257E-08	2.991E-08	1.357E-08	7.979E-09	5.307E-09
SSE	1.413E-06	4.741E-07	2.101E-07	1.249E-07	8.471E-08	3.974E-08	1.349E-08	5.841E-09	3.346E-09	2.186E-09

NAPS COL 2.3(3)

Table 2.3-214 Long-Term D/Q ($1/m^2$) for Routine Releases at Distances Between 0.25 to 50 Miles

Ground Level Release - No Purge Releases
Relative Deposition Per Unit Area ($1/m^2$) At Fixed Points By Downwind Sectors
Distances In Miles

Direction From Site	0.25	0.50	0.75	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50
S	4.819E-08	1.630E-08	8.367E-09	5.138E-09	2.561E-09	1.553E-09	1.050E-09	7.611E-10	5.787E-10	4.559E-10	3.691E-10
SSW	3.194E-08	1.080E-08	5.546E-09	3.405E-09	1.698E-09	1.030E-09	6.961E-10	5.045E-10	3.836E-10	3.022E-10	2.446E-10
SW	2.633E-08	8.902E-09	4.571E-09	2.807E-09	1.399E-09	8.486E-10	5.738E-10	4.158E-10	3.161E-10	2.491E-10	2.016E-10
WSW	2.286E-08	7.732E-09	3.970E-09	2.438E-09	1.215E-09	7.371E-10	4.983E-10	3.611E-10	2.746E-10	2.163E-10	1.751E-10
W	2.691E-08	9.101E-09	4.673E-09	2.869E-09	1.430E-09	8.676E-10	5.866E-10	4.251E-10	3.232E-10	2.546E-10	2.061E-10
WNW	2.495E-08	8.438E-09	4.333E-09	2.660E-09	1.326E-09	8.044E-10	5.439E-10	3.941E-10	2.997E-10	2.361E-10	1.911E-10
NW	2.242E-08	7.583E-09	3.893E-09	2.391E-09	1.192E-09	7.229E-10	4.887E-10	3.542E-10	2.693E-10	2.122E-10	1.718E-10
NNW	1.628E-08	5.504E-09	2.826E-09	1.735E-09	8.652E-10	5.247E-10	3.548E-10	2.571E-10	1.955E-10	1.540E-10	1.247E-10
N	4.309E-08	1.457E-08	7.481E-09	4.594E-09	2.290E-09	1.389E-09	9.391E-10	6.805E-10	5.175E-10	4.077E-10	3.300E-10
NNE	6.257E-08	2.116E-08	1.086E-08	6.671E-09	3.326E-09	2.017E-09	1.364E-09	9.882E-10	7.514E-10	5.920E-10	4.793E-10
NE	5.046E-08	1.706E-08	8.761E-09	5.379E-09	2.682E-09	1.627E-09	1.100E-09	7.969E-10	6.059E-10	4.774E-10	3.865E-10
ENE	2.720E-08	9.199E-09	4.723E-09	2.900E-09	1.446E-09	8.769E-10	5.929E-10	4.296E-10	3.267E-10	2.574E-10	2.084E-10
E	3.824E-08	1.293E-08	6.640E-09	4.077E-09	2.033E-09	1.233E-09	8.335E-10	6.040E-10	4.593E-10	3.618E-10	2.929E-10
ESE	5.097E-08	1.724E-08	8.849E-09	5.434E-09	2.709E-09	1.643E-09	1.111E-09	8.050E-10	6.121E-10	4.822E-10	3.904E-10
SE	4.574E-08	1.547E-08	7.942E-09	4.877E-09	2.431E-09	1.475E-09	9.970E-10	7.225E-10	5.493E-10	4.328E-10	3.504E-10
SSE	4.085E-08	1.381E-08	7.092E-09	4.355E-09	2.171E-09	1.317E-09	8.902E-10	6.451E-10	4.905E-10	3.865E-10	3.129E-10

NAPS COL 2.3(3)

Table 2.3-214 Long-Term D/Q ($1/m^2$) for Routine Releases at Distances Between 0.25 to 50 Miles

Ground Level Release - No Purge Releases
Relative Deposition Per Unit Area ($1/m^2$) At Fixed Points By Downwind Sectors
Distances In Miles

Direction From Site	5.00	7.50	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00
S	3.053E-10	1.496E-10	9.388E-11	4.745E-11	2.872E-11	1.926E-11	1.380E-11	1.036E-11	8.056E-12	6.435E-12	5.252E-12
SSW	2.024E-10	9.917E-11	6.222E-11	3.145E-11	1.904E-11	1.276E-11	9.145E-12	6.867E-12	5.339E-12	4.265E-12	3.481E-12
SW	1.668E-10	8.174E-11	5.129E-11	2.592E-11	1.569E-11	1.052E-11	7.538E-12	5.660E-12	4.401E-12	3.515E-12	2.869E-12
WSW	1.449E-10	7.099E-11	4.454E-11	2.251E-11	1.363E-11	9.136E-12	6.547E-12	4.916E-12	3.822E-12	3.053E-12	2.492E-12
W	1.705E-10	8.356E-11	5.243E-11	2.650E-11	1.604E-11	1.075E-11	7.706E-12	5.786E-12	4.499E-12	3.594E-12	2.933E-12
WNW	1.581E-10	7.748E-11	4.861E-11	2.457E-11	1.487E-11	9.971E-12	7.145E-12	5.365E-12	4.171E-12	3.332E-12	2.720E-12
NW	1.421E-10	6.962E-11	4.369E-11	2.208E-11	1.336E-11	8.961E-12	6.421E-12	4.821E-12	3.749E-12	2.994E-12	2.444E-12
NNW	1.031E-10	5.054E-11	3.171E-11	1.603E-11	9.701E-12	6.504E-12	4.661E-12	3.500E-12	2.721E-12	2.174E-12	1.774E-12
N	2.730E-10	1.338E-10	8.394E-11	4.243E-11	2.568E-11	1.722E-11	1.234E-11	9.264E-12	7.203E-12	5.754E-12	4.697E-12
NNE	3.964E-10	1.943E-10	1.219E-10	6.161E-11	3.729E-11	2.500E-11	1.792E-11	1.345E-11	1.046E-11	8.355E-12	6.820E-12
NE	3.197E-10	1.567E-10	9.830E-11	4.968E-11	3.007E-11	2.016E-11	1.445E-11	1.085E-11	8.435E-12	6.738E-12	5.500E-12
ENE	1.724E-10	8.446E-11	5.300E-11	2.679E-11	1.621E-11	1.087E-11	7.789E-12	5.849E-12	4.548E-12	3.633E-12	2.965E-12
E	2.423E-10	1.187E-10	7.451E-11	3.766E-11	2.279E-11	1.528E-11	1.095E-11	8.223E-12	6.393E-12	5.107E-12	4.168E-12
ESE	3.229E-10	1.583E-10	9.929E-11	5.019E-11	3.038E-11	2.037E-11	1.459E-11	1.096E-11	8.520E-12	6.806E-12	5.555E-12
SE	2.898E-10	1.420E-10	8.912E-11	4.504E-11	2.726E-11	1.828E-11	1.310E-11	9.835E-12	7.647E-12	6.108E-12	4.986E-12
SSE	2.588E-10	1.268E-10	7.957E-11	4.022E-11	2.434E-11	1.632E-11	1.170E-11	8.782E-12	6.828E-12	5.454E-12	4.452E-12

Table 2.3-215 Long-Term D/Q ($1/m^2$) for Routine Releases Along Various Distance Segments

Ground Level Release - No Purge Release
Relative Deposition Per Unit Area ($1/m^2$) By Downwind Sectors
Segment Boundaries In Miles

Direction From Site	0.5-1	1-2	2-3	3-4	4-5	5-10	10-20	20-30	30-40	40-50
S	8.694E-09	2.686E-09	1.069E-09	5.841E-10	3.712E-10	1.594E-10	4.944E-11	1.960E-11	1.046E-11	6.477E-12
SSW	5.762E-09	1.780E-09	7.084E-10	3.871E-10	2.460E-10	1.057E-10	3.277E-11	1.299E-11	6.936E-12	4.293E-12
SW	4.749E-09	1.467E-09	5.839E-10	3.191E-10	2.028E-10	8.710E-11	2.701E-11	1.071E-11	5.717E-12	3.538E-12
WSW	4.125E-09	1.274E-09	5.071E-10	2.771E-10	1.761E-10	7.565E-11	2.346E-11	9.298E-12	4.965E-12	3.073E-12
W	4.855E-09	1.500E-09	5.969E-10	3.262E-10	2.073E-10	8.905E-11	2.761E-11	1.094E-11	5.844E-12	3.617E-12
WNW	4.502E-09	1.391E-09	5.534E-10	3.024E-10	1.922E-10	8.256E-11	2.560E-11	1.015E-11	5.419E-12	3.354E-12
NW	4.045E-09	1.250E-09	4.973E-10	2.718E-10	1.727E-10	7.420E-11	2.301E-11	9.119E-12	4.870E-12	3.014E-12
NNW	2.937E-09	9.072E-10	3.610E-10	1.973E-10	1.254E-10	5.386E-11	1.670E-11	6.619E-12	3.535E-12	2.188E-12
N	7.773E-09	2.402E-09	9.557E-10	5.222E-10	3.319E-10	1.426E-10	4.421E-11	1.752E-11	9.357E-12	5.792E-12
NNE	1.129E-08	3.487E-09	1.388E-09	7.583E-10	4.820E-10	2.070E-10	6.420E-11	2.544E-11	1.359E-11	8.410E-12
NE	9.103E-09	2.812E-09	1.119E-09	6.115E-10	3.887E-10	1.669E-10	5.177E-11	2.052E-11	1.096E-11	6.782E-12
ENE	4.908E-09	1.516E-09	6.033E-10	3.297E-10	2.095E-10	9.001E-11	2.791E-11	1.106E-11	5.907E-12	3.656E-12
E	6.899E-09	2.132E-09	8.482E-10	4.635E-10	2.946E-10	1.265E-10	3.924E-11	1.555E-11	8.305E-12	5.140E-12
ESE	9.195E-09	2.841E-09	1.130E-09	6.177E-10	3.926E-10	1.686E-10	5.230E-11	2.073E-11	1.107E-11	6.851E-12
SE	8.252E-09	2.550E-09	1.015E-09	5.544E-10	3.524E-10	1.514E-10	4.693E-11	1.860E-11	9.934E-12	6.149E-12
SSE	7.369E-09	2.277E-09	9.059E-10	4.950E-10	3.146E-10	1.351E-10	4.191E-11	1.661E-11	8.870E-12	5.490E-12

NAPS COL 2.3(1)

Table 2.3-216 Climatological Extremes at Selected NWS and Cooperative Observing Stations in the Unit 3 Site Area (Date of Occurrence)

Parameter	Partlow 3WNW	Louisa	Piedmont Research Station	Gordonsville 3S	Fredericksburg Nat'l Park	Charlottesville 2W	Richmond
Maximum Snowfall Event	24 in.[a] (1/30/1966)	19 in.[a] (1/08/1996)	25.5 in.[a] (1/08/1996)	20.5 in.[a] (1/08/1996)	25.5 in.[a] (1/28/1922)	22.5 in.[a] (3/07/1962)	21.6 in.[b] (1/1940)
Maximum Snowpack	4 in.[a] (12/23/1967, 2/29/1969)	24 in.[a] (1/26/1987)	22 in.[a] (1/08/1996)	22 in.[a]a (1/26/1987)	17 in.[a] (1/25/1940)	20 in.[a] (1/31/1966)	Insufficient Data[a]
100-Year Return Snowfall	21.8 in.[a]	21.1 in.[a]	26.5 in.[a]	24.6 in.[a]	22.0 in.[a]	22.7 in.[a]	17.5 in.[a]

a. Reference 2.3-208

b. SSAR Reference 1

Table 2.3-217 [Deleted]

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 1 of 7)

MCR χ/Q (sec/m^3) at the East HVAC Intake (Same as Inleakage via Class 1E Electrical Room South-East Intake)

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	7.1E-04	1.2E-02	2.1E-03	8.5E-04	3.1E-03
0–2 hours	8.4E-04	1.6E-02	2.9E-03	9.5E-04	3.8E-03
2–8 hours	6.7E-04	1.0E-02	1.8E-03	8.1E-04	2.9E-03
8–24 hours	2.8E-04	3.5E-03	6.2E-04	3.6E-04	1.1E-03
1–4 days	1.9E-04	2.4E-03	4.5E-04	2.4E-04	7.4E-04
4–30 days	1.5E-04	2.2E-03	3.6E-04	1.9E-04	5.8E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	1.8E-03	3.4E-03	1.8E-03	8.7E-04
0–2 hours	2.3E-03	4.3E-03	2.4E-03	1.1E-03
2–8 hours	1.6E-03	3.1E-03	1.6E-03	7.9E-04
8–24 hours	5.9E-04	1.1E-03	5.5E-04	3.4E-04
1–4 days	3.9E-04	7.2E-04	3.9E-04	2.5E-04
4–30 days	3.1E-04	5.8E-04	3.1E-04	1.9E-04

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 2 of 7)

MCR χ/Q (sec/m^3) at the West HVAC Intake (Same as Inleakage via Class 1E Electrical Room South-West Intake)

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	9.1E-04	1.8E-03	5.8E-03	4.4E-04	1.7E-03
0–2 hours	1.1E-03	2.2E-03	6.9E-03	5.5E-04	2.2E-03
2–8 hours	8.4E-04	1.7E-03	5.4E-03	4.0E-04	1.5E-03
8–24 hours	3.4E-04	7.3E-04	2.3E-03	1.6E-04	5.9E-04
1–4 days	2.6E-04	5.3E-04	1.7E-03	1.2E-04	4.2E-04
4–30 days	2.0E-04	4.4E-04	1.4E-03	1.0E-04	3.5E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	2.9E-03	1.9E-03	3.5E-03	8.2E-04
0–2 hours	3.7E-03	2.5E-03	4.5E-03	1.1E-03
2–8 hours	2.6E-03	1.7E-03	3.2E-03	7.2E-04
8–24 hours	9.8E-04	6.8E-04	1.2E-03	2.8E-04
1–4 days	6.8E-04	4.9E-04	8.8E-04	2.2E-04
4–30 days	5.7E-04	4.0E-04	7.1E-04	1.8E-04

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 3 of 7)

MCR χ/Q (sec/m^3) at the R/B Door

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	1.0E-03	1.6E-03	3.3E-03	5.3E-04	1.8E-03
0–2 hours	1.3E-03	1.8E-03	3.8E-03	6.8E-04	2.2E-03
2–8 hours	9.5E-04	1.5E-03	3.1E-03	4.8E-04	1.6E-03
8–24 hours	3.7E-04	6.2E-04	1.3E-03	2.0E-04	6.2E-04
1–4 days	2.9E-04	4.4E-04	9.0E-04	1.5E-04	4.5E-04
4–30 days	2.3E-04	3.6E-04	7.2E-04	1.2E-04	3.7E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	2.9E-03	1.9E-03	3.2E-03	8.5E-04
0–2 hours	3.6E-03	2.3E-03	3.9E-03	1.2E-03
2–8 hours	2.6E-03	1.7E-03	2.9E-03	7.3E-04
8–24 hours	1.0E-03	6.8E-04	1.2E-03	2.7E-04
1–4 days	7.3E-04	5.0E-04	8.9E-04	2.1E-04
4–30 days	6.1E-04	4.0E-04	6.9E-04	1.8E-04

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 4 of 7)

MCR χ/Q (sec/m^3) at the Class 1E Electrical Room North-East Intake

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	7.3E-04	8.9E-03	2.1E-03	9.0E-04	3.2E-03
0–2 hours	8.6E-04	1.2E-02	2.9E-03	9.8E-04	4.0E-03
2–8 hours	6.9E-04	7.9E-03	1.8E-03	8.7E-04	2.9E-03
8–24 hours	2.8E-04	2.9E-03	6.0E-04	3.8E-04	1.1E-03
1–4 days	2.0E-04	2.0E-03	4.4E-04	2.5E-04	7.3E-04
4–30 days	1.5E-04	1.8E-03	3.7E-04	2.0E-04	5.9E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	1.8E-03	3.4E-03	1.8E-03	8.8E-04
0–2 hours	2.3E-03	4.3E-03	2.4E-03	1.1E-03
2–8 hours	1.6E-03	3.1E-03	1.6E-03	8.1E-04
8–24 hours	5.8E-04	1.0E-03	5.5E-04	3.5E-04
1–4 days	3.9E-04	7.1E-04	3.8E-04	2.5E-04
4–30 days	3.1E-04	5.7E-04	3.1E-04	1.9E-04

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 5 of 7)

MCR χ/Q (sec/m^3) at the Class 1E Electrical Room North-West Intake

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	9.2E-04	1.8E-03	5.4E-03	4.5E-04	1.8E-03
0–2 hours	1.1E-03	2.2E-03	6.2E-03	5.5E-04	2.3E-03
2–8 hours	8.6E-04	1.7E-03	5.1E-03	4.1E-04	1.6E-03
8–24 hours	3.5E-04	7.5E-04	2.2E-03	1.7E-04	6.1E-04
1–4 days	2.7E-04	5.3E-04	1.6E-03	1.2E-04	4.3E-04
4–30 days	2.1E-04	4.5E-04	1.3E-03	1.0E-04	3.6E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	3.0E-03	2.0E-03	3.6E-03	8.3E-04
0–2 hours	3.9E-03	2.5E-03	4.6E-03	1.1E-03
2–8 hours	2.7E-03	1.8E-03	3.2E-03	7.4E-04
8–24 hours	1.0E-03	6.9E-04	1.3E-03	2.8E-04
1–4 days	7.3E-04	5.0E-04	9.0E-04	2.2E-04
4–30 days	5.8E-04	4.0E-04	7.5E-04	1.9E-04

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 6 of 7)

South Intake Technical Support Center Dispersion Factor χ/Q (sec/m^3)

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	8.2E-04	5.6E-04	9.9E-04	3.1E-04	7.5E-04
0–2 hours	1.1E-03	6.6E-04	1.2E-03	4.0E-04	9.1E-04
2–8 hours	7.3E-04	5.3E-04	9.2E-04	2.8E-04	7.0E-04
8–24 hours	2.7E-04	2.4E-04	4.1E-04	1.2E-04	2.8E-04
1–4 days	2.0E-04	1.7E-04	3.0E-04	8.3E-05	2.1E-04
4–30 days	1.7E-04	1.3E-04	2.3E-04	7.4E-05	1.6E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	1.2E-03	7.5E-04	1.2E-03	6.7E-04
0–2 hours	1.4E-03	9.0E-04	1.4E-03	9.2E-04
2–8 hours	1.1E-03	7.0E-04	1.1E-03	5.9E-04
8–24 hours	4.2E-04	2.8E-04	4.4E-04	2.2E-04
1–4 days	3.2E-04	2.1E-04	3.2E-04	1.7E-04
4–30 days	2.5E-04	1.6E-04	2.5E-04	1.4E-04

NAPS COL 2.3(2)

Table 2.3-218 MCR and TSC Atmospheric Dispersion Factors (χ/Q) for Accident Dose Analysis (Sheet 7 of 7)

North Intake Technical Support Center Dispersion Factor χ/Q (sec/m^3)

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	9.3E-04	4.9E-04	7.7E-04	3.5E-04	7.1E-04
0–2 hours	1.2E-03	5.6E-04	8.9E-04	4.5E-04	8.3E-04
2–8 hours	8.4E-04	4.7E-04	7.3E-04	3.1E-04	6.7E-04
8–24 hours	3.2E-04	2.0E-04	3.0E-04	1.4E-04	2.8E-04
1–4 days	2.3E-04	1.4E-04	2.1E-04	9.4E-05	2.1E-04
4–30 days	1.9E-04	1.1E-04	1.7E-04	8.3E-05	1.6E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0–8 hours	1.0E-03	6.9E-04	1.0E-03	7.2E-04
0–2 hours	1.2E-03	8.1E-04	1.2E-03	9.5E-04
2–8 hours	9.9E-04	6.5E-04	9.4E-04	6.4E-04
8–24 hours	4.2E-04	2.8E-04	4.1E-04	2.4E-04
1–4 days	3.0E-04	2.0E-04	2.8E-04	1.9E-04
4–30 days	2.5E-04	1.6E-04	2.4E-04	1.5E-04

NAPS COL 2.3(1)
NAPS ESP VAR 2.3-1

Table 2.3-219 Unit 3 Site Tornado Characteristics

Criteria	Unit of Measure	Site Tornado (10^{-7} per year occurrence)
Max. Wind Speed	mph	200
Max. Rotational Velocity	mph	160
Max. Translation Velocity	mph	40
Radius of Max. Rotational Velocity	ft	150
Pressure Drop	psi	0.9
Rate of Pressure Drop	psi/sec	0.4

2.4 Hydrology

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

NAPS COL 2.4(1)

Replace the first sentence of the first paragraph of DCD Section 2.4 with the following:

Unit 3 is designed for maximum ground water elevation below plant grade as described in Section 2.4.12. as well as a maximum level for flood or tsunami of 1 ft below plant grade.

NAPS CDI

Replace the last two paragraphs of DCD Section 2.4 with the following.

Section 2.4 describes the hydrological characteristics of the Site. The site location and description are provided in Section 2.1 of this report in sufficient detail to support the safety analysis. This section discusses characteristics and natural phenomena that have the potential to affect the design basis for the US-APWR units. The section is divided into the following 14 subsections:

- Section 2.4.1 Hydrologic Description
- Section 2.4.2 Floods
- Section 2.4.3 Probable Maximum Flood (PMF) on Streams and Rivers
- Section 2.4.4 Potential Dam Failures
- Section 2.4.5 Probable Maximum Surge and Seiche Flooding
- Section 2.4.6 Probable Maximum Tsunami Flooding
- Section 2.4.7 Ice Effects
- Section 2.4.8 Cooling Water Canals and Reservoirs
- Section 2.4.9 Channel Diversions
- Section 2.4.10 Flooding Protection Requirements
- Section 2.4.11 Low Water Considerations
- Section 2.4.12 Groundwater
- Section 2.4.13 Accidental Releases of Liquid Effluents to Ground and Surface Waters
- Section 2.4.14 Technical Specifications and Emergency Operation Requirements

NAPS COL 2.4(1)

2.4.1 Hydrologic Description

Replace the content of DCD Subsection 2.4.1 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.1, which is incorporated by reference with the following supplements.

2.4.1.1 Site and Facilities

The second paragraph of this SSAR section is supplemented as follows with information on the site grade elevation for Unit 3 and the effects on site drainage.

The design plant grade elevation for Unit 3 safety-related structures is 290.0 ft NAVD88 (290.86 NGVD29). Figure 2.1-201 shows the layout of the external structures and components of Unit 3. The layout of Unit 3 will affect a few small wetlands and the upstream portions of two intermittent streams that flow north into an unnamed arm of Lake Anna just northwest of the power-block area. These areas will be partially filled in for the construction of the Unit 3 cooling towers in the CWS. The drainage in these areas will be redirected to drainage swales and stormwater management basins before rejoining the two intermittent streams. There are no other natural drainage features requiring changes to accommodate Unit 3. Evaluations of the flood levels from various flooding sources as they relate to protection of safety-related facilities for Unit 3 are discussed in Sections 2.4.2 and 2.4.10.

The third paragraph of this SSAR section is supplemented as follows with information on the ESW cooling system.

The ESWS uses the closed-cycle wet UHS cooling tower for dissipation of waste heat from safety-related components and heat exchangers.

2.4.1.3 Existing and Proposed Water Control Structures

The second sentence of the seventh paragraph of this SSAR section is supplemented as follows with information on the Lake Anna normal pool level.

NAPS ESP VAR 2.4-4

The normal pool level is maintained at an elevation of 249.39 ft NAVD88 (250.25 ft NGVD29), which is 3 inches higher than the normal pool level of 249.14 ft NAVD88 (250 feet NGVD29) before the addition of Unit 3.

The increased normal pool level improves water availability during drought conditions downstream of Lake Anna.

The sixth sentence of the seventh paragraph of this SSAR section is supplemented as follows with information on the flood surcharge.

A flood surcharge of 14.75 feet above the normal pool level is provided for flood storage.

Table 2.4-1 of this SSAR section is supplemented with information on the Lake Anna storage allocation as shown in Table 2.4-1R.

2.4.2 Floods

NAPS COL 2.4(1)

Replace the content of DCD Subsection 2.4.2 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.2, which is incorporated by reference with the following supplements.

2.4.2.2 Flood Design Considerations

The last paragraph of this SSAR section is supplemented as follows with information on the design plant grade elevation for Unit 3.

The design plant grade for Unit 3 safety-related components and structures is at Elevation 290.0 ft NAVD88 (290.86 ft NGVD29) providing 1.1 ft of freeboard above the design basis flooding level (DBFL), which is due to the local PMP.

2.4.2.3 Effects of Local Intense Precipitation

This SSAR section is supplemented as follows to show that local intense precipitation is discharged to Lake Anna and that safety-related structures are located at elevations above the maximum water surface elevation produced by local intense precipitation.

The site layout, drainage facilities, and drainage areas are shown on Figure 2.4-201. Plant north for the US-APWR is oriented 217.54 degrees from true north. All directions presented in this subsection are referenced to plant north. The safety-related buildings with above grade entrances consist of the R/B, PS/Bs, the PSFSVs, and the UHS cooling towers and related structures. These safety-related buildings are located in the power block and all grading slopes away from the safety-related buildings. The design plant grade surrounding all safety-related buildings is at Elevation 290.0 ft NAVD88 (290.86 ft NGVD29). Beyond the safety-related buildings, the site grading falls at varying slopes to drainage ditches located along the northern, eastern and western edges of the power block. The north drainage ditch conveys runoff to the east drainage ditch. The east and west drainage ditches convey the collected runoff from the power block and surrounding areas as shown on Figure 2.4-201 to the plant stormwater management pond located along the southern boundary of the site. The stormwater management pond discharges to Lake Anna through a bio-retention under-drain and a riser and pipe outlet. An emergency spillway over the plant access road is also provided to discharge large storm events, such as the PMP peak discharge, to Lake Anna. In performing the runoff analysis for the PMP storm, the under-drain and riser pipe outlet were conservatively assumed to be clogged. The sub-basin drainage areas shown on Figure 2.4-201 are summarized in Table 2.4-201 and Table 2.4-202.

NAPS ESP COL 2.4-4 For typical design storm events, such as the 10-year storm, runoff from the plant area is conveyed to the north, east and west drainage ditches through catch basins and storm drains as shown on Figure 2.4-201. The north, east and west drainage ditches also pass through culverts at road crossings. For the PMP runoff analysis, however, all underground storm drains and culverts were conservatively assumed to be completely clogged. Therefore, all flows were assumed to be overland or in open ditches.

The PMP runoff analysis was performed on the north, east and west drainage ditches to determine the peak water levels during the PMP event and compare them to the design plant grade elevations for the safety-related buildings.

The rational method was used to determine the peak discharges for each of the sub-basin drainage areas shown on Figure 2.4-201. Two runoff coefficients were selected to represent ground cover conditions in the sub-basins. Conservative runoff coefficient values were selected to represent saturated ground conditions and also to reflect the intense rainfall that would occur during a PMP event. For vegetated areas, a runoff coefficient of 0.9 was used. For all other areas, a runoff coefficient of 1.0 was used to reflect an impervious surface. Composite runoff coefficients were determined based on the percentage of vegetated and impervious land cover for each sub-basin. Time of concentration values were estimated for each sub-basin using Natural Resources Conservation Service methodologies (Reference 2.4-201). According to guidance from the U.S. Army Corps of Engineers (Reference 2.4-202) the time of concentration values should be reduced to account for the non-linear response for large storms such as the PMP. Thus, a 25% reduction in the estimated time of concentration values was adopted. PMP rainfall intensities were developed from the values listed in SSAR Table 2.4.3 and are shown in Figure 2.4-202. Using a duration equal to the reduced time of concentration for each sub-basin, the PMP rainfall intensity for each sub-basin was determined from Figure 2.4-202. The PMP peak discharge for each sub-basin was determined using the sub-basin point of interest drainage area, runoff coefficient, and PMP rainfall intensity. The estimated values for each sub-basin are shown in Table 2.4-203.

The steady-state backwater method in the computer program HEC-RAS (Reference 2.4-203) was used to estimate the peak PMP water levels in the north, east and west drainage ditches. HEC-RAS was first used to model the PMP flows over the stormwater pond emergency spillway and determine the peak PMP water level in the pond, which then became the starting water level at the downstream-most cross sections for the east and west drainage ditches. Cross-section data for the storm water pond spillway (outfall) and the north, east and west drainage ditches are shown on Figure 2.4-203 and Table 2.4-204.

Plant access roads or sidewalks cross the north, east and west drainage ditches at five locations. At each of these locations, the culverts under the roads were assumed to be blocked for the PMP runoff analysis. Inline weirs were used in HEC-RAS to model the road crossings and the flow over the top of the roads.

Manning's roughness coefficients (n values) for the channel and over bank areas were assigned based on guidance provided by Chow (Reference 2.4-204). Ditch linings consist mainly of rip rap, which is represented in the model by a Manning's n value of 0.035. Land cover in the ditch over bank areas consists of mostly gravel with limited areas of grass vegetation and pavement. Therefore, a uniform Manning's n value of 0.035, representing the gravel surface, was used for all overbank areas. This is a conservative approach as Manning's n values for gravel cover are higher than those for paved or grass areas and produce higher water levels.

The peak discharges listed in Table 2.4-203 were entered into the HEC-RAS model conservatively at the upstream end of each sub-basin. The results of the HEC-RAS analysis are summarized in Table 2.4-204.

NAPS ESP COL 2.4-5 The design plant grade elevation for safety-related structures is Elevation 290.0 ft NAVD88 (290.86 ft NGVD29) as shown in Figure 2.1-201. As summarized in Table 2.4-204, all cross sections in the power block area have maximum water surface elevations below Elevation 290.0 ft NAVD88 (290.86 ft NGVD29). The maximum PMP water level in the power block area, located north of the UHS, is Elevation 288.9 ft NAVD88 (289.8 ft NGVD29), which is 1.1 ft below the design plant grade elevation for safety-related structures. The maximum PMP water level near the remaining power block safety-related structures is Elevation 287.7 ft NAVD88 (288.6 ft NGVD29) which is 2.3 ft below the design plant grade.

At the southern boundary of the Unit 3 site, the drainage divide between the Unit 3 site and the Units 1 and 2 site is at Elevation 272.0 ft NAVD88 (272.86 ft NGVD29). The maximum PMP water level in this area, represented by the storm water management pond, is predicted to be at Elevation 271.84 ft NAVD88 (272.70 ft NGVD29), which is 0.16 ft below the drainage divide elevation. Thus, all Unit 3 PMP flows will be confined to the Unit 3 site and runoff generated from Unit 3 will not impact the Units 1 and 2 site.

Drainage ditches, overflow areas, and embankments will be protected to withstand the predicted flood flow velocities resulting from the local PMP event. The HEC-RAS model analysis indicates that the locations of supercritical flow regimes and potential hydraulic jumps, illustrated in Figure 2.4-221, are the east and west drainage ditches upstream of the inlets to the storm water management pond, the side slopes of the storm water management pond near the inlets to the pond, the east drainage ditch upstream of the culvert and the confluence with the north drainage ditch, and the outfall channel embankment. These locations will be provided with linings or hardened surface protection designed to withstand the erosive forces associated with the expected flow regimes during the local PMP event.

Grading in the vicinity of the safety-related structures slopes away from the individual structures such that PMP ground and roof runoff will sheet flow away from each of these buildings and towards the collection ditches preventing flood flows from entering the buildings. Some ponding may occur near storm drain inlets and other depressed areas. The ponding will be temporary, however, and localized. No storm drain inlets or depressed areas are located near safety-related buildings.

The Unit 3 site drainage facilities and grading in the power block area provide evacuation of the runoff from the PMP storm event. The design plant grade elevations for safety-related buildings are located above the estimated PMP water levels and grading is such that sheet flows and roof drainage flow away from safety-related buildings. Additionally, the Unit 3 PMP flows do not impact the Units 1 and 2 site. No flood protection measures are necessary for the Unit 3 site. The following controls will be implemented to ensure that the drainage properties of the Unit 3 plant will not be adversely impacted.

During the Unit 3 construction phase, drawings issued for construction and the as-built drawings for site grading and drainage details will be checked against the site topography, surface conditions, and channel lining properties represented in the local PMP flood analysis, including the HEC-RAS computer model. Construction procedures will specify that drainage facilities remain free of obstructions. Throughout the construction phase, the storm water drainage facilities will be inspected at least once every two weeks. These inspections will confirm the continuing integrity of the as-constructed Unit 3 storm water drainage facilities, including the channels and the overbank areas.

After the start of Unit 3 operations, the Unit 3 storm water drainage facilities will continue to be monitored and maintained to ensure the channel and overbank topography, surface cover, and lining properties remain as represented in the local PMP flood analysis, including the HEC-RAS computer model. Quarterly site walk-downs will be performed to inspect areas with erosion potential. These areas will include ditches, outfall channels, and side slopes. In addition, storm water effluent will be monitored quarterly for indications of upstream channel erosion or degradation such as clarity, floating solids, settled solids, suspended solids, etc. If erosion or any other type of pollution has occurred that could lead to impeding storm water flow, corrective action will be initiated to determine the source and mitigate the problem.

NAPS COL 2.4(1)

2.4.3 Probable Maximum Flood (PMF) on Streams and Rivers

Replace the content of DCD Subsection 2.4.3 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.3 which is incorporated by reference with the following supplements.

The third paragraph of this SSAR section is supplemented as follows with information on the revised Lake Anna PMF analysis incorporating the raised normal pool level.

NAPS ESP VAR 2.4-4

The Lake Anna PMF analysis presented in the SSAR utilized a normal pool elevation of 249.14 ft NAVD88 (250.00 ft NGVD29). For the addition of the Unit 3 power reactor, the normal pool elevation has been raised by 3 inches to an elevation of 249.39 ft NAVD88 (250.25 ft NGVD29). The increased normal pool elevation results in increased water availability during drought conditions downstream of the Lake Anna Dam.

Because the normal pool elevation has been increased, another Lake Anna PMF analysis has been performed to reflect the new normal pool elevation. The modeling approach, calibration, and nearly all input data from the Lake Anna PMF model presented in the SSAR remain the same for the present analysis. The input data for the starting water level and the stage-discharge relationship have been revised to reflect the new normal pool elevation. Additionally, the U.S. Army Corps of Engineers (USACE) computer program HEC-HMS (Reference 2.4-220) is used to compute inflow and outflow hydrographs as well as Lake Anna water levels instead of the USACE Computer Program HEC-1 (SSAR Reference 14), which was used in the SSAR PMF analysis. HEC-HMS performs the same function as HEC-1 and is an upgraded program that makes use of modern computer operating systems. All of the methodologies utilized in the SSAR HEC-1 analysis with the same input data are utilized in the present HEC-HMS analysis. For the HEC-HMS model, adjustments to two variables (the Coefficient Ratio and the Recession Ratio) were necessary due to revisions to input parameters for HEC-HMS. Those instances where alterations were required are described in the following subsections. Otherwise, the input parameters described in the SSAR are still valid for the present HEC-HMS analysis and are incorporated by reference.

Initially, the SSAR HEC-1 input parameters, without modification to the normal pool elevation, were input into the HEC-HMS model. As mentioned previously, minor adjustments were made to two input variables due to revisions to the input parameters. With these adjustments, the HEC-HMS analysis produced results essentially identical to the results produced in the SSAR HEC-1 analysis.

Then, the normal pool elevation (starting water level) and the stage-discharge relationship were revised to reflect the raised normal pool for Lake Anna in the HEC-HMS analysis. The results of the present HEC-HMS analysis indicate that with a 3 inch increase in the starting water level, the maximum Lake Anna PMF still water level at Lake Anna Dam does not increase and remains at elevation 263.21 ft NAVD88 (264.07 ft NGVD29). Because the still water level at the dam does not increase above that level, the backwater and wind wave activity analysis have not been revised.

The PMF elevation at the Unit 3 site is 266.53 ft NAVD88 (267.39 ft NGVD29). This elevation is 23.47 ft below the Unit 3 design plant grade elevation of 290.0 ft NAVD88 (290.86 ft NGVD29) for safety-related facilities, including the safety-related UHS SSCs. Because the design plant grade and operating deck for the UHS are more than 1.0 foot above the PMF elevation, the UHS is capable of withstanding the PMF on streams and rivers without loss of the UHS safety functions.

2.4.3.2 Precipitation Losses

The second paragraph of this SSAR section is supplemented as follows with information on precipitation losses used in the Lake Anna PMF model.

The HEC-1 precipitation loss coefficients listed in SSAR Table 2.4-11, DKLTR, ERAIN, RTIOI, and STRKR, are defined as Initial Range, Exponent. Coefficient Ratio, and Initial Coefficient respectively in HEC-HMS. The Initial Range, Initial Coefficient and Exponent HEC-HMS precipitation loss coefficients are defined exactly the same as their counterpart HEC-1 coefficients. The exact same values for these HEC-1 loss coefficients, used in the SSAR PMF analysis, were input into the HEC-HMS model for the present analysis. The Coefficient Ratio in HEC-HMS has a slightly different definition than RTIOL in HEC-1. An appropriate value for the Coefficient Ratio in HEC-HMS was determined by trial and error until the runoff from the Lake Anna watershed in the HEC-HMS results essentially matched the runoff in the HEC-1 results and thus confirmed that the selected HEC-HMS Coefficient Ratio is valid for the calibrations performed in the SSAR PMF analysis. The value selected for the HEC-HMS Coefficient Ratio and used in the present PMF analysis is 11.055.

2.4.3.3 Runoff Model

The fourth and fifth paragraphs of this SSAR section are supplemented as follows with information on the stage-storage, stage-discharge and base flow data used in the Lake Anna PMF analysis.

The same stage-storage data for Lake Anna presented in the SSAR is input into the HEC-HMS model for the present analysis.

The HEC-1 base flow variable defined as the Recession Ratio (RR) and used in the SSAR PMF analysis is defined as the Recession Constant (RC) in HEC-HMS and has a different definition. HEC-HMS provides a formula to convert the RR to an RC as shown below (Reference 2.4-220):

$$RC = \frac{1}{RR^{24}}$$

The RR value used in the SSAR HEC-1 model is 1.0135; thus the RC value used in the present HEC-HMS model is 0.72482.

The SSAR HEC-1 model stage-discharge relationship data based on the Lake Anna Dam adopted spillway rule curve has been revised and input into the present HEC-HMS model. Because outflow from the dam is controlled by the positions of the skimmer gates and three radial gates, only the portion of the discharge rating data near the normal pool elevation is revised. During flooding events with higher water levels, the same operating procedures and gate openings are used. The physical geometry of the dam has not changed as a result of the raised normal pool elevation.

2.4.3.5 Water Level Determination

The first paragraph of this SSAR Section is supplemented as follows with information on the HEC-HMS computed water levels.

The PMF inflow hydrograph was routed through the combined reservoir using HEC-HMS to determine the maximum still water level associated with the PMF. This routing resulted in a peak outflow of 141,000 cfs with a maximum water level at the dam of 263.21 ft NAVD88 (264.07 ft NGVD29).

2.4.4 Potential Dam Failures

Replace the content of DCD Subsection 2.4.4 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.4, which is incorporated by reference with the following supplements.

The second paragraph in this SSAR section is supplemented as follows to address the US-APWR UHS design.

NAPS ESP COL 2.4-6
NAPS ESP COL 2.4-7

Section 9.2.5.2 describes the UHS functions and addresses NRC requirements to provide sufficient emergency cooling capability. The UHS consists of mechanical draft cooling towers and partially buried water storage basins that provide the required 30-day water supply without makeup during accident conditions. As described in Section 9.2.5.2.1, nonsafety-related makeup water to the UHS storage basins is provided from Lake Anna. Therefore, even if Lake Anna were to be drained due to a dam failure, no safety-related structures or systems for Unit 3 would be adversely affected.

NAPS COL 2.4(1)

2.4.5 Probable Maximum Surge and Seiche Flooding

Replace the content of DCD Subsection 2.4.5 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.5, which is incorporated by reference.

NAPS COL 2.4(1)

2.4.6 Probable Maximum Tsunami Flooding

Replace the content of DCD Subsection 2.4.6 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.6, which is incorporated by reference.

2.4.7 Ice Effects

NAPS COL 2.4(1)

Replace the content of DCD Subsection 2.4.7 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.7, which is incorporated by reference with the following supplements.

2.4.7.2 Description of the Cooling Water System

The second paragraph of this SSAR section is supplemented as follows with information on the emergency cooling system for Unit 3.

The emergency cooling water for Unit 3 is provided from the UHS as described in DCD Section 9.2.5.

The last paragraph of this SSAR section is supplemented as follows with information on normal and emergency cooling system functions for Unit 3 specific systems.

The normal cooling systems for Unit 3 are not safety-related. The Unit 3 safety-related cooling is performed by the ESWS and UHS. As described in Section 9.2.5.2, the UHS design consists of safety-related mechanical draft cooling towers and cooling tower basins. The cooling tower basins provide the required safety-related cooling water inventory. The nonsafety-related makeup water supply to the UHS tower basins is provided from the Unit 3 station water intake/fire structure pump house on Lake Anna.

2.4.7.4 Frazil Ice

The fifth paragraph of this SSAR section is supplemented as follows with information on site-specific design for Unit 3.

The design of the Unit 3 station water intake is such that approach velocities are less than 0.5 fps. An approach velocity this low would not produce sufficient turbulence to generate frazil ice. Nonetheless, based on criteria stated in SSAR Reference 27 and others, there are other extreme climate factors that could combine and could cause formation of frazil ice. However, makeup water supplies from the Unit 3 station water intake to the UHS cooling tower basins are not safety-related. Freeze protection for the UHS is described in Section 9.2.5.2.2.

The last paragraph of this SSAR section is supplemented as follows with information on preventing possible effects of anchor ice on the Unit 3 intake.

The most likely location for anchor ice to form is at the intake trash racks or intake screens. In the event of shutdown of Units 1 and 2 during cold weather, continuous rotation of traveling water screens and use of the trash removal rake on the intake trash rack will be effective in preventing any anchor ice formation.

2.4.7.5 Surface Ice

The second paragraph of this SSAR section is supplemented as follows with information on preventing possible effects of surface ice on the Unit 3 intake structure.

Additionally, the skimmer wall at the front of the Unit 3 pump intake structure extends below the design low water level to further preclude the entry of ice sheets.

The fourth paragraph of this SSAR section is supplemented as follows with information showing emergency cooling for Unit 3 is not affected by surface ice formation.

It should be noted that the station water intake and associated pumps for Unit 3 do not perform safety-related functions. Therefore, no safety-related Unit 3 facilities are affected by surface ice formation on the lake.

The last paragraph of this SSAR section is supplemented as follows with information showing emergency cooling for Unit 3 is not affected by the break-up of surface ice.

The presence of the skimmer wall, trash racks and traveling screens at the Unit 3 station water intake prevent ice floes from reaching the pumps. The accumulation of ice at the trash racks and traveling screens could clog them and reduce the flow capacity of the intake. However, because the station water intake/fire water pump house is not safety-related and the emergency cooling water supply is provided by the UHS cooling tower basins, no safety-related facilities are affected by ice floe accumulation on the lake.

The last paragraph of this SSAR section is supplemented with the following information on UHS freeze protection.

The design of the UHS cooling tower basins, which supply safety-related water for the ESWS, include measures to address freeze protection as described in Section 9.2.5.

2.4.7.6 Ice and Snow Roof Loads on Safety Related Structures

The second paragraph of the SSAR section is supplemented as follows with information relating to snow loads on roofs of Unit 3 safety-related structures.

Details of the snow depths and 48-hour PMWP for the design snow loads on the roofs of safety-related structures are provided in Section 2.3.1.3.4.

The last paragraph of this SSAR section is supplemented as follows with information to show ice and snow loads for Unit 3 safety-related structures are accounted for in the design.

Design loadings for roofs of safety-related structures are described in DCD Section 3.8.4.3.4.2 and Section 3.8.4.3.4.2.

2.4.8 Cooling Water Canals and Reservoirs

NAPS COL 2.4(1) Replace the content of DCD Subsection 2.4.8 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.8, which is incorporated by reference with the following supplements.

The first paragraph of this SSAR section is supplemented as follows with information on the ESWS.

An ESWS uses the closed-cycle wet UHS cooling towers for dissipation of waste heat from safety-related components and heat exchangers.

The third paragraph in this SSAR section is supplemented with information as follows to address whether Lake Anna is used for safety-related water withdrawals.

NAPS ESP COL 2.4-8 The UHS for Unit 3 is described in Section 9.2.5.2. The North Anna Reservoir and WHTF, which comprise Lake Anna, are not relied on as a safety-related source of water withdrawals for emergency cooling.

The eighth paragraph of this SSAR section is supplemented as follows to reflect the increase in the normal pool level.

NAPS ESP VAR 2.4-4 For the addition of Unit 3, the normal pool elevation has been raised by 3 inches to an elevation of 249.39 ft NAVD88 (250.25 ft NGVD29).

With Unit 3 operating, the normal water level in the WHTF is 250.89 feet NAVD88 (251.75 feet NGVD29) as shown in Figure 2.4-14R.

NAPS COL 2.4(1)

2.4.9 Channel Diversions

Replace the content of DCD Subsection 2.4.9 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.9, which is incorporated by reference.

NAPS COL 2.4(1)

2.4.10 Flooding Protection Requirements

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.10, which is incorporated by reference with the following supplements.

The first paragraph of this SSAR section is supplemented as follows with information on the site grade elevation for Unit 3.

The design plant grade is at Elevation 290.0 ft NAVD88 (290.86 ft NGVD29) (a greater height above the maximum design basis Lake Anna flood level of 266.53 ft NAVD88 (267.39 ft NGVD29) than was assumed in the SSAR).

The first paragraph of this SSAR section is further supplemented as follows with information to address slope embankment protection features for the Unit 3 intake structure.

NAPS ESP COL 2.4-9

The Unit 3 station water intake/fire pump house is located in a separate intake channel true west of the cove that houses the intake structure pump house for Units 1 and 2 as shown on Figure 2.4-204. The Unit 3 intake channel area is separated from Lake Anna by an outer berm constructed in the early 1980s. The top of the outer berm is at Elevation 255.0 ft NAVD88 (255.86 ft NGVD29) and protects the Unit 3 intake channel area from flood events up to the 100-year flood on Lake Anna, estimated to be at Elevation 254.14 ft NAVD88 (255.0 ft NGVD29) (SSAR Reference 23). Flow from Lake Anna passes though a multi-barrel culvert in the outer berm as shown on Figure 2.4-204. The Unit 3 station water intake/fire pump house and the intake channel area are protected from wind wave activity on Lake Anna by the outer berm, which has no visible indications of erosion or damage from wave activity. Rip-rap protection of the slope embankment at the pump house location is provided to prevent local runoff from eroding the embankment near this on-shore intake structure. It should be noted that although protection is provided, the Unit 3 station water intake/fire pump house is not a safety-related structure.

NAPS COL 2.4(1)

The second paragraph of this SSAR section is supplemented as follows with information to show that flood protection measures are not required for the Unit 3 site.

A local PMP drainage analysis was performed assuming, conservatively, that all underground storm drains and culverts are clogged. Details of the local PMP analysis and the resulting flood levels are presented in Section 2.4.2.3. The maximum PMP water level in the power block area is predicted to be at Elevation 288.9 ft NAVD88 (289.8 ft NGVD29), which is 1.1 ft below Elevation 290.0 ft NAVD88 (290.86 ft NGVD29), the design plant grade elevation for safety-related facilities. Thus, no Unit 3 safety-related structure is subject to static or dynamic loading due to any flood-producing phenomena, including the local PMP events. No flood protection measures are required for the Unit 3 site. Additionally, no technical specifications or emergency procedures are required to implement flood protection activities.

NAPS COL 2.4(1)

2.4.11 Low Water Considerations

Replace the content of DCD Subsection 2.4.11 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.11, which is incorporated by reference with the following supplements.

2.4.11.1 Low Flow in Streams

The third sentence of the second paragraph of this SSAR section is supplemented as follows with information on the Lake Anna operating water level.

NAPS ESP VAR 2.4-4

With the addition of Unit 3, the lake is maintained at an operating water level of 249.39 ft NAVD88 (250.25 ft NGVD29).

2.4.11.4 Future Controls

This SSAR section is supplemented as follows with information on the water budget analysis and calculated minimum water levels.

As indicated in Section 2.4.1, other than the required releases from the Lake Anna Dam, the only other consumptive water use from Lake Anna is the existing units. To determine the impact of Unit 3 on Lake Anna water levels, a water budget analysis of the lake was performed. The period analyzed extends from October 1979 to October 2007 with two different water use scenarios investigated, which are described below.

Two Unit Scenario	Units 1 and 2 running at a plant capacity factor of 93%, which is in excess of their historical operating experience.
Three Unit Scenario	Units 1 and 2 running as described above and Unit 3 with an assumed 96 percent capacity factor using a closed-cycle, dry and wet cooling tower system, withdrawing make-up water from the North Anna Reservoir and discharging blowdown to the WHTF.

The conceptual model used to represent the Lake Anna water balance considers surface inflow, groundwater inflow, and precipitation as additions to the lake storage; and evaporation and dam releases as subtractions from the lake storage. The continuity equation for this control volume may be expressed as (SSAR Reference 17):

$$\frac{dS}{dt} = I - O, \mathrm{S}(0) = \mathrm{S}_0 \qquad (2.4.11\text{-}1)$$

where:

S is the storage

t is time

I is the inflow rate

O is the outflow rate

S_0 is the initial storage

In this analysis, S includes the combined storage of the North Anna Reservoir and the WHTF. The inflow rate to Lake Anna, I, is defined as:

$$I = I_{SW} + I_{GW} + I_P \qquad (2.4.11\text{-}2)$$

where:

I_{SW} is the surface water inflow to the lake from contributing tributaries

I_{GW} is the groundwater inflow to lake

I_P is the inflow from precipitation falling directly on the lake

Because data are not available to characterize I_{SW} and I_{GW} adequately, the total inflow rate to Lake Anna, I, is unknown. The basis for estimating this time series will be described subsequently.

The outflow rate from Lake Anna, *O*, is defined as

$$O = O_{Preop-Evap} + O_{Unit3-Evap} + O_R \qquad (2.4.11\text{-}3)$$

where:

$O_{Preop-Evap}$ is the pre-operational outflow due to evaporation

$O_{Unit3-Evap}$ is the evaporative loss associated with Unit 3's wet cooling towers

O_R is the outflow from dam releases

Note that $O_{Preop-Evap}$ includes the natural evaporation from the lake plus the forced evaporation from operating the once-through cooling systems of the Units 1 and 2.

The initial value problem defined by Equation 2.4.11-1 is solved by the finite-difference method. Using subscript *n* and *n+1* to represent the beginning and end of any given time period, Equation 2.4.11-1 can be written as:

$$\frac{S_{n+1} - S_n}{\Delta t} = I_n - O_n \qquad (2.4.11\text{-}4)$$

and rearranged to yield:

$$S_{n+1} = (I_n - O_n)\Delta t + S_n \qquad (2.4.11\text{-}5)$$

Note that S_{n+1} is a function of reservoir elevation, *h*, which can be obtained from the reservoir's elevation-storage relationship. Equation 2.4.11-5 is solved first for S_1 given the initial conditions at $t = 0$. The computation is then repeated for succeeding time steps.

Required model input includes the relationship between water surface elevation and lake storage, the relationship between water surface elevation and lake outflow, the inflow time history to Lake Anna, and the time histories of evaporative losses from the lake and the wet cooling towers. The bases for assigning these input data are described below.

The relationship between water surface elevation and storage is derived from the elevation-volume curves for the North Anna Reservoir and the WHTF. These curves have been added to yield a single elevation-storage curve for the entire Lake Anna for the purpose of this water budget study. Table 2.4-201 summarizes the storage volumes at Elevations 239.14, 249.14, and 259.14 ft NAVD88 (240, 250 and 260 ft NGVD29). Note that these storage volumes do not reflect the storage volumes used in the

Lake Anna PMF analysis and shown on SSAR Figure 2.4-10. As discussed in SSAR Section 2.4.3.3, portions of the WHTF storage volume were not included in the Lake Anna PMF Analysis. A quadratic equation was fitted to the values for interpolating between elevations. The estimated storage volume of 305,100 acre-ft at 249.14 ft NAVD88 (250 ft NGVD29) lake level used in the water budget model is slightly higher (by 0.03 percent) than the 305,000 acre-ft volume reported in the Unit 1 and 2 UFSAR Section 2.4.1.2 (SSAR Reference 1). This small difference would have no impact on any of the hydrologic and water use evaluations.

The operating rule curve implemented in the model, which relates water surface elevation to dam releases, has been developed as follows. For lake levels less than or equal to 249.39 ft NAVD88 (250.25 ft NGVD29), a minimum instantaneous release from the Lake Anna impoundment of 40 cfs is maintained. When the lake level drops to or below 247.14 ft NAVD88 (248 ft NGVD29) releases can be incrementally reduced to a 20 cfs minimum (SSAR Reference 7). For lake levels greater than or equal to 249.39 ft NAVD88 (250.25 ft NGVD29), it is assumed that any inflow in excess of the evaporative losses is released, provided the minimum release requirements are met. The inflow time history to Lake Anna has been calculated by a reverse routing procedure using observed Lake Anna releases and water levels and estimated pre-operational evaporation. This procedure has been adopted because only a small fraction of the Lake Anna watershed is gauged as described in SSAR Section 2.4.1. The inflow to Lake Anna is calculated by solving Equation 2.4.11-4 for I_n, or:

$$I_n = \frac{S_{n+1} - S_n}{\Delta t} + O_n \qquad (2.4.11\text{-}6)$$

This calculation requires the time histories for storage, S, and outflow, O. The storage time history has been determined using the available period of record for lake level observation, which extends from October 1, 1978, through October 31, 2007. Lake levels, h, have been related to S through quadratic interpolation of the values summarized in Table 2.4-201. According to Equation 2.4.11-3, O includes the historical releases from the Lake Anna Dam, and the historical rate of Lake Anna evaporation associated with operation of the existing units. Historical releases from the dam from October 1, 1978, through October 9, 1995, have been derived from the Partlow stream gauging station, which is located approximately one-half mile downstream of the dam. Stream gauging at this station was discontinued on October 10, 1995. Releases from October 10, 1995, through October 31, 2007 have, therefore, been estimated from the historical gate openings and associated rating curves for the Lake Anna Dam. The determination of historical lake evaporation is described below.

Historical evaporation from Lake Anna has been estimated using the Lake Anna Cooling Pond Model developed by the Massachusetts Institute of Technology (Reference 2.4-221) (Reference 2.4-222). This model calculates, as part of the heat balance, the heat lost to the atmosphere due to evaporation and the associated evaporation rate on a daily basis for the control volumes used to represent the main ponds in the WHTF and the North Anna Reservoir. The model assumes a constant lake level at 249.14 ft NAVD88 (250.0 ft NGVD29). The thermal model also includes a number of side arms for which the model does not provide the evaporation rates directly. To determine these evaporation rates, an exponentially decreasing function is used to represent the temperature distribution in the surface layer of each side arm based on the entrance and return flow temperatures predicted by the thermal model. Using the mean value of this function to assign a characteristic temperature for the entire side arm, side arm evaporation is calculated using the Ryan-Harleman function (Reference 2.4-223). The pre-operational evaporative loss, $O_{Preop-Evap}$, is then determined as the sum of the values calculated directly by the thermal model for the ponds and those calculated for the side arms. Note that this time series has been estimated using the historical waste heat load from Units 1 and 2.

For predictive purposes, the evaporative losses associated with Units 1 and 2, which use once-through cooling systems, have been determined on a daily basis using the thermal model following the methodology described above. The calculated evaporation rates have been corrected to reflect a 93 percent plant capacity factor for the existing units and averaged to obtain weekly values for use in the water budget model. The corresponding waste heats loads are 1.26×10^{10} Btu per hour for Units 1 and 2 combined.

Evaporative losses from Unit 3 were determined as follows:

Evaporation rates from Unit 3's wet cooling towers were calculated on a daily basis as a function of air temperature and relative humidity, using performance data supplied by a cooling tower vendor, and a waste heat load of 1.03 × 10^{10} Btu/hour from the circulating and plant service water systems.

Evaporation rates were determined for plant operation in the EC and MWC modes. In the EC mode, which applies when lake levels are at or above Elevation 249.14 ft NAVD88 (250 ft NGVD29), Unit 3's CWS wet cooling towers are used to dissipate 100 percent of the waste heat from the main condenser. When lake levels fall below Elevation 249.14 NAVD88 (250 ft NGVD29) for seven successive days in the model prediction, the plant is assumed to be operated in the MWC mode, wherein the dry towers would be used to dissipate a minimum of about one-third of the waste heat and the wet towers would be used to dissipate the remaining waste heat. For any given time step, the determination of whether Unit 3 would be in an EC or MWC mode of operation was made based on the lake elevation from the previous time step. The CWS cooling tower evaporation rates were combined with those from the ESWS, corrected to reflect a 96 percent plant capacity factor for Unit 3, and averaged to obtain weekly values for use in the water budget model.

The minimum calculated Lake Anna water levels for the Two Unit and Three Unit scenarios are 244.2 and 243.5 ft NAVD88 (245.1 and 244.4 ft NGVD29) respectively. The durations of low lake water levels from the analysis are shown in Table 2.4-6R. The minimum operating level for existing Units 1 and 2 and for Unit 3 (Elevation 241.14 ft NAVD88 (242.0 ft NGVD29) is below the minimum lake level predicted under the Three Unit scenario. Therefore, there are no impacts of low-flow conditions on the operation of either the existing Units 1 and 2 or Unit 3.

2.4.11.5 Plant Requirements

The last sentence of the first paragraph on this SSAR Section is supplemented as follows with information on water withdrawals for emergency cooling.

Lake Anna is not relied on as a safety-related water supply for emergency cooling and does not serve as the UHS.

This SSAR section is supplemented as follows with information on the operational modes for the circulating water cooling system (CWS) with respect to low water conditions.

NAPS ESP COL 2.4-10 The Unit 3 CWS operates in either of two operating modes:

- Energy Conservation (EC)—The dry cooling array is bypassed and cooling water is circulated directly to the hybrid tower with a provision for cold weather bypass.
- Maximum Water Conservation (MWC)—The dry cooling tower and hybrid cooling tower operate in series with a provision for cold weather bypass.

Generally, when the North Anna Reservoir water level is at or above Elevation 249.14 ft NAVD88 (250 ft NGVD29) at the dam, and adequate reservoir discharge is being maintained, the EC mode is used. However, if the reservoir water level falls below Elevation 249.14 ft NAVD88 (250 ft NGVD29) and is not restored within a reasonable period of time, the MWC mode is used. While in the MWC mode, the dry tower fans may be turned off to provide additional electrical output during hours of peak demand. Normal operation water demands for the CWS are described in Section 10.4.5.2.1.

As discussed in Section 2.4.14, Unit 3 will be shut down when the water level in Lake Anna drops below Elevation 241.14 ft NAVD88 (242.0 ft NGVD29).

2.4.11.6 Heat Sink Dependability Requirements

This SSAR section is supplemented as follows with information on the effect of low water conditions on the UHS.

The Unit 3 UHS is described in Section 9.2.5.2. Lake Anna is not relied on as a safety-related source of water withdrawals for emergency cooling.

Delete DCD Table 2.4-1.

2.4.12 Groundwater

NAPS COL 2.4(1) Replace the content of DCD Subsection 2.4.12 with the following.

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.12, which is incorporated by reference with the following supplements and variances.

2.4.12.1.2 Local Hydrogeology

The third paragraph of this SSAR section is supplemented as follows based on additional borings.

Borings drilled as part of the ESP subsurface investigation program (SSAR Appendix 2.5.4B) and the Unit 3 subsurface investigation programs (Appendicies 2.5.4AA, 2.5.4BB and 2.5.4CC) penetrated saprolite with a maximum thickness of 114 ft and a median thickness of 37 ft. The saprolite penetrated by these borings is generally described as clayey silt, silty sand and sand with occasional (less than 10 percent) rock fragments, grading to silty fine to coarse sand with some (between 10 and 50 percent) rock fragments and traces of clay.

The fifth paragraph of this SSAR section is supplemented as follows with information on additional groundwater level measurements data.

Groundwater at the Unit 3 site occurs in unconfined conditions in both the saprolite and underlying bedrock. The results of previous investigations at the site indicate that a hydrologic connection exists between the saprolite and the bedrock (SSAR Reference 45). This condition has been confirmed as part of the ESP and Unit 3 subsurface investigation programs (SSAR Appendix 2.5.4B and Appendicies 2.5.4AA, 2.5.4BB and 2.5.4CC) by the presence of nearly equal water level elevations recorded in the following observation well pairs: OW-845 and OW-846; OW-841 and OW-951; OW-848 and OW-950; and OW-842 and OW-949 (Figure 2.4-205). The wells are installed adjacent to each other, one sealed in the bedrock and the other in the saprolite. Water level elevations are provided in Table 2.4-15R. At the Unit 3 site, the water table is considered to be a subdued reflection of the ground surface and, therefore, the direction of groundwater movement is toward areas of lower elevations (SSAR Reference 45). Measurements made between December 2002 and November 2007 in observation wells at the site exhibit water level elevations ranging from about Elevation 237 ft NAVD88 (237.86 ft NGVD29) to Elevation 314 ft NAVD88 (314.86 ft NGVD29), with corresponding ground surface elevations of about Elevation 283 ft NAVD88 (283.86 ft NGVD29) and Elevation 335 ft NAVD88 (335.86 ft NGVD29), respectively (Table 2.4-15R). The measurements shown in Table 2.4-15R characterize short-term seasonal variability in the site water levels. Figure 2.4-205 presents hydrographs based on the water levels provided in this table for the 16 observation wells (OW-841 through OW-849, OW-901, OW-945 through OW-947, and OW-949 through OW-951) installed during the ESP and Unit 3 subsurface investigation programs and three monitoring wells (P-10, P-14, and P-18) previously installed for Units 1 and 2. The other wells being monitored (P- and WP-) were installed previously for Units 1 and 2 groundwater monitoring purposes around the SWR and the independent spent fuel storage installation (ISFSI), respectively. Figure 2.4-206 shows the locations of the observation wells.

Piezometric head contour maps (Figure 2.4-207 through Figure 2.4-214b), prepared using water levels measured from December 2002 through November 2007 (Table 2.4-15R), indicate that groundwater flow is generally to true north and east, toward Lake Anna. Freshwater Creek and Elk Creek, both of which flow to Lake Anna, form hydrologic boundaries to the true west and south of the site, respectively (SSAR Reference 46). Because the water levels in the observation wells are generally above the top of the well screen, the water level elevation represents the piezometric head. An evaluation of the piezometric head contours shown on Figure 2.4-207 through Figure 2.4-214b, and using the maximum groundwater level observed in OW-901 (Elevation 289 ft NAVD88 (289.86 ft NGVD29)) and the minimum level observed in OW-950 (Elevation 237 ft NAVD88 (237.86 ft NGVD29)), with a distance

NAPS ESP VAR 2.0-3

between the two wells of 1131 ft, results in a calculated hydraulic gradient toward Lake Anna of about 5 ft per 100 ft.

The eighth paragraph of this SSAR section is supplemented as follows with information on hydraulic conductivity values.

Thirteen groundwater observation wells installed at the site as part of the ESP and Unit 3 subsurface investigation programs were tested using the slug test method to determine hydraulic conductivity values for the saprolite and underlying shallow bedrock (SSAR Appendix 2.5.4B and Appendicies 2.5.4AA, 2.5.4BB and 2.5.4CC). In addition, borehole packer tests were conducted in the bedrock at one of the Unit 3 observation well locations (OW-949) as an alternate method for determining hydraulic conductivity in the bedrock. Hydraulic conductivities calculated for the saprolite, based on tests in eleven wells,

NAPS ESP VAR 2.0-2

range from 0.076 to 3.017 m/day (0.25 to 9.9 ft/day), with a geometric mean of 0.53 m/day (1.74 ft/day). The hydraulic conductivity of the shallow bedrock, as determined from tests in two wells, is estimated to range from 0.152 to 1.920 m/day (0.5 to 6.3 ft/day) with a geometric mean of 0.625 m/day (2.05 ft/day). Table 2.4-16R summarizes the hydraulic conductivity data.

The ninth paragraph in this SSAR section is supplemented as follows with information on additional geotechnical data and calculations of void ratio and total porosity.

NAPS ESP VAR 2.4-1

Bulk densities for the bedrock range from 23.56 kN/m^3 (150 pounds per cubic foot) (pcf)) for highly weathered rock to 25.76 kN/m^3 (164 pcf) for slightly weathered to fresh rock (Table 2.5-212). Laboratory tests to determine the moisture content of saprolite samples indicate a median moisture content of about 17 percent (Table 2.5-212). Laboratory tests to determine the specific gravity of saprolite samples indicate a median specific gravity of 2.65 (Appendix 2.5.4AA). Using the median moisture content of 17 percent and a value of 2.65 for the specific gravity of the saprolite, the void ratio of the saprolite is estimated to be about 0.45. The void ratio is defined as the ratio of the volume of the voids to the volume of the solids and for a fully saturated soil is calculated as follows (Reference 2.4-205):

$$\text{Void Ratio} = \text{moisture content} \times \text{specific gravity}$$

Using a void ratio of 0.45 for the saprolite, the total porosity is estimated to be about 31 percent. The porosity is defined as the ratio of the volume of the voids to the total volume of the soil. The void ratio and porosity are inter-related as follows (Reference 2.4-205):

$$\text{Total Porosity} = \text{void ratio} / (1 + \text{void ratio})$$

Using a total porosity of 0.31, an effective porosity of about 25 percent is estimated based on 80 percent of the total porosity (Reference 2.4-224).

The tenth paragraph of this SSAR section is supplemented as follows with information on calculations of seepage velocity and travel time.

Based on the estimated hydraulic gradient, hydraulic conductivity, and effective porosity indicated above, groundwater beneath the Unit 3 site is expected to flow toward Lake Anna at a rate of about 0.35 ft/day. This groundwater seepage velocity is calculated as follows (Reference 2.4-206):

Seepage Velocity = (hydraulic conductivity × hydraulic gradient) / effective porosity

Travel time is defined as the time it takes the groundwater to move a set distance and is calculated as follows:

Travel Time = distance / velocity

Using a distance of approximately 1100 ft between the Unit 3 auxiliary building and the closest point along the shoreline of Lake Anna as described in Section 2.4.13, the groundwater travel time is estimated to be about 8.6 years.

2.4.12.1.3 Plant Groundwater Use

The first paragraph of this SSAR section is supplemented as follows with information on the number and allocation of water supply wells at the site.

Groundwater withdrawal for use by Units 1 and 2 is accomplished from three water supply wells permitted for public use by the Virginia Department of Health (VDH). These three wells (Nos. 4 (new), 6, and 7) comprise a single water supply system at the site. A separately permitted North Anna Nuclear Information Center (NANIC) well provides the water supply for the NANIC, while a fifth well provides water to the security training building. A sixth well is used to supply water to the Metrology/Environmental laboratory. Two other site wells (Number 2 and old Number 4) are not normally used, but are available, if needed. Well Number 3A is scheduled to be closed in accordance with Virginia regulations. The locations of these wells are shown on Figure 2.4-215 and the wells are described in Table 2.4-17R.

The second paragraph of this SSAR section is supplemented as follows with information on the individual and total capacities of the primary groundwater supply system wells for Units 1 and 2 (Nos. 4 (new), 6, and 7).

The three wells comprising the primary groundwater supply system for Units 1 and 2 have individual capacities ranging from 0.166 to 0.235 m^3/min (44 to 62 gpm) and a total capacity of 0.609 m^3/min (161 gpm). These three wells are permitted by the VDH for a total design capacity of 487.56 m^3/min (128,800 gpd), or about 0.337 m^3/min (89 gpm), based on a determination of the wells' capacity to supply an equivalent population of 3680 employees. Well Number 2 has a reported capacity of 0.034 m^3/min (9 gpm) and old Number 4 has a reported capacity of 0.204 m^3/min (54 gpm) (Reference 2.4-207).

The third paragraph of this SSAR section is supplemented as follows with information on the monthly groundwater withdrawal quantities of the primary groundwater supply system wells for Units 1 and 2 (Nos. 4 (new), 6, and 7).

Table 2.4-205 shows the monthly withdrawal quantities that were reported for the year ending December 31, 2006. It can be determined from this table that the primary wells withdrew a combined average of almost 0.027 m^3/min (7.25 gpm) for the year, and that the NANIC well withdrew an average of a little over 0.0038 m^3/min (1 gpm). The highest total monthly withdrawal in 2006 for the combined wells averaged almost 0.053 m^3/min (14 gpm) in March (Reference 2.4-208).

The fourth paragraph of this SSAR section is supplemented as follows with information to explicitly state that groundwater is not used for safety-related purposes.

Any groundwater supply required by Unit 3 will not be used for safety-related purposes and will come from the existing wells or from drilling additional wells.

2.4.12.3 Monitoring of Safeguard Requirements

The fifth and sixth paragraphs of this SSAR section are supplemented as follows with information on the groundwater monitoring program required during and following construction of the plant.

Because the Units 1 and 2 groundwater monitoring wells were not considered to be of sufficient areal extent to determine groundwater levels beneath the Unit 3 site, nine additional observation wells were installed as part of the ESP subsurface investigation program and seven additional observation wells were installed as part of the Unit 3 subsurface investigation program. Water levels in these 16 wells and 10 of the Units 1 and 2 monitoring wells (Table 2.4-15R) were measured between December 2002 and November 2007 to provide data on groundwater flow direction, gradient, and seasonal groundwater level fluctuations at the site.

Prior to site earthwork activities, some observation wells will need to be abandoned. As discussed in Section 2.5.4.5.1, the design plant grade elevation for Unit 3 is 290 ft NAVD88 (290.86 ft NGVD29). To achieve this elevation, and relative to plant north, excavation will be required in the northern portion of the power block area while lower areas to the south will need to be filled. As a result, existing observation wells in these and other areas of the site will be abandoned prior to the start of earthwork activities. An evaluation of the existing observation well locations will be performed to determine which wells will be abandoned and if any new wells will be required to establish an adequate monitoring network for the evaluation of impacts on site groundwater levels during plant construction. Abandoned wells will be filled in compliance with Virginia regulations.

Evaluation of the groundwater monitoring program will include a review of the frequency with which groundwater level measurements are made in the observation wells. Groundwater levels in all or selected wells will be measured on a monthly basis for the duration of any temporary dewatering activities, and on a quarterly basis thereafter for two years following the completion of construction. Groundwater levels will then be measured on a semi-annual or annual basis during plant operation.

2.4.12.4 Design Bases for Subsurface Hydrostatic Loading

The third paragraph of this SSAR section is supplemented as follows with information on the maximum groundwater level for hydrostatic loading purposes.

Construction of Unit 3 at a design plant grade elevation of 290 ft NAVD88 (290.86 ft NGVD29), 19 ft higher than that of Units 1 and 2, will result in the maximum groundwater level in this area being higher than that previously estimated in the SSAR. The pre-construction ground surface in the Unit 3 power block area ranges in elevation from about 318 ft NAVD88 (318.86 ft NGVD29) (B-919) to 272 ft NAVD88 (272.86 ft NGVD29) (B-928) and the piezometric head contour maps (Figure 2.4-207 through Figure 2.4-214b) indicate that groundwater level elevations in this area range from about 300 to 265 ft NAVD88 (300.86 to 265.86 ft NGVD29).

As discussed in Section 2.5.4.5.1, and relative to plant north, the Unit 3 design plant grade elevation will be achieved by excavation in the northern portion of the power block area and filling in lower areas to the south and southwest. A 3-horizontal to 1-vertical (3H:1V) slope will be cut into the existing natural ground around the northern and western perimeters of the plant area.

Because earthwork and construction associated with Unit 3 will alter the existing groundwater levels within the power block area, a numerical groundwater flow model was constructed to evaluate these effects and determine maximum post-construction groundwater levels beneath the power block area. The groundwater model was developed using site-specific hydrogeologic and hydrologic data and the computer code Visual MODFLOW Version 4.3 (Reference 2.4-209). The post-construction piezometric head contour map (Figure 2.4-216) indicates that maximum groundwater level elevations in the power block area range from about 270.0 to 284.4 ft NAVD88 (270.86 to 285.26 ft NGVD29). The maximum groundwater level elevation of 284.4 ft NAVD88 (285.26 ft NGVD29), or 5.6 ft below the design plant grade elevation of 290 ft NAVD88 (290.86 ft NGVD29), occurs in the UHSRS area of Unit 3. Figure 2.4-216 contains a table showing the maximum groundwater levels at selected points in the power block area. Maximum groundwater levels at other locations on this figure can be interpolated from the piezometric head contours. As described in Section 3.4, seismic category I structures below grade are protected by a water barrier provided on all exterior concrete members subjected to groundwater. As described in Section 3.7.2.4.1, the groundwater design bases (assumed groundwater level elevations) for seismic category I R/B complex and PS/Bs used in the seismic and stability analyses are based on maximum groundwater levels from Figure 2.4-216. Section 3NN.6 shows that a site-specific seismic analysis for the R/B complex used 7 ft below plant grade, while the maximum groundwater level from Figure 2.4-216 for this area is 7.7 ft below plant grade. Section 2.3 of Reference 2.4-225 shows that for the site-specific analysis for the UHSRS and UHSRS pipe chase, the design margin accomodates the maximum groundwater without the need for a permanent dewatering system. Therefore, a permanent dewatering system is not required.

2.4.13 Accidental Releases of Liquid Effluents to Ground and Surface Waters

NAPS COL 2.4(1)

The information needed to address DCD COL Item 2.4(1) is included in SSAR Section 2.4.13, which is incorporated by reference with the following supplements.

The purpose of this section is to provide a conservative analysis of a postulated, accidental release of radioactive liquid effluents to the groundwater at the Unit 3 site. The accident scenario is described. The model used to evaluate radionuclide transport is presented, along with potential pathways of contamination to water users. The radionuclide transport analysis is described, and the results are summarized. The radionuclide concentrations to which a water user might be exposed are compared against the regulatory limits.

2.4.13.1 Accident Scenario

The BAT and primary makeup water tank do not contain radioactive liquid. Tanks containing radioactive liquid include the following: holdup tank, waste holdup tank, volume control tank, chemical drain tank, sump tank, and refueling water storage auxiliary tank. The volume control tank, chemical drain tank, sump tank and refueling water storage auxiliary tank were eliminated from consideration as the limiting tank with respect to the accidental release analysis due to their smaller volumes and/or lower radionuclide inventories for isotopes of interest than the holdup tank and waste holdup tank. Therefore, a holdup tank or a waste holdup tank outside containment is postulated to rupture with its contents released to the groundwater. These tanks were selected to produce an accident scenario that leads to the most adverse contamination of groundwater or surface water resources in the vicinity of the site. Derivation of the holdup tank and waste holdup tank source term is described in Section 11.2.3.2.

2.4.13.2 Model

Figure 2.4-217 illustrates the model used to evaluate the postulated accidental release. The key elements and assumptions embodied in the model are described and discussed below.

A holdup tank or a waste holdup tank is postulated to rupture, and 80 percent of the liquid volume is assumed to be released following the guidance provided in BTP 11-6 (Reference 2.4-210). The capacities of the holdup tank and the waste holdup tank are approximately 16,000 ft^3

and 4,000 ft^3, respectively, as provided in DCD Table 11.2-16. Following tank rupture, it is conservatively assumed that a pathway is created that allows the entire release to enter the groundwater (unconfined aquifer) instantaneously.

The assumption of instantaneous release to the groundwater following tank rupture is very conservative because it requires failure of the floor drain system, plus the barriers presented by the basemat and the epoxy coated walls of the cubicles of the auxiliary building, which is seismically designed.

It should also be recognized that the lowest level of the auxiliary building is well below the water table. Post-construction groundwater model results presented in Figure 2.4-216 indicate that the expected water table in the vicinity of the auxiliary building is about 280 ft NAVD88 (280.86 ft NGVD29), or 19 ft above the floor elevation. If the basemat or exterior walls of the auxiliary building and associated epoxy coating were to fail simultaneously, groundwater would flow into the auxiliary building, precluding the release of liquid effluents out of the building. Only if the interior of the auxiliary building was flooded to a level higher than the surrounding groundwater would there be a pathway for liquid effluents to be released out of the building and to the groundwater. Hence, the assumption of an accidental release of liquid effluents from the auxiliary building to groundwater is extremely conservative, given the hydrogeologic conditions at the site.

With the postulated instantaneous release of the contents of a holdup tank or a waste holdup tank to groundwater, radionuclides enter the unconfined aquifer and migrate with the groundwater in the direction of decreasing hydraulic head. Hydraulic head contour maps for the unconfined aquifer presented in Figure 2.4-207 through Figure 2.4-214b indicate that the groundwater pathway from the auxiliary building is true north-northeast toward Lake Anna, a groundwater discharge area. In particular, the hydrogeologic data suggest that the groundwater pathway terminates in the cove used for the Unit 3 intake from Lake Anna. The flow path is assumed to be a straight line between the auxiliary building and the true south edge of the cove, a distance of about 1100 ft based on Figure 2.4-219. As indicated in Section 2.4.12.1.2, groundwater flow occurs in both the saprolite and underlying, shallow bedrock. During saturated zone transport, radionuclide concentrations of the liquid released to the groundwater are reduced by the processes of adsorption, hydrodynamic dispersion, and radioactive decay. As described in Section 2.4.12.1.3, there is an existing water-supply well in the power block area (Well No. 2 on Figure 2.4-215). This well will be closed and grouted to accommodate the construction of Unit 3. There are no other existing water-supply or monitoring wells between the postulated release point and Lake Anna.

Lake Anna serves as a groundwater discharge area for the unconfined aquifer. The radionuclides associated with a liquid release would enter the surface water system via Lake Anna. The portion of Lake Anna closest to the release point is the cove that was created for the abandoned Units 3 and 4. As shown in Figure 2.4-204, the station water intake for Unit 3 is located at the end of the cove, which is physically separated from the rest of the lake by a cofferdam, but hydraulically connected to the lake by a set of culverts. The intake provides make-up water to the normal plant circulating water and ESW cooling systems, and supplies water to the station water system for demineralized water and fire protection use. Because flow through the cove is induced when Unit 3 is operating, the subsequent surface water pathways for any radionuclides discharged with the groundwater to the cove depends on the operating status of the plant.

During the operational lifetime of Unit 3 (up to 60 years), any contaminated groundwater discharging to the cove would be abstracted from the lake by the station water intake for Unit 3. Any radionuclides introduced into the make-up water systems ultimately would be discharged with the cooling tower blowdown to the discharge canal. This blowdown discharge would be mixed and diluted with surface water in the discharge canal. The discharge canal is hydraulically connected to the WHTF, which in turn discharges to the North Anna Reservoir through Dike 3. Any radionuclides released from the discharge canal would undergo additional mixing and dilution in the WHTF as well as the North Anna Reservoir.

If Unit 3 were not operating, any contaminated groundwater would simply be mixed and diluted with surface water in the cove. Because the cove is isolated from the rest of the lake by the cofferdam and connected by culverts, hydraulic interaction between the two surface water bodies would occur only when there are changes in lake level or during runoff events.

As described in SSAR Section 2.1.1.3, the liquid effluent release limits for Unit 3 apply at the end of the discharge canal, which is designated as the release point to unrestricted areas in the context of 10 CFR 20. As noted in ESP-ER Table 2.3-4, the Doswell Water Treatment Plant is the nearest and only municipal water system currently supplied from the North Anna River. The treatment plant is about 20 miles downstream of the Lake Anna Dam and near the confluence with the Little River.

2.4.13.3 Radionuclide Transport Analysis

A radionuclide transport analysis has been conducted to estimate the radionuclide concentrations that might expose existing and future water users based on an instantaneous release of the radioactive liquid from a holdup tank or a waste holdup tank. Analysis of liquid effluent release commences with a screening model to determine the limiting tank, using demonstratively conservative assumptions and coefficients. Radionuclide concentrations resulting from the screening analysis are then compared against the effluent concentration limits (ECLs) identified in 10 CFR 20, Appendix B, Table 2, Column 2, to determine acceptability. Further analysis, using more realistic modeling techniques, is conducted for the radionuclides of interest as identified in the screening analysis.

a. **Methodology**

This analysis accounts for the parent radionuclides assumed present in a holdup tank or a waste holdup tank plus progeny radionuclides that are generated subsequently during transport. The analysis considered all progeny in the decay chain sequences that are important for dosimetric purposes. International Commission on Radiation Protection (ICRP) Publication 38 (Reference 2.4-211) was used to identify the member for which the decay chain sequence can be truncated. For some of the radionuclides, consideration of up to three members of the decay chain sequence was required. The derivation of the equations governing the transport of the parent and progeny radionuclides follows.

Transport of the parent radionuclide along a groundwater pathline is governed by the advection-dispersion-reaction equation (Reference 2.4-212), which is given as [equations and associated citations renumbered to 2.4.13-1 through 2.4.13-19]:

$$R\frac{\partial C}{\partial t} = D\frac{\partial^2 C}{\partial x^2} - v\frac{\partial C}{\partial x} - \lambda RC \qquad (2.4.13\text{-}1)$$

where: C = radionuclide concentration in terms of atom density; R = retardation factor; D = coefficient of longitudinal hydrodynamic dispersion; ν = average linear velocity; and λ = radioactive decay constant. The retardation factor is defined from the relationship:

$$R = 1 + \frac{\rho_b K_d}{n_e} \tag{2.4.13-2}$$

where: ρ_b = bulk density; K_d = distribution coefficient; and n_e = effective porosity. The average linear velocity is determined using Darcy's law, which is:

$$\nu = -\frac{K}{n_e}\frac{dh}{dx} \tag{2.4.13-3}$$

where: K = hydraulic conductivity; and dh/dx = hydraulic gradient. The radioactive decay constant can be written as:

$$\lambda = \frac{\ln 2}{t_{1/2}} \tag{2.4.13-4}$$

where: $t_{1/2}$ = radionuclide half-life.

Using the method of characteristics approach described in Reference 2.4-213, the material derivative of concentration can be written as:

$$\frac{dC}{dt} = \frac{\partial C}{\partial t} + \frac{dx}{dt}\frac{\partial C}{\partial x} \tag{2.4.13-5}$$

Conservatively neglecting hydrodynamic dispersion, the characteristic equations for Equation 2.4.13-1 can be expressed as follows:

$$\frac{dC}{dt} = -\lambda C \tag{2.4.13-6}$$

$$\frac{dx}{dt} = \frac{\nu}{R} \tag{2.4.13-7}$$

The solutions of the system of equations comprising Equation 2.4.13-6 and Equation 2.4.13-7 can be obtained by integration to yield the characteristic curves of Equation 2.4.13-1. For the parent radionuclide, the equations representing the characteristic curves can be obtained as:

$$C_1 = C_{10}\exp(-\lambda_1 t) \tag{2.4.13-8}$$

$$t = R_1 L/\nu \tag{2.4.13-9}$$

where: C_1 = activity concentration of the parent radionuclide; C_{10} = initial activity concentration of the parent radionuclide; λ_1 = radioactive decay constant for the parent radionuclide; R_1 = retardation factor for the parent radionuclide; and L = groundwater pathline length.

Similar relationships exist for progeny radionuclides. For the first progeny in the decay chain, the advection-dispersion-reaction equation is:

$$R_2\frac{\partial C_2}{\partial t} = D\frac{\partial^2 C_2}{\partial x^2} - \nu\frac{\partial C_2}{\partial x} + d_{12}\lambda_1 R_1 C_1 - \lambda_2 R_2 C_2 \qquad (2.4.13\text{-}10)$$

where: subscript 2 denotes the first progeny radionuclide; and d_{12} = fraction of parent radionuclide transitions that result in production of progeny radionuclide. The characteristic equations for Equation 2.4.13-10, assuming $R_1 \approx R_2$ and again conservatively neglecting hydrodynamic dispersion, can be derived as:

$$\frac{dC_2}{dt} = d_{12}\lambda_1 C_1 - \lambda_2 C_2 \qquad (2.4.13\text{-}11)$$

$$\frac{dx}{dt} = \frac{\nu}{R_2} \qquad (2.4.13\text{-}12)$$

Recognizing that Equation 2.4.13-11 is formally similar to Equation B.43 of Reference 2.4-214, these equations can be integrated to yield an expression for the activity concentration of the first progeny radionuclide:

$$C_2 = K_1 \exp(-\lambda_1 t) + K_2 \exp(-\lambda_2 t) \qquad (2.4.13\text{-}13)$$

$$t = R_2 L/\nu \qquad (2.4.13\text{-}14)$$

for which:

$$K_1 = \frac{d_{12}\lambda_2 C_{10}}{\lambda_2 - \lambda_1}$$

$$K_2 = C_{20} - \frac{d_{12}\lambda_2 C_{10}}{\lambda_2 - \lambda_1}$$

The advection-dispersion-reaction equation for the second progeny in the decay chain is:

(2.4.13-15)

$$R_3\frac{\partial C_3}{\partial t} = D\frac{\partial^2 C_3}{\partial x^2} - \nu\frac{\partial C_3}{\partial x} + d_{13}\lambda_1 R_1 C_1 + d_{23}\lambda_2 R_2 C_2 - \lambda_3 R_3 C_3$$

where: subscript 3 denotes the second progeny radionuclide; d_{13} = fraction of parent radionuclide transitions that result in production of second progeny radionuclide; and d_{23} = fraction of first progeny radionuclide transitions that result in production of second progeny radionuclide. The characteristic equations for Equation 2.4.13-15, assuming $R_1 \approx R_2 \approx R_3$ and again conservatively neglecting hydrodynamic dispersion, can be derived as

$$\frac{dC_3}{dt} = d_{13}\lambda_1 C_1 + d_{23}\lambda_2 C_2 - \lambda_3 C_3 \quad (2.4.13\text{-}16)$$

$$\frac{dx}{dt} = \frac{\nu}{R_3} \quad (2.4.13\text{-}17)$$

Considering the formal similarity of Equation 2.4.13-16 to Equation B.54 of Reference 2.4-214, Equation 2.4.13-16 and Equation 2.4.13-17 can be integrated to yield an expression for the activity concentration of the second progeny radionuclide:

$$C_3 = K_1 \exp(-\lambda_1 t) + K_2 \exp(-\lambda_2 t) + K_3 \exp(-\lambda_3 t) \quad (2.4.13\text{-}18)$$

$$t = R_3 L / \nu \quad (2.4.13\text{-}19)$$

for which:

$$K_1 = \frac{d_{13}\lambda_3 C_{10}}{\lambda_3 - \lambda_1} + \frac{d_{23}\lambda_2 d_{12}\lambda_3 C_{10}}{(\lambda_3 - \lambda_1)(\lambda_2 - \lambda_1)}$$

$$K_2 = \frac{d_{23}\lambda_3 C_{20}}{\lambda_3 - \lambda_2} + \frac{d_{23}\lambda_2 d_{12}\lambda_3 C_{10}}{(\lambda_3 - \lambda_1)(\lambda_2 - \lambda_1)}$$

$$K_3 = C_{30} - \frac{d_{13}\lambda_3 C_{10}}{\lambda_3 - \lambda_1} - \frac{d_{23}\lambda_3 C_{20}}{\lambda_3 - \lambda_2} + \frac{d_{23}\lambda_2 d_{12}\lambda_3 C_{10}}{(\lambda_3 - \lambda_1)(\lambda_3 - \lambda_2)}$$

b. **Screening Analysis**

Using the methodology developed above, a screening analysis was performed considering advection and radioactive decay only to eliminate from consideration those radionuclides in the source term that would be well below the 10 CFR 20, Appendix B, Table 2 ECLs under very conservative modeling assumptions (i.e., no adsorption and no dispersion). For this limiting case, activity concentrations for parent and relevant progeny radionuclides were calculated at the point where liquid effluent from a postulated accidental release would discharge from the groundwater. This point has been identified to be the cove that will serve as the forebay for the Unit 3 makeup water intake, as discussed previously. This portion of the lake is within the restricted area as defined in SSAR Section 2.1.1.3 and illustrated on SSAR Figure 2.1-1. Activity concentrations for the parent and first two progeny radionuclides at the point of groundwater discharge can be calculated from

Equations 2.4.13-8, 2.4.13-13, and 2.4.13-18 with time, *t*, being equal to the groundwater travel time.

The groundwater travel time between the point of the postulated release and the point of discharge to the cove is calculated based on the following data:

Hydraulic conductivity, *K* = 9.9 ft/d

Hydraulic gradient, *dh/dx* = –0.05

Effective porosity, n_e = 0.25

Transport distance, L = 1100 ft

The hydraulic conductivity value represents the maximum observed value for the site, based on test data summarized in Table 2.4-16R. The hydraulic gradient was determined from Figure 2.4-219. The February 2007 potentiometric surface contour map shows the maximum gradient along the assumed flow path during the monitoring period. The gradient was determined using the 290 ft NAVD88 (290.86 ft NGVD29) and 240 ft NAVD88 (240.86 ft NGVD29) contours with a pathline distance of 1030 ft. The effective porosity was established as described in Section 2.4.12.1.2.

Based on these values, Equation 2.4.13-3 is used to calculate the average linear velocity as:

$$\nu = \frac{K}{n_e}\frac{dh}{dx} = \frac{9.9}{0.25} \times 0.05 = 1.98 \text{ ft/d}$$

Using Equation 2.4.13-9, the groundwater travel time is then:

$$t = L/\nu = 1100/1.98 = 1.52 \text{ years}$$

Taking $R_1=R_2=R_3=1$ and using Equations 2.4.13-8, 2.4.13-13, and 2.4.13-18, as appropriate, the source term concentrations were decayed for a period of 1.52 years.

A particle tracking simulation was conducted using the post-construction groundwater flow model developed for the site as discussed in Section 2.4.12.4. Particles were released from each of the four corners of the auxiliary building below the building foundation to evaluate the flow path of a postulated release of liquid effluent from the auxiliary building. The particle tracking simulation indicates an accidental release of liquid effluent from the auxiliary building would discharge into the Unit 3 forebay (see Figure 2.4-220), consistent with the model used for this analysis.

The shortest of the modeled particle travel times from the auxiliary building to the discharge location is approximately 29 years or approximately 19 times longer than the travel time assumed in this accidental release analysis. The travel time of 29 years is based on all the input parameter values used to develop the post-construction groundwater levels presented in Section 2.4.12.4 and an effective porosity value of 0.25. The difference in travel times between the groundwater model and the present transport calculation is primarily due to the difference in hydraulic conductivity values used in each of these two analyses. The calibrated hydraulic conductivity value in the northern part of the groundwater model domain, where the simulated particle pathlines are located, is about 1.2 ft/day, while the transport calculation used the maximum measured hydraulic conductivity at the site, i.e., 9.9 ft/day.

The travel time used in this analysis (1.52 years) is therefore considered very conservative compared to post-construction groundwater conditions predicted by the groundwater flow model. Radioactive decay data and decay chain specifications were taken from ICRP Publication 38 (Reference 2.4-211). Results of the screening analysis for the holdup tank and the waste holdup tank are provided in Tables 2.4-206 and 2.4-206a, respectively, under the column heading "Advection and Radioactive Decay" and include the groundwater concentration, *C*, at the point of discharge to the cove and the ratio of groundwater concentration to the associated effluent concentration limit, *C*/ECL. Ratios of less than 1×10^{-6} were taken to be zero. Radionuclides for which the *C*/ECL value is greater than or equal to 0.01 include H-3, Mn-54, Fe-55, Co-58, Co-60, Sr-90, Y-90, Ru-106, Te-127m, Cs-134, Cs-137, and Ce-144, and are considered to be the radionuclides of interest for the purpose of assessing compliance with 10 CFR 20. The *C*/ECL values for the remaining radionuclides are so small that they do not play a role in assessing regulatory compliance, even when summed; these radionuclides were eliminated from further consideration.

c. **Groundwater Pathway**

The radionuclides of interest identified above were further evaluated considering adsorption in addition to advection and radioactive decay. Distribution coefficient, K_d, values were determined by laboratory analysis of site soil samples (Reference 2.4-219). For the purpose of assessing 10 CFR 20 compliance, each radionuclide was assigned its minimum site-specific K_d value as obtained by laboratory testing. Site-specified K_d values were determined for Mn, Fe, Co, Zn, Sr, Ru, Ag, Cs, and Ce for 20 saprolite and weathered rock samples. These samples were obtained from borings B-901, B-904, B-913, B-917, B-919, B-920, B-928, B-929, B-931, B-932, B-949, and B-951, the locations of which are shown on Figures 2.5-221 and 2.5-222. K_d values for these samples were determined using the batch method in accordance with ASTM D 4646-03 at Savannah River National Laboratory using site water obtained from the unconfined aquifer. The results are summarized in Table 2.4-207. Site-specific K_d values are not available for some radionuclides, including isotopes of yttrium (Y), tellurium (Te), and praseodymium (Pr). In the case of Y-90, the K_d value was assumed to be the same as Sr-90 serving as the parent radionuclide. The K_d values for Te-127 and Te-127m were conservatively assigned the 10th percentile of the Te distribution based on data published in NUREG/CR-6697 (Reference 2.4-215). For Pr-144 and Pr-144m, daughter products of Ce-144, their K_d values were assumed to be the same as cerium. For H-3, a component of water, the K_d value is zero by definition. The K_d values used in the transport analysis are provided in Tables 2.4-206 and 2.4-206a.

Retardation factors for the radionuclides of interest were calculated using Equation 2.4.13-2 with the K_d values as described above, an effective porosity of 0.25, and a bulk density of 1.83 g/cm^3. The bulk density was estimated using a soil grain specific gravity of 2.65 and total porosity of 0.31, which were determined on a site-specific basis (Section 2.4.12.1.2). The concentration of each radionuclide was then determined at the point of groundwater discharge to the cove using Equations 2.4.13-8, 2.4.13-13, and 2.4.13-18, as necessary, and the appropriate initial concentration, decay rate, and retardation factor. Tables 2.4-206 and 2.4-206a provide the results under the column heading “Advection, Decay, and Adsorption.” As before for the groundwater concentration (C) to ECL ratios, C/ECL values less than 1×10^{-6} were taken to be zero. Radionuclides for which the C/ECL value is greater than or equal to 0.01 include H-3, Sr-90, and Y-90. Under the unity rule in 10 CFR 20, accounting for advection, radioactive decay, and adsorption, the sum of fractions for a holdup tank and a waste holdup tank are 717 and 552, respectively. These results, coupled with the fact that the holdup tank volume is four times larger than that of the waste holdup tank, indicate the holdup tank is the limiting tank. Therefore, a holdup tank is selected as the limiting tank for the accidental release analysis.

d. **Surface Water Pathways**

The results presented in Table 2.4-206 indicate that H-3, Sr-90, and Y-90 need to be further evaluated to determine compliance with 10 CFR 20, Appendix B, Table 2 limits, which apply to the nearest source of potable water located in an unrestricted area. This evaluation requires consideration of surface water pathways, which in turn are determined by the status of plant operation. Because of its mobility, a release of H-3 would likely enter the surface water within the operational lifetime of Unit 3 (up to 60 years), whereas the less mobile Sr-90 and Y-90 could enter the surface water either during Unit 3 operation or after the plant has been shutdown, depending on when an accidental release might occur. As described previously, any constituent in the groundwater discharging to the cove during plant operation is expected to be: 1) entrained, mixed, and diluted with surface water in the cove that comprises the Unit 3 intake forebay; 2) subsequently withdrawn from the cove by the makeup water intake for Unit 3, introduced into the closed-cycle CWS, and circulated through wet cooling towers; and 3) discharged with the cooling tower blowdown to the discharge canal. If Unit 3 were not operating, constituents in groundwater discharging to the cove would simply be mixed and diluted with surface water in the cove. Note that this cove is isolated from the rest of Lake Anna by a cofferdam and is connected hydraulically with the lake by a set of culverts as shown in Figure 2.4-204.

For the scenario in which the plant is operating (where H-3, Sr-90, and Y-90 are of interest), radionuclide concentrations in the discharge canal can be estimated by diluting the volume of liquid effluent released into the volume of the discharge canal and accounting for the radioactive decay that would occur during groundwater transport. This approach assumes that Units 1 and 2 are not operating, which is conservative because it ignores the large volume of circulating water discharged from Units 1 and 2 that would otherwise be available for dilution. Assuming fully mixed conditions and no hydraulic interaction with the WHTF, the sum of fractions can be calculated as:

$$\sum \frac{C_{\text{discharge}}}{\text{ECL}} = \frac{V_{\text{release}}}{V_{\text{discharge}}} \sum \frac{C}{\text{ECL}} \qquad (2.4.13\text{-}22)$$

where: $C_{discharge}$ = radionuclide concentration in the discharge canal (restricted area); $V_{release}$ = 80 percent of the capacity of a holdup tank (13,800 ft^3); $V_{discharge}$ = volume of water in the discharge canal; and C = radionuclide concentration of the groundwater discharging to surface water (Table 2.4-206). The discharge canal is 3850 ft long and has a trapezoidal cross-section with a bottom width of 100 ft, side slopes of 2.5:1, and an invert elevation of 266.14 ft NAVD88 (227 ft msl, which corresponds to NGVD29) (ESP ER Section 3.4.2.2). Given these characteristics, the discharge canal volume can be calculated as:

$$V_{discharge} = AL = (b + zy)yL \qquad (2.4.13\text{-}23)$$

where: A = cross sectional area; b = bottom width; z = side slope; y = depth; and L = channel length. For a lake elevation of 249.39 ft NAVD88 (250.25 ft NGVD29), the volume of the discharge canal is calculated using Equation 2.4.13-23 as follows:

$$V_{\text{discharge}} = [100 + 2.5(23.25)](23.25)(3850) = 14{,}154{,}000 \text{ ft}^3$$

Applying Equation 2.4.13-22 to H-3 and Sr-90 and Y-90 then yields the following for a lake elevation of 249.39 ft NAVD88 (250.25 ft NGVD29):

H-3, Sr-90 and Y-90:

$$\sum \frac{C_{discharge}}{ECL} = \frac{12800}{14154000} \times (716 + 0.4 + 0.03) = 0.65 < 1$$

For the scenario in which the plant is not operating (where Sr-90 and Y-90 are of interest), a bounding estimate of the sum of fractions in the unrestricted area of Lake Anna can be determined by calculating the radionuclide concentration in the isolated cove of Lake Anna that receives the effluent release via groundwater discharge. Assuming fully mixed conditions and no hydraulic interaction with the main lake, this concentration can be calculated as:

$$\sum \frac{C_{cove}}{ECL} = \frac{V_{release}}{V_{cove}} \sum \frac{C}{ECL} \qquad (2.4.13\text{-}24)$$

where: C_{cove} = radionuclide concentration in the Lake Anna cove (restricted area); V_{cove} = volume of water in cove (3,984,000 ft^3 assuming a 249.39 ft NAVD88 (250.25 ft NGVD29) water surface elevation); and C = radionuclide concentration of the groundwater discharging to surface water (Table 2.4-206). This value is considered bounding because any water leaving the cove would have to mix with additional surface water prior to entering the unrestricted area. Applying Equation 2.4.13-24 to Sr-90 and Y-90 gives:

Sr-90 and Y-90:

$$\sum \frac{C_{cove}}{ECL} = \frac{12800}{3984000} \times (0.4 + 0.03) = 0.001 < 1$$

The results presented above demonstrate that use of the maximum observed hydraulic conductivity and minimum site-specific K_d values result in sum of fraction values less than one (unity) within the restricted area, both during plant operation and after the plant has been shut down. Because 10 CFR 20 limits are met within the restricted area, the same limits will be achieved with even greater margin in unrestricted areas as a consequence of additional mixing and dilution. Therefore, it is concluded that the requirements of 10 CFR 20 are met under these limiting conditions that combine maximum hydraulic conductivity and minimum distribution coefficients.

2.4.13.4 Compliance with 10 CFR 20

A conservative analysis of a postulated, accidental release of liquid effluents in groundwater has been conducted. The analysis was performed using demonstratively conservative coefficients and assumptions, and physical conditions likely to give the most adverse dispersion of liquid effluent. It is concluded that an accidental release of liquid from a holdup tank (the limiting tank) to groundwater would result in radionuclide concentrations in the nearest potable water supply, located in an unrestricted area, that are below the 10 CFR 20 limits.

NAPS COL 2.4(1)

2.4.14 Technical Specifications and Emergency Operation Requirements

The design plant grade elevation for safety-related SSCs is located above the design basis flood level, as stated in Section 2.4.2, and above the maximum groundwater elevation, as stated in Section 2.4.12.

Safety-related SSCs for the plant are protected from external floods as discussed in Section 3.4. The elevation of exterior access openings, which are above the PMF and local PMP flood levels, and the design of exterior penetrations below design flood and groundwater levels, which are appropriately sealed, result in a design and site combination that do not necessitate emergency procedures or meet the criteria for Technical Specification LCOs to ensure safety-related functions at the plant.

NAPS ESP COL 2.4-2 Unit 3 will shutdown when the water level in Lake Anna drops below Elevation 241.14 ft NAVD88 (242.0 ft NGVD29). Because this operational restriction is not related to protection of safety-related SSCs or degradation of the UHS, low lake level is not a Technical Specification LCO.

2.4.15 Combined License Information

Replace the content of DCD Subsection 2.4.15 with the following.

NAPS COL 2.4(1) *2.4(1)* ***Hydrologic Events***

This COL item is addressed in Section 2.4.

Section 2.4 References

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NAPS COL 2.4(1)

Table 2.4-1R Lake Anna Storage Allocation

Purpose	Volume (acre-feet)
Minimum recreational pool and inactive storage below 246 ft NGVD29*	255,000
Conservation and active storage, 246 to 250.25 ft NGVD29*	53,300
Flood control storage, 250.25 to 265 ft NGVD29*	241,700
Total Storage	550,000

* The conversion from NGVD29 datum elevations to NAVD88 datum elevations is –0.86 ft

NAPS COL 2.4(1)

Table 2.4-6R Lake Anna Low Water Level Durations

Lake Level (ft NGVD29*)	Two Unit	Three Unit
248.0	4.7%	5.5%
246.0	0.9%	1.1%
244.0	0%	0%
242.0	0%	0%

Two Unit - Unit 1 and 2 using once-through cooling

Three Unit - Units 1 and 2 using once-through cooling and Unit 3 using closed-cycle cooling system with dry and wet cooling towers.

* The conversion from NGVD29 datum elevations to NAVD88 datum elevations is –0.86 ft

NAPS COL 2.4(1)

Table 2.4-15R Quarterly Groundwater Level Elevations

Observation Well No.	Well Depth[a] (ft)	Reference Point Elev.[b] (ft)	Reference Point Stickup[c] (ft)	Top of Well Screen Elev. (ft)	Well Screen Length (ft)	Groundwater Level Elevations[b] Date of Measurement									
						12/17/02	03/17/03	06/17/03	09/29/03	02/01/05	11/29/06	02/28/07	05/30/07	8/29/07	11/28/07
OW-841	34.3	251.6	1.5	228.1	9.7	248.9	249.6	249.6	249.3	249.1	249.51	249.11	248.74	248.4	248.4
OW-842	49.6	336.7	1.5	297.8	9.6	307.5	308.9	310.8	312.0	314.2	313.36	313.84	314.23	313.0	311.6
OW-843	49.2	320.6	1.5	282.1	9.7	285.1	288.1	290.8	290.2	290.7	288.58	289.78	290.15	286.6	285.0
OW-844	24.6	273.5	1.5	257.6	9.6	265.5	266.7	267.3	266.4	266.2	266.49	266.32	265.63	263.5	263.4
OW-845	55.0	297.3	1.5	253.0	9.7	272.7	274.9	277.4	277.3	277.1	276.19	276.21	276.86	275.1	273.9
OW-846	32.7	297.3	1.5	273.5	9.8	272.5	274.8	277.1	277.0	276.8	276.01	275.95	276.59	274.8	273.7
OW-847	49.8	319.7	1.5	280.6	9.6	285.4	287.0	289.5	290.8	293.3	d	d	294.24	292.5	292.6
OW-848	47.3	284.5	1.5	240.8	5.0	241.7	242.9	243.6	244.0	243.2	243.86	243.2	242.63	242.4	242.0
OW-849	49.8	298.5	1.5	259.4	9.7	265.5	269.5	271.7	270.8	269.5	270.21	d	270.03	267.6	265.9
OW-901	108	311.3	1.70	214.6	10	N/A	N/A	N/A	N/A	N/A	285.13	286.98	288.46	284.7	282.4
OW-945	54.5	283.1	1.50	240.1	10	N/A	N/A	N/A	N/A	N/A	d	d	271.59	267.5	266.6
OW-946	43.4	335.6	1.60	303.6	10	N/A	N/A	N/A	N/A	N/A	302.86	302.8	312.62	309.9	307.5
OW-947	58.0	315.1	1.80	268.3	10	N/A	N/A	N/A	N/A	N/A	297.61	297.81	297.92	296.0	295.3
OW-949	104.5	336.9	1.23	243.2	10	N/A	N/A	N/A	N/A	N/A	313.69	313.9	314.39	313.3	312.1
OW-950	92.0	284.5	1.52	203.0	10	N/A	N/A	N/A	N/A	N/A	239.8	238.68	238.37	237.8	237.1
OW-951	67.1	250.7	1.01	194.6	10	N/A	N/A	N/A	N/A	N/A	249.44	249.6	249.4	249.0	249.0
P-10	22.5	285.5	2.4	266.1	5	273.5	273.9	274.3	274.3	274.4	274.6	274.5	274.3	273.9	273.8
P-14	N/A	326.2	N/A	N/A	N/A	270.7	271.3	271.9	272.2	272.9	273.1	273.1	273.2	272.6	272.3
P-18	N/A	328.1	N/A	N/A	N/A	284.8	285.6	286.6	287.5	289.0	289.6	289.8	290.0	289.7	288.8
P-19	58.5	321.4	N/A	N/A	5	283.4	284.3	285.4	286.4	288.0	d	d	289.6	288.7	287.9
P-20	61.0	319.7	N/A	N/A	5	274.0	274.5	274.9	274.1	275.8	276.2	276.0	276.0	275.8	275.6
P-21	58.5	318.3	N/A	N/A	5	N/A	260.3	261.1	261.5	262.5	262.8	262.7	263.0	262.4	261.3
P-22	60.0	319.6	N/A	N/A	5	275.9	276.9	277.7	278.0	278.6	278.9	278.7	278.5	277.7	277.1
P-23	41.2	295.5	1.9	257.8	5	260.2	261.7	262.4	262.2	262.6	262.7	262.4	262.4	260.9	260.6
P-24	25.0	292.5	2.3	270.4	5	275.5	276.2	277.5	277.4	277.5	277.9	277.9	277.2	276.5	276.0
WP-3	N/A	309.9	N/A	266.5	5	291.7	293.0	294.8	294.3	294.1	294.42	294.2	294.09	292.4	292.2
Lake Anna Water Level Elevation[e]						248.1	250.1	250.4	250.1	250.1	250.1	250.1	249.8	248.3	247.5
Service Water Reservoir Water Level Elevation[e]						314.6	313.3	314.6	314.6	314.5	314.5	314.4	314.5	314.3	313.7

NAPS ESP VAR 2.4-3 (applies to row WP-3)

NAPS COL 2.4(1)

Table 2.4-15R Quarterly Groundwater Level Elevations

Observation Well No.	Well Depth[a] (ft)	Reference Point Elev.[b] (ft)	Reference Point Stickup[c] (ft)	Top of Well Screen Elev. (ft)	Well Screen Length (ft)	Groundwater Level Elevations[b] Date of Measurement									
						12/17/02	03/17/03	06/17/03	09/29/03	02/01/05	11/29/06	02/28/07	05/30/07	8/29/07	11/28/07

OW-800 series wells installed in December 2002 as part of ESP Subsurface Investigation Program
OW-900 series wells installed in November 2006 as part of Unit 3 Subsurface Investigation Program
P- wells installed previously to monitor NAPS Units 1 and 2 Service Water Reservoir
WP- well installed previously as part of Interim Spent Fuel Storage Installation monitoring program
a. Below ground surface at time of installation
b. Vertical Datum is NAVD88
c. Above ground surface at time of installation.
d. Erroneous reading due to poor electrical contact with water surface by water level indicator.
e. Vertical Datum is NGVD29. To convert to NAVD88, subtract 0.86 ft.

N/A – not available

NAPS COL 2.4(1)

Table 2.4-16R Hydraulic Conductivity Value

Observation Well No.	Depth Interval Tested (ft)	Elevation	Material	Hydraulic Conductivity cm/sec	Hydraulic Conductivity ft/day
PT-1 [a]	Near-surface	Unknown	Saprolite	2.8×10^{-5}	0.08
PT-2 [a]	Near-surface	Unknown	Saprolite	1.4×10^{-5}	0.04
P-10 [b]	14.5–22.5	269.5–261.5	Saprolite	6.1×10^{-4} to 6.1×10^{-5}	1.7 to 0.17
P-24 [b]	16.8–25.0	274.3–266.1	Saprolite	2.9×10^{-4} to 6.6×10^{-6}	0.8 to 0.02
P-23 [b]	33.7–41.2	260.7–253.2	Saprolite	6.6×10^{-5}	0.19
OW-844 [c]	12.7–24.6	259.3–247.4	Saprolite	9.9 to 8.9×10^{-5}	0.28 to 0.25
OW-841 [c]	20.1–34.3	230.0–215.8	Saprolite	8.2 to 7.8×10^{-4}	2.3 to 2.2
OW-846 [c]	20.3–32.7	275.5–263.1	Saprolite	1.2×10^{-3} to 6.8×10^{-4}	3.4 to 1.9
OW-847 [c]	35.0–49.8	283.2–268.4	Saprolite	2.3 to 2.1×10^{-4}	0.66 to 0.58
OW-842 [c]	35.3–49.6	299.9–285.6	Saprolite	3.3×10^{-4}	0.93
OW-849 [c]	35.6–49.8	261.4–247.2	Saprolite	1.1×10^{-3} to 7.0×10^{-4}	3.2 to 2.0
OW-843 [c]	36.4–49.2	282.7–269.9	Saprolite	4.9 to 4.5×10^{-4}	1.4 to 1.3
OW-848 [c]	39.1–47.3	243.9–235.7	Saprolite	1.2×10^{-3} to 9.9×10^{-4} [d]	3.4 to 2.8 [d]
OW-845 [c]	39.7–55.0	256.1–240.8	Quartz Gneiss	1.1×10^{-3} to 6.3×10^{-4} [e]	3.1 to 1.8 [e]
OW-945 [f]	41.5–51.5	240.1–230.1	Saprolite	1.4 to 1 x 10^{-3}	3.8 to 2.8
OW-946 [f]	30.4–40.4	303.6–293.6	Saprolite	3.5 to 2.6 x 10^{-3}	9.9 to 7.4
OW-947 [f]	45.0–55.0	268.3–258.3	Saprolite	2.4 to 1.6 x 10^{-4}	0.67 to 0.46
OW-949 [f]	92.5–102.5	243.2–233.2	Quartz Gneiss	8.4 to 6.7 x 10^{-4}	2.4 to 1.9
Packer Test Results					
B-949 [f]	84.0–89	250.8–245.8	Quartz Gneiss	1.7 x 10^{-4}	0.48
	94.5–99.5	240.3–235.3	Quartz Gneiss	2.2 x 10^{-3}	6.28

NAPS COL 2.4(1)

Table 2.4-16R Hydraulic Conductivity Value

Observation Well No.	Depth Interval Tested (ft)	Elevation	Material	Hydraulic Conductivity cm/sec	ft/day
Laboratory Test Results					
B-48 [a]	3.5	290.5	Sandy silt	1×10^{-6}	0.003
B-8 [a]	5.5	293.5	Fine sand, tr. silt	1×10^{-6}	0.003
B-2 [a]	15.5	269.5	Fine to med. sand, w/clayey silt	4×10^{-5}	0.11
B-15 [a]	36	281	Silty fine sand	1.3×10^{-5}	0.04

a. SSAR Reference 43
b. SSAR Reference 56
c. SSAR Appendix 2.5.4 B
d. Results may not be accurate due to static water level approximately 0.5 ft below top of well screen.
e. Results may not be accurate due to short duration of stable water level recovery measurements.
f. Appendix 2.5.4AA

NAPS COL 2.4(1)
NAPS ESP VAR 2.4-2
ESP COR4

Table 2.4-17R North Anna Power Station Water Supply Wells

Well	Depth (ft)	Measured Yield (gpd)	Design Yield (gpd)	Water Treatment
No. 2 [a,b]	335	12,960	Unknown	Unknown (normally not in use)
No. 3A [a,b]	185	74,880		Unknown
No. 4 (new) [a,b]	305	63,360	35,200 [c]	None
No. 6 [a,b]	375	79,200	44,000 [c]	None
No. 4 (old) [a,b] (not used)	200	77,760	NA	NA
NANIC [a,d]	260	106,560	19,600	Calcite filtration
Security Training Building	640	Unknown	Unknown	Unknown
No. 7 [c]	730	89,280	49,600	None
Metrology Laboratory	116	Unknown	Unknown	Unknown

a. SSAR Reference 50
b. SSAR Reference 48
c. Reference 2.4-207
d. SSAR Reference 49

NAPS COL 2.4(1)

Table 2.4-201 Unit 3 Sub-Basin Drainage Areas

Sub-Basin	Drainage Area (ft^2)	Drainage Area (acres)
B	497,200	11.41
W1	185,400	4.26
W2	126,100	2.89
W3	128,900	2.96
W4	88,900	2.04
W5	234,300	5.38
E1	234,400	5.38
E2	307,700	7.06
E3	509,400	11.69
N1	171,200	3.93
Total	2,483,500	57.00

NAPS COL 2.4(1)

Table 2.4-202 Unit 3 Sub-Basin Point of Interest (POI) Drainage Areas

Sub-Basin	Contributing Upstream Sub-Basins	Total POI Drainage Area (acres)
B	All	57.00
W1	W1, W2, W3, W4, W5	17.53
W2	W2, W3, W4, W5	13.27
W3	W3, W4, W5	10.38
W4	W4, W5	7.42
W5	W5	5.38
E1	E1, E2, E3, N1	28.06
E2	E2, E3, N1	22.68
E3	E3	11.69
N1	N1	3.93

NAPS COL 2.4(1)

Table 2.4-203 Unit 3 Site PMP Peak Discharges

Sub-Basin	POI Drainage Area (acres)	Composite Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (in/hr)	PMP Peak Discharge (cfs)
B	57.00	0.98	16.8	36.0	2011.0
W1	17.53	0.99	15.2	38.0	659.5
W2	13.27	1.00	14.7	39.0	517.5
W3	10.38	1.00	14.3	39.5	410.0
W4	7.42	1.00	13.7	41.0	304.2
W5	5.38	1.00	12.5	43.0	231.3
N1	3.93	0.99	14.4	39.5	153.7
E1	28.06	0.97	16.8	36.0	979.9
E2	22.68	0.96	15.9	36.8	801.2
E3	11.69	0.93	11.8	45.8	497.9

NAPS COL 2.4(1)

Table 2.4-204 Unit 3 Site PMP Water Levels

Ditch	Cross Section	Discharge (cfs)	Maximum Water Level (ft NAVD88)*	Ditch/ Channel Bottom Width (ft)	Ditch/ Channel Invert El. (ft NAVD88)*	Bank El. (ft NAVD88)*
Outfall	630	2011.0	271.8	240	260.0	270.0
	565	2011.0	271.8	308	260.0	270.0
	425	2011.0	271.8	Weir	N/A	N/A
	300	2011.0	265.0	90	218.0	268.0
	0	2011.0	265.0	230	220.0	265.0
East	1812	497.9	297.1	3	294.0	296.0
	1660	497.9	291.1	3	288.0	290.0
	1538	497.9	289.1	3	285.0	288.0
	1462	497.9	289.1	Weir	N/A	N/A
	1418**	497.9	287.5	5	285.0	288.0
	1334**	497.9	287.5	5	283.2	286.0
	1274**	801.2	287.4	5	281.8	286.0
	1120**	801.2	287.3	5	281.5	284.0
	1049**	801.2	287.2	5	281.4	284.0
	930**	801.2	287.0	5	281.1	284.0
	850**	979.9	286.9	5	280.9	284.0
	756**	979.9	286.7	5	280.9	284.0
	636**	979.9	286.4	5	280.5	284.0
	573	979.9	286.4	Weir	N/A	N/A
	504	979.9	285.6	5	280.5	284.0
	328	979.9	283.9	0	280.0	282.0
	240	979.9	281.6	0	277.2	280.0
	148	979.9	277.7	0	273.5	276.0
	84	979.9	274.8	0	271.5	274.0
	0	979.9	271.3	14	270.0	271.8

NAPS COL 2.4(1)

Table 2.4-204 Unit 3 Site PMP Water Levels

Ditch	Cross Section	Discharge (cfs)	Maximum Water Level (ft NAVD88)*	Ditch/ Channel Bottom Width (ft)	Ditch/ Channel Invert El. (ft NAVD88)*	Bank El. (ft NAVD88)*
North	479**	153.7	288.9	4	283.8	290.0
	282**	153.7	288.9	4	283.2	290.0
	210**	153.7	288.9	4	283.0	288.0
	150**	153.7	288.9	Weir	N/A	N/A
	70**	153.7	287.6	5	282.0	288.0
	0**	153.7	287.5	5	281.9	288.0
West	1830**	231.3	287.9	4	284.0	290.0
	1579**	231.3	287.8	4	283.0	290.0
	1142**	231.3	287.7	4	282.2	286.0
	1220**	231.3	287.7	4	281.8	286.0
	1060**	304.2	287.6	4	281.5	286.0
	1000**	304.2	287.6	Weir	N/A	N/A
	940**	410.0	285.8	4	281.0	286.0
	788**	410.0	285.4	4	280.4	286.0
	610**	517.5	284.6	4	279.3	286.0
	516	659.5	283.8	4	278.7	285.5
	422	659.5	282.4	4	278.0	282.0
	211	659.5	277.0	4	272.0	278.0
	104	659.5	270.3	4	266.0	274.0
	36	659.5	271.8	4	263.0	274.0

* Conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft

** Cross Section is located in the power Block Area

NAPS COL 2.4(1)

Table 2.4-205 North Anna Power Station Groundwater Use [a]
January 1, 2006 to December 31, 2006
(Millions of Gallons)

Month	Well #4 (new)	Well #6	Well #7
January	0.2545	0.0072	0
February	0.2895	0	0.0001
March	0.6233	0.0002	0.0002
April	0.0854	0.2029	0
May	0.0006	0.2901	0
June	0	0.3228	0
July	0.0013	0.3007	0.0001
August	0.0005	0.3933	0.0008
September	0.0763	0.2379	0
October	0.2123	0.0529	0
November	0.226	0.0311	0
December	0.1978	0.0081	0
Total	1.9675	1.8472	0.0012
Monthly Average	0.1640	0.1539	0.0001

a. Reference 2.4-208

NAPS COL 2.4(1)

Table 2.4-206 Groundwater Concentrations at Point of Groundwater Discharge to The Cove

Source Term Characteristics									Advection and Radioactive Decay					Advection, Decay and Adsorption			
Parent Radio-nuclide	Progeny in Chain	Half-life[a] (days)	Branching Fraction[a]			Decay Rate[b] (days^{-1})	ECL[c] (µCi/cm^3)	Holdup Tank Conc[d] (µCi/cm^3)	K1	K2	K3	Ground Water Conc[e] (µCi/cm^3)	Ground Water Conc/ ECL	Distribution Coefficient (cm^3/g)	Retardation Factor[f]	Ground Water Conc[g] (µCi/cm^3)	Ground Water Conc/ ECL
			d_{12}	d_{13}	d_{23}												
H-3		4.51E+03				1.54E-04	1.00E-03	7.80E-01				7.16E-01	7.16E+02	0.00	1.0	7.16E-01	7.16E+02
Cr-51		2.77E+01				2.50E-02	5.00E-04	7.70E-05				7.06E-11	2.02E-06 0.00E+00				
Mn-54		3.13E+02				2.21E-03	3.00E-05	1.60E-05				4.68E-06	1.56E-01	4.50	33.9	1.17E-23	0.00E+00
Fe-55		9.86E+02				7.03E-04	1.00E-04	8.60E-05				5.82E-05	5.82E-01	4504.00	32970.3	0.00E+00	0.00E+00
Fe-59		4.45E+01				1.56E-02	1.00E-05	4.50E-05				7.85E-09	7.85E-04				
Co-58		7.08E+01				9.79E-03	2.00E-05	7.70E-04				3.34E-06	1.67E-01	6.50	48.6	1.36E-118	0.00E+00
Co-60		1.93E+03				3.59E-04	3.00E-06	1.10E-04				9.01E-05	3.00E+01	6.50	48.6	6.79E-09	2.26E-03
Br-83		9.96E-02				6.96E+00	9.00E-04	2.52E-06				0.00E+00	0.00E+00				
	Kr-83m	7.63E-02	0.9998			9.09E+00	NA	0.00E+00	1.08E-05	-1.08E-05		0.00E+00					
Br-84		2.21E-02				3.14E+01	4.00E-04	3.48E-07				0.00E+00	0.00E+00				
Rb-86		1.87E+01				3.71E-02	7.00E-06	1.32E-05				1.44E-14	0.00E+00				
Rb-88		1.24E-02				5.61E+01	4.00E-04	6.24E-05				0.00E+00	0.00E+00				
Sr-89		5.05E+01				1.37E-02	8.00E-06	1.56E-05				7.61E-09	9.51E-04				
Sr-90		1.06E+04				6.54E-05	5.00E-07	5.40E-07				5.21E-07	1.04E+00	3.60	27.4	2.00E-07	4.00E-01
	Y-90	2.67E+00	1.0000			2.60E-01	7.00E-06	4.68E-07	5.40E-07	-7.21E-08		5.21E-07	7.44E-02	3.60	27.4	2.00E-07	2.86E-02
Sr-91		3.96E-01				1.75E+00	2.00E-05	1.12E-06				0.00E+00	0.00E+00				
	Y-91m	3.45E-02	0.5780			2.01E+01	2.00E-03	7.32E-07	7.09E-07	2.29E-08		0.00E+00	0.00E+00				
	Y-91	5.85E+01		0.4220	1.0000	1.18E-02	8.00E-06	3.36E-06	-8.05E-09	-1.35E-11	3.37E-06	4.66E-09	5.83E-04				
Y-93		4.21E-01				1.65E+00	2.00E-05	6.12E-08				0.00E+00	0.00E+00				
Zr-95		6.40E+01				1.08E-02	2.00E-05	2.88E-06				7.02E-09	3.51E-04				
	Nb-95m	3.61E+00	0.0070			1.92E-01	3.00E-05	0.00E+00	2.14E-08	-2.14E-08		5.21E-11	1.74E-06				
	Nb-95	3.52E+01		0.9930	1.0000	1.97E-02	3.00E-05	2.76E-06	6.40E-06	2.44E-09	-3.65E-06	1.55E-08	5.18E-04				
Mo-99		2.75E+00				2.52E-01	2.00E-05	7.80E-04				1.20E-64	0.00E+00				
	Tc-99m	2.51E-01	0.8760			2.76E+00	1.00E-03	7.32E-04	7.52E-04	-1.99E-05		1.15E-64	0.00E+00				
	Tc-99	7.78E+07		0.1240	1.0000	8.91E-09	6.00E-05	1.56E-10	-3.00E-11	6.42E-14	1.86E-10	1.86E-10	3.10E-06				
Ru-103		3.93E+01				1.76E-02	3.00E-05	1.92E-06				1.07E-10	3.55E-06				
	Rh-103m	3.90E-02	0.9970			1.78E+01	6.00E-03	2.04E-06	1.92E-06	1.24E-07		1.06E-10	0.00E+00				

NAPS COL 2.4(1)

Table 2.4-206 Groundwater Concentrations at Point of Groundwater Discharge to The Cove

Source Term Characteristics									Advection and Radioactive Decay					Advection, Decay and Adsorption			
Parent Radio-nuclide	Progeny in Chain	Half-life[a] (days)	Branching Fraction[a] d12	d13	d23	Decay Rate[b] (days^{-1})	ECL[c] (μCi/cm^3)	Holdup Tank Conc[d] (μCi/cm^3)	K1	K2	K3	Ground Water Conc[e] (μCi/cm^3)	Ground Water Conc/ ECL	Distribution Coefficient (cm^3/g)	Retardation Factor[f]	Ground Water Conc[g] (μCi/cm^3)	Ground Water Conc/ ECL
Ru-106		3.68E+02				1.88E-03	3.00E-06	5.28E-07				1.86E-07	6.18E-02	272.00	1992.0	0.00E+00	0.00E+00
	Rh-106	3.46E-04	1.0000			2.00E+03	NA	0.00+00	5.28E-07	-5.28E-07		1.86E-07					
Te-125m		5.80E+01				1.20E-02	2.00E-05	1.32E-06				1.73E-09	8.63E-05				
Te-127m		1.09E+02				6.36E-03	9.00E-06	1.44E-05				4.21E-07	4.68E-02	0.61	5.5	5.93E-14	0.00E+00
	Te-127	3.90E-01	0.9760			1.78E+00	1.00E-04	1.56E-05	1.41E-05	1.50E-06		4.12E-07	4.12E-03	0.61	5.5	5.81E-14	0.00E+00
Te-129m		3.36E+01				2.06E-02	7.00E-06	6.00E-05				6.32E-10	9.03E-05				
	Te-129	4.83E-02	0.6500			1.44E+01	4.00E-04	3.84E-05	3.91E-05	-6.56E-07		4.11E-10	1.03E-06				
I-129		5.73E+09				1.21E-10	2.00E-07	9.24E-14				9.24E-14	0.00E+00				
I-130		5.15E-01				1.35E+00	2.00E-05	4.44E-06				0.00+00	0.00E+00				
Te-131m		1.25E+00				5.55E-01	8.00E-06	1.12E-05				1.81E-139	0.00E+00				
	Te-131	1.74E-02	0.2220			3.98E+01	8.00E-05	2.16E-06	2.52E-06	-3.61E-07		4.08E-140	0.00E+00				
	I-131	8.04E+00		0.7780	1.0000	8.62E-02	1.00E-06	6.12E-03	-2.07E-06	7.84E-10	6.12E-03	9.68E-24	0.00E+00				
Te-132		3.26E+00				2.13E-01	9.00E-06	2.88E-04				1.44E-55	0.00E+00				
	I-132	9.58E-02	1.0000			7.24E+00	1.00E-04	3.36E-04	2.97E-04	3.93E-09		1.49E-55	0.00E+00				
I-133		8.67E-01				7.99E-01	7.00E-06	1.20E-03				1.53E-196	0.00E+00				
	Xe-133m	2.19E+00	0.0290			3.17E-01	NA	0.00E+00	-2.28E-05	2.28E-05		8.40E-82					
	Xe-133	5.25E+00		0.9710	1.0000	1.32E-01	NA	0.00E+00	-2.26E-04	-1.63E-05	2.43E-04	3.16E-36					
I-134		3.65E-02				1.90E+01	4.00E-04	1.02E-05				0.00E+00	0.00E+00				
I-135		2.75E-01				2.52E+00	3.00E-05	2.40E-04				0.00E+00	0.00E+00				
	Xe-135m	1.06E-02	0.1540			6.53E+01	NA	0.00E+00	3.84E-05	-3.84E-05		0.00E+00					
	Xe-135	3.79E-01		0.8460	1.0000	1.83E+00	NA	0.00E+00	-6.39E-04	1.11E-06	6.37E-04	0.00E+00					
Cs-134		7.53E+02				9.21E-04	9.00E-07	5.64E-03				3.38E-03	3.76E+03	64.90	476.1	1.04E-108	0.00E+00
Cs-136		1.31E+01				5.29E-02	6.00E-06	1.68E-03				2.88E-16	0.00E+00				
Cs-137		1.10E+04				6.30E-05	1.00E-06	4.08E-03				3.94E-03	3.94E+03	64.90	476.1	2.36E-10	2.36E-04
	Ba-137m	1.77E-03	0.9460			3.91E+02	NA	3.84E-03	3.86E-03	-1.97E-05		3.73E-03					
Ba-140		1.27E+01				5.46E-02	8.00E-06	6.60E-06				4,48E-19	0.00E+00				
	La-140	1.68E+00	1.0000			4.13E-01	9.00E-06	7.44E-06	7.61E-06	-1.66E-07		5.16E-19	0.00E+00				

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Table 2.4-206 Groundwater Concentrations at Point of Groundwater Discharge to The Cove

Source Term Characteristics									Advection and Radioactive Decay					Advection, Decay and Adsorption			
Parent Radio-nuclide	Progeny in Chain	Half-life[a] (days)	Branching Fraction[a] d12	Branching Fraction[a] d13	Branching Fraction[a] d23	Decay Rate[b] (days^{-1})	ECL[c] (μCi/cm^3)	Holdup Tank Conc[d] (μCi/cm^3)	K1	K2	K3	Ground Water Conc[e] (μCi/cm^3)	Ground Water Conc/ ECL	Distribution Coefficient (cm^3/g)	Retardation Factor[f]	Ground Water Conc[g] (μCi/cm^3)	Ground Water Conc/ ECL
Ce-141		3.25E+01				2.13E-02	3.00E-05	3.00E-06				2.14E-11	0.00E+00				
Ce-143		1.38E+00				5.04E-01	2.00E-05	1.92E-07				4.52E-129	0.00E+00				
	Pr-143	1.36E+01	1.0000			5.11E-02	2.00E-05	1.68E-06	-2.17E-08	1.70E-06		7.90E-19	0.00E+00				
Ce-144		2.84E+02				2.44E-03	3.00E-06	1.68E-06				4.33E-07	1.44E-01	329.10	2410.0	0.00E+00	0.00E+00
	Pr-144m	5.00E-03	0.0178			1.39E+02	NA	0.00E+00	2.99E-08	-2.99E-08		7.71E-09		329.10	2410.0	0.00E+00	
	Pr-144	1.20E-02		0.9822	0.9990	5.78E+01	6.00E-04	1.68E-06	1.68E-06	2.13E-08	-2.14E-08	4.33E-07	7.22E-04	329.10	2410.0	0.00E+00	0.00E+00
Np-239		2.36E+00				2.94E-01	2.00E-05	7.90E-05				1.08E-75	0.00E+00				
	Pu-239	8.79E+06	1.0000			7.89E-08	2.00E-08	0.00E+00	-2.12E-11	-2.12E-11		-2.12E-11	1.06E-03				

a. Obtained from ICRP Publication 38 (Reference 2.4-211).
b. Calculated using Equation 2.4.13-4.
c. Obtained from 10 CFR 20, Appendix B, Table 2, Column 2.
d. Source term developed as described in Section 11.2.3.2.
e. Calculated using Equations 2.4.13-8, 2.4.13-13, or 2.4.13-18 depending on position in decay chain and assuming no retardation.
f. Calculated using Equation 2.4.13-2.
g. Calculated using Equations 2.4.13-8, 2.4.13-13, or 2.4.13-18 depending on position in decay chain.
NA - ECL is not available

Table 2.4-206a Groundwater Concentrations From a Waste Holdup Tank at Point of Groundwater Discharge to The Cove

Source Term Characteristics									Advection and Radioactive Decay					Advection, Decay and Adsorption			
			Branching Fraction[a]														
Parent Radio-nuclide	Progeny in Chain	Half-life[a] (days)	d_{12}	d_{13}	d_{23}	Decay Rate[b] (days^{-1})	ECL[c] (µCi/cm^3)	Waste Holdup Tank Conc[d] (µCi/cm^3)	K1	K2	K3	Ground Water Conc[e] (µCi/cm^3)	Ground Water Conc/ ECL	Distribution Coefficient (cm^3/g)	Retardation Factor[f]	Ground Water Conc[g] (µCi/cm^3)	Ground Water Conc/ ECL
H-3		4.51E+03				1.54E-04	1.00E-03	6.00E-01				5.51E-01	5.51E+02	0.00	1.0	5.51E-01	5.51E+02
Cr-51		2.77E+01				2.50E-02	5.00E-04	1.60E-04				1.47E-10	0.00E+00				
Mn-54		3.13E+02				2.21E-03	3.00E-05	3.00E-05				8.77E-06	2.92E-01	4.50	33.9	2.20E-23	0.00E+00
Fe-55		9.86E+02				7.03E-04	1.00E-04	1.60E-04				1.08E-04	1.08E+00	4504.00	32970.3	0.00E+00	0.00E+00
Fe-59		4.45E+01				1.56E-02	1.00E-05	8.90E-05				1.55E-08	1.55E-03				
Co-58		7.08E+01				9.79E-03	2.00E-05	1.50E-03				6.52E-06	3.26E-01	6.50	48.6	2.65E-118	0.00E+00
Co-60		1.93E+03				3.59E-04	3.00E-06	1.90E-04				1.56E-04	5.19E+01	6.50	48.6	1.17E-08	3.91E-03
Br-83		9.96E-02				6.96E+00	9.00E-04	1.02E-05				0.00E+00	0.00E+00				
	Kr-83m	7.63E-02	0.9998			9.09E+00	NA	0.00E+00	4.35E-05	-4.35E-05		0.00E+00					
Br-84		2.21E-02				3.14E+01	4.00E-04	1.36E-06				0.00E+00	0.00E+00				
Rb-86		1.87E+01				3.71E-02	7.00E-06	7.20E-06				7.85E-15	0.00E+00				
Rb-88		1.24E-02				5.61E+01	4.00E-04	7.89E-05				0.00E+00	0.00E+00				
Sr-89		5.05E+01				1.37E-02	8.00E-06	3.12E-05				1.52E-08	1.90E-03				
Sr-90		1.06E+04				6.54E-05	5.00E-07	9.72E-07				9.37E-07	1.87E+00	3.60	27.4	3.60E-07	7.20E-01
	Y-90	2.67E+00	1.0000			2.60E-01	7.00E-06	7.08E-07	9.72E-07	-2.64E-07		9.38E-07	1.34E-01	3.60	27.4	3.60E-07	5.14E-02
Sr-91		3.96E-01				1.75E+00	2.00E-05	4.32E-06				0.00E+00	0.00E+00				
	Y-91m	3.45E-02	0.5780			2.01E+01	2.00E-03	2.85E-06	2.74E-06	1.15E-07		0.00E+00	0.00E+00				
	Y-91	5.85E+01		0.4220	1.0000	1.18E-02	8.00E-06	6.36E-06	-3.11E-08	-6.77E-11	6.39E-06	8.85E-09	1.11E-03				
Y-93		4.21E-01				1.65E+00	2.00E-05	2.40E-07				0.00E+00	0.00E+00				
Zr-95		6.40E+01				1.08E-02	2.00E-05	5.52E-06				1.35E-08	6.73E-04				
	Nb-95m	3.61E+00	0.0070			1.92E-01	3.00E-05	0.00E+00	4.09E-08	-4.09E-08		9.98E-11	3.33E-06				
	Nb-95	3.52E+01		0.9930	1.0000	1.97E-02	3.00E-05	4.92E-06	1.23E-05	4.68E-09	-7.36E-06	2.98E-08	9.93E-04				
Mo-99		2.75E+00				2.52E-01	2.00E-05	2.88E-03				4.42E-64	0.00E+00				
	Tc-99m	2.51E-01	0.8760			2.76E+00	1.00E-03	2.64E-03	2.78E-03	-1.36E-04		4.26E-64	0.00E+00				
	Tc-99	7.78E+07		0.1240	1.0000	8.91E-09	6.00E-05	2.40E-10	-1.11E-10	4.40E-13	3.50E-10	3.50E-10	5.84E-06				
Ru-103		3.93E+01				1.76E-02	3.00E-05	3.96E-06				2.20E-10	7.33E-06				
	Rh-103m	3.90E-02	0.9970			1.78E+01	6.00E-03	3.96E-06	3.95E-06	7.96E-09		2.19E-10	0.00E+00				

Table 2.4-206a Groundwater Concentrations From a Waste Holdup Tank at Point of Groundwater Discharge to The Cove

Source Term Characteristics									Advection and Radioactive Decay					Advection, Decay and Adsorption			
			Branching Fraction[a]														
Parent Radio-nuclide	Progeny in Chain	Half-life[a] (days)	d_{12}	d_{13}	d_{23}	Decay Rate[b] (days^{-1})	ECL[c] (μCi/cm^3)	Waste Holdup Tank Conc[d] (μCi/cm^3)	K1	K2	K3	Ground Water Conc[e] (μCi/cm^3)	Ground Water Conc/ ECL	Distribution Coefficient (cm^3/g)	Retardation Factor[f]	Ground Water Conc[g] (μCi/cm^3)	Ground Water Conc/ ECL
Ru-106		3.68E+02				1.88E-03	3.00E-06	9.60E-07				3.37E-07	1.12E-01	272.00	1992.0	0.00E+00	0.00E+00
	Rh-106	3.46E-04	1.0000			2.00E+03	NA	0.00E+00	9.60E-07	-9.60E-07		3.37E-07					
Te-125m		5.80E+01				1.20E-02	2.00E-05	2.64E-06				3.45E-09	1.73E-04				
Te-127m		1.09E+02				6.36E-03	9.00E-06	2.64E-05				7.71E-07	8.57E-02	0.61	5.5	1.09E-13	0.00E+00
	Te-127	3.90E-01	0.9760			1.78E+00	1.00E-04	3.12E-05	2.59E-05	5.34E-06		7.56E-07	7.56E-03	0.61	5.5	1.06E-13	0.00E+00
Te-129m		3.36E+01				2.06E-02	7.00E-06	2.20E-04				1.26E-09	1.81E-04				
	Te-129	4.83E-02	0.6500			1.44E+01	4.00E-04	7.92E-05	7.81E-05	1.09E-06		8.23E-10	2.06E-06				
I-129		5.73E+09				1.21E-10	2.00E-07	8.64E-14				8.64E-14	0.00E+00				
I-130		5.15E-01				1.35E+00	2.00E-05	1.70E-05				0.00E+00	0.00E+00				
Te-131m		1.25E+00				5.55E-01	8.00E-06	4.32E-05				6.99E-139	0.00E+00				
	Te-131	1.74E-02	0.2220			3.98E+01	8.00E-05	8.16E-06	9.73E-06	-1.57E-06		1.57E-139	0.00E+00				
	I-131	8.04E+00		0.7780	1.0000	8.62E-02	1.00E-06	1.68E-02	-7.98E-06	3.40E-09	1.68E-02	2.66E-23	0.00E+00				
Te-132		3.26E+00				2.13E-01	9.00E-06	1.02E-03				5.11E-55	0.00E+00				
	I-132	9.58E-02	1.0000			7.24E+00	1.00E-04	1.20E-03	1.50E-03	1.49E-04		5.26E-55	0.00E+00				
I-133		8.67E-01				7.99E-01	7.00E-06	4.80E-03				6.13E-196	0.00E+00				
	Xe-133m	2.19E+00	0.0290			3.17E-01	NA	0.00E+00	-9.14E-05	9.14E-05		3.36E-81					
	Xe-133	5.25E+00		0.9710	1.0000	1.32E-01	NA	0.00E+00	-9.05E-04	-6.54E-05	9.70E-04	1.26E-35					
I-134		3.65E-02				1.90E+01	4.00E-04	3.97E-05				0.00E+00	0.00E+00				
I-135		2.75E-01				2.52E+00	3.00E-05	9.37E-04				0.00E+00	0.00E+00				
	Xe-135m	1.06E-02	0.1540			6.53E+01	NA	0.00E+00	1.50E-04	-1.50E-04		0.00E+00					
	Xe-135	3.79E-01		0.8460	1.0000	1.83E+00	NA	0.00E+00	-2.49E-03	4.33E-06	2.49E-03	0.00E+00					
Cs-134		7.53E+02				9.21E-04	9.00E-07	2.75E-03				1.65E-03	1.83E+03	64.90	476.1	5.08E-109	0.00E+00
Cs-136		1.31E+01				5.29E-02	6.00E-06	1.01E-03				1.73E-16	0.00E+00				
Cs-137		1.10E+04				6.30E-05	1.00E-06	1.96E-03				1.89E-03	1.89E+03	64.90	476.1	1.13E-10	1.13E-04
	Ba-137m	1.77E-03	0.9460			3.91E+02	NA	1.68E-03	1.85E-03	-1.74E-04		1.79E-03					
Ba-140		1.27E+01				5.46E-02	8.00E-06	1.56E-05				1.06E-18	0.00E+00				
	La-140	1.68E+00	1.0000			4.13E-01	9.00E-06	1.68E-05	1.80E-05	-1.18E-06		1.22E-18	0.00E+00				

Table 2.4-206a Groundwater Concentrations From a Waste Holdup Tank at Point of Groundwater Discharge to The Cove

Source Term Characteristics									Advection and Radioactive Decay					Advection, Decay and Adsorption			
Parent Radio-nuclide	Progeny in Chain	Half-life[a] (days)	Branching Fraction[a] d_{12}	d_{13}	d_{23}	Decay Rate[b] ($days^{-1}$)	ECL[c] ($\mu Ci/cm^3$)	Waste Holdup Tank Conc[d] ($\mu Ci/cm^3$)	K1	K2	K3	Ground Water Conc[e] ($\mu Ci/cm^3$)	Ground Water Conc/ ECL	Distribution Coefficient (cm^3/g)	Retardation Factor[f]	Ground Water Conc[g] ($\mu Ci/cm^3$)	Ground Water Conc/ ECL
Ce-141		3.25E+01				2.13E-02	3.00E-05	6.12E-06				4.37E-11	1.46E-06				
Ce-143		1.38E+00				5.04E-01	2.00E-05	7.44E-07				1.75E-128	0.00E+00				
	Pr-143	1.36E+01	1.0000			5.11E-02	2.00E-05	3.96E-06	-8.40E-08	4.04E-06		1.88E-18	0.00E+00				
Ce-144		2.84E+02				2.44E-03	3.00E-06	3.12E-06				8.04E-07	2.68E-01	329.10	2410.0	0.00E+00	0.00E+00
	Pr-144m	5.00E-03	0.0178			1.39E+02	NA	0.00E+00	5.55E-08	-5.55E-08		1.43E-08		329.10	2410.0	0.00E+00	
	Pr-144	1.20E-02		0.9822	0.9990	5.78E+01	6.00E-04	3.12E-06	3.12E-06	3.96E-08	-3.97E-08	8.04E-07	1.34E-03	329.10	2410.0	0.00E+00	0.00E+00
Np-239		2.36E+00				2.94E-01	2.00E-05	3.00E-04				4.10E-75	0.00E+00				
	Pu-239	8.79E+06	1.0000			7.89E-08	2.00E-08	0.00E+00	-8.05E-11	8.05E-11		8.05E-11	4.03E-03				

Sum = 552

a. Obtained from ICRP Publication 38 (Reference 2.4-211).
b. Calculated using Equation 2.4.13-4.
c. Obtained from 10 CFR 20, Appendix B, Table 2, Column 2.
d. Source term developed as described in Section 11.2.3.2.
e. Calculated using Equations 2.4.13-8, 2.4.13-13, or 2.4.13-18 depending on position in decay chain and assuming no retardation.
f. Calculated using Equation 2.4.13-2.
g. Calculated using Equations 2.4.13-8, 2.4.13-13, or 2.4.13-18 depending on position in decay chain.
NA - ECL is not available

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Table 2.4-207 Site-Specific Kd Values

	K_d (cm^3/g)								
Sample	Mn	Fe	Co	Zn	Sr	Ru	Ag	Cs	Ce
B-949/R3	>8,145	>45,497	>15,765	>5,110	68.5	>1,148	>31,091	>19,504	>10,422
B-951/R5	>12,196	>20,291	>18,778	>4,217	60.2	>1,200	>12,729	6,863	>10,232
B-901/R20	>7,858	>5,146	2,364	>2,411	14.8	>632	>12,792	387	>6,753
B-901/R22	5,499	>14,207	5,459	>4,147	33	>988	>9,903	574	>7,073
B-901/S5	4.5	>13,456	6.5	11.8	3.9	>272	28.6	68	329.1
B-901/S8	>6,525	>5,646	>9,423	>7,190	166.4	>1,448	28.6	181	>9,572
B-904/S10	36.9	>12,489	58.3	136	3.6	>328	73.2	241	4,175
B-913/S9	12,492	>14,397	13,082	>5,901	14.5	>1,429	43.4	796	>10,149
B-913/S10	7,903	>6,505	5,711	>6,702	8.4	>1,080	6	141	>9,182
B-917/S12	8,046	>30,209	5,747	>5,511	7.6	>1,171	25.7	154	>8,831
B-917/S14	>10,470	>16,121	6,559	>4,563	6.6	>936	32.6	118.9	>6,893
B-917/S15	4,692	>4,504	3,991	>2,764	3.8	>524	16.6	64.9	>5,419
B-919/S8	>4,121	>40,524	3,840	>3,426	14.8	>1,007	232	378	>7,750
B-920/S11	>15,785	>19,392	8,768	>7,905	25.5	>1,593	>482	379	>12,056
B-928/S7	3,801	>6,104	3,244	>8,103	7.6	>1,212	>304	104	>11,468
B-929/S12	3,453	>19,967	5,331	>6,270	7.1	>1,264	2.5	104.9	>8,887
B-931/S11	3,988	>28,132	5,151	>6,070	4.7	>1,149	44.4	67.5	>10,519
B-932/S6	9,013	>16,288	6,739	>5,684	11.2	>1,367	>12,665	159	10,449
B-951/S7	>21,374	>25,330	>20,653	>6,991	26.8	>1,665	>12,716	3,406	>12,914
B-951/S9	6,143	>24,220	8,818	>6,162	12.7	>1,472	>8,190	336	>13,194

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Table 2.4-207 Site-Specific Kd Values

	K_d (cm^3/g)								
Sample	Mn	Fe	Co	Zn	Sr	Ru	Ag	Cs	Ce
Min =	4.5	4504	6.5	11.8	3.6	272	2.5	64.9	329.1
10% =	3111.4	5596.0	2133.4	2183.5	3.9	504.4	15.5	68.0	5294.6
25% =	4087.8	10993.0	3953.3	3966.8	7.0	975.0	28.6	115.4	7028.0
50% =	7191.5	16204.5	5729.0	5597.5	12.0	1160.0	152.6	211.0	9377.0
Max =	21374	45497	20653	8103	166.4	1665	31091	19504	13194
Mean =	7577.3	18421.3	7474.4	4963.7	25.1	1094.3	5070.3	1701.4	8813.4

Table 2.4-208 [Deleted]

Table 2.4-209 [Deleted]

Table 2.4-210 [Deleted]

Table 2.4-211 [Deleted]

Table 2.4-212 [Deleted]

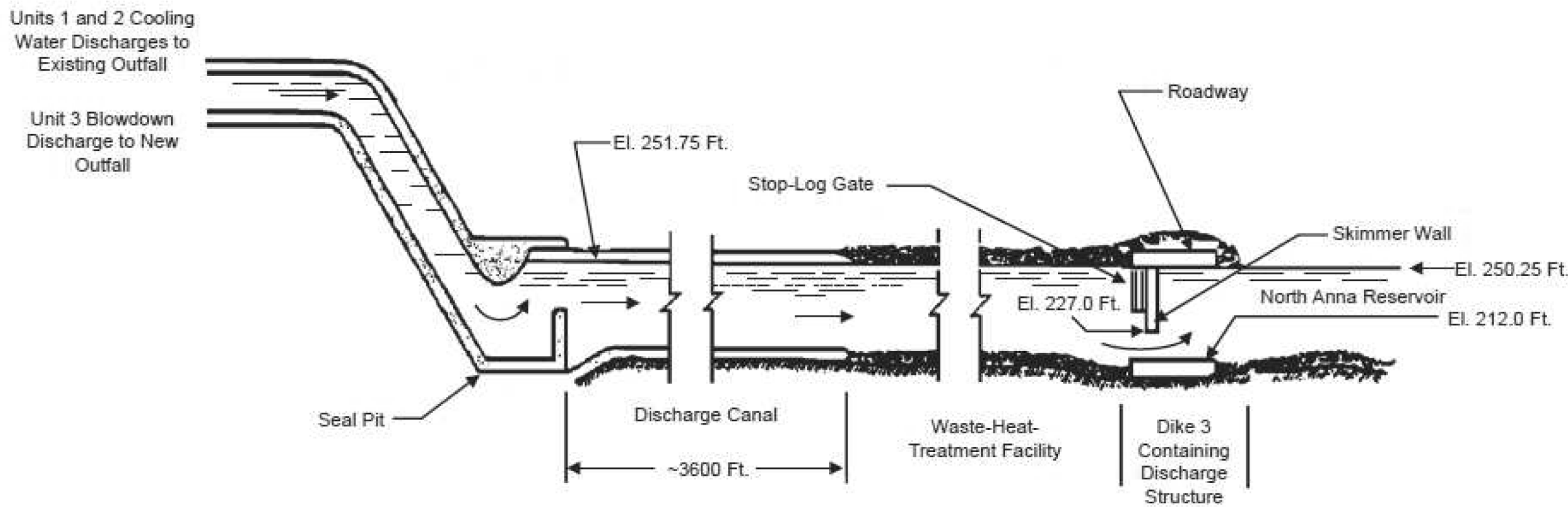
NAPS COL 2.4(1)

Table 2.4-213 Lake Anna Storage Data for Water Balance Model

Elevation (ft NGVD29*)	Storage (acre-feet) North Anna Reservoir	WHTF	Total Lake Anna
240	161,900	33,300	195,200
250	244,300	60,800	305,100
260	352,750	105,300	458,050

* The conversion from NGVD29 datum elevations to NAVD88 datum elevations is –0.86 ft

 Figure 2.4-14R Schematic Cross-Sectional Diagram of Water Discharge System at Dike 3 WHTF



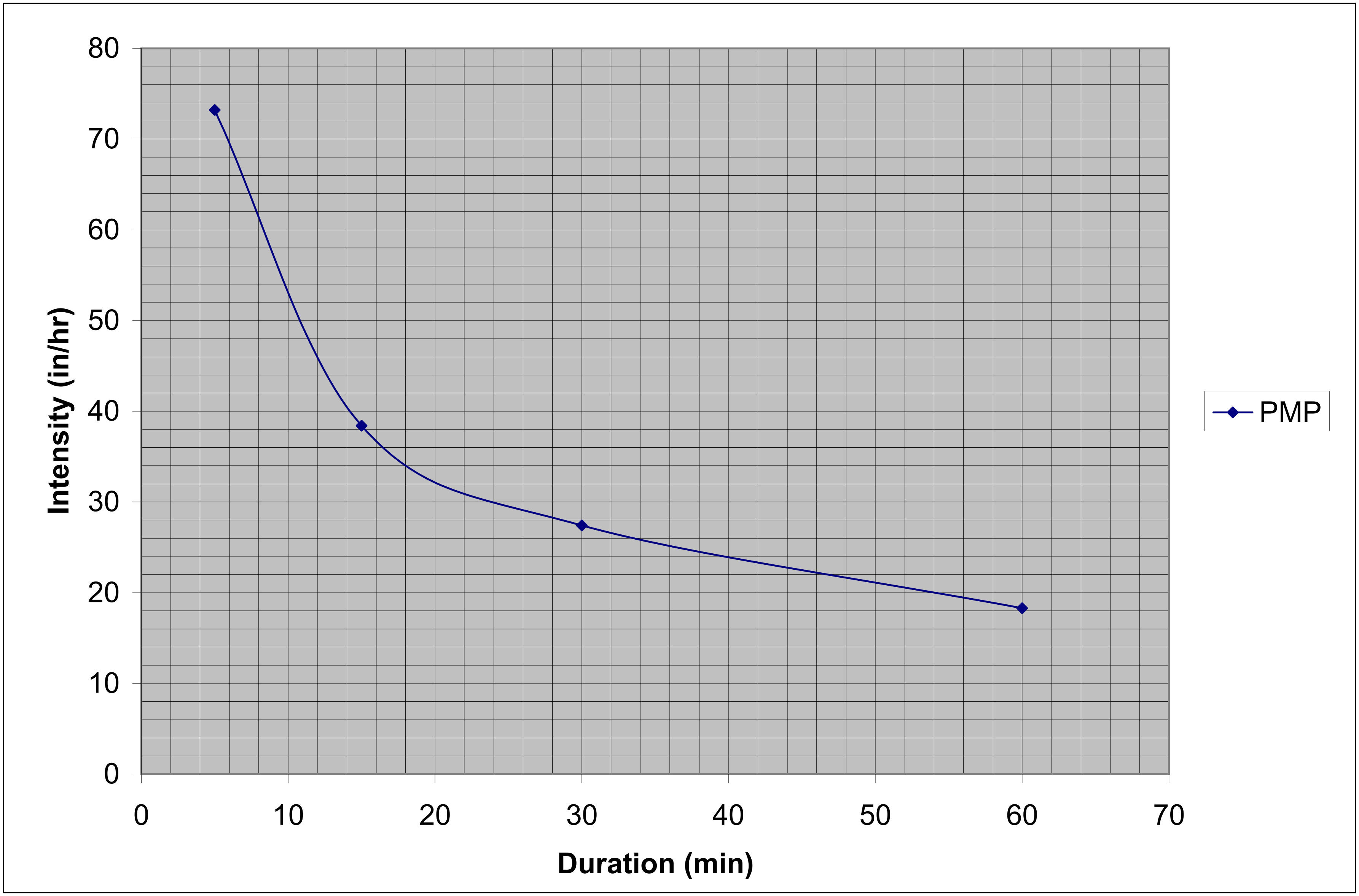
Note: Elevations are in NGVD29, subtract 0.86 ft to convert to NAVD88

NAPS COL 2.4(1)

Figure 2.4-201 Site Layout and Sub-Basin Drainage Areas

NAPS COL 2.4(1)

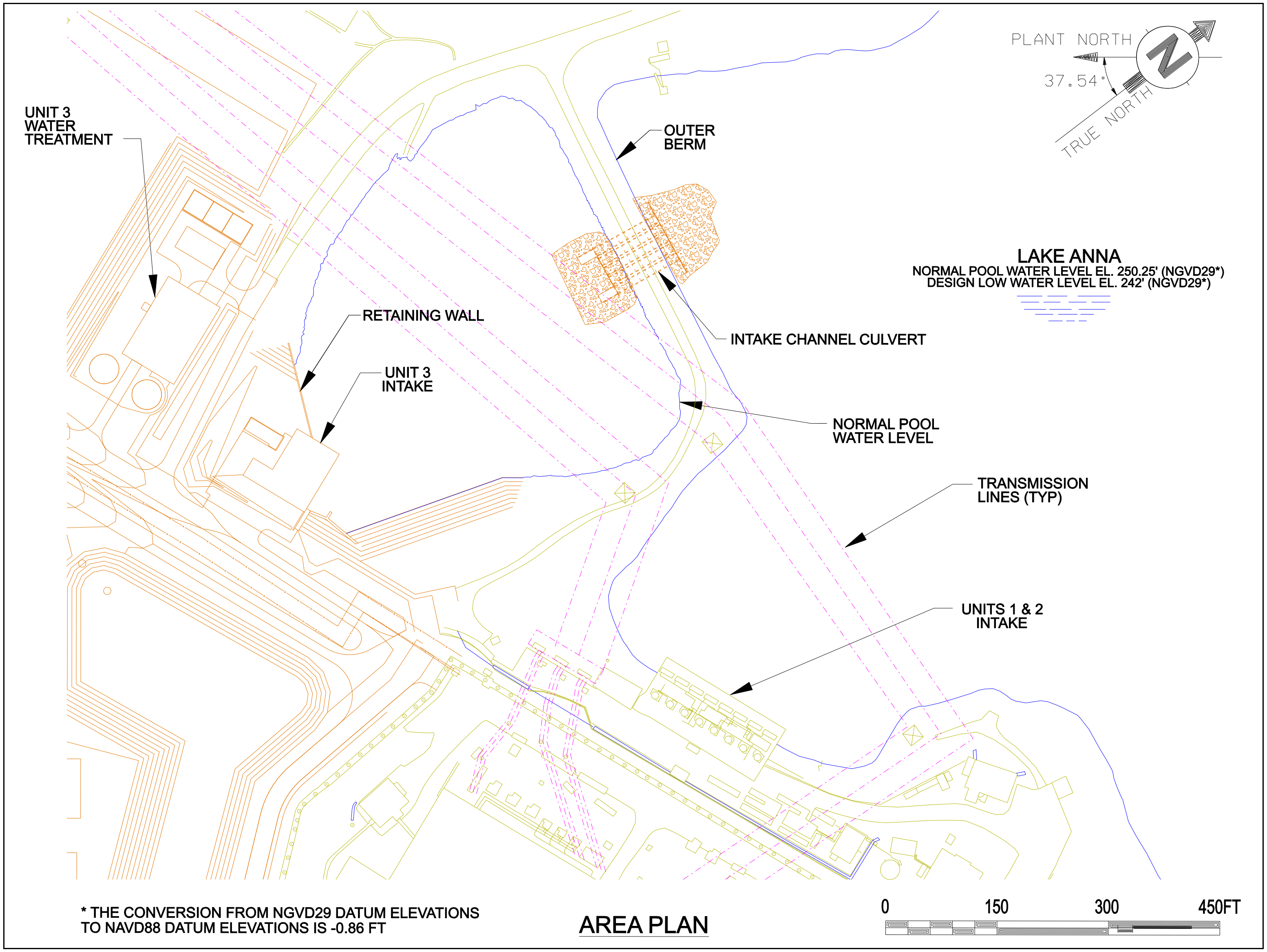
Figure 2.4-202 Unit 3 Site PMP Duration- Intensity Curve



NAPS COL 2.4(1)

Figure 2.4-203 Cross-Section Locations

NAPS ESP COL 2.4-9 Figure 2.4-204 Unit 3 Station Water Intake/Fire Pump House Location



NAPS COL 2.4(1) **Figure 2.4-205 Groundwater Level Hydrographs**

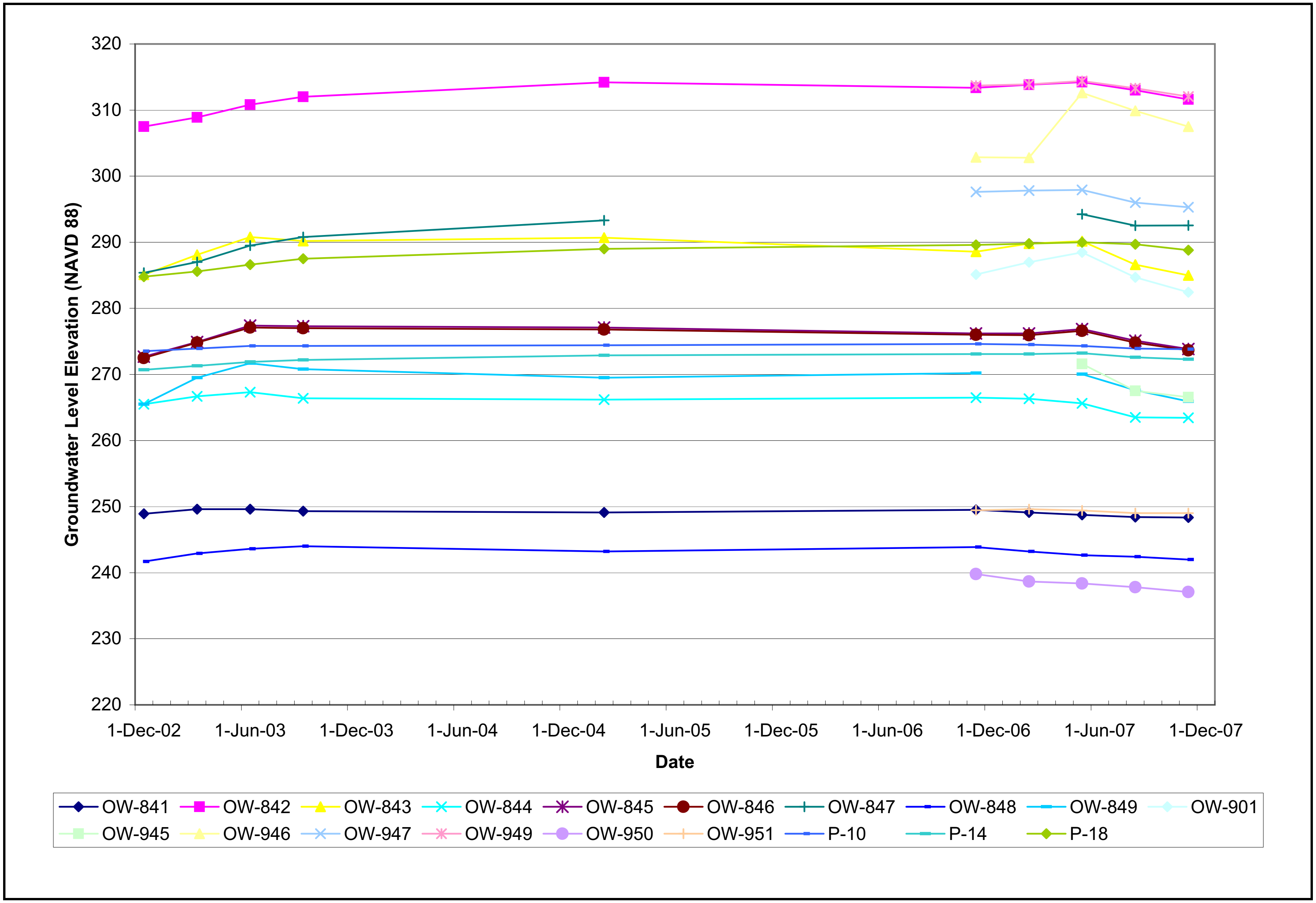
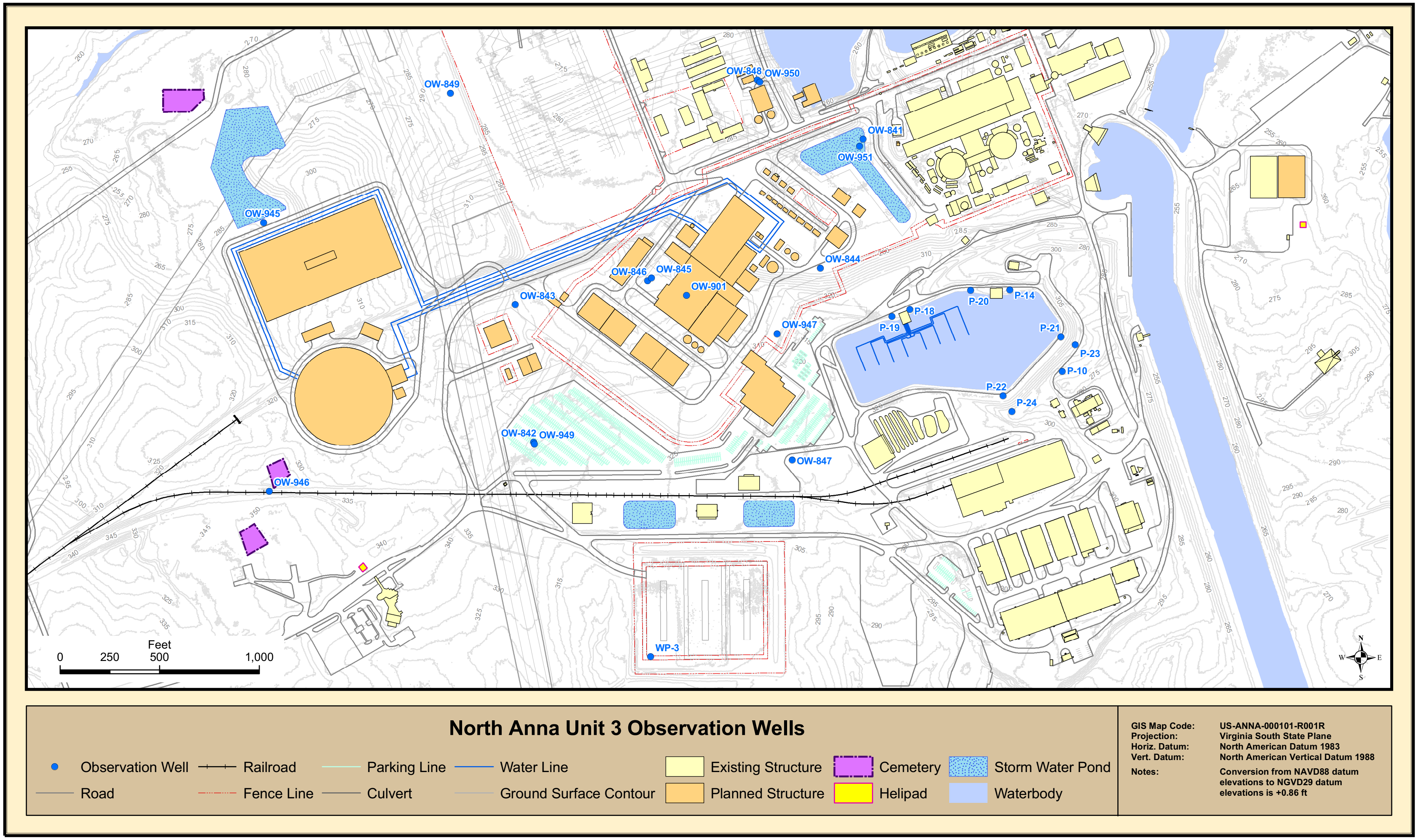
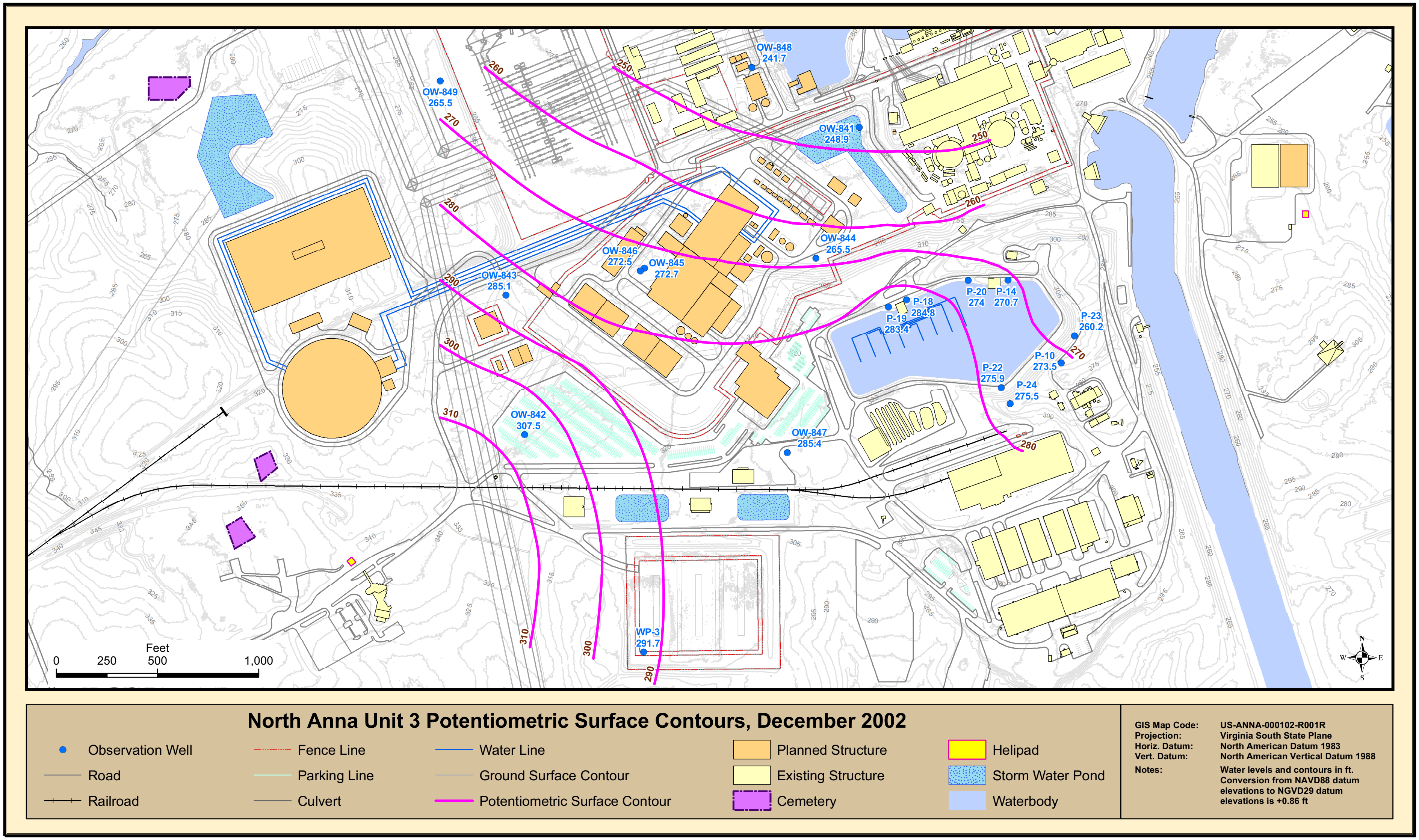


Figure 2.4-206 Observation Well Location Plan



NAPS COL 2.4(1)

Figure 2.4-207 Piezometric Head Contour Map: December 2002



NAPS COL 2.4(1)

Figure 2.4-208 Piezometric Head Contour Map: March 2003

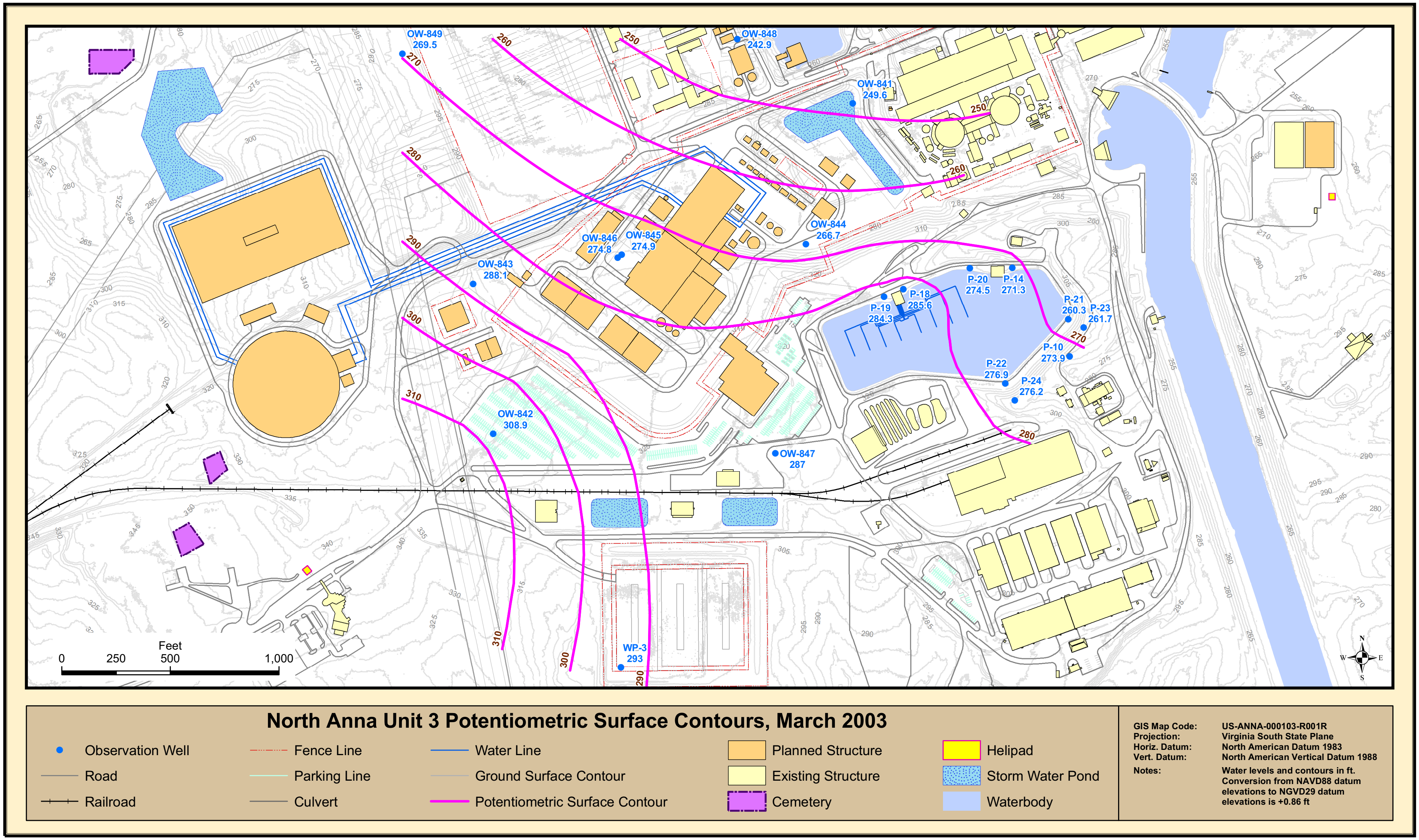
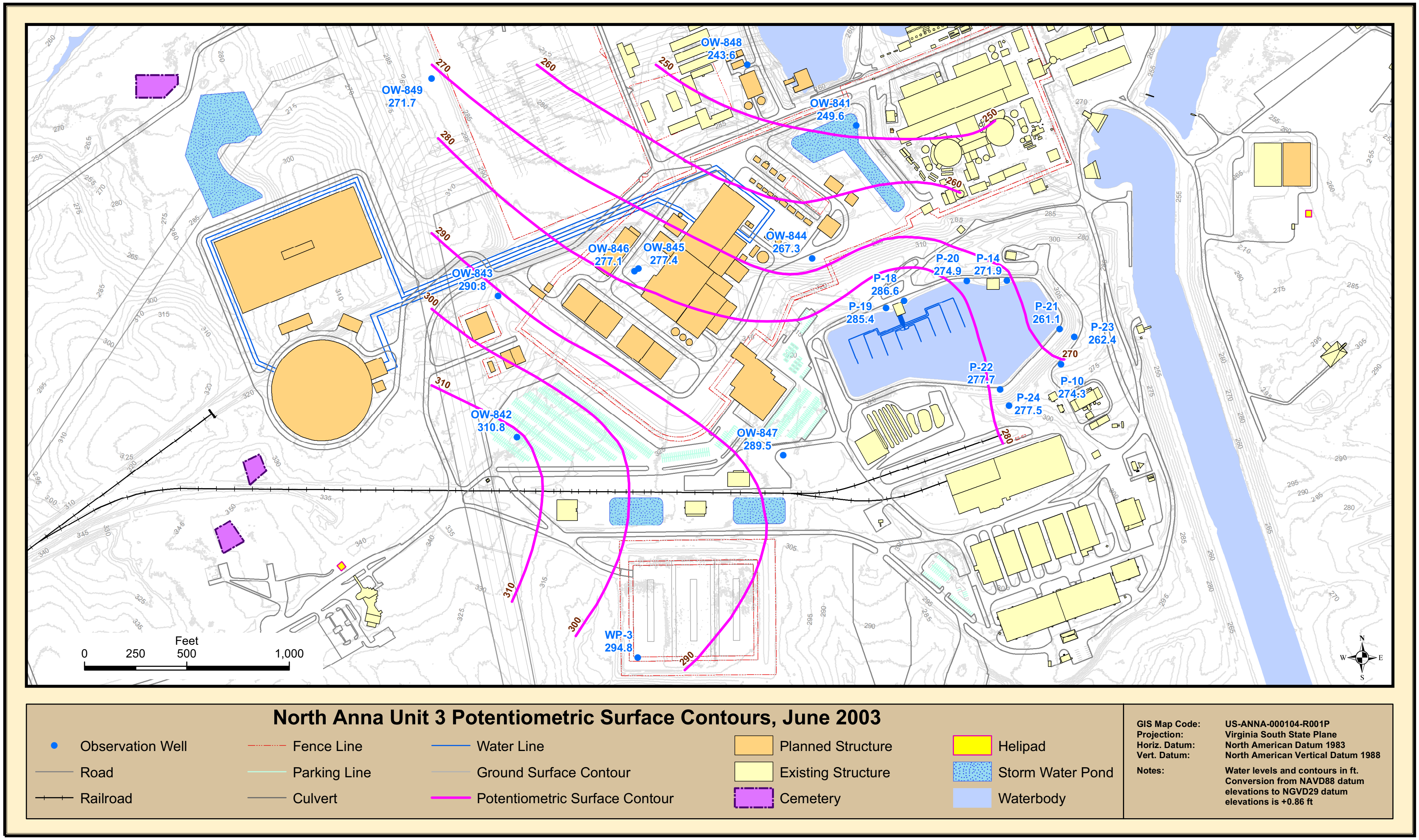
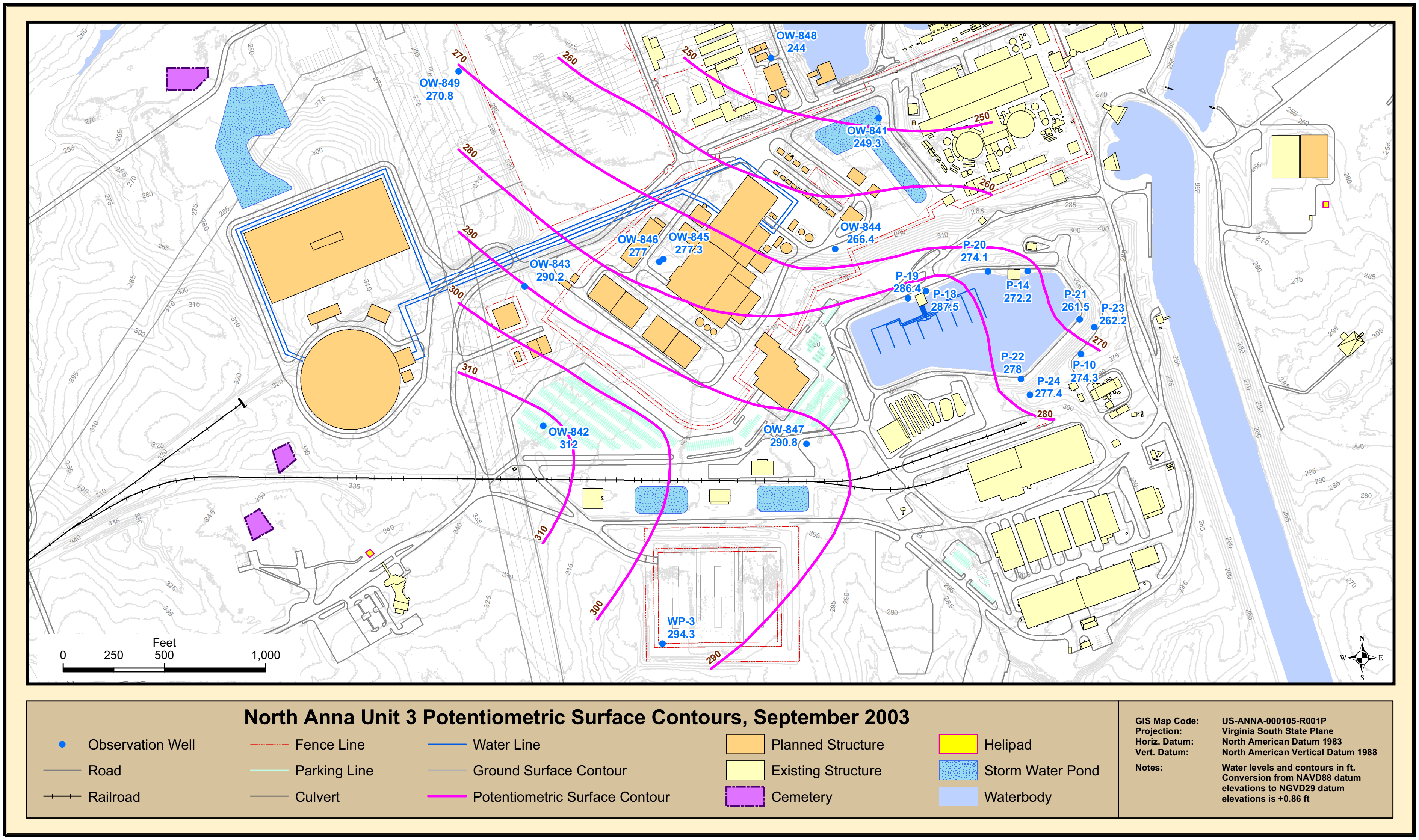


Figure 2.4-209 Piezometric Head Contour Map: June 2003

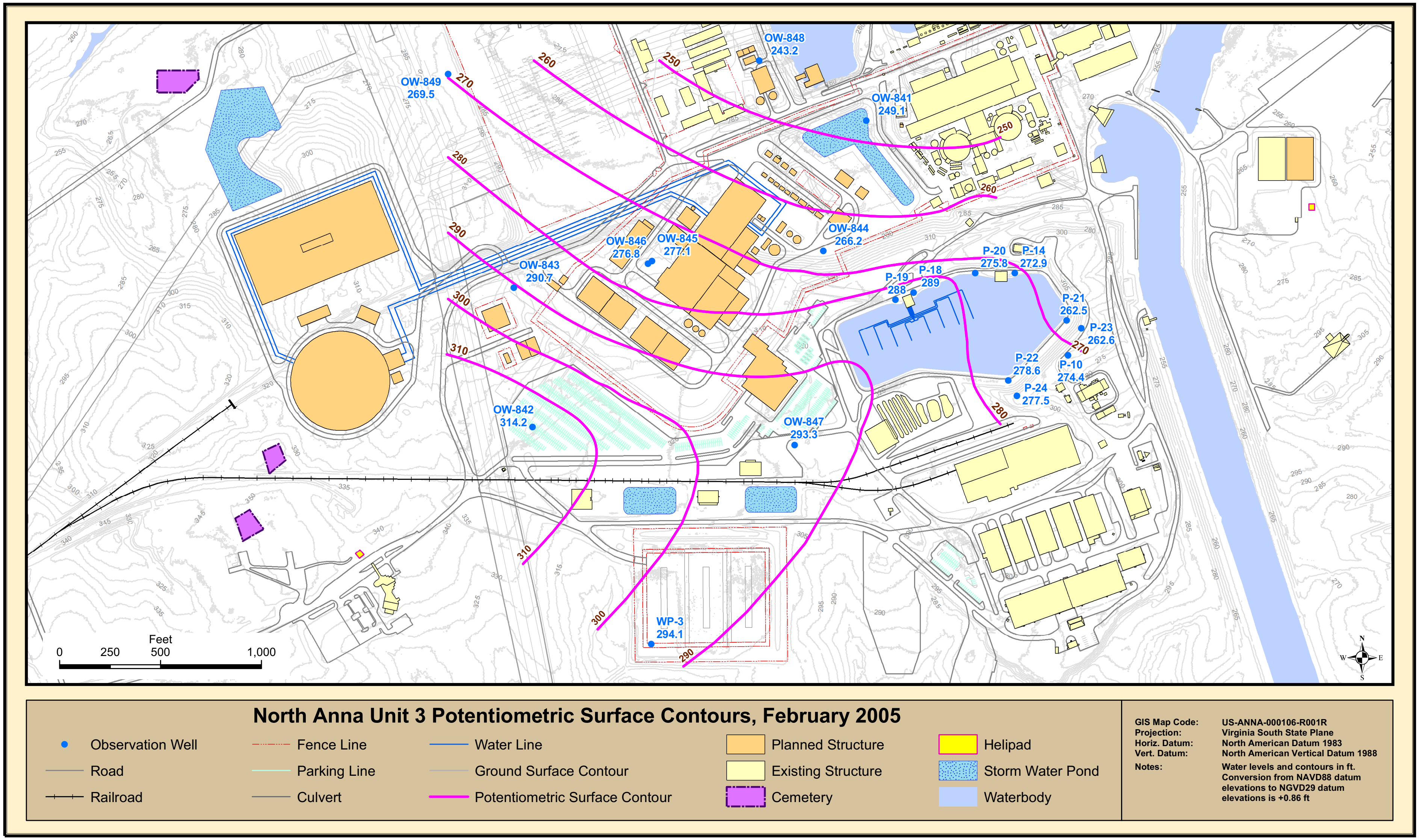


NAPS COL 2.4(1)

Figure 2.4-210 Piezometric Head Contour Map: September 2003



NAPS COL 2.4(1) **Figure 2.4-211 Piezometric Head Contour Map: February 2005**



NAPS COL 2.4(1)

Figure 2.4-212 Piezometric Head Contour Map: November 2006

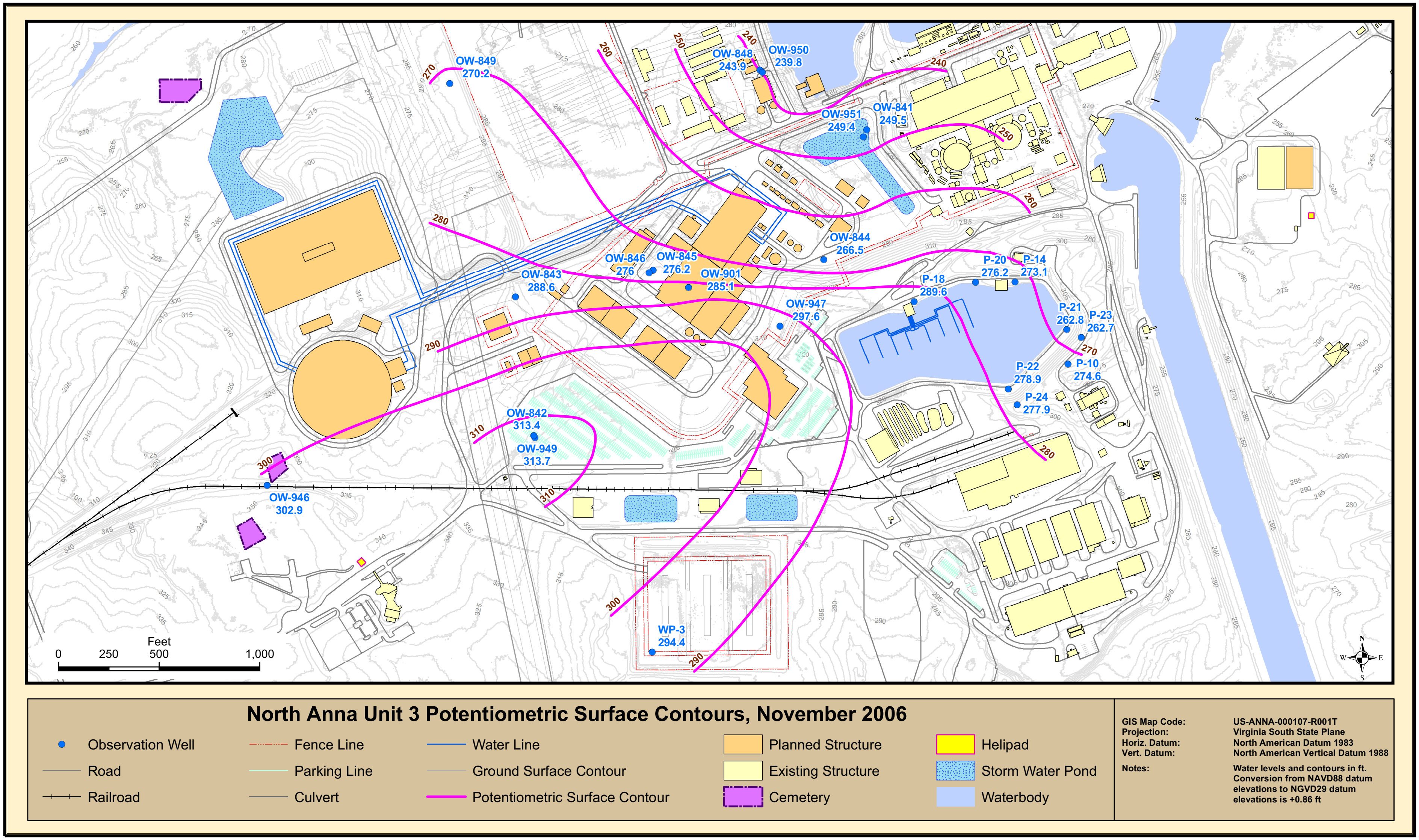
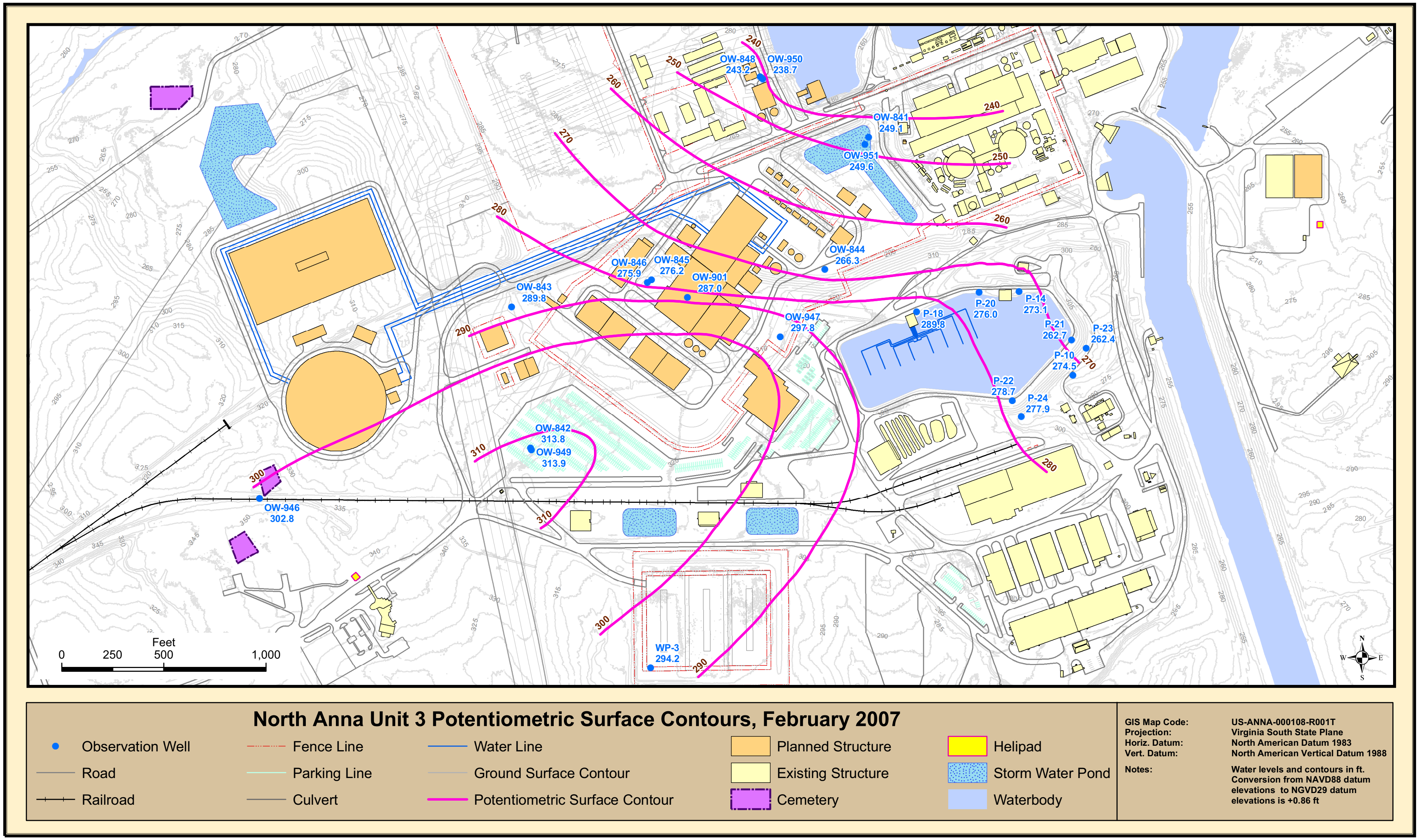
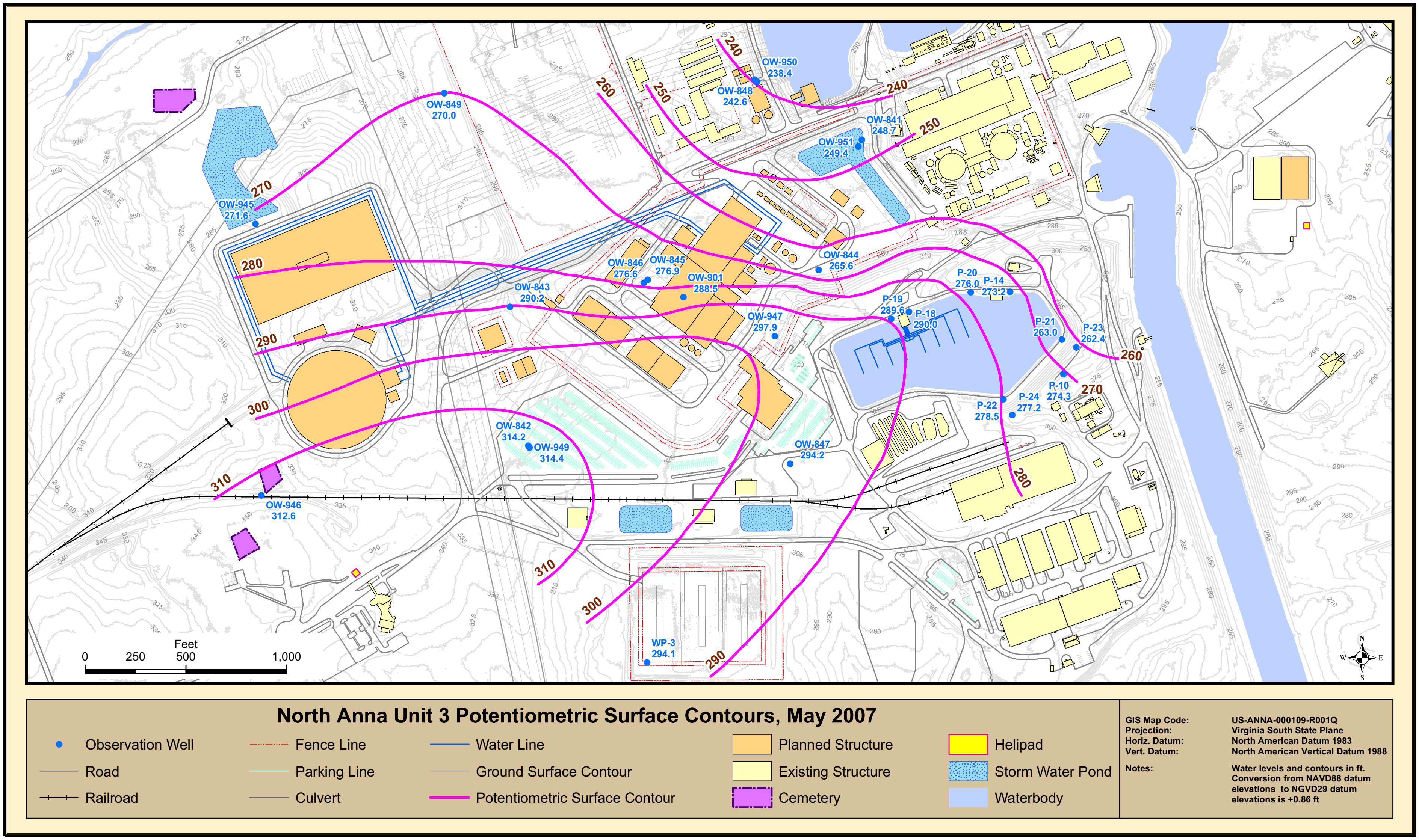


Figure 2.4-213 Piezometric Head Contour Map: February 2007



NAPS COL 2.4(1)

Figure 2.4-214 Piezometric Head Contour Map: May 2007



NAPS COL 2.4(1) **Figure 2.4-214a Piezometric Head Contour Map: August 2007**

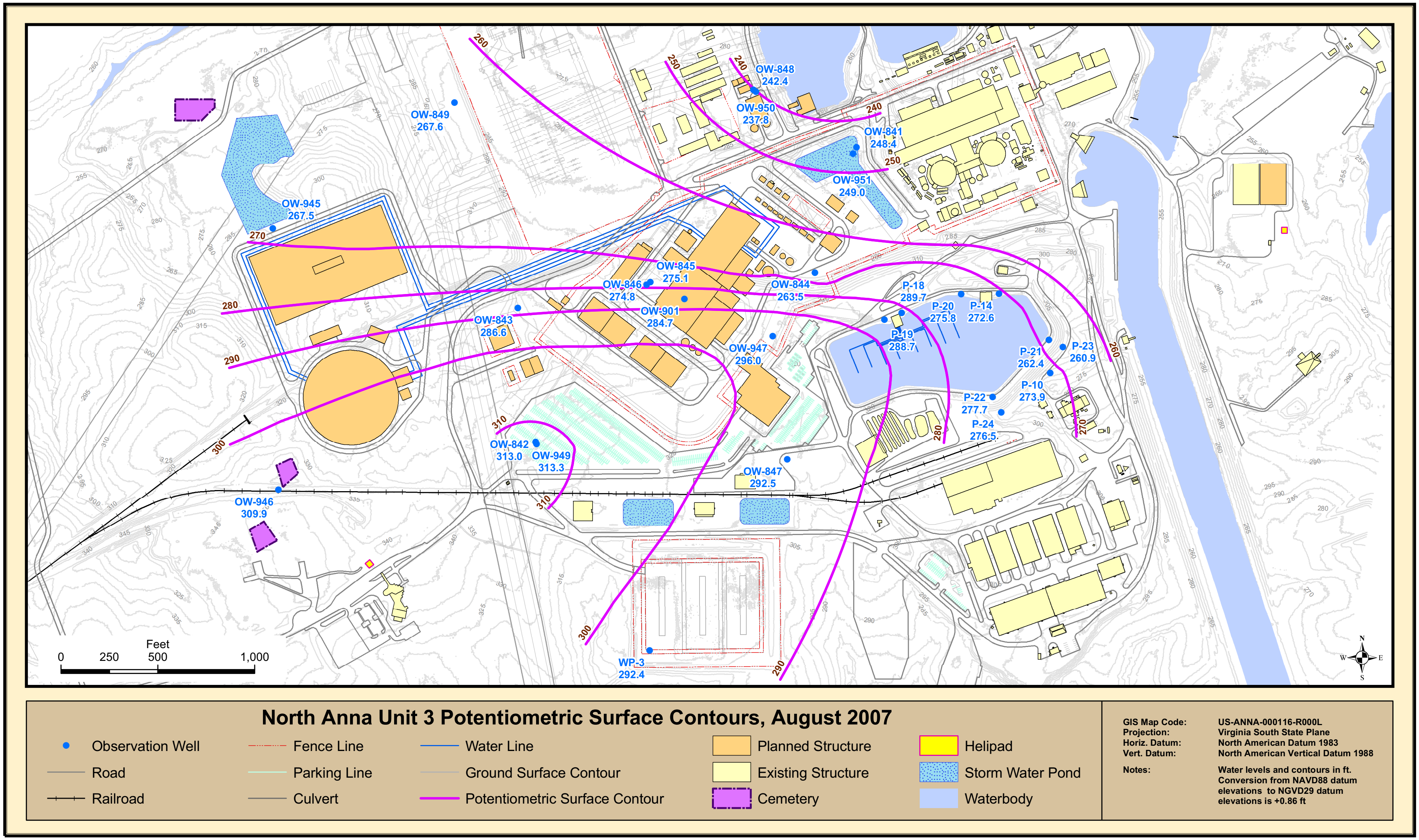
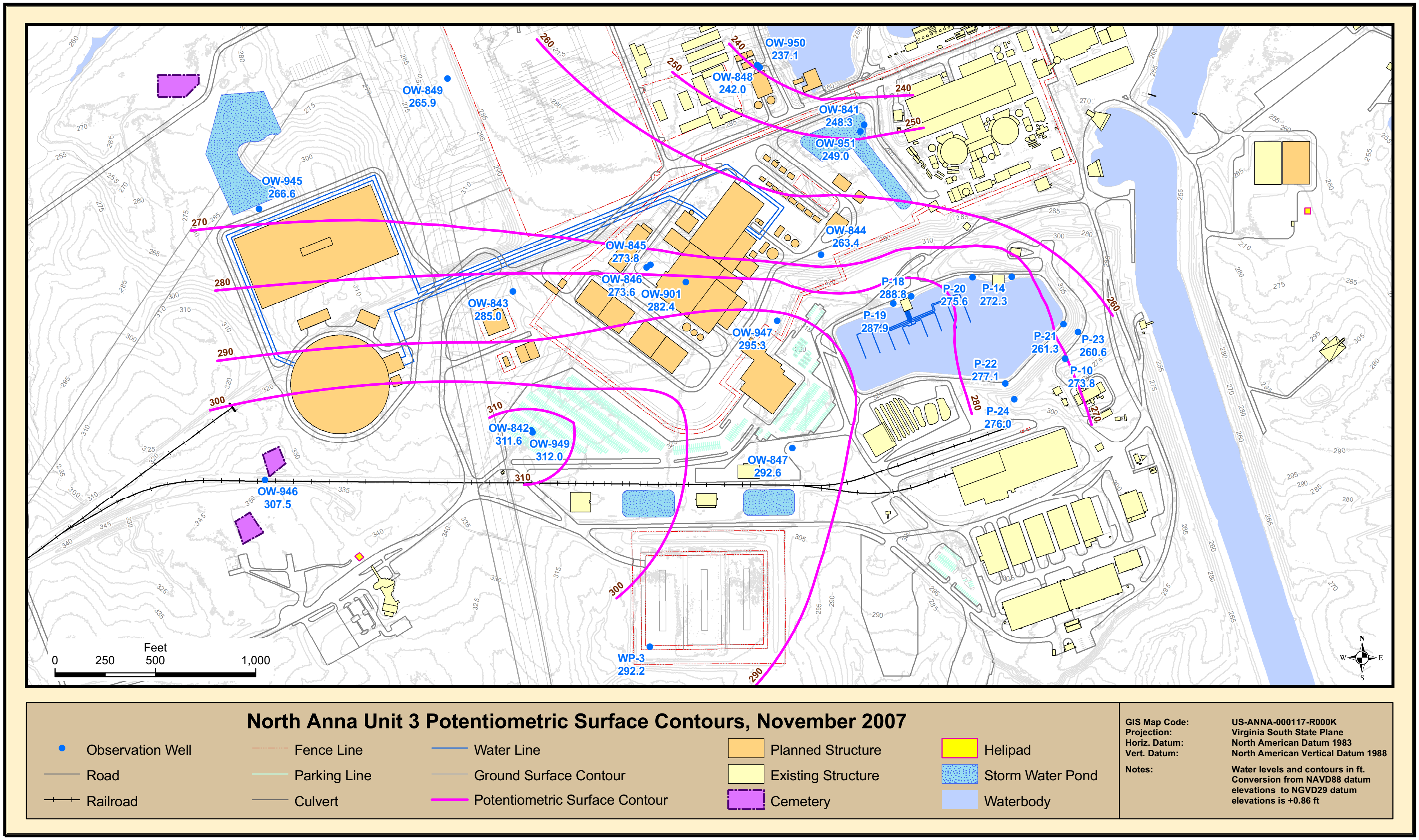
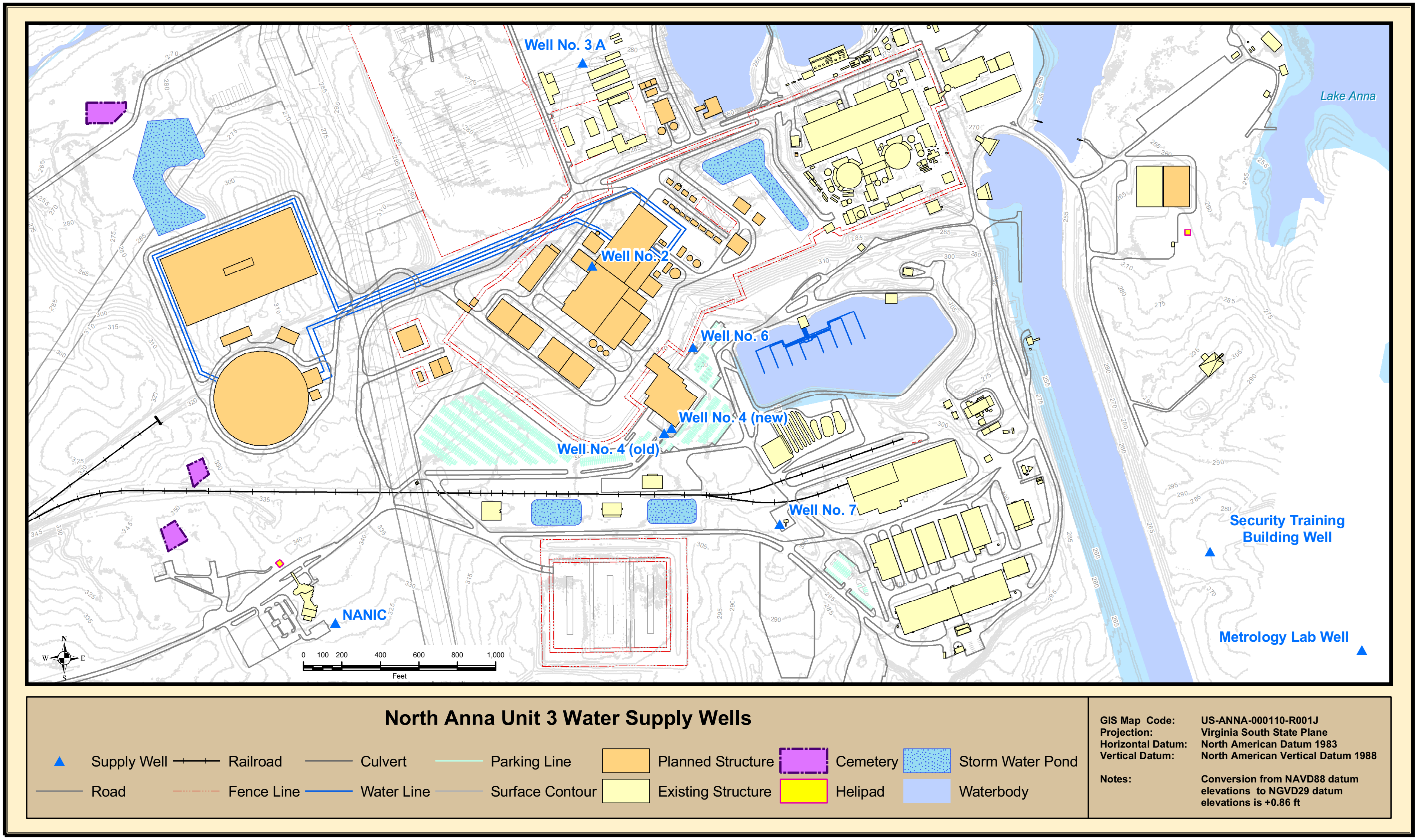


Figure 2.4-214b Piezometric Head Contour Map: November 2007



NAPS COL 2.4(1) **Figure 2.4-215 Water Supply Well location Plan**



NAPS COL 2.4(1)

Figure 2.4-216 Maximum Groundwater Levels in the Power Block Area (contours in ft NAVD88)

NAPS COL 2.4(1)

Figure 2.4-217 Model for Evaluating Radionuclide Transport in Groundwater

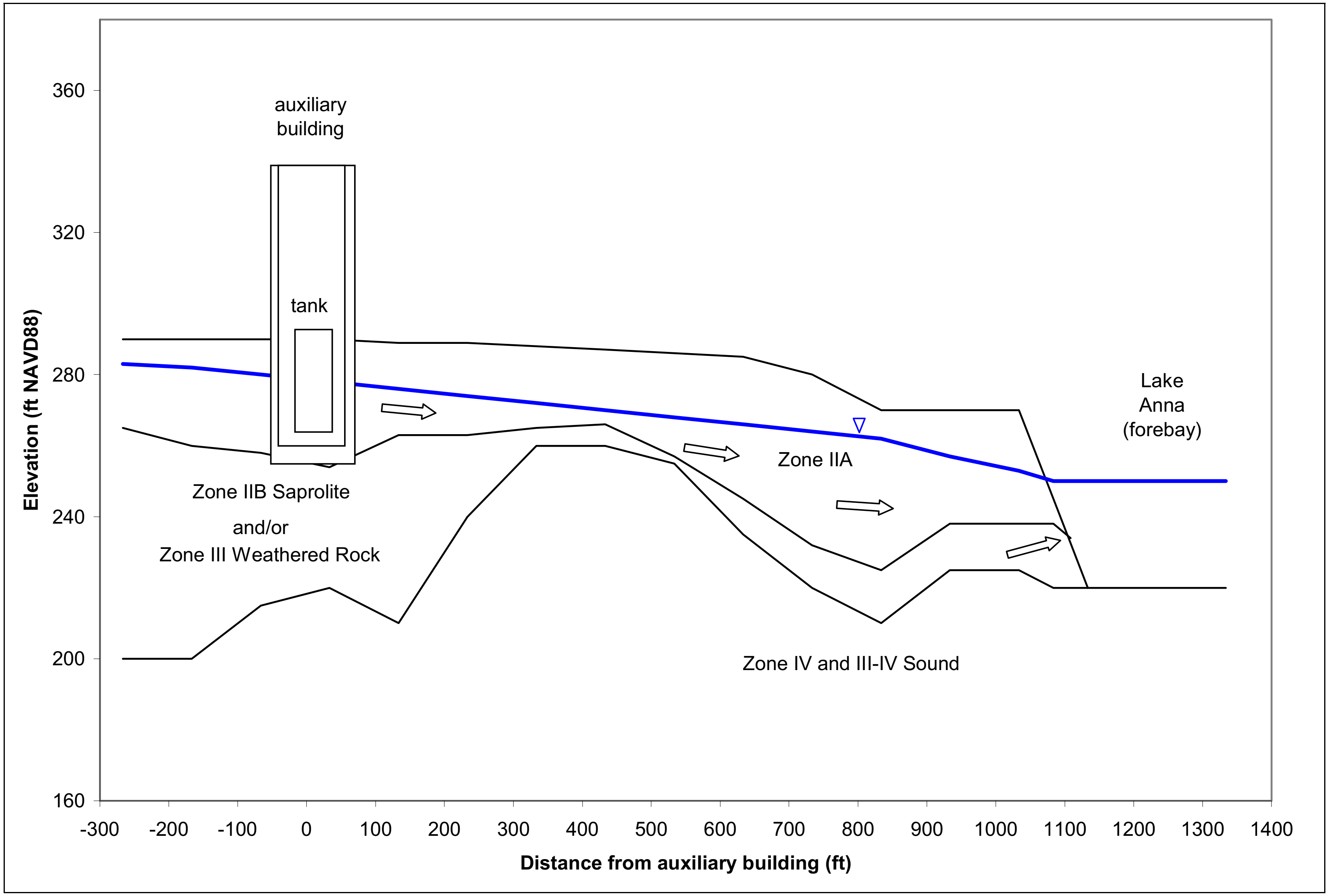


Figure 2.4-218 [Deleted]

NAPS COL 2.4(1) **Figure 2.4-219 Plan View of Subsurface Pathway for Accidental Release**

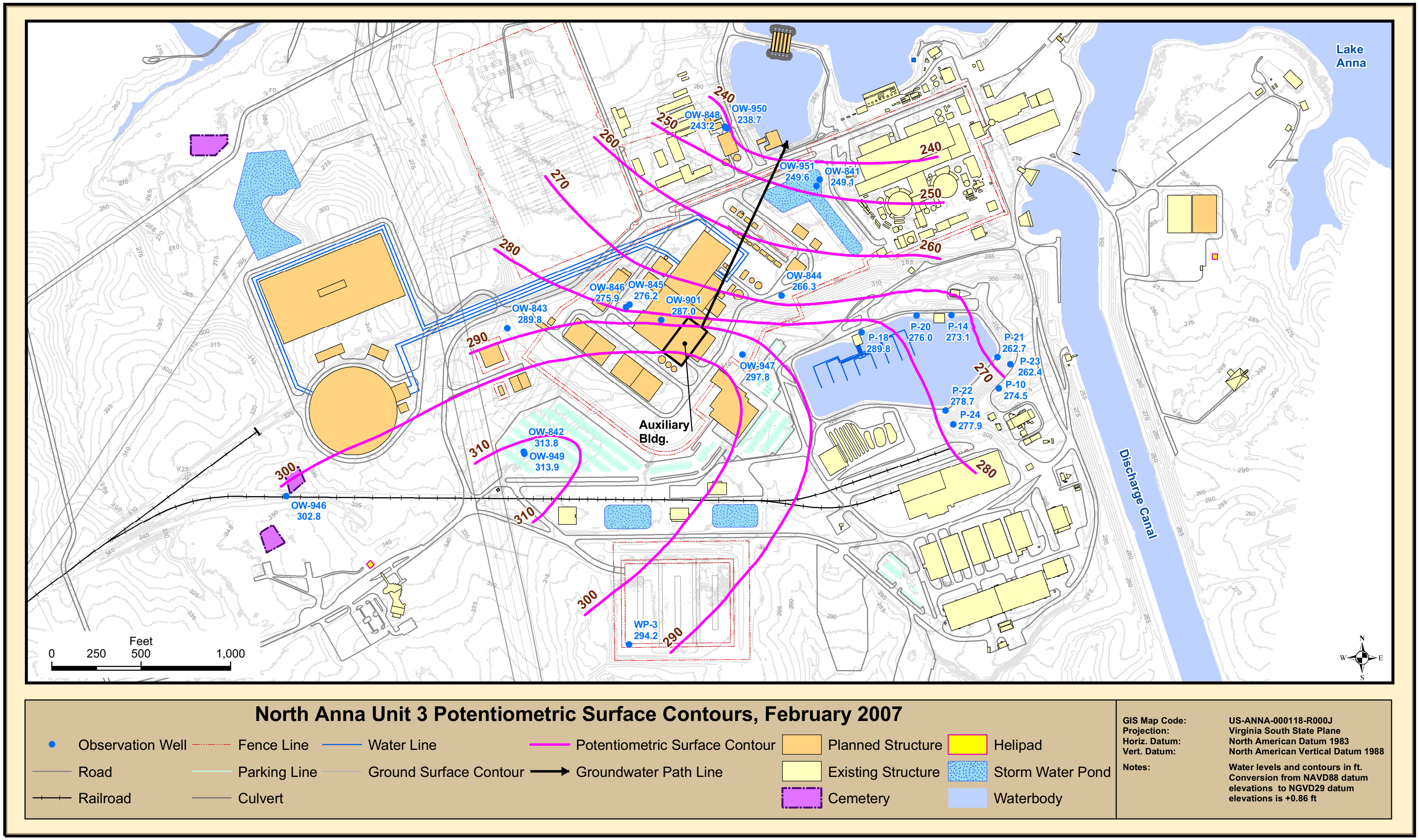


Figure 2.4-220 Particle Tracks from Auxiliary Building

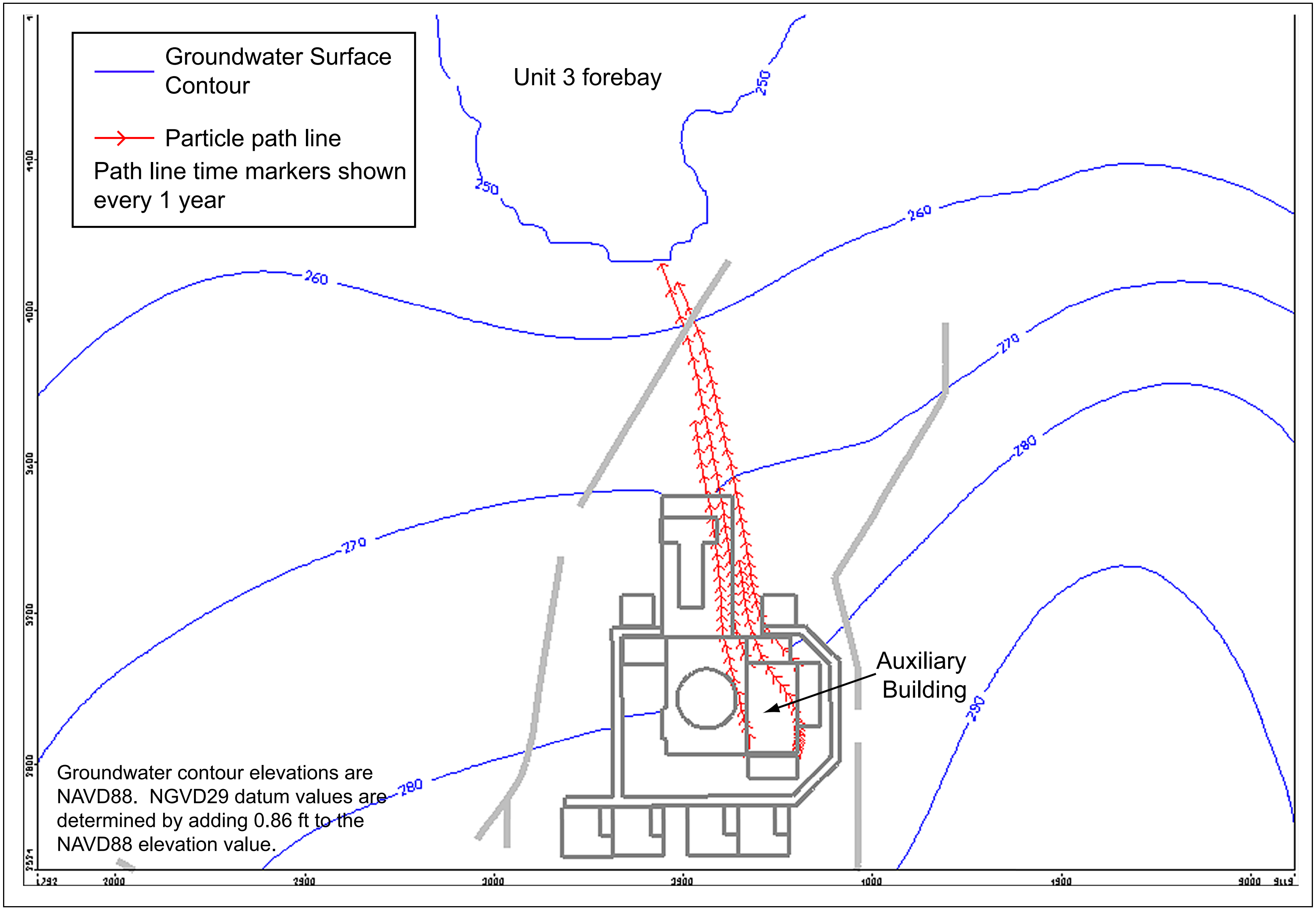
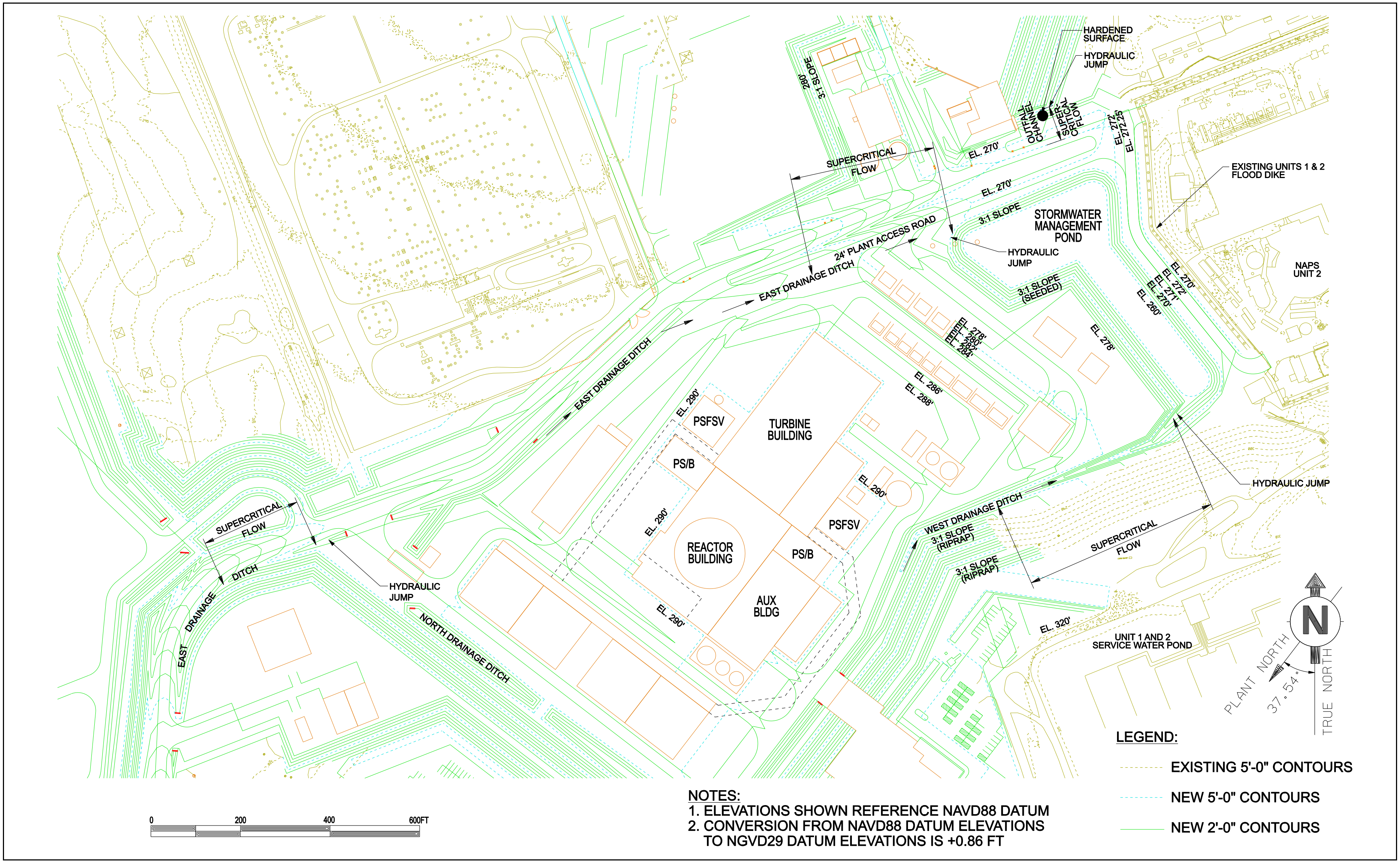


Figure 2.4-221 Supercritical Flow Regime & Hydraulic Jump Locations



2.5 Geology, Seismology, and Geotechnical Engineering

2.5.1 Basic Geologic and Seismic Information

NAPS COL 2.5(1)

Replace the content of DCD Subsection 2.5.1 with the following.

The information needed to address DCD COL Item 2.5(1) is included in SSAR Section 2.5.1, which is incorporated by reference with the following supplements.

2.5.1.2.3 Site Area Stratigraphy

The third paragraph of this SSAR section is supplemented as follows with information that addresses the geological and geotechnical data collected from the additional Unit 3 borings.

Seven borings were completed to depths ranging between 15 and 52 m (50 and 170 ft) during the ESP investigation (SSAR Appendix 2.5.4B). To supplement the existing geological and geotechnical data, 93 borings, 23 CPTs, 6 test pits, 5 sets of borehole geophysical logging, 5 sets of shear wave suspension logging, and 2 sets of electrical resistivity tests were performed as part of the subsurface investigation program for Unit 3. The boring data and geotechnical testing are discussed in detail in Section 2.5.4. The data developed by the Unit 3 subsurface investigation program are presented in Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC.

b. Ta River Metamorphic Suite (Cambrian and/or Ordovician)

The fourth paragraph of Item b of this SSAR section is supplemented as follows with information that summarizes the Unit 3 subsurface investigation program.

Borings completed during previous subsurface investigations at the NAPS site (SSAR References 7 and 8; and SSAR Appendix 2.5.4B) and borings completed as part of the Unit 3 subsurface investigation encountered rocks of the Ta River Metamorphic Suite at the Unit 3 site (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC).

Paragraphs six through ten of Item b of this SSAR section are supplemented as follows with information describing the results of the subsurface investigation performed for Unit 3.

NAPS ESP COL 2.5-1

Borings completed at the Unit 3 site as part of the Unit 3 subsurface investigation, documented in SSAR Reference 7, SSAR Appendix 2.5.4B, Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC, encountered the top of the moderately to highly weathered rock (Zone III) from about Elevation 206 to 292 ft NAVD88 (206.86 ft to 292.86 ft NGVD29). The maximum thickness of the Zone III rock measured about 23.47 m (77 ft) and is described in the boring logs as a yellowish brown, gray, tan, reddish brown and dark green, very severely to moderately weathered, very closely to closely fractured, very soft to hard, biotite quartz gneiss and quartz biotite gneiss, with traces of clay, iron oxide staining, magnetite, muscovite and feldspar. In the central portion of the power block area, the Zone III rock is typically between elevations of about 260 to 280 ft NAVD88 (260.86 to 280.86 ft NGVD29). To true north and true south, this rock is typically at elevations of less than 240 ft NAVD88 (240.86 ft NGVD29). In three of the borings (M-11, B-917, and B-913) the top of the Zone III rock is at an elevation less than 220 ft NAVD88 (220.86 ft NGVD29). Of the three borings, the lowest recorded top of Zone III rock elevation is in boring B-917 at about 207 ft NAVD88 (207.86 ft NDVD29). The thickness of the saprolite overlying the Zone III rock is typically greatest at these boring locations, and in boring M-11 the combined thickness of Zones IIA and IIB saprolite reaches a maximum thickness of about 114 ft.

The top of the slightly weathered to moderately weathered rock (Zone III-IV) was encountered in the borings at elevations ranging from about 187 to 292 feet NAVD88 (187.86 ft to 292.86 ft NGVD29) and is generally described in the boring logs as a reddish brown to gray, moderately to slightly weathered, very close to moderately fractured, soft to very hard, biotite quartz gneiss and quartz biotite gneiss. The top of the slightly weathered to fresh rock (Zone IV) was encountered in the borings at elevations ranging between about 171 and 278 ft NAVD88 (171.86 ft and 278.86 ft NGVD29) and is generally described in the boring logs as a gray and reddish brown, slightly weathered to fresh, very close to widely fractured, very hard, biotite quartz gneiss and quartz biotite gneiss. In the central portion of the power block area the top of Zone III-IV rock is typically between elevations of about 240 ft to 270 ft NAVD88 (240.86 ft to 270.86 ft NGVD29), with the exception of three borings (B-901, W-1, and B-903) where the top of Zone III-IV rock is at elevations of approximately 229 ft NAVD88 (229.86 ft NGVD29), 211 ft NAVD88 (211.86 ft NGVD29) and 221 ft NAVD88 (221.86 ft NGVD29), respectively. To true north and true south, the top of the Zone III-IV rock is typically at an elevation less than 220 ft NAVD88 (220.86 ft NGVD29) and a number of the borings exhibited an elevation less than 210 ft NAVD88 (210.86 ft NGVD29). The lowest recorded top of Zone III-IV rock elevation is in borings B-917 and W-9 at approximately 187 ft NAVD88 (187.86 ft NGVD29).

The last paragraph of Item b of this SSAR section is supplemented with a new paragraph on Unit 3-specific geologic boring results.

The borings exhibit severely weathered and jointed intervals in the Zone III-IV and Zone IV rock. These intervals were encountered in several of the borings at varying elevations ranging from 150 ft to 285 ft NAVD88 (150.86 to 285.86 ft NGVD29). The intervals ranged in thickness from 0.2 to 20 ft (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC). Characteristically, these intervals comprise poor to very poor quality rock that is highly fractured or jointed. The joints (typically sets of 3 to 10 joints) exhibit clay filling, iron and manganese oxide staining and occasionally quartz and feldspar veins. Occasionally, water loss in the fracture zones is reported to have occurred during drilling. In boring W-1 a micro-shear zone in the Zone III-IV rock was encountered at an elevation of about 210 ft NAVD88 (210.86 ft NGVD29). It is described in the boring log as a possible sheer zone, 0.6 ft thick comprising soft, yellow-brown clay with rock fragments.

Quartz and feldspar veins encountered in the Zones III-IV and IV rock commonly contain traces of mica, garnet, magnetite, calcite, pyrite and occasional chlorite and epidote. These veins range in thickness from less than 0.1 ft to 0.8 ft. The thickest quartz vein at 0.8 ft thick encountered in boring M-1 is at an elevation of approximately 123 ft NAVD88 (123.86 ft NGVD29).

h. Residual Soil and Saprolite (Cenozoic)

Residual Soil

The second paragraph of Item h of this SSAR section is supplemented as follows with information to address residual soil characterization.

Residual soil was not encountered in any of the borings drilled as part of the Unit 3 subsurface investigation (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC).

Saprolite

Paragraph five of Item h of this SSAR section is supplemented as follows with a new paragraph that addresses geologic findings relative to saprolite.

Borings drilled as part of the subsurface investigation for Unit 3 encountered the top of the Zone IIA saprolite at elevations ranging from 232 to 335 ft NAVD88 (232.86 ft to 335.86 ft NGVD29). The thickest Zone IIA saprolite encountered was about 94 ft while the median thickness was about 30 ft. The saprolite is generally described in the boring logs as a yellowish red to yellowish brown to pale brown to greenish brown, medium dense to dense, clayey silt, silty sand and sand with relict rock fabric. The top of the Zone IIB saprolite was encountered at elevations ranging from about 215 to 302 ft NAVD88 (215.86 ft to 302.86 ft NGVD29). The thickest Zone IIB saprolite encountered was about 43 ft while the median thickness was about 8 ft. The saprolite is generally described in the boring logs as a pale brown to reddish and yellowish brown to brownish gray to greenish gray, very dense, fine to coarse grained sand and very severely weathered, soft to moderately hard gneiss with traces of clay, mafic minerals, and iron oxide staining.

k. Artificial Material

The first paragraph of Item k of this SSAR section is supplemented as follows with information to address findings relative to artificial material.

Borings performed as part of the subsurface investigation for Unit 3 encountered fill to depths of between about 0.12 to 5.48 m (0.4 and 18 ft) below the ground surface. The maximum thickness of fill (18 ft) was encountered in boring B-932 and is described in the boring log as a greenish gray and yellowish brown sandy silt and clay with traces of gravel and organic debris. Asphalt and road base, typically less than about one foot thick, was encountered in a number of borings (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC).

The first paragraph of Item k of this SSAR section is supplemented with information on prohibiting the use of Zone IIA soil as structural fill.

NAPS ESP PC 3.E(5)

As described in Section 2.5.4.5.3, Zone IIA soil will not be used as structural fill to support Seismic Category I or II structures.

2.5.1.2.6 Site Engineering Geology Evaluation

a. **Engineering Behavior of Soil and Rock**

Soil

The second paragraph under Soil in Item a of this SSAR section is supplemented as follows with information to address soil behavior.

The saprolite at the Unit 3 site has been categorized into Zone IIA and Zone IIB saprolite, based on its general composition and grain size (Section 2.5.4). Grain size tests on samples of the Zone IIA saprolite show that the median fines content for the saprolite is about 24 percent with the majority of the samples classified as a silty sand (SM). Grain size tests on samples of the Zone IIB saprolite show that the fines content for the saprolite ranges from about 15 to 27 percent. The saprolite is also classified as a silty sand (SM). Zone IIA saprolite is the more weathered of the two saprolites and contains less than 10 percent rock fragments with relict texture. The borings drilled as part of the subsurface investigation for Unit 3, documented in Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC, reveal that SPT N-values ranged from 2 to refusal, with a median value of 15 blows per foot (bpf) for this saprolite. Zone IIB saprolite contains between 10 and 50 percent relict rock fragments, and SPT N-values ranged from 24 to refusal with a median value of 75 bpf. Section 2.5.4 contains a detailed discussion of the geotechnical properties of the saprolite at the Unit 3 site.

Rock

The second paragraph under Rock of Item a of this SSAR section is supplemented as follows with information to address rock behavior.

Based on the results of the borings drilled as part of the subsurface investigation for Unit 3, documented in Appendix 2.5.4AA, rock quality designation (RQD) generally ranges from zero to 50 percent for the Zone III rock with an average RQD value of about 20 percent. An RQD of 20 percent is indicative of very poor quality rock (SSAR Reference 109).

The third paragraph under Rock of Item a of this SSAR section is supplemented as follows with information to address rock behavior.

Based on the results of the borings drilled as part of the subsurface investigation for Unit 3 and documented in Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC, RQD generally ranges from about 50 to 90 percent for the Zone III-IV rock with an average value of about 65 percent, indicative of fair quality rock (SSAR Reference 109). For the Zone IV rock, RQD is generally above 80 percent and mostly above 90 percent. The average RQD value is 95 percent, indicative of excellent quality rock (SSAR Reference 109). The boring results for the previous geotechnical investigations (SSAR References 7 and 8), and for both the ESP subsurface investigation (Reference 2.5-201) and the Unit 3 subsurface investigation (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC) indicate that Zones III, III-IV and IV are suitable bearing surfaces on which to found the Seismic Category I structures. The R/B, the West PS/B and the Fuel Storage Vault will be founded on the Zone III-IV or Zone IV bedrock; where the top of this bedrock is below the foundation level, the overlying materials will be replaced with concrete fill. The remaining safety-related structures will be founded on Zone III rock or on concrete fill above the top of the Zone III rock. The joints and fractures present in both zones are not of sufficient density or areal extent to affect the engineering behavior of the rock with respect to its foundation bearing capacity or integrity.

b. **Zones of Alteration, Weathering and Structural Weakness**

The third paragraph of Item b of this SSAR section is supplemented as follows with information to address zones of alteration, weathering and structural weakness.

Borings completed as part of the ESPA subsurface investigation program (SSAR Appendix 2.5.4B) and the Unit 3 COL subsurface investigation programs (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC) reveal zones of severely weathered and fractured rock in the moderately to slightly weathered (Zone III-IV) and slightly weathered to fresh rock (Zone IV). The zones are at elevations ranging between about 150 ft and 285 ft NAVD88 (150.86 ft and 285.86 ft NGVD29) and range in thickness from 0.2 ft to 20 ft with a median thickness of about 5 ft. RQD values in these zones range from 0 to 40 percent with a median value of about 10 percent. Characteristically, these fracture zones exhibit clay filling, iron and manganese oxide staining and, occasionally, quartz and feldspar veins. Occasionally, water loss in the fracture zones is reported to have occurred during drilling.

The fourth paragraph of Item b of this SSAR section is supplemented as follows with information on excavation and replacement of weathered or fractured rock.

NAPS ESP PC 3.E(4)

Weathered or fractured rock at the foundation level for safety-related structures will be excavated and replaced with lean concrete before initiation of foundation construction. See also Section 2.5.4.10.

f. **Construction Groundwater Control**

The first paragraph of Item f of this SSAR section is supplemented as follows with information to address ground water level.

Groundwater levels at the site are expected to result in the need for temporary dewatering of foundation excavations extending below the water table. Dewatering will be performed in a manner that minimizes drawdown effects on the surrounding environment. Drawdown effects will be limited to the Unit 3 site and no offsite users will be affected.

g. **Unforeseen Geologic Features**

The first paragraph of Item g of this SSAR section is supplemented as follows with information to address geologic mapping of excavations of safety-related structures.

NAPS ESP PC 3.E(6)

Future excavations for safety-related structures will be geologically mapped. Unforeseen geologic features that are encountered will be evaluated. The NRC will be notified no later than 30 days before any excavations for safety-related structures are open for NRC examination and evaluation. See also Section 2.5.4.5.2.

2.5.1.2.7 Site Groundwater Conditions

The second paragraph of this SSAR section is supplemented as follows with information to address site groundwater conditions.

A detailed discussion of Unit 3 site groundwater conditions based on the Unit 3 subsurface investigation is provided in Section 2.4.12.

2.5.2 Vibratory Ground Motion

NAPS COL 2.5(1)
NAPS COL 3.7(6)
NAPS COL 3.7(20)

Replace the content of DCD Section 2.5.2 with the following.

The information needed to address DCD COL Item 2.5(1) is included in SSAR Section 2.5.2, which is incorporated by reference with the following variances and supplements.

NAPS ESP VAR 2.0-4

The second paragraph in this SSAR section is supplemented as follows.

SSAR Sections 2.5.2.1 through 2.5.2.4 document the review and update of the available Electric Power Research Institute (EPRI) seismic source and ground motion models. Section 2.5.2.5 summarizes basic information about the seismic wave transmission characteristics of the Unit 3 site with reference to more detailed discussion of the engineering aspects of the shallow subsurface in Section 2.5.4, and also indicates the depth at which the GMRS are defined for Unit 3. The engineering properties of the subsurface materials are used to develop the GMRS as described in Section 2.5.2.6 and the foundation input response spectra (FIRS) as described in Section 3.7.1.

The last paragraph in this SSAR section is supplemented as follows with information to address the operating basis earthquake (OBE).

The derivations of the selected vertical SSE spectra are described in Section 2.5.2.6.7. The derivation of the OBE is described in Section 3.7.1.

2.5.2.5 Seismic Wave Transmission Characteristics of the Site

NAPS ESP VAR 2.0-4

This SSAR section is supplemented as follows with information to address the GMRS control point.

As described in Section 2.5.4.2, the upper in situ soil is characterized as residual clays and clayey silts (Zone I) which is scarce across the site and will be removed. This zone is followed by saprolite (Zone IIA and Zone IIB), followed by rock which is classified into three zones: Zone III (weathered rock), Zone III-IV (moderately weathered to slightly weathered rock) and Zone IV (slightly weathered to fresh rock, including 9200 fps hard rock).

For the purpose of defining the GMRS, Elevation 250 ft is used as the control point which closely corresponds to the bottoms of the foundations of the R/B Complex and PS/Bs which are at the lowest foundation elevation of the Seismic Category I structures. At this elevation, the top layer of the rock column is Zone III-IV material with a BE shear wave velocity of 4250 fps. The design grade elevation for Unit 3 is Elevation 290 ft. Vertical datum is with reference to NAVD88 throughout Section 2.5.2, unless stated otherwise.

The seismic wave transmission characteristics of the site materials are defined in Section 2.5.4.7 including shear wave velocity profiles, soil and rock layer thicknesses, unit weights, Poisson's ratios, as well as strain-dependent property curves and damping ratios. The properties of the different soil and rock layers provide the BE properties and an estimate of the variation of these properties. Profile simulation accounts for the variation of the shear wave velocities, damping ratios, strain-dependent property curves, as well as the thicknesses of the different layers to generate the simulated profile sets for the considered structures.

The analyses of seismic wave transmission characteristics of the site are presented in Sections 2.5.2.6.7 and 3.7.1 in the rock and soil column amplification analyses required for the development of the GMRS and for the FIRS for each Seismic Category I structure, respectively.

2.5.2.6.7 Selected SSE Ground Motion

c. Selection of Enveloping Horizontal SSE Spectrum

NAPS ESP VAR 2.0-4

Item c in this SSAR section is supplemented as follows with information to address the definition of the selected GMRS.

Horizontal Hard Rock SSE Spectrum

NAPS DEP 3.7(5)

NAPS DEP 3.7(5)

NAPS DEP 3.7(5)

SSAR Figure 2.5-54A shows four horizontal ground spectra - the mean 5×10^{-5} annual hazard RG 1.165 (SSAR Reference 2) high- (HF) and low-frequency (LF) scaled spectra (from SSAR Figure 2.5-51), the performance-based spectrum (from Figure 2.5-53R) and the selected hard rock SSE spectrum (shown in SSAR Figure 2.5-48), which is the envelope of the other three spectra. As shown in SSAR Figure 2.5-54A, the envelope of the HF and LF RG 1.165 spectra indicates amplitudes very similar to the performance-based spectrum for frequencies of 1 Hz and higher. The selected horizontal SSE spectrum has been drawn to conservatively envelope both the mean 5×10^{-5} annual hazard RG 1.165 spectra and the performance-based spectrum.

For further perspective, SSAR Figure 2.5-54B compares three spectra and available discrete spectral values from the 1989 EPRI and LLNL studies recognized in SSAR Reference 2:

NAPS DEP 3.7(5)

1. The mean 5×10^{-5} annual hazard RG 1.165 envelope spectrum (from SSAR Figure 2.5-51).
2. The performance-based spectrum (from Figure 2.5-53R).
3. The selected SSE spectrum GMRS, which is the envelope of the above two.
4. “1989 EPRI” spectral values, which are median 10^{-5} spectral values for the North Anna site described in SSAR Reference 115.
5. “1989 LLNL” spectral values, which are estimated median 10^{-5} spectral values calculated using a parabolic extrapolation from results published in SSAR Reference 129, using median ground

motions for annual probabilities from 2×10^{-3} to 10^{-4} to estimate median ground motions for an annual probability of 10^{-5} (results for annual probabilities less than 10^{-4} are not available in SSAR Reference 129).

SSAR Figure 2.5-54B shows that all spectra and spectral values are similar, giving further credibility to the selected hard rock SSE spectrum.

The spectra shown in SSAR Figure 2.5-48, SSAR Figure 2.5-51, Figure 2.5-53R, SSAR Figure 2.5-54A, and SSAR Figure 2.5-54B represent scaled free-field hard rock control point ground motion spectra (9200 fps shear wave velocity) for 5 percent of critical damping.

NAPS DEP 3.7(5)

For the purpose of developing the horizontal GMRS at Elevation 250 feet, as described below, as well as the FIRS in Section 3.7.1, it is necessary to consider the specification of the hard rock ground motions as input to site response analyses. Following site response analysis Approach 2 in NUREG/CR-6728 (SSAR Reference 119), the controlling earthquakes and spectral content that comprise design response spectra in the HF range differ from those in the LF range and need to be considered. The HF and LF rock response spectra, developed from consideration of the corresponding controlling earthquakes (see SSAR Table 2.5-25) and implementation of the modified RG 1.165 Reference Probability Approach, shown in SSAR Figure 2.5-54A, are adapted to develop the required input rock response spectra for the Unit 3 site response analyses both in the development of the GMRS below and in the development of FIRS in Section 3.7.1.

HF and LF rock response spectra are defined, in composite, to match the horizontal enveloping hard rock SSE spectrum in SSAR Figure 2.5-48, but individually, are based on the HF and LF reference probability response spectra shapes. Considering SSAR Figure 2.5-54A, the LF horizontal hard rock response spectrum is defined by the horizontal enveloping hard rock SSE spectrum for frequencies less than 1.5 Hz and by the 5×10^{-5} per year LF reference probability spectral values for higher frequencies. Similarly, the HF horizontal hard rock response spectrum is defined by the horizontal enveloping hard rock SSE spectrum for frequencies greater than 1.5 Hz and by the 5×10^{-5} per year HF reference probability spectral values for lower frequencies. The HF and LF hard rock horizontal response spectra are plotted in Figure 2.5-202a.

As presented below in the development of the horizontal GMRS, as well as in the development of FIRS presented in Section 3.7.1, the site response analysis method employed does not require the input of earthquake time histories, but rather the specification of the HF and LF horizontal hard rock response spectra, presented above. Earthquake time histories spectrally-matched to the HF and LF horizontal hard rock spectra are, however, used in site response analyses for liquefaction hazard analyses, as described in Sections 2.5.4.7.4 and 2.5.4.8.

SSAR Figure 2.5-54B(1) shows the HF horizontal hard rock response spectrum-compatible time history that was developed, and SSAR Figure 2.5-54B(2) shows the LF horizontal hard rock response spectrum-compatible time history. The average magnitude and distance (M-bar and D-bar) values for the HF and LF target spectra are given in SSAR Table 2.5-25. Based on these magnitude and distance values, two horizontal seed input time histories were selected from the database of Central and Eastern United States (CEUS) time histories given in SSAR Reference 171. The seed time histories selected were:

- CEUS modified San Ramon - Kodak, 180 degree horizontal component from the 1980 Livermore earthquake (HF controlling earthquake).
- CEUS modified Kashmar, longitudinal component from the 1978 Tabas, Iran earthquake (LF controlling earthquake).

Their 5%-damped response spectra were matched to the HF and LF target spectra, respectively, satisfying the spectral matching criteria of SSAR Reference 171.

These hard rock spectra and time histories do not include any effects such as structure, embedment, or incoherence of seismic waves due to basemat size.

Horizontal GMRS

Section 2.5.4.7 describes the subsurface shear wave velocity and related material property information for the site. The GMRS soil and rock profile is developed based on the Vs data (from the three downhole geophysical B-series borings, B-901, B-907, and B-909) in the power block area which is characteristic of the entire site. The data from the two supplemental downhole geophysical borings (M-10 and M-30) are not included in the GMRS development. However, the shear-wave velocity values for in-situ rock measured in all geophysical borings, as well as the observed thickness variation of different strata, are well represented within the randomized profiles with the exception of borehole M-30, which has very high Vs values (~9500 fps and higher) at shallow depths. Since the hard rock spectrum is defined at rock with shear-wave velocity above 9200 fps (per RG 1.208), for the M-30 borehole, the ground motion at Elevation 250 ft is the hard rock spectrum which is completely enveloped by the GMRS defined at this elevation. Since the GMRS is calculated as the log-mean of the response from the 60 simulated profiles, inclusion of profiles similar to boring M-30 with very high shear-wave velocity in the simulation process would reduce the overall log-mean response closer to the hard rock spectrum. Therefore, the exclusion of borehole M-30 from the rock profile simulation is conservative. The BE shear-wave velocity profile is determined from log-mean of profiles 1 and 2 (see Figure 2.5-241a), as defined in Section 2.5.4.7. The rock profile considered for the GMRS calculation consists entirely of Zone III-IV and IV rock material which behave linearly and are supported on the 9200 fps hard rock at BE Elevation of 145 ft. Due to the linear characteristics of the considered rock column, there are no confining effects from the soils above and the calculation of the GMRS as a free field geologic outcrop is carried out by removing the top layers above Elevation 250 ft consistent with the requirements of DC/COL-ISG-17 (Reference 3OO-8). Figure 2.5-202b presents the site-specific BE shear-wave velocity profile for the GMRS.

The computer program SPS is used to generate site-specific simulated (randomized) soil profiles to represent the dynamic properties of the site while considering the uncertainty associated with each of these properties. The generation of the low-strain simulated soil profiles uses the input BE properties and their associated uncertainty. The uncertainty is expressed in terms of statistical distribution, standard deviation (SD), and correlation among engineering parameters.

Figure 2.5-202c presents the set of 60 shear-wave velocity simulated profiles before including thickness variation, i.e., based on the BE thicknesses provided for each soil layer. Note that this figure also provides the randomized shear-wave velocities above Elevation 250 ft which correspond to the structural fill described in Section 3.7.1 and are removed before use for the purpose of GMRS calculation. Also note that the log-average (simulated median) profile matches the input BE profile very closely. Maximum and minimum bounds of twice the SD around the

BE are imposed to prevent unrealistic shear-wave velocity realizations. Figure 2.5-202d presents the set of 60 shear-wave velocity simulated profiles, including thickness variation, characteristic of the site conditions. Note that while the simulated median profile matches the input BE profile, it shows smoother transitions between the consecutive strata, which is the result of the combination of shear-wave velocity and thickness variation in the simulated profiles. For the purpose of site response analysis, halfspace bedrock, where the input hard rock motion is applied, is defined by a minimum shear-wave velocity of 9200 fps. Bedrock depth varies across the site and is generally found at a depth of around 145 ft from finished grade (refer to Section 2.5.4). The Zone III-IV and IV strata are assigned strain-independent damping ratios, based on BE damping ratios of 1 percent with a log-standard deviation of 0.6. This amounts to damping values with one standard deviation range of 0.5 percent to 1.5 percent. The resulting low-strain damping ratio profiles are presented in Figure 2.5-202e. This figure also provides the randomized damping ratios above Elevation 250 ft which correspond to the structural fill described in Section 3.7.1 and are removed before use for the purpose of GMRS calculation.

The LF and HF input hard rock spectra are presented in Figure 2.5-202a. The hard rock spectra are applied at bedrock having a shear wave velocity of 9200 fps, and are propagated upward from bedrock to Elevation 250 ft, through the set of 60 simulated profiles, representing the site-specific conditions using the computer program P-SHAKE (Reference 2.5-222).

P-SHAKE implements an equivalent-linear iterative approach similar to SHAKE (References 3OO-2 and 3OO-9), where a number of iterations is needed to reach a converged solution. Since the rock profile considered for GMRS calculation is entirely described by linear properties, the free field 5 percent damping acceleration response spectra (ARS), at the GMRS control point (Elevation 250 ft) are computed without iterations at the top of the truncated soil and rock columns as a geologic outcrop motion consistent with the truncated soil column response (TSCR) described in DC/COL-ISG-17 (Reference 3OO-8).

As input for site response analysis, the duration of the input motion is specified as a parameter in P-SHAKE. The strong motion durations are determined as a function of the magnitudes (M) of the LF and HF input hard rock motions from Table 2.3-1 in ASCE 4-98 (Reference 3OO-1).

The magnitudes and corresponding durations are reported in Table 3OO-202. An additional parameter required for P-SHAKE is the effective strain ratio (equivalent uniform strain divided by maximum strain), which is calculated as a function of earthquake magnitude, as shown in Equation 3OO-1 (Reference 3OO-2). The resulting effective strain ratios used in site response analysis are reported in Table 3OO-202.

All spectra are calculated at 301 points equally spaced in log-scale in the frequency range from 0.1 to 100 Hz (a period range of 0.01 to 10 seconds). The cut-off frequency of the P-SHAKE runs is 100 Hz. The set of 60 simulated profiles results in a set of ARS at the selected horizons. ARS amplification functions are calculated at the GMRS level, by dividing the computed horizontal ARS at the GMRS horizon by the ARS of the input hard rock motion. The natural logarithmic average of the resulting ARS is calculated and that average is referred to as log-mean ARS. Log-mean ARS amplification functions are calculated in the same manner.

Figures 2.5-202f and 2.5-202g present the geologic outcrop ARS amplification functions calculated at the GMRS horizon for the LF and HF motions, respectively. In these figures, the thin gray lines designate the response of the 60 individual profiles, while the thick red line designates the log-mean response. The LF and HF log-mean ARS amplification functions are presented together in Figure 2.5-202h. The resulting 5 percent damped geologic outcrop log-mean ARS at the GMRS horizon along with the input bedrock HF and LF motions are presented in Figure 2.5-202i.

Finally, the horizontal GMRS is calculated by enveloping the LF and HF 5 percent damped log-mean ARS at the GMRS elevation and is presented in Figure 2.5-202j along with the input bedrock HF and LF motions. The response spectral values for the horizontal GMRS are interpolated for a selected set of 38 frequency points as presented in Figure 2.5-201 and tabulated in Table 2.5-201.

d. Development of Vertical SSE Spectra

NAPS ESP VAR 2.0-4

The first three paragraphs of Item d. in this SSAR section are supplemented as follows with information to address the use of the V/H ratios.

Vertical Hard Rock SSE Spectrum

The applicable V/H ratios used to develop the selected vertical hard rock SSE spectrum (5 percent of critical damping) are listed in SSAR Table 2.5-27. The vertical hard rock SSE spectrum is calculated by multiplying the selected horizontal hard rock SSE spectral amplitude at each frequency by the applicable V/H ratio for that frequency. The selected horizontal and vertical spectra are plotted in SSAR Figure 2.5-48 for the hard rock SSE.

Vertical GMRS

The horizontal GMRS spectral accelerations, V/H ratios, and vertical GMRS spectral accelerations for the Elevation 250 ft hypothetical rock outcrop control point are listed in Table 2.5-201. The vertical GMRS is calculated by multiplying the selected horizontal GMRS spectral amplitude at each frequency by the applicable V/H ratio for that frequency from NUREG/CR-6728 (SSAR Reference 171). The horizontal and vertical GMRS are plotted in Figure 2.5-201.

2.5.2.7 Operating Basis Earthquake

This SSAR section is supplemented as follows with information regarding the OBE.

NAPS ESP VAR 2.0-4

The OBE is specified in Section 3.7.1.1.

2.5.3 Surface Faulting

Replace the content of DCD Subsection 2.5.3 with the following.

NAPS COL 2.5(1)

The information needed to address DCD COL Item 2.5(1) is included in SSAR Section 2.5.3, which is incorporated by reference with the following supplements.

2.5.3.2.5 Unit 3 Subsurface Investigation

Borehole data, from the supplemental subsurface investigation described in Section 2.5.4.3, were reviewed for evidence of Quaternary fault movement. No such evidence was exhibited by the borehole data.

2.5.4 Stability of Subsurface Materials and Foundations

NAPS COL 2.5(1)

The information needed to address DCD COL Item 2.5(1) is included in SSAR Section 2.5.4, which is incorporated by reference with the following supplements.

SSAR Section 2.5.4 has been supplemented by integrating information on the additional Unit 3 borings into a single section with the same numbering as the SSAR.

2.5.4.1 Geologic Features

SSAR Section 2.5.1.1 describes the regional geology, including regional physiography and geomorphology, regional geologic history, regional stratigraphy, and the regional tectonic setting. SSAR Section 2.5.1.2 addresses site-specific geology and structural geology, including site physiography and geomorphology, site geologic history, site stratigraphy, site structural geology, and a site geologic hazard evaluation.

2.5.4.2 Properties of Subsurface Materials

2.5.4.2.1 Introduction

This section describes the static and dynamic engineering properties of the Unit 3 site subsurface materials. An overview of the subsurface profile and materials is given in Section 2.5.4.2.2. The field investigations are described in Section 2.5.4.2.3. The laboratory tests on soil and rock samples from the investigation and their results are presented in Section 2.5.4.2.4. The engineering properties of the subsurface materials are given in Section 2.5.4.2.5. Metric units have been deleted. These deletions do not contain revision bars.

2.5.4.2.2 Description of Subsurface Materials

The following is a brief description of the subsurface materials, giving the soil and rock constituents, and their range of thicknesses encountered at the Unit 3 site. The information was taken from the 93 borings made at the site (outlined in Section 2.5.4.2.3). For reference, the existing site ground surface elevations in the areas explored range from about Elevation 250 ft to Elevation 335 ft, with a median of about Elevation 296 ft. The design grade elevation for Unit 3 is Elevation 290 ft. Vertical datum is with reference to NAVD88 throughout Section 2.5.4, unless stated otherwise. Also, directions are with respect to Plant North, unless stated otherwise.

a. **Zone IV Bedrock**

The Unit 3 subsurface investigation (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC) describes the bedrock underlying the power block area mostly as quartz gneiss, biotite quartz gneiss, quartz biotite gneiss, or biotite gneiss. A detailed description of the bedrock is provided in Section 2.5.1.2.3.

The top of Zone IV bedrock encountered in the borings made for Unit 3 ranges from about Elevation 171 ft to Elevation 278 ft. Top of Zone IV rock contours beneath the Unit 3 power block area are shown on Figure 2.5-209. The top of Zone III-IV bedrock ranges from about Elevation 187 ft to Elevation 292 ft. Top of Zone III-IV rock contours beneath the Unit 3 power block area are shown on Figure 2.5-210.

b. **Zone III Weathered Rock**

The top of Zone III bedrock encountered in the borings made for Unit 3 ranges from about Elevation 206 ft to Elevation 292 ft. The maximum thickness measured is about 77 ft. Top of Zone III rock contours beneath the Unit 3 power block area are shown on Figure 2.5-211.

c. **Zone IIA and IIB Saprolites**

Distribution of Zone IIA and IIB saprolites varies throughout the Unit 3 site. The Zone IIB saprolites represent about 25 percent of the saprolites on site and are typically very dense silty sands with from 10 to 50 percent core stone. The thickest Zone IIB deposit encountered in the Unit 3 borings was 43 ft while the median thickness was about 8 ft. The top of

Zone IIB saprolite encountered ranges from about Elevation 215 ft to Elevation 302 ft. Top of Zone IIB saprolite contours beneath the Unit 3 power block area are shown on Figure 2.5-212.

The overlying Zone IIA saprolites comprise, at the Unit 3 site, about 75 percent of the saprolitic materials on site. About 80 percent of the Zone IIA saprolites are classified as coarse grained (sands, silty sands), while the remainder are fine grained (clayey sands, sandy and clayey silts, and clays). The thickest Zone IIA deposit encountered in the Unit 3 borings was 94 ft while the median thickness was about 30 ft. The top of Zone IIA saprolite ranges from about Elevation 232 ft to Elevation 335 ft. Top of Zone IIA saprolite contours beneath the Unit 3 power block area are shown on Figure 2.5-213.

d. **Zone I and Fill**

For Unit 3 foundations, Zone I soils and existing fills will be excavated. Thus, they are not considered further here.

e. **Subsurface Profiles**

Figure 2.5-215 through Figure 2.5-220 illustrate typical subsurface profiles across the Unit 3 power block area. The locations of these profiles are shown in Figures 2.5-214 and 2.5-221. These profiles, with structure cross-sections added, are presented to illustrate foundation interfaces in Section 2.5.4.3. They also are used to illustrate the Unit 3 excavation in Section 2.5.4.5, and for bearing capacity considerations in Section 2.5.4.10.

2.5.4.2.3 **Field Investigations**

The borings, observation wells, and CPTs from the Unit 3 site exploration program are summarized in Table 2.5-205, Table 2.5-206, and Table 2.5-207, respectively. The elevations, depths and thicknesses of the subsurface zones observed from the individual borings are shown in Table 2.5-208. Geophysical surveys are described in Section 2.5.4.4.

The initial subsurface field investigation (900-series borings, observation wells, etc.) was performed during August through November 2006. Two supplemental subsurface investigations were performed later, one in September and early October 2009 (M-series borings) and the other in October 2009 (W-series borings). The W-series borings were labeled as Investigation Supplement No. 1 and the M-series borings were labeled as Investigation Supplement No. 2. Most of the initial investigation and all of the supplemental investigations were conducted in the power block area with the number and depth of investigation points conforming to the guidance provided in RG 1.132 (SSAR Reference 153). Additional exploration points were located outside the power block area, e.g., at the proposed locations for the cooling towers.

The Unit 3 exploration point locations in the power block area are shown in Figure 2.5-221. Borings from previous exploration programs are also shown. Exploration points outside the power block area are shown on Figure 2.5-222.

The scope of work and the special methods used to collect field data are listed below. The work was performed during the initial (900-series) investigation except as noted:

- 93 exploratory borings (MACTEC Engineering and Consulting, Raleigh, North Carolina) including 55 borings in the 900-series, and 10 W-series and 28 M-series borings
- 7 observation wells with permeability (slug) tests in 4 wells (MACTEC Engineering and Consulting, Raleigh, North Carolina, and Bedford Well Drilling, Bedford, Virginia)
- 4 packer tests (Miller Well Drilling, Hayesville, North Carolina, under MACTEC supervision)
- 23 CPTs plus 4 down-hole seismic cone tests and pore pressure dissipation tests in 4 CPTs (Gregg InSitu, Inc., Columbia, South Carolina)
- 6 test pits (MACTEC Engineering and Consulting, Raleigh, North Carolina)
- 5 sets of borehole geophysical logging and 5 sets of suspension P-S velocity logging (GEOVision, Corona, California) including 3 sets in the 900-series and 2 M-series sets
- 2 sets of electrical resistivity tests (MACTEC Engineering and Consulting, Raleigh, North Carolina)
- Survey of exploration points (McKim and Creed, Virginia Beach, Virginia) for all the investigations

The exploration program was performed using the guidance in RG 1.132 (SSAR Reference 153). The fieldwork was performed under an audited and approved QAP and work procedures developed specifically for the Unit 3 project. MACTEC Engineering and Consulting, contracted to

Dominion to perform the subsurface investigation, worked under MACTEC's Quality Assurance Plan that met the requirements of 10 CFR 50, Appendix B. This Plan included meeting the requirements of Subpart 2.20 of ASME NQA-1, 1994 edition (Reference 2.5-204).

The subsurface investigation and sample/core collection was directed by the MACTEC site manager who was on site at all times during the field operations. A Bechtel geotechnical engineer or geologist, along with a Dominion representative, was also on site continuously during these operations. MACTEC's QA/QC engineer was on site part of the time. The draft boring and well logs were prepared in the field by MACTEC geologists.

Sample and core storage and handling were in accordance with ASTM D 4220 (Reference 2.5-205). For the initial subsurface investigation, an on-site storage facility for soil samples and rock cores was established before the fieldwork began. This facility was in the limited access and climate controlled "A" Level area of the Units 1 and 2 warehouse. Samples and cores were stored either within a 12-ft square area surrounded by a 6-ft high chain link fence, or in an adjacent secured area. For the supplemental subsurface investigations, samples were sorted in an onsite lockable, climate controlled 20 ft by 8 ft trailer, with a high security door system and security bars over each window. Each sample and core in each storage area was logged into an inventory control system. Samples removed from the facility were noted in the sample inventory logbook. A chain-of-custody form was also completed for samples removed from the facility.

Details and results of the exploration program are contained in Appendices 2.5.4AA (900-series), 2.5.4BB (W-series), and 2.5.4CC (M-series). The borings, observation wells, CPTs and test pits are summarized below. The laboratory tests are summarized and the results presented in Section 2.5.4.2.4. The geophysical tests are summarized and the results presented in Section 2.5.4.4.

a. **Borings and Samples/Cores**

The 93 borings drilled ranged from 22 ft to 300 ft in depth. The 300-ft deep boring was drilled at the center of the R/B location, to about 215 ft depth in sound rock beneath the bottom of the basemat level. The borings were advanced in soil using rotary wash drilling techniques until standard penetration test (SPT) refusal (defined as 50 blows per 1 in. or less for start of rock coring) occurred. Steel casing was then set into the rock, and the holes were advanced using wireline rock coring equipment consisting of a 5-ft long “HQ” or “NQ” core barrel with a split inner barrel.

The soil was sampled using an SPT sampler at 2.5-ft intervals to about 15 ft depth and at 5-ft intervals below 15 ft. The SPT was performed using an automatic hammer, and was conducted in accordance with ASTM D 1586 (SSAR Reference 155). The recovered soil samples were visually described and classified by the onsite geologist. A selected portion of the soil sample was placed in a glass sample jar with a moisture-proof lid. The sample jars were labeled, placed in boxes, and transported to the on-site storage area.

A set of energy measurements was made on each of the automatic SPT hammers used by the drill rigs that performed the borings. The nine sets of energy measurements were made in accordance with ASTM D 4633 (Reference 2.5-206). The average energy transfer ratio (ETR) for each rig ranged from 75.2 percent to 87.4 percent, with an overall average of 82.1 percent. The N-values shown on the boring logs (Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC) and on the subsurface profiles (Figure 2.5-215 through Figure 2.5-220) are not adjusted for hammer energy. N-values used in engineering analysis (e.g., liquefaction analysis) are adjusted for hammer energy, i.e., N_{60} was used in these situations.

Intact samples were obtained in accordance with ASTM D 1587 (Reference 2.5-220) using a Shelby tube sampler or a rotary Pitcher sampler. Upon sample retrieval, the disturbed portions at both ends of the tube were removed, both ends were trimmed square to establish an effective seal, and pocket penetrometer (PP) tests were performed on the trimmed lower end of the samples. Both ends of the sample were then sealed with hot wax, covered with plastic caps, and sealed once again using electrician tape and wax. The tubes were labeled and transported to the sample storage area. Intact samples are identified on the boring logs included in Appendix 2.5.4AA.

Rock coring was performed in accordance with ASTM D 2113 (SSAR Reference 156). After removal from the split inner barrel, the recovered rock was carefully placed in wooden core boxes. The onsite geologist visually described the core, noting the presence of joints and fractures, and distinguishing natural breaks from mechanical breaks. The geologist also computed the percentage recovery and the RQD.

Photographs of the cores were taken in the field. Filled and labeled core boxes were transported to the on-site sample storage facility.

The boring logs and the photographs of the rock cores are provided in Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC, along with details of the automatic hammer energy measurements. Borehole locations, depths, etc. are summarized in Table 2.5-205. The soil and rock materials encountered in the Unit 3 borings were similar to those found in the previous sets of borings conducted at the NAPS site. The elevations, depths and thicknesses of the subsurface zones observed from the individual borings are shown in Table 2.5-208.

b. **Observation Wells**

Each of the seven observation wells was installed adjacent to a sample boring. Three of the wells were screened in the soil/weathered rock zone, while four were screened in rock. Each well depth was selected in the field after a review of the borehole record. For the wells screened in rock, the screen depth was also based on the rock core description and packer test results. Boreholes for the wells in soil/weathered rock were advanced with hollow stem augers while the boreholes for all but one of the wells in rock were advanced using air-rotary drilling techniques. The borehole for the fourth well in rock (OW-951) was advanced with hollow stem augers until auger refusal, and was completed in rock using an “HQ” core barrel with a split inner barrel. This was after repeated cave-ins during attempts to advance the hole with air-rotary drilling.

After the designated depth of each well was reached, and the PVC screen and casing set, the sand pack and bentonite seal were placed, and then a grout plug was placed from the top of the bentonite seal to the ground surface. (In OW-951, a filter sock was placed over the screen, above which a formation packer and bentonite seal were set.) Each well was capped with a lockable steel cap and surrounded with a concrete pad.

Each well was developed by pumping. Two or three standing well volumes of water were purged initially by pumping, cycling the pump on and off to create a surging effect. The well was considered developed when the pH and conductivity stabilized and the pumped water was reasonably free of suspended sediment.

Permeability tests were performed in each of the three wells screened in soil/weathered rock, and in one of the wells screened in rock (OW-949) in accordance with ASTM D 4044, Section 8 (SSAR Reference 157) using a procedure that is commonly termed the slug test method. Slug testing involves establishing a static water level, lowering a solid cylinder (slug) into the well to cause an increase in water level in the well, and monitoring the time rate for the well water to return to the pre-test static level. The slug is then rapidly removed to lower the water level in the well, and the time rate for the water to recover to the pre-test static level is again measured. Electronic transducers and data loggers were used to measure the water levels and times during the test.

Permeability testing by the packer method was conducted in the borings adjacent to the four wells screened in rock. Test procedures used are described in ASTM D 4630 (Reference 2.5-207), as modified by U.S. Army Corps of Engineers in their Rock Testing Handbook (Reference 2.5-208) to use a manually read flowmeter rather than a digitally recorded one. The packer testing method, known as the constant head injection test, involved establishing and maintaining a constant pressure in the test length, measured by an electronic transducer, to determine the rate of inflow associated with maintaining the pressure.

Appendix 2.5.4AA contains the boring logs for the observation wells, the well installation records, the well development records, and the well permeability and packer test results. Observation well locations, depths, etc., are summarized in Table 2.5-206.

c. **Cone Penetrometer Tests**

The 23 CPTs were advanced using a track-mounted 20-ton self-contained cone rig. Each CPT was advanced to refusal, to depths ranging from about3 ft to 60 ft. Tip resistance, sleeve friction and porewater pressure were measured. The CPTs were performed in accordance with ASTM D 5778 (SSAR Reference 158). The pore pressure filter was located immediately behind the cone tip.

Down-hole seismic testing was performed at approximately 3-ft intervals in four of the CPTs (C-902, C-916, C-921 and C-923, see Section 2.5.4.4). One pore pressure dissipation test was performed in each of four CPTS (C-902, C-904b, C-911 and C-917) at depths ranging from about 13 ft to 29 ft.

The CPT logs, shear wave time of arrival records, and pore pressure versus time plots are contained in Appendix 2.5.4AA. CPT locations, depths, etc., are summarized in Table 2.5-207.

d. **Test Pits**

Six test pits were excavated to depths ranging from about2 ft to 4.5 ft to obtain bulk samples of site soils to test for suitability as backfill. A rubber-tired backhoe was used to excavate the test pits. Bulk samples were collected in new 5 gallon plastic buckets. Small portions of the samples were placed in glass jars and sealed for moisture retention.

2.5.4.2.4 Laboratory Testing

Numerous laboratory tests of soil and rock samples were performed for Unit 3. The types and numbers of these tests are shown in Table 2.5-209.

The laboratory testing investigation was performed in accordance with the guidance presented in RG 1.138 (SSAR Reference 148). The laboratory work was performed under an approved QAP with work procedures developed specifically for the Unit 3 project. Soil and rock samples were shipped under chain-of-custody protection from the storage area (described in Section 2.5.4.2.3) to the testing laboratory. When required, samples sent to the testing laboratory were divided and/or shipped to an appropriate testing laboratory under chain-of-custody rules. Laboratory testing of soil and rock samples, except for chemical tests and resonant column torsional shear (RCTS) tests, was performed at the MACTEC laboratories in Charlotte and Raleigh, North Carolina and Atlanta, Georgia. Chemical testing for pH, sulfates and chlorides in selected soil samples was conducted by Severn Trent Laboratories in Earth City, Missouri. RCTS testing of selected soil samples was performed by Fugro Inc. in Houston, Texas, under the technical direction of Dr. K. H. Stokoe of the University of Texas in Austin.

Since the Unit 3 power block area is approximately 1500 ft northeast of the center of the Unit 2 Containment Building, the tests focused on verifying that the properties of the soil and rock beneath the Unit 3 power block area were similar to those beneath Units 1 and 2 as determined during previous studies. In addition, chemical tests (for corrosiveness toward buried steel and aggressiveness toward buried concrete) and RCTS tests (for shear modulus and damping ratio variation with cyclic strain) were run on selected saprolite samples.

The details and results of the laboratory testing are included in Appendices 2.5.4AA and 2.5.4CC, except for the RCTS test results which are included in Appendix 2.5.4AAS1. Appendices 2.5.4AA and 2.5.4CC include references to the industry standards used for each specific laboratory test. The results of the tests on soil samples (excluding strength and RCTS tests) are summarized in Table 2.5-210. Table 2.5-211 gives the results of the unconfined compression tests on the rock cores. The results of the RCTS tests are shown in Figure 2.5-223.

The results of the laboratory tests as they relate to the engineering properties of the soil and rock are described in Section 2.5.4.2.5.

2.5.4.2.5 Engineering Properties

The engineering properties for Zones IIA, IIB, III, III-IV, and IV derived from the Unit 3 field exploration and laboratory testing programs are provided in Table 2.5-212 and described in the following paragraphs. These engineering properties are similar to those obtained from the previous field and laboratory testing programs (as shown in SSAR Table 2.5-45), with some differences. Where there are differences, the impact from an engineering standpoint is usually either the same or more favorable.

The following paragraphs discuss selected properties shown in Table 2.5-212 under the subheadings: a) rock properties, including concrete fill; b) soil properties, including structural backfill; c) RCTS results; and d) chemical properties.

a. **Rock and Concrete Fill Properties**

In general, the rock strength and stiffness values, derived from the field and laboratory testing of the Unit 3 rock, are higher than given in the SSAR. This could reflect less fractured or weathered rock beneath the Unit 3 area, and/or better rock coring equipment and techniques that produced better quality cores.

The Recovery and RQD are based on the results presented for each core in the boring logs in Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC. The RQDs from the borings for Strata III, III-IV and IV are plotted versus elevation in Figure 2.5-224. For Stratum III, RQD generally ranges from zero to around 50 percent, with some higher values. The average value is about 20 percent. For Stratum III-IV, RQD generally ranges from around 50 to 90 percent. The average value is about 65 percent (compared to 50 percent in the SSAR). For Stratum IV, RQD is generally above 80 percent and mostly above 90 percent. The average value is about 95 percent. The average recovery values for Zone III, III-IV and IV are about 50 percent, 90 percent, and 98 percent, respectively.

The unconfined compressive strengths and unit weights in Table 2.5-212 are based on the rock strength test results shown in Table 2.5-211. The elastic modulus values are also based on the values shown in Table 2.5-211. The shear modulus values are derived from the elastic modulus values using the Poisson's ratio values tabulated in Table 2.5-212. These higher strain shear modulus values agree well with the low strain values derived from the geophysical tests performed for the Unit 3 exploration program described in Section 2.5.4.4. These high and low strain shear modulus values are essentially the same for high strength rock, certainly for the Zone IV and Zone III-IV rock. Some strain softening has been allowed in the case of the Zone III rock, as described in Section 2.5.4.7. Low strain is defined here as 10^{-4} percent while high strain is taken as 0.25 to 0.5 percent, the amount of strain frequently associated with settlement of structures on soil.

V_s and V_p in Table 2.5-212 are based on suspension P-S velocity logging performed as part of the Unit 3 exploration program (Appendices 2.5.4AA and 2.5.4CC). These results are summarized in Section 2.5.4.4.4.

Concrete Fill

As stated in Section 2.5.4.10, if Zone II saprolitic soils and/or Zone III weathered rock is encountered at foundation subgrade level of the R/B, PS/Bs, and PSFSVs, they will be removed and replaced with concrete fill. Concrete fill will also replace Zone II saprolitic soils beneath the remaining seismic category I structures, i.e., Ultimate Heat Sink Related Structures (UHSRS), UHSRS pipe chase, and ESWPT. The concrete fill will have a minimum strength of 2500 psi, with a unit weight and Poisson's ratio of 145 pcf and 0.15, respectively. The bearing capacity of concrete fill is addressed in Section 2.5.4.10.1.

Figures 2.5-229, 2.5-230, and 2.5-233 show weathered rock will be removed and replaced by concrete fill from up to about 38 ft depth below the base of the R/B foundation, with an average thickness of about 15 ft. Figure 2.5-233 shows weathered rock will be removed and replaced by concrete fill from up to 33 ft depth below the base of the West PS/B foundation, with an average thickness of about 23 ft. Figures 2.5-231 and 2.5-232 show as much as 60 ft of Zone II and Zone III materials being replaced by concrete fill beneath portions of the East and West PSFSVs.

Analysis indicates that if the top 25 ft of Zone III rock beneath the R/B foundation is replaced with concrete, the seismic response at foundation level decreases with increasing shear wave velocity (V_s) of the concrete. Based on the calculated log-mean V_s values at and below the R/B foundation (shown in Figure 2.5-241a), the V_s of the in-situ rock at 25 ft below the R/B foundation base is approximately 5000 ft/sec. Therefore, the V_s of the concrete fill should be equal to or greater than 5000 ft/sec to ensure that the seismic response of the column that includes the concrete fill is equal to or less than the response from the original analysis of the in-situ rock. Further analysis indicates that concrete with strength of 2500 psi has a BE V_s of 7,000 ft/sec.

Construction, QA, and engineering properties of the concrete fill, including strength and durability, are controlled through project specifications. The project specifications provide controls on the construction process (including placement techniques), material properties (including mix design and concrete properties during placement; for example slump, air content, and mix temperature) and other variables. The concrete fill is required by project specifications to conform to the pertinent provisions of ACI 349 (Reference 2.5-215) including provisions contained in ASTM standards and ACI Committee 201 and 207 publications referenced within ACI 349.

b. **Soil Properties**

Zone IIA Saprolite

Grain size curves from sieve analyses of Zone IIA silty and clayey sand, and sandy silt samples are shown in Appendices 2.5.4AA and 2.5.4CC. The tests were run mainly on the silty sand samples with more than 90 percent having fines contents of less than 50 percent. Figure 2.5-225a shows fines content versus depth from these tests. The median fines content for the Zone IIA saprolite is about 24 percent, with the majority of samples having a Unified Soil Classification System (USCS) classification (Reference 2.5-209) of SM.

The median natural moisture content from 100 tests performed is 19 percent. For the relatively small percentage of samples that exhibited plasticity, the median liquid limit was 38 percent while the plasticity index (PI) was 11 percent.

The measured SPT N-values from 656 tests ranged from 2 to refusal (defined as >100 blows/ft), with a median value of 15 blows/ft. These are plotted versus depth on Figure 2.5-226. The N_{60} median value adjusted for hammer energy is 20 blows/ft. The effective angle of internal friction of a medium dense coarse-grained saprolite (N =20 blows/ft) would typically be taken as around 35 degrees (SSAR Reference 150). However, the relatively high silt content and the presence of low plasticity clay minerals reduce this angle. Consolidated-undrained (C-U) triaxial tests reported in UFSAR Appendices 2C and 3E (SSAR Reference 5) produced internal friction angles (φ') ranging from 23 to 33 degrees, with a median of 30.8 degrees. The average effective cohesive (c') component from the Appendix 2C tests was0.275 kips per square foot (ksf). A series of C-U tests performed for the Unit 3 program gave effective internal friction angles ranging from about 31 to 36 degrees, with a median of 33 degrees, and very little effective cohesion. The values of φ' = 33 degrees and c' =0.125 ksf were adopted for the Zone IIA saprolite. This compares with φ' = 30 degrees and c' =0.25 ksf used in the SSAR.

A large amount of testing was performed after low unit weights were measured in the Zone IIA saprolites in the Units 1 and 2 Service Water Reservoir area. The testing details and results are given in UFSAR Appendix 3E, Attachment 4 (SSAR Reference 5). It was concluded that there are isolated lower densities, but these are not typical. UFSAR Table 3.8-13 (SSAR Reference 5) identifies 125 pcf as a design total unit weight. A value of 125 pcf is shown in Table 2.5-212.

The shear wave velocities versus depth measured in the soil by suspension P-S velocity logging and CPT seismic testing during the Unit 3 field investigation are shown in Figure 2.5-227. The average shear wave velocity ranges from about 500 feet per second (fps) to 1200 fps in the upper 40 ft, with a BE of about 850 fps. This is presented in more detail in Section 2.5.4.4 and Section 2.5.4.7.

The high strain (i.e., in the range of 0.25 to 0.5 percent) elastic modulus value has been derived using the relationship with SPT N-value given in SSAR Reference 151. The shear modulus value has been obtained from the elastic modulus values using the relationship between elastic modulus, shear modulus and Poisson's ratio (SSAR Reference 150). The BE low strain (i.e., 10^{-4} percent) shear modulus has been derived from the shear wave velocity of 850 fps. The elastic modulus value has been obtained from this shear modulus value using the relationship between elastic modulus, shear modulus, and Poisson's ratio (SSAR Reference 150).

In Table 2.5-212, the value of unit coefficient of subgrade reaction is based on the value for medium dense sand provided by Terzaghi (SSAR Reference 152), while the earth pressure coefficients are Rankine values, assuming level backfill and a zero friction angle between the soil and the wall (see also Section 2.5.4.10.3).

All of the bulk samples obtained from the test pits were Zone IIA saprolite, since the test pits only sampled near-surface soils. Details of the results of the modified Proctor compaction tests and the California Bearing Ratio (CBR) tests run on these samples are provided in Appendix 2.5.4AA. The maximum dry density ranged from about 100 pcf to 126 pcf, with a median value of 116 pcf. The corresponding optimum moisture content ranged from 9 to 22 percent, with a median value of 13 percent. A plot of molded dry density versus CBR (soaked samples) is given in Figure 2.5-228.

Zone IIB Saprolite

Grain size curves from 19 sieve analyses of Zone IIB silty sand samples are shown in Appendices 2.5.4AA and 2.5.4CC. The samples had fines contents ranging from about 15 to 27 percent. These fines contents are shown versus depth in Figure 2.5-225a. The Zone IIB USCS classification is SM.

The measured SPT N-values from 206 tests ranged from 24 to refusal (defined as >100 blows/ft), with a median value of about 75 blows/ft. These are plotted versus depth on Figure 2.5-226. The N_{60} median value adjusted for individual hammer energy is 100 blows/ft. The effective angle of internal friction of a very dense sand (N =100 blows/ft) would typically be taken as over 40 degrees (SSAR Reference 150). However, with the moderately high silt content, φ' has been limited to 40 degrees with c' = 0. The unit weight of 130 pcf reflects the very dense nature of the Zone IIB saprolite.

The shear wave velocities measured in the soil by suspension P-S velocity logging and CPT seismic testing during the Unit 3 field investigation are shown in Figure 2.5-227. The average shear wave velocity ranges from about 1200 fps to 2500 fps with a BE of about 1600 fps. This is presented in more detail in Section 2.5.4.4 and Section 2.5.4.7.

The high strain (i.e., in the range of 0.25 to 0.5 percent) elastic modulus value has been derived using the relationship with SPT N-value given in SSAR Reference 151. The shear modulus value has been obtained from the elastic modulus values using the relationship between elastic modulus, shear modulus and Poisson's ratio (SSAR Reference 150). The low strain (i.e., 10^{-4} percent) shear modulus has been derived from the BE shear wave velocity of1600 fps.

In Table 2.5-212, the value of unit coefficient of subgrade reaction is based on the value for dense sand provided by Terzaghi (SSAR Reference 152). The earth pressure coefficients are Rankine values, assuming level backfill and a zero friction angle between the soil and the wall (see also Section 2.5.4.10.3).

Structural Backfill

Structural backfill for placing around major power block structures is obtained from crushing the sound rock (Zone III, Zone III-IV, and/or Zone IV) removed from the deep excavation for some of these structures, including the R/B. If there is an insufficient quantity of on-site sources, similar material will be obtained from offsite. The rock is crushed down to well-graded, angular or sub-angular sand and gravel-sized particles conforming to the gradation of Size No. 21A in the Virginia Department of Transportation (DOT) Road and Bridge Specifications (SSAR Reference 166). It is compacted with heavy equipment in thin lifts to a dry density that is at least 95 percent of the maximum dry density obtained from ASTM D 1557 (SSAR Reference 165) (see also Section 2.5.4.5). Based on this, N_{60} = 50 blows/ft and φ' = 40 degrees were selected as reasonable and conservative.

Zone IIB saprolite material may be used as secondary structural fill as described in Section 2.5.4.5.4.

Additional details about the structural backfill and the laboratory and field testing programs proposed for the backfill are presented in Section 2.5.4.5.3.

c. **RCTS Testing**

The results of the three RCTS tests are presented in Appendix 2.5.4AAS1 and illustrated in Figure 2.5-223. Two of the tests were on Zone IIA saprolites (each an SM sample, obtained using a Shelby tube) and one test was on a sample of Zone IIB saprolite (also SM, obtained using a rotary Pitcher barrel sampler). The test results on

Figure 2.5-223 show normalized shear modulus (G/G_{max}) and material damping ratio, D, versus shear strain, for both the resonant column and torsional shear modes. The results are shown for a confining pressure approximately equal to the in-situ confining pressure.

Comparison of the RCTS results with the generic curves used in the seismic soil column analyses is illustrated and discussed in Section 2.5.4.7.

d. **Electrical Resistivity and Chemical Properties**

When assessing the corrosion potential of soils, electrical resistivity and selected chemical testing results are typically used in combination. Field electrical resistivity and laboratory chemical tests were performed on the Zone IIA and Zone IIB saprolites during the Unit 3 subsurface investigation, and the results of the tests are given in Appendix 2.5.4AA. The results of the chemical tests are also shown in Table 2.5-210. The results are described in the following paragraphs.

Zone IIA Saprolite

The electrical resistivity measured in two arrays ranges from over 100 ohm-m close to the surface to around 500 ohm-m at30 ft depth. The chloride content of the soil, measured in 15 tests, ranges from about < 2 to 210 parts per million (ppm), with a median value of about 6 ppm. These results suggest very low corrosion potential. The pH, measured in 15 tests, ranges from 4.8 to 7, with a median of 5.8. These pH results indicate a higher corrosion potential than the resistivity or chloride results. The sulfate content measured in 15 tests ranges from about < 3 to 11 ppm, with a median of about 5 ppm, indicating that no special sulfate resisting cement is required.

Zone IIB Saprolite

The electrical resistivity measured in two arrays was about 450 ohm-m at 50 ft depth. The chloride content, measured in 5 tests, is less than 10 ppm, while the five measured pH values range from 6.7 to 7.4. These results suggest very low corrosion potential. The sulfate content measured in 5 tests ranges from about < 2 to 9 ppm, indicating that no special sulfate resisting cement is required.

2.5.4.3 Foundation Interfaces

NAPS ESP COL 2.5-2

The locations of site exploration points for the Unit 3 subsurface investigation, including borings, observation wells, CPTs, electrical resistivity tests, and test pits made in the power block area are shown on Figure 2.5-221. Borings from previous exploration programs are also shown. Exploration points outside the power block area are shown on Figure 2.5-222.

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Figure 2.5-221 shows the finish grading plan for the safety-related and other major facilities, and includes the plan outline of these structures and also the locations of the exploration points. Also shown in Figure 2.5-221 are the locations of the 6 subsurface profiles shown on Figure 2.5-215 through Figure 2.5-220. The cross sections of the structure foundations and the proposed excavation and backfilling limits (Figure 2.5-214) are superimposed on Figure 2.5-215 through Figure 2.5-220 to produce Figure 2.5-229 through Figure 2.5-234.

Logs of the core borings are in Appendices 2.5.4AA, 2.5.4BB, and 2.5.4CC and logs of observation wells, CPTs and test pits are in Appendix 2.5.4AA.

2.5.4.4 Geophysical Surveys

The geophysical testing for Unit 3 consisted of field electrical resistivity testing, geophysical down-hole testing, and seismic CPTs.

2.5.4.4.1 Field Electrical Resistivity Testing

Field electrical resistivity testing was conducted along two crossing lines located as shown on Figure 2.5-221. The Wenner four-electrode method was used to perform the tests in accordance with ASTM G 57 (Reference 2.5-210). In this method, four electrodes, two for current and two for voltage, are spaced an equal distance apart and inserted about 1 ft into the ground. A current is sent through the two outer electrodes and voltage is measured at the two inner electrodes. Electrode spacing (“A” spacing) ranged from 3 ft to 100 ft. The results of the testing are given in Appendix 2.5.4AA and are described relative to corrosion potential in Section 2.5.4.2.5.d.

2.5.4.4.2 Geophysical Down-Hole Testing

This suite of tests was performed in borings B-901 (300.0 ft depth), B-907 (200.5 ft depth), B-909 (201.9 ft depth), M-10 (201.9 ft depth) and M-30 (201.7 ft depth). The tests conducted were natural gamma, three arm caliper, resistivity, spontaneous potential, borehole acoustic televiewer logging, boring deviation, and suspension P-S velocity logging. The results of all of these tests and detailed descriptions of the test methods are in Appendices 2.5.4AA and 2.5.4CC. Plots of the shear and compression wave velocity (V_s and V_p) results versus depth are presented in Section 2.5.4.4.4. The descriptions below are summarized from the more detailed description in Appendices 2.5.4AA and 2.5.4CC.

For all of the tests, all five borings were logged as partially-cased borings, filled with clear water or polymer-based drilling mud, with a 4 in. PVC or steel casing placed in the top 40 ft (B-901 and B-907), 44 ft (M-30), 80 ft (B-909) or 90 ft (M-10) of soil above bedrock contact during the measurements in the lower rock portions of the borings. The casing was then removed and measurements were performed in the upper soil portion of the borings. The instrument probe receives control signals from, and sends the digitized receiver signals to, instrumentation on the surface via an armored 4-conductor cable. The cable is wound onto the drum of a winch and is used to support the probe.

a. **Natural Gamma and 3-Arm Caliper**

Natural gamma and caliper data were collected using a Model 3ACS 3-leg caliper probe, manufactured by Robertson Geologging, Ltd. With this tool, caliper measurements were collected concurrently with the measurement of natural gamma emission from the borehole wall. The probe is 6.82 ft long and 1.5 in. in diameter and can:

- Measure boring diameter and volume
- Locate hard and soft formations
- Locate fissures, caving, pinching and casing damage
- Identify bed boundaries
- Correlate strata between borings
- Provide natural gamma measurements

Natural gamma measurements rely upon small quantities of radioactive material contained in all rocks to emit gamma radiation as they decay. The measurement is useful because the radioactive elements are concentrated in certain rock types, e.g., clay or shales, and depleted in others, e.g., sandstone or coal.

For testing, the probe was lowered to the bottom of the boring where the caliper legs were opened, and data collection was begun. The probe was returned to the surface at a rate of10 ft/minute, collecting data continuously at0.05 ft spacing.

b. **Resistivity, Spontaneous Potential and Natural Gamma**

Resistivity, spontaneous potential, and natural gamma data were collected using a Model ELXG electric log probe, manufactured by Robertson Geologging, Ltd. The probe, which is 8.2 ft long and 1.73 in. in diameter, measures single point resistance, short and long normal resistivity, spontaneous potential, and natural gamma, and can:

- Identify bed boundaries
- Correlate strata between borings
- Identify strata geometry (shale indication)
- Provide natural gamma measurements

For testing, the probe was lowered to the bottom of the boring, and data collection was begun. The probe was returned to the surface at a rate of 10 ft/minute, collecting data continuously at0.05 ft spacing.

c. **Acoustic Televiewer and Borehole Deviation Measurement**

Acoustic image and boring deviation data were collected using a High Resolution Acoustic Televiewer probe, manufactured by Robertson Geologging, Ltd. The probe, which is 7.58 ft long and 1.9 in. in diameter, is fitted with upper and lower four-band centralizers, and can:

- Measure boring inclination and deviation from vertical
- Determine need to correct soil and geophysical log depths to true vertical depths
- Provide acoustic imaging of the borehole to identify fractures, dikes, and weathered zones, and determine dip and azimuth of these features

This system produces images of the borehole wall based on the amplitude and travel time of an ultrasonic beam reflected from the formation wall. The strength of the reflected signal from the formation wall depends primarily upon the impedance contrast between the clear water or drilling fluid and the wall. In the North Anna rock borings, the contrast between the fluid and the rock formation generally provided high contrast. The acoustic wave propagates along the axis of the probe and is then reflected perpendicular to this axis by a reflector that focuses the beam to a 0.1-in. diameter spot about 2 in. from the central axis of the probe. This reflector is able to rotate. During the survey, data were collected at 360 samples per revolution.

The probe contains a fluxgate magnetometer to monitor magnetic north, and all raw televiewer data are referenced to magnetic north. In addition, a 3-axis accelerometer is enclosed in the probe, and boring deviation data are recorded during the logging runs, to permit correction of structure dip angle from apparent dip to true dip in non-vertical borings.

For testing, the probe was lowered to the bottom of the boring, and data collection was begun. The probe was returned to the surface at a rate of 3ft/minute, collecting data continuously at 0.008 ft intervals. The data were presented on a computer screen for operator review during the logging run, and stored on hard disk for later processing.

d. **Suspension P-S Logger**

Suspension soil and rock velocity measurements were performed using the Robertson Geologging USB Micrologger II digital recorder with a digital OYO Suspension P-S Logging Probe. This system directly determines the average in-situ horizontal V_s and V_p measurements of a 3.3 ft high segment of the soil and rock column surrounding the borehole by measuring the elapsed time between arrivals of a wave propagating upwards through the soil and rock column.

Suspension P-S velocity logging uses a 19 ft long cable suspended probe containing a source near the bottom, and two geophone receivers spaced 3.3 ft apart. The probe is lowered into the borehole to a specified depth where the source generates a pressure wave in the borehole fluid (drilling mud). The pressure wave is converted to seismic waves (P-wave and S-wave) at the borehole wall. At each receiver location, the P- and S-waves are converted to pressure waves in the fluid and received by the geophones mounted in the probe, which in turn send the data to a recorder on the surface. At each measurement depth, two opposite horizontal records and one vertical record are obtained. This procedure is typically repeated every 1.65 ft or 3.3 ft as the probe is moved from the bottom of the borehole towards the ground. The elapsed time between arrivals of the waves at the geophone receivers is used to determine the average velocity of a 3.3 ft high column of soil or rock around the borehole. For QA, analysis is also performed on source-to-receiver data.

2.5.4.4.3 Seismic Tests with Cone Penetrometer

The tests were performed at 5-ft intervals in C-902, C-916, C-921 and CPT-923. Shear waves were generated by striking a heavy beam adjacent to the CPT location. Only shear waves were generated. The wave arrival was recorded by a geophone attached near the bottom of the cone string. The results of these seismic CPTs are provided in Appendix 2.5.4AA, and discussed in Section 2.5.4.4.4.

2.5.4.4.4 Results of Shear and Compression Wave Velocity Tests

a. **Soil**

The measurements of V_s from suspension P-S logging and seismic CPT tests in the Zone IIA and Zone IIB saprolite (and top of Zone III weathered rock) are shown versus depth in Figure 2.5-227. The corresponding measurements of V_p, from the suspension P-S logging are shown in Figure 2.5-235. Low strain Poisson's ratio can be determined from a relationship between V_s and V_p (SSAR Reference 150). A plot of Poisson's ratio versus depth derived from the suspension P-S logging V_s and V_p measurements is shown in Figure 2.5-236. Note that on these plots, the Zone IIA saprolite extends to about 29 ft depth in boring B-909, to about 34 ft depth in boring M-30, to about 35 ft depth in borings B-901 and B-907, and to about 59 ft depth in boring M-10.

For the Zone IIA saprolite, the average V_s generally increases with depth from around 500 fps at the ground surface to 1200 fps as it transitions to Zone IIB saprolite. The median value within the layer is about850 fps. This compares with a median of about 950 fps noted in the SSAR. The results of the compression wave tests in Zone IIA saprolite are fairly consistent at around1800 fps, while the low strain Poisson's ratio can be taken as 0.35.

For the Zone IIB saprolite, the average V_s generally ranges from around 1200 fps to 2500 fps as it transitions to Zone III. The median value within the layer is about 1600 fps which is the same as noted in the SSAR. The results of the compression wave tests in Zone IIB saprolite in Figure 2.5-235 reflect the V_p of water. V_p from SSAR Table 2.5-45 of 3500 fps was used, with a low strain Poisson's ratio of 0.37.

b. **Rock**

Figure 2.5-237 shows the measurements of V_s from suspension P-S logging in the Zone III, Zone III-IV and Zone IV bedrock versus elevation. Figure 2.5-238 shows the corresponding measurements of V_p, while Figure 2.5-239 shows Poisson's ratio versus elevation derived from V_s and V_p. These measurements were taken in the power block area, i.e., at the R/B (B-901), Auxiliary Building (A/B) (B-907 and B-909), at the east end of the UHSRS complex (M-30) and to the west of the UHSRS complex (M-10).

Based on a review of the V_S versus elevation information in Figure 2.5-237, and the RQD data in Figure 2.5-224 as described in Section 2.5.4.2.5.a, it was concluded that the overall shear wave velocities of the rock as defined by the three rock zones (III, III-IV and IV) are somewhat higher at the Unit 3 plant location than described in the SSAR. For Zone III weathered rock, the range of V_S is approximately 2000 fps to 4000 fps, with a BE value of 3000 fps. For Zone III-IV partially weathered rock, the range of V_S is approximately 3000 fps to 8000 fps, with a BE value of 4500 fps. For Zone IV fresh rock, the range of V_S is approximately 8000 fps to 11,000 fps, with a BE value of 9000 fps.

In Figure 2.5-237, Zone IV bedrock extends consistently up to around Elevation 184 ft, although the shear wave velocity values indicate that Zone IV extends above this elevation in some of the borings, and well above it in M-30. Conversely, B-901 shows Zone III rock extending from this elevation up to about Elevation 205 ft before grading to Zone III-IV rock. From Elevation 205 ft to about Elevation 225 ft, all the borings show Zone III-IV, except for the two UHSRS borings – M-10 indicates Zone III while M-30 indicates Zone IV. Above about Elevation 225 ft, B-907 and B-909 show mostly Zone III and lower end and Zone III-IV rock material, while B-901 shows Zone III-IV rock and M-30 indicates mostly Zone IV rock.These V_S profiles demonstrate that, whereas previously the “top of competent rock” was the top of the Zone III-IV (SSAR), the shear wave velocities in the Zone III rock can be high enough (e.g., in B-907) that, in some instances, Zone III can be included in the “competent rock” description.The V_S profiles also demonstrate, along with the RQD profile in Figure 2.5-224, that above about Elevation 184 ft, weathered/fractured zones can be encountered; however, there is no pattern to where these zones occur, indicating the randomized process of weathering.

2.5.4.5 Excavation and Backfill

NAPS ESP COL 2.5-3

This section describes the following topics:

- The extent (horizontally and vertically) of Seismic Category I excavations, fills and slopes
- Excavation methods and stability
- Backfill sources, quantities, compaction specifications and quality control (QC)

2.5.4.5.1 Extent of Excavations, Fills and Slopes

Figure 2.5-214, the excavation plan, shows the extent of excavations, fills and slopes for Unit 3. These are shown in cross-section in Figure 2.5-229 through Figure 2.5-234. To obtain the design plant grade of Elevation 290 ft, considerable quantities of soil will be excavated. Elevations around the perimeter of this area will range from about Elevation 288 ft to 278 ft to allow for adequate surface drainage. The location of original ground surface is shown in the cross-sections. As noted below, there are some lower areas to the south and southwest that will be backfilled. (Directions are with respect to Plant North.) The total estimated cut to achieve rough grade is about 887,000 cubic yards, while the amount of backfilling is about 391,000 cubic yards. Additional excavation for the power block is about 1,077,000 cubic yards. Benched 3-horizontal to 1-vertical (3H:1V) slopes extend up from plant grade around the northern and western perimeters of the area.The stability of the 3H:1V slopes is addressed in Section 2.5.5.

To the south and southwest of the turbine building (T/B), going towards the existing Units 1 and 2, ground surface elevation reduces at a 5 percent slope down to the transformers and then at an 11% slope down to the plant access road. Storm water basin #1 is located between this access road and the boundary of Units 1 and 2 with yard grade at Elevation 270 ft. To attain the ground elevation in Unit 3, there is cut in the power block area. The cut reaches as much as 40 ft in the area of the UHSRS. However, as existing grade falls off towards the south and southwest of the power block area, there is as much as 20 ft of backfill needed around portions of the south and west ends of the T/B. As much as 30 ft of backfill is provided to bring grade up to the planned ground surface area of the originally planned Units 3 and 4, where ground level is presently at around Elevation 250 ft.

Figures 2.5-214 and 2.5-221 show the outline of the power block foundations. As shown in Figures 2.5-229 through 2.5-231 and Figures 2.5-233 and 2.5-234, temporary excavation for Unit 3 construction will be performed using vertical walls.

2.5.4.5.2 Excavation Methods and Stability

a. **Excavation in Soil**

Excavation in the soils (Zones IIA and IIB) and any existing fills is achieved with conventional excavating equipment. Excavation of less than 20 ft in height will adhere to Occupational Safety and Health Administration (OSHA) regulations (SSAR Reference 162). As noted in the previous section, a temporary vertical wall system will be used to support the power block excavation. The slopes around the perimeter of the power block area are no steeper than 3H to 1V, with benches every 20 ft of height. Since the saprolitic soils can be highly erosive, even temporary slopes cut into the saprolite are sealed and protected.

b. **Excavation in Rock**

Excavation in the Zone III moderately to severely weathered rock is achieved using conventional earthmoving equipment. A temporary vertical wall system will be used to support the excavation, where necessary.

Excavation made for the originally planned Units 3 and 4 in the slightly to moderately weathered rock (Zone III-IV) and fresh to slightly weathered rock (Zone IV) is documented in SSAR Reference 163. Techniques employed were similar to those used for Units 1 and 2 (SSAR Reference 164) but with “lessons learned” applied. The methods of rock excavation outlined below for Unit 3 are based, in part, on the methods that worked successfully for Units 1 and 2 and the originally planned Units 3 and 4. Unit 3 is approximately 1500 ft from the center of the Unit 2 containment building, whereas the originally planned Unit 3 R/B was only about 300 ft from the Unit 2 R/B. Thus, the following techniques to reduce vibrations that worked for the originally planned Unit 3 will be used and will be effective for the new Unit 3:

- Controlled blasting techniques, including cushion blasting, pre-splitting and line drilling may be used, with appropriately dimensioned bench lifts. The blasted faces are vertical except where the foliation dip is into the excavation. There, the excavation may be parallel to the foliation dip (typically about 1-H to 1-V).
- Any blasting is strictly controlled to preserve the integrity of the rock outside the excavations and to prevent damage to existing structures, equipment, and freshly poured concrete. Peak particle velocity is measured and kept within specified limits that are a function of distance from the blast.
- The rock is reinforced to ensure adequate support and safety. Reinforcing includes installation of rock bolts in finished rock faces (typically at around 5 ft centers), and the use of welded wire mesh.

Necessary measures are taken when weathered or fractured zones are encountered. Instrumentation such as slope indicators and extensometers are installed to monitor rock movements, especially on the foliation dip slopes.

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- The excavation for safety-related structures will be geologically mapped and photographed by experienced geologists. Unforeseen geologic features that are encountered will be evaluated. The NRC will be notified no later than 30 days before any excavations for safety-related structures are open to allow for NRC staff examination and evaluation.
- There is no measurable rebound or heave of the sound rock subgrade, and monitoring is not needed.

2.5.4.5.3 Structural Fill Sources, Compaction and Quality Control

Although a large amount of Zone IIA soil will be excavated for Unit 3, this material will not be used as structural fill to support seismic category I or II structures. Structural fill is either lean concrete or a sound, well-graded granular material. The anticipated extent of the concrete and granular fill is shown on the foundation cross-sections on Figure 2.5-229 through Figure 2.5-234. If Zone III weathered rock or fractured rock is encountered at foundation subgrade level of the R/B, PS/Bs or PSFSVs, it will be removed and replaced with concrete fill. Zone III material beneath the ESWPTs or the UHSRS has adequate bearing capacity for these structures as described in Section 2.5.4.10.1. Concrete fill will also replace Zone IIA and Zone IIB saprolitic soils beneath the remaining seismic category I structures.In short, all structural fill beneath seismic category I or II structures will be concrete fill. As noted in Section 2.5.4.2.5.a, the concrete fill will have a minimum strength of 2500 psi, a BE shear wave velocity of 7000 fps, and a unit weight and Poisson’s ratio of 145 pcf and 0.15, respectively.

The granular structural fill material that will be used as backfill around seismic category I and II structures does not exist naturally on site. However, given the large amount of rock that will need to be excavated for Unit 3, it will be economical to set up a crushing and blending plant onsite to produce crushed aggregate to the required gradation specifications for use as structural backfill. The onsite source will consist of crushed Zone III, Zone III-IV, and/or Zone IV rock. The rock will be crushed down to well-graded, angular or sub-angular sand and gravel-sized particles conforming to the gradation of Size No. 21A specified by the Virginia DOT Road and Bridge Specifications (SSAR Reference 166). This gradation is shown in Figure 2.5-225b. The soundness of the aggregate will be confirmed using sulfate soundness and Los Angeles abrasion tests. This structural backfill will be placed in lifts not exceeding 12 in. loose thickness and compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557 (SSAR Reference 165) to within 3 percent of its optimum moisture content. Compaction will be performed with a heavy steel-drummed vibratory roller, except within 5 ft of a structure wall, where smaller compaction equipment will be used in conjunction with reduced lift thickness to minimize excess pressures against the wall. As noted in Section 2.5.4.2.5.b, based on the type of material and its degree of compaction, N_{60} = 50 blows/ft and φ' = 40 degrees were assumed as reasonable and conservative for this structural backfill.

Although proposed structural backfill material from the site is not presently available, bulk samples of similar material will be obtained from a quarry in the site vicinity that crushes the native rock (sound gneiss or schist) to the VDOT Size 21A gradation. Laboratory tests will be used to confirm the properties of the structural backfill, and will include:

- Confirmatory gradation tests
- Modified Proctor compaction tests to provide values of maximum density and optimum moisture content
- C-U triaxial compression tests, with porepressure measurements, on compacted samples at different confining pressures to verify the angle of internal friction

Since the gradation of the structural backfill material falls within a relatively narrow band, the test results should be consistent, and so the number of laboratory tests can be limited. Two each of the modified Proctor and CU triaxial tests should provide sufficient data.

As an alternative or supplement to the onsite crushed rock, dense-graded aggregate can be used as structural backfill material. Dense-graded aggregate will conform to Virginia DOT Size 21A (SSAR Reference 166) as noted in the previous paragraph.

Zone IIB saprolite material may be used as secondary structural fill under and around structures (excluding seismic Category I and II structures) and under roads. This material may be used either on its own or mixed with excess finer materials from crushing Zone III, Zone III-IV, and Zone IV material.

Fill placement and compaction control procedures will be addressed in a technical specification that includes requirements for suitable fill, sufficient testing to address potential material variations, and in-place density testing frequency. Compacted structural fill placement and testing will follow the guidelines of ASME NQA-1 (Reference 2.5-221). At least one field density test will be performed per lift and for no more than every 250 cubic yards of fill placed. The technical specification also includes requirements for an on-site testing laboratory for QC (gradation, moisture-density, placement, compaction, etc.) and requirements to ensure that the fill operations conform to the earthwork specification. The soil testing firm is required to be independent of the earthwork contractor and to have an approved QAP. Sufficient laboratory compaction (modified Proctor) and grain size distribution tests will be performed to ensure that variations in the fill material are accounted for. (Variations in the crushed and blended rock are expected to be minimal.)

A test fill program is also included for the purposes of determining an optimum size of roller, number of passes, lift thickness, and other relevant data for achievement of the specified compaction.

2.5.4.5.4 Control of Groundwater During Excavation

Construction dewatering is presented in Section 2.5.4.6.2. Since the saprolitic soils can be highly erosive, sumps and ditches constructed for dewatering are lined. The tops of excavations are sloped back to prevent runoff down the excavated slopes during heavy rainfall.

2.5.4.6 Groundwater Conditions

2.5.4.6.1 Groundwater Measurements and Elevations

Groundwater is present in unconfined conditions in both the surficial sediments and underlying bedrock at the Unit 3 site. Seven observation wells installed for the Unit 3 investigation (along with nine wells installed at the site as part of the ESP subsurface investigation program) have exhibited groundwater levels ranging from about Elevation 238 ft to Elevation 314 ft between December 2002 and August 2007. (The groundwater generally occurs at depths ranging from about 18 ft to 25 ft below the present-day ground surface in the main Unit 3 power block area.)

The logs and details of these seven wells, and tests in the wells, are given in Appendix 2.5.4AA. Details of measured groundwater levels and their fluctuations are given in Section 2.4.12. Hydraulic conductivity values for the saprolite based on slug tests performed in eleven of the observation wells range from 0.25 ft to 9.9 ft/day, with a geometric mean value of 1.74 ft/day. The hydraulic conductivity of the underlying shallow bedrock as determined from slug tests performed in two of the wells and packer tests performed in one of the wells is estimated to range from about 0.5 ft to 6.3 ft/day, with a geometric mean value of 2.05 ft/day. Groundwater movement at the site is generally to the geographical north and east, toward Lake Anna. A detailed description of groundwater conditions is provided in Section 2.4.12.

Groundwater levels at the site require temporary dewatering of foundation excavations extending below the water table during construction of Unit 3. This construction dewatering is performed in a manner that minimizes drawdown effects on the surrounding environment. Drawdown effects are expected to be limited to the NAPS site. The relatively low permeability of the saprolite and underlying rock means that sumps and pumps should be sufficient for successful construction dewatering, as presented in Section 2.5.4.6.2.

The groundwater level for the power block area of Unit 3 is discussed in Section 2.4.12.4 which indicates that the maximum predicted groundwater level in the power block area of Unit 3 increases from south to north, ranging from about Elevation 270 ft at the south end of the T/B to about Elevation 284.4 ft at the north end of the UHSRS.

2.5.4.6.2 Construction Dewatering and Seepage

Dewatering for all major excavations is achieved by gravity-type systems.

a. **Soils**

Due to the relatively impermeable nature of even the coarse-grained saprolite, sump-pumping of ditches is adequate to dewater the soil. These ditches are advanced below the progressing excavation grade.

During the construction of Units 1 and 2 and originally planned Units 3 and 4, plant excavation and dewatering was significant in causing local groundwater levels to decline. However, the extent of the area of influence of the construction dewatering was estimated to be a radius of less than 500 ft due to the low permeability of the materials being dewatered (SSAR Reference 164).

b. **Rock**

Sump-pumping is used to collect water from relief drains that are installed in the major rock excavation walls to prevent hydrostatic pressure buildup behind the walls. Such relief drains were spaced on 20 ft centers around the perimeters of the originally planned Units 3 and 4 containment excavations.

Although an approximately 40 ft head existed between excavation grade and the North Anna Reservoir during the final stages of excavation for the originally planned Units 3 and 4, no dewatering difficulties were encountered, due to the tight nature of the joints in the rock below about Elevation240 ft. The excavation for Unit 3 is at least 1000 ft from Lake Anna, and so negligible seepage effects from the lake are anticipated.

2.5.4.6.3 Effect of Groundwater Conditions on Foundation Stability

NAPS ESP COL 2.5-4

The maximum groundwater level below plant grade is described in Section 2.5.4.10. There are no buoyancy issues with deep buried structures because of the appreciable dead loads imposed by these structures. Large diameter buried piping such as the circulating water pipes are designed to resist buoyancy when empty.

No permanent dewatering system is required for Unit 3.

2.5.4.7 Response of Soil and Rock to Dynamic Loading

The R/B basemat at Unit 3 is founded on Zone III-IV or Zone IV bedrock or on concrete placed on Zone III-IV or Zone IV bedrock, after removing Zone III weathered rock. (Although the cross-sections in Figures 2.5-229, 2.5-230 and 2.5-233 through the R/B show no excavation of the Zone IV bedrock, the top of the Zone IV in B-902 on the eastern edge of the R/B is at around Elevation 278 ft; thus, appreciable excavation of the Zone IV rock at this location will be needed to reach foundation level at Elevation 251 ft). A similar scheme is followed for the PS/B and PSFSV foundations, with all Zone III material immediately beneath the foundation being removed and replaced with concrete fill. For the other seismic category I structures (UHSRS, UHSRS pipe chase, and ESWPTs) all Zone II soil beneath the foundations will be removed and replaced with concrete fill, but Zone III material beneath the foundation will not be removed. The aforementioned foundation subgrades are illustrated in Figures 2.5-229 through 2.5-234.

The seismic acceleration at the sound bedrock level is amplified or attenuated up through the weathered rock and soil column. To estimate this amplification or attenuation, the following data are required:

- Shear wave velocity profiles of the rock and soil overlying hard rock
- Variation with strain of the shear modulus and damping values of the weathered rock and soil
- Site-specific seismic acceleration-time histories

2.5.4.7.1 Shear Wave Velocity Profile

NAPS ESP COL 2.5-9

Various measurements were made at the Unit 3 site to obtain estimates of the shear wave velocity in the soil and rock. These are summarized in Section 2.5.4.4. The materials of interest here are the Zone IIA and Zone IIB saprolitic soils, the structural backfill, the Zone III weathered rock, the Zone III-IV slightly to moderately weathered rock, and the Zone IV slightly weathered to fresh rock. The V_s profiles described under a. Bedrock below are the profiles developed specifically for the seismic category I structures supported on rock or on concrete fill on rock. The V_s profiles described under b. Soil below are the profiles developed (1) using the in-situ soil for slope stability analysis (Section 2.5.5) and liquefaction analysis (Section 2.5.4.8) and (2) using the structural backfill profile above the foundation level.

a. **Bedrock**

V_s profiles of the bedrock measured in the five Suspension P-S Logging boreholes are shown on Figure 2.5-237. One or more of the five V_s profiles is used as the input V_s for the analysis to develop input motions for each of the various seismic category I and II structures. Since in most cases the V_s profile was not directly beneath the footprint of the structure, the V_s profile or combination of V_s profiles used was based on the proximity of the V_s measurement to the structure, and/or the similarity of the average subsurface profile (in terms of Zone III, Zone III-IV, etc.) beneath the structure to the subsurface profile in the V_s borehole.

R/B, East PS/B and East PSFSV

For these structures, all three of the V_s profiles in the main power block complex (B-901, B-907 and B-909) were combined, and are shown in Figure 2.5-240. Below about Elevation 135 ft, the shear wave velocity is fairly constant at between approximately 9000 fps and 10,000 fps. The figure shows Zone IV bedrock extending up to around Elevation 184 ft.

Above this elevation, two distinct V_s profiles are identified, with one representing the more weathered and fractured rock profile, and the other the mostly unweathered and unfractured profile. These profiles (Profiles 1 and 2) are also shown on Figure 2.5-241a along with the log mean values derived from Profiles 1 and 2 and from the measured V_s values. The boring log mean plot indicates that V_s = 9200 fps is reached at about Elevation 145 ft.

West PS/B and West PSFSV

V_s boring B-909 is relatively close to the West PS/B and West PSFSV and has a fairly similar subsurface profile to the average profile beneath and in the immediate vicinity of these structures. The shear wave velocity profile used for the West PS/B and West PSFSV analyses is thus based on the B-909 V_s profile, and is shown in Figure 2.5-241b. The V_s values are averaged over 10-ft intervals. Since readings are taken every 1.6 ft, there are 6 readings per 10-ft interval. The minimum and maximum readings shown on Figure 2.5-241b are the minimum and maximum readings with the 10-ft interval. Note the 26 ft of concrete fill has a BE V_s of 7000 fps with minimum and maximum values of 6000 and 8000 fps.

UHSRS

The four UHSRS are labeled UHSRS A through UHSRS D, with UHSRS A at the eastern end and UHSRS D at the western end. The UHSRS Pipe Chase runs between UHSRS B and UHSRS C. A minimum of 3 ft of concrete fill is placed immediately below the foundation of each UHSRS.

UHSRS A & B

V_s boring M-30 is the closest to UHSRS A and UHSRS B and has a relatively similar subsurface profile to the average profiles beneath UHSRS A and B. The shear wave velocity profile used for the UHSRS A and B analyses is thus based on the M-30 V_s profile, and is shown in Figure 2.5-241c.

UHSRS C

V_s boring B-907 is the closest to UHSRS C and has a relatively similar subsurface profile to the average profile beneath UHSRS C. The shear wave velocity profile used for the UHSRS C analysis is thus based on the B-907 V_s profile, and is shown in Figure 2.5-241d.

UHSRS D

V_s borings B-907 and M-10 are the closest to UHSRS D and have a relatively similar subsurface profile to the average profile beneath UHSRS D. The shear wave velocity profile used for the UHSRS D analysis is thus based on the combined B-907 and M-10 V_s profiles, and is shown in Figure 2.5-241e.

UHSRS Pipe Chase

The UHSRS Pipe Chase is a relatively short section that runs between UHSRS B and UHSRS C. It is very close to the surface with its base at about Elevation 286 ft. The V_s profile used for the Pipe Chase analysis is based on the combined B-901, B-907 and M-30 V_s profiles, and is shown in Figure 2.5-241f. In this case, the minimum and maximum values shown are the minimum and maximum average values among the three borings.

ESWPT

The East and West ESWPTs are founded at about Elevation 259 ft.

East ESWPT

Like the UHSRS Pipe Chase, the shear wave velocity profile used for the East ESWPT analysis is based on the combined B-901, B-907 and M-30 V_s profiles, and is shown in Figure 2.5-241g. The subsurface profiles beneath the UHSRS Pipe Chase and East ESWPT are quite different, with Zone III and Zone III-IV being considerably thinner beneath the East ESWPT. Consequently, looking at Zone III-IV in Figure 2.5-241f and 2.5-241g, for example, the V_s profile beneath the East ESWPT is the same but much more compressed than the profile beneath the UHSRS Pipe Chase.

West ESWPT

The shear wave velocity profile used for the West ESWPT analysis is based on the combined B-907 and B-909 V_s profiles, and is shown in Figure 2.5-241h.

Table 2.0-201 provides an evaluation of DCD site parameter values and corresponding Unit 3 site characteristic values for shear wave velocity.

b. **Soil**

Two soil profiles were considered for the soil and rock column amplification/attenuation SHAKE analyses (Reference 2.5-211). The first is a natural soil profile that is outside the power block since all of the natural soil is removed from within the power block area. The profile is in the vicinity of borings B-929 and B-947, on the planned 3H:1V slope to the west and north of the power block area. The borings show the Zone II saprolite is thick in this area, with the combined thickness of the Zone IIA and Zone IIB materials being about 65 ft. This profile was used in the slope stability analyses presented in Section 2.5.5 and for the PGA used in the liquefaction analysis in Section 2.5.4.8.

The measured shear wave velocity profiles in Figure 2.5-227 were averaged vertically in 5-ft intervals to obtain the average, upper bound and LB profiles shown in Figure 2.5-243. (Note that this average profile is very similar to the profile without the M-10 and M-30 values, and so the SHAKE analysis that had been run without the M-10 and M-30 data was not revised.) As with the bedrock profile, this soil profile was randomized for input into the SHAKE analysis. At the natural soil profile location, subsurface information indicated that the top of competent rock was at about Elevation 250 ft. The same bedrock profile described above in Section 2.5.4.7.1.a for the R/B, PS/B and PSFSV has the top of competent rock at Elevation 273 ft at the R/B location. This same rock profile is assumed to extend below Elevation 250 ft for the SHAKE analysis that includes the natural soil profile. (The top of competent material varies in elevation throughout the site, frequently, but not consistently following the changes in original topography of the site. As indicated earlier, Zone III-IV rock is always considered competent, but some Zone III weathered rock is also considered competent.)

The second soil profile is that of the engineered structural fill that will be used as backfill around the seismic category I structures. As noted in Section 2.5.4.5.3, the primary source of structural backfill is crushed rock obtained from the power block excavation.

For this structural backfill, there are no measured shear wave velocities, since the backfill will be crushed rock obtained from the new plant excavation. To obtain a shear wave velocity profile range, the SPT N-value selected in Section 2.5.4.2.5.b for the backfill, i.e., N_{60} = 50 blows/ft, was used. Relationships between N-value (adjusted for overburden pressure) and shear wave velocity developed by Seed, et al. (Reference 2.5-212) and Imai and Tonoucchi (Reference 2.5-213) were used to obtain a profile of shear wave velocity versus depth, as shown in Figure 2.5-244. This profile was averaged vertically in 5-ft intervals to obtain the average shear wave velocity profile shown in Figure 2.5-245.The upper and LB shown in this figure are 1.414 and 0.707 times the mean value of shear wave velocity, respectively, which correspond to 2.0 and 0.50 times the shear modulus. The curves in Figure 2.5-244 are shown in Figure 2.5-245 averaged into 5-ft intervals for SHAKE input.

2.5.4.7.2 Variation of Shear Modulus and Damping with Strain

a. **Shear Modulus**

The shear modulus reduction curve for the Zone IIA saprolite is the same as used for the Zone IIA saprolite in the SSAR, i.e., Curve 1 in SSAR Figure 2.5-63. This curve is reproduced here in Figure 2.5-246, labeled “Recommended for Natural Soil.” A series of grain size tests on the Zone IIB saprolite indicated that all of the samples tested were sands, with no appreciable gravel content. Thus, Curve 1 in SSAR Figure 2.5-63 was also used for the Zone IIB saprolite, and labeled “Recommended for Natural Soil” in Figure 2.5-246. The typical thickness of the saprolite is about 35 ft. Curve 1 is almost identical to the average of the EPRI curves (SSAR Reference 170) for depths 0 to 20 ft, and 20 ft to 50 ft.

The results of the RCTS tests (normalized shear modulus (G/G_{max}) versus shear strain) from Figure 2.5-223 are superimposed on Curve 1 in Figure 2.5-247. These results show good agreement with Curve 1, and so no additional SHAKE runs were made using the RCTS shear modulus reduction curves. Note that the median thickness of the Zone IIA saprolite encountered in the Unit 3 borings was about 25 ft, and approximately 80 percent of the material was classified as silty sand (SM). The two silty sand samples of Zone IIA saprolite tested in RCTS are thus considered sufficient and representative. Similarly, the median thickness of the Zone IIB saprolite encountered in the Unit 3 borings was about 9 ft, and all of this material was classified as silty sand (SM). Thus the sample of Zone IIB silty sand tested in RCTS is considered sufficient and representative.

As noted in Section 2.5.4.2.5.b, the primary source of structural backfill is bedrock excavated to construct the Unit 3 power block, crushed down to well-graded, angular sand and gravel-sized particles. Curve 2 in SSAR Figure 2.5-63, which was derived for a gravel-type material, was selected as the shear modulus reduction curve for this structural backfill and is included in Figure 2.5-246. Curve 3 in SSAR Figure 2.5-63 was used for the Zone III weathered rock. The shear modulus of the Zone IV and Zone III-IV weathered rock was considered non-strain dependent.

b. **Damping**

The typical thickness of the saprolite and the structural backfill is about 35 ft. For the granular materials (Zone IIA and Zone IIB saprolite, and the structural backfill), the average of the EPRI curves (SSAR Reference 170) for depths 0 to 20 ft, and 20 ft to 50 ft was selected. This curve is shown on Figure 2.5-228.Curve 3 in SSAR Figure 2.5-64 is used for the Zone III weathered rock. This curve is also shown on Figure 2.5-248.

Figure 2.5-247 shows the results of the RCTS tests from Figure 2.5-223 for material damping ratio D versus shear strain superimposed on the granular soils curve from Figure 2.5-248. These results show reasonable agreement, and so no additional SHAKE runs were made using the RCTS damping ratio reduction curves.

There is no variation of damping ratio of the Zone III-IV or Zone IV rock with cyclic shear strain. However, this rock has some intrinsic damping properties. A value of 1 percent was selected for the BE damping ratio with a variation of ±0.5 percent.

2.5.4.7.3 Site Specific Acceleration-Time Histories

The time histories for the Unit 3 site described in SSAR Section 2.5.4.7.3 were used as input for the SHAKE2000 (Reference 2.5-211) computer program analyses performed on the natural soil described in Section 2.5.4.7.1.b (Soil). The analyses using the V_s profiles described in Section 2.5.4.7.1.a (Bedrock) used the P-SHAKE computer program (Reference 2.5-222) which does not use acceleration-time histories for input. Note that selected P-SHAKE runs included the V_s profile for structural backfill above foundation level.

2.5.4.7.4 Rock and Soil Column Amplification/Attenuation Analysis

The ARS derived from the P-SHAKE analyses for the seismic category I structures described in Section 2.5.4.7.1.a are presented in Section 3.7.1.

NAPS ESP COL 2.5-5 The SHAKE2000 (Reference 2.5-211) computer program was used to compute the site dynamic responses using the soil and rock profiles described in Section 2.5.4.7.1.b and the variation of shear modulus and damping ratio with strain described in Section 2.5.4.7.2. The analysis used the acceleration-time histories described in Section 2.5.4.7.3. For the LF case, an earthquake with moment magnitude of 7.2 and an acceleration at hard bedrock level (V_s = 9200 fps) of 0.15g was used in the SHAKE2000 analysis, while for the high frequency case, an earthquake with moment magnitude of 5.4 and an acceleration at hard bedrock level of 0.39g was used.

Figure 2.5-249 and Figure 2.5-250 show the maximum acceleration versus depth profiles obtained from SHAKE2000 for the low and high frequency earthquakes, respectively. The mean values on these profiles are used as input into the slope stability analyses described in Section 2.5.5. The mean PGA is used as input into the liquefaction analysis for the Unit 3 soils described in Section 2.5.4.8. The peak acceleration at the natural ground surface using the LF earthquake is 0.30g, while the corresponding acceleration using the high frequency earthquake is 0.56g.

2.5.4.8 **Liquefaction Potential**

The Zone IIB saprolitic soils are extremely dense and the Zone III weathered rock has over 50 percent core stone and has typically been sampled by rock coring. Neither of these materials has liquefaction potential. The primary source of structural backfill is bedrock excavated for the Unit 3 power block. This is crushed to angular or sub-angular gravel-sized particles and compacted in thin lifts with a heavy vibratory steel-drummed roller. This fill is not liquefiable. The only material analyzed here regarding liquefaction is the Zone IIA saprolitic soil.

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All of the seismic category I structures are founded on rock or on concrete on rock at the Unit 3 site. Thus, even if the Zone IIA saprolite is liquefiable, such liquefaction does not impact the stability of any seismic category I structure. (As described in Section 2.5.4.10, the Zone IIA saprolite has relatively high resistance to bearing failure but can produce excessive settlements under certain conditions. Thus, the Zone IIA saprolite is not used to support seismic category I structures, regardless of whether it is potentially liquefiable or not.)

The PGAs obtained from the Unit 3 SHAKE analyses through the natural soil profile are less than those reported in the SSAR, due to some slightly different rock and soil profiles, and the randomization process applied to these profiles. The previous liquefaction analyses are described in light of these lower accelerations in Section 2.5.4.8.1. Section 2.5.4.8.1 also contains the results of liquefaction analyses performed on Zone IIA saprolites outside the power block area, based on borings and CPTs performed for Unit 3 outside the perimeter of the vertical soil cut, i.e., analyses of soils that will not be excavated. Any failure of slopes due to liquefaction could impact adjacent safety-related structures. Locations having this potential are identified, and a liquefaction analysis of the slope soils is performed.

2.5.4.8.1 **Liquefaction Analyses Performed for Unit 3**

This section was developed in accordance with, and conforms to guidance in RG 1.198 (Reference 2.5-214).

a. **Magnitude and Acceleration Values for Unit 3 Liquefaction Analyses**

As noted in Section 2.5.4.7.4, the peak acceleration at the natural ground surface using the LF earthquake is 0.30g, while the corresponding acceleration using the high frequency earthquake is 0.56g. The LF earthquake had a magnitude of 7.2 and the high frequency earthquake had a magnitude of 5.4.

The 0.30g value was conservatively rounded up to 0.31g for the liquefaction analysis. The 0.31g and 0.56g values, with corresponding magnitudes, were used as the PGAs for the liquefaction analyses described in the following paragraphs.

As in the SSAR, an acceptable factor of safety (FS) of 1.1 or higher is used in the analyses.

b. **Updated Seismic Margin Assessment**

The seismic margin assessment described in the SSAR for the Units 1 and 2 power block area was modified in the Unit 3 evaluation, maintaining the same assumptions as used in the original study but substituting the Unit 3 design accelerations and moment magnitudes. Magnitude scaling factors of 1.13 and 2.5 were used in the analysis for the low and high frequency earthquakes, respectively. The resulting FS values ranged from about 1.05 to 2.95, with an overall average value of about 1.6.

c. **Analysis of SSAR Samples and CPT Results**

The analysis followed the method proposed by Youd, et al. (SSAR Reference 178). Magnitude scaling factors of 1.13 and 2.5 were used in the analysis for the low and high frequency earthquakes, respectively. The K_σ factor for high overburden pressures was incorporated into the analysis, using a relative density of 60 percent.

Using the magnitude scaling factors for the low and high frequency earthquakes described above, and the Unit 3 PGAs, the analysis of the SPT results from the SSAR gave FS values against liquefaction greater than 1.1 for those samples that were liquefiable. For the eight CPTs performed, the liquefaction analysis showed a 4-ft thick zone in one CPT, a 2-ft thick and a 1-ft thick zone in one CPT, and two 0.5-ft thick zones in one CPT where the FS against liquefaction was less than 1.1.

d. **Analysis of Unit 3 SPT Samples and CPT Results**

As noted earlier, at the locations of the majority of the borings and CPTs in the power block area that contains the seismic category I structures, the Zone IIA saprolite will be excavated. Thus, analyzing the liquefaction potential of these soils prior to excavation is of little relevance. In this area, there are 18 borings and 9 CPTs that are outside the vertical cut excavation zone and that indicate the presence of Zone IIA saprolite.

Liquefaction analysis of each sample of Zone IIA saprolite obtained by SPT sampling in the 18 borings was performed to determine the FS against liquefaction. The results from the 9 CPTs were also analyzed. The analysis conservatively ignored the age, overconsolidation, and mineralogy/fabric effects of the saprolite. (The saprolite is estimated to be between 0.8 and 1.6 million years old, according to SSAR Reference 176.) Cohesive samples and/or samples above the groundwater table were considered non-susceptible to liquefaction.

The analysis followed the method proposed by Youd, et al. (SSAR Reference 178). This state-of-the-art liquefaction methodology is based on the evolution of the Seed and Idriss "Simplified Procedure" over the past 25 years. Magnitude scaling factors of 1.13 and 2.5 were used in the analysis for the moment magnitude 7.2 (LF) and 5.4 (HF) earthquakes, respectively. The K_σ factor for high overburden pressures was incorporated into the analysis, using a relative density of 60 percent.

The analysis of the SPT results from the 18 borings gave FS values against liquefaction greater than 1.1 for those samples that were liquefiable, except for two samples. For the 9 CPTs analyzed, the liquefaction analysis showed the FS against liquefaction was less than 1.1 in three of them. However, the low FS values occurred mainly in 0.5ft or 1.0 ft thick layers, with the thickest continuous zone of FS < 1.1 being only 1.5 ft thick.

An analysis was performed on the soils in boring B-929 that is located on the proposed 3H:1V slope analyzed in Section 2.5.5. Using the same approach as before, two samples were identified with FS values less than 1.1. Analysis of CPT-918 to the north of the top of the slope indicated no liquefaction potential. Note that if the age factor of 2 that was used in the seismic margin assessment is applied to the Unit 3 SPT and CPT results, all of the computed FS values are greater than 1.1.

Using the method outlined in Tokimatsu and Seed (SSAR Reference 179), the maximum estimated dynamic settlement of the Zone IIA saprolite due to earthquake shaking was significantly less than the 5 in. estimated based on soil encountered in one of the CPTs performed for the ESP investigation using the same computation method. This value of 5 in. is conservatively adopted as the maximum dynamic settlement that could occur in the saprolite due to the design seismic event.

2.5.4.8.2 **Conclusions about Liquefaction**

Only the Zone IIA saprolites fall into the gradation and relative density categories where liquefaction would be considered possible.

Any liquefaction of the Zone IIA saprolite will not impact the stability of any seismic category I structure.

The conclusions from the foregoing sections on the analysis of liquefaction potential of Zone IIA saprolite are as follows. Note that all of the analysis neglected the beneficial effects against liquefaction of age, structure, fabric, and mineralogy. The only exception was the seismic margin analysis where age effects were accounted for.

- A seismic margin liquefaction analysis of the Units 1 and 2 power block area was modified to use the Unit 3 seismic parameters (M = 7.2 with 0.31g PGA for LF and M = 5.4 with 0.56g PGA for HF). The analysis gave FS values that were, with very few exceptions, greater than 1.1.

- A state-of-the-art liquefaction analysis of the ESP SPT samples using the low and high frequency Unit 3 seismic parameters gave FS values greater than 1.1 for all the SPT results analyzed. For the ESP CPT measurements, there was a 2-ft thick and a 4-ft thick zone where the FS against liquefaction was less than 1.1.
- A state-of-the-art liquefaction analysis of the Unit 3 SPT measurements in borings outside the vertical cut area to be excavated gave FS values against liquefaction greater than 1.1 for those samples that were liquefiable, except for four samples.
- A state-of-the-art liquefaction analysis of the Unit 3 CPT measurements showed the maximum thickness where the FS against liquefaction was less than 1.1, was only1.5 ft.
- Maximum dynamic settlement of the Zone IIA saprolite due to earthquake shaking is conservatively estimated as about 5 in. based on the maximum value obtained from the ESP investigation. This settlement will be outside the zone of loading influence of any of the seismic category I structures.

Based on the above analysis results, it can be concluded that a very small percentage of the Zone IIA saprolitic soils have a potential for liquefaction based on the low and high frequency Unit 3 seismic characteristics. The liquefaction analysis did not take into account the beneficial effects of age, structure, fabric, and mineralogy, and thus the chances of any liquefaction occurring are extremely low. Any liquefaction of the Zone IIA saprolite that does occur will not impact the stability of any Unit 3 seismic category I structure.

2.5.4.9 Earthquake Design Basis

See Sections 2.5.2.6.7 and 3.7.1.1 for the GMRS and FIRS, respectively.

2.5.4.10 Static Stability

NAPS ESP COL 2.5-6

As with Units 1 and 2, and the originally planned Units 3 and 4, the Unit 3 R/B is founded on Zone III-IV or Zone IV bedrock or on concrete fill on this rock. The East and West PS/B and the East and West PSFSV structures are also founded on Zone III-IV or Zone IV bedrock or on concrete fill on this rock. If Zone III fractured rock is encountered at the foundation subgrade level, then it will be removed and replaced with lean concrete. The subgrade of each of the other seismic category I structures (the UHSRS, UHSRS pipe chase, and the ESWPT) depends on its elevation and location. For their foundations, any Zone IIA and/or Zone IIB material beneath the foundation level will be replaced with concrete fill. (This also applies to the seismic category II A/B and T/B.) Table 2.5-213 shows the plan dimensions and the bottom of foundation elevations and depths for the seismic category I and II structures. The cross sections in Figures 2.5-229 through2.5-234 show the materials supporting these structures.The subsurface profiles beneath the seismic category I and II structures used for bearing capacity and settlement analyses are shown on Table 2.5-213. Note that there can be more than one material immediately beneath the foundations of the larger structures because of the variable stratigraphy (e.g., both concrete fill and Zone III-IV material are shown beneath the R/B in Figure 2.5-229.) The profiles shown in Table 2.5-213 are the average profiles.

NAPS COL 3.7(7)

2.5.4.10.1 Bearing Capacity

a. **Allowable Bearing Capacity of Rock and Concrete Fill**

The allowable static bearing capacity values for each bedrock zone are given in Table 2.5-214. The Zone III allowable static bearing capacity of 20 ksf is less than the value of 20 percent of the ultimate crushing strength (or unconfined compressive strength) given in several building codes (SSAR Reference 181). The ultimate crushing strength is given as 1.0 kips per square inch (ksi) (144 ksf) in Table 2.5-212. The 20 ksf value is the same value given for weathered rock in Table 2.5-2 of the Units 1 and 2 UFSAR (SSAR Reference 5). For dynamic loading, 20 percent of the ultimate crushing strength can be used. It should be noted that although the 20 ksf allowable static bearing capacity is greater than the maximum static bearing pressure from the R/B basemat, as noted earlier the R/B foundation will not be founded directly on the Zone III weathered rock. If excavation during construction for this foundation reveals any weathered or fractured zones at foundation level, such zones will be over-excavated and replaced with concrete fill. This also applies to the PS/B and PSFSV foundations.

The Zone III-IV and Zone IV bedrock have design unconfined compressive strengths of 9 ksi (1296 ksf) and 17 ksi (2448 ksf), respectively (Table 2.5-212). The allowable static values of the bearing capacity of 80 ksf and 160 ksf for Zone III-IV and Zone IV rock, respectively, are presumptive values based on various building codes for moderately weathered to fresh foliated rock (SSAR Reference 181). For dynamic loading, 20 percent of the ultimate crushing strength can be used, i.e., 259 ksf for Zone III-IV, and 490 ksf for Zone IV. For 2500 psi concrete fill, the computed allowable bearing capacity is 214 ksf (Reference 2.5-215) for both static and dynamic loading.

b. **Allowable Bearing Capacity for Structures**

Table 2.5-215 gives the estimated allowable static and dynamic bearing capacity values for the seismic category I and II structures, based on the materials underlying the structures shown in Table 2.5-213. Review of Table 2.5-213 for the R/B, PS/B, and PSFSV shows that there is concrete fill beneath each structure underlain by Zone III-IV bedrock. Table 2.5-214 indicates that, for the static case, the Zone III-IV bearing capacity is less than that of concrete, while for the dynamic case, the concrete bearing capacity is less than that of Zone III-IV. The lesser bearing capacity is conservatively assumed in each case. All of the remaining structures (UHSRS, UHSRS pipe chase, ESWPT, A/B and T/B) are underlain by concrete fill, and then Zone III weathered rock, according to Table 2.5-213. Again, the lesser bearing capacity is conservatively assumed in each case. This means that, according to the Table 2.5-214 values, the bearing capacity of the Zone III weathered rock will be used for both the static and dynamic cases.

The design applied bearing pressure (ABP) values for each structure are shown in Table 2.5-215. Note that these pressures conservatively neglect any buoyancy effects. (See c. buoyancy effects below.) The ratio of the allowable bearing capacity (ABC) to ABP for each structure is given in Table 2.5-215. This ratio should be at least 1.0. Table 2.5-215 shows the ratio for static loading ranges from 2.8 to 15.7, while the ratio for dynamic loading ranges from 3.4 to 22.9.

The Zone IIA saprolite can be used to support relatively lightly-loaded, non-settlement sensitive structures that are not classified as seismic category I or II. The allowable bearing capacity value is limited to 4 ksf because of settlement considerations. (The 4 ksf value can be increased by one third for dynamic or transient conditions.) As noted in Section 2.5.4.10.2, settlement considerations usually dominate when this material is used for supporting foundations, and the actual allowable bearing capacity may be less than 4 ksf, especially for larger foundations.

c. **Buoyancy Effects**

NAPS ESP COL 2.5-4 As noted in Section 2.5.4.6.1, Section 2.4.12.4 indicates that the maximum predicted groundwater level in the power block area of Unit 3 increases from south to north, ranging from about Elevation 270 ft at the south end of the T/B to about Elevation 284.4 ft at the north end of the UHSRS. Thus, there can be a hydrostatic uplift force on many of the structures founded below grade. All of the below-ground structures shown in Table 2.5-213 have sufficient applied foundation loads (Table 2.5-215) that there are no net uplift forces even at DCD site parameter for maximum groundwater level. However, such forces can be significant in the design of buried piping, particularly when the pipe is empty. In such a situation, the weight and strength of the backfill above the pipe is analyzed to confirm satisfactory resistance to the uplift forces. The normal factor of safety of 3 against soil failure is used in this analysis.

NAPS ESP COL 2.5-6

2.5.4.10.2 Settlement Analysis

The pseudo-elastic method of analysis was used for settlement estimates. This approach is suitable for the granular soils and bedrock at the site. The analysis is based on a stress-strain model that computes settlement of discrete layers:

$$\delta = \Sigma(\Delta p_i \times \Delta h_i)/E_i$$

where:

δ = settlement

i = 1 to n, where n is the number of layers

p_i = vertical applied pressure at cent of layer i

h_i = thickness of layer i

E_i = elastic modulus of layer i

The stress distribution below rectangular foundations is based on a Boussinesq-type distribution for flexible foundations (Reference 2.5-216). The computation extends to a depth where the increase in vertical stress (σ_z) due to the applied load is equal to or less than 10 percent of the applied foundation pressure. The Boussinesq-type vertical pressure under a rectangular footing, σ_z, is as follows (Reference 2.5-216):

$$\sigma_z = (p/2\pi)\{\tan^{-1}[lb/(zR_3)] + (lbz/R_3)(1/R_1^2 + 1/R_2^2)\}$$

where:

p = applied foundation pressure

l = length of footing

b = width of footing

z = depth below footing at which pressure is computed

$R_1 = (l^2 + z^2)^{0.5}$

$R_2 = (b^2 + z^2)^{0.5}$

$R_3 = (l^2 + b^2 + z^2)^{0.5}$

Settlement estimates were made using the preceding relationships and the concrete fill and rock properties given in Table 2.5-212. These estimates were made for each seismic category I and II structure, and are presented in Table 2.5-216, based on applied pressures from the foundations given in Table 2.5-215 and included in Table 2.5-216. The maximum estimated total settlement for any structure is about 0.049 in. This is also, conservatively, the maximum differential settlement within or between structures.

Note that the total and differential estimated settlements under the R/B foundation are within the limits stated in Table 2.0-201 by at least a factor of ten.

2.5.4.10.3 **Earth Pressures**

Static and seismic lateral earth pressures are addressed for plant below-ground walls. Both active and at-rest cases are included. Active earth pressure is used for temporary retaining walls installed to facilitate construction. For these, the earth pressure coefficients are Rankine values, assuming level backfill and a zero friction angle between the soil and the wall. At-rest earth pressures are used for basement walls. Hydrostatic pressures are based on the groundwater table being 1 ft below grade. This is conservative based on the predicted groundwater levels in the power block area summarized in Section 2.4.12. An area wide surcharge pressure of 500 psf is used. Lateral pressures due to compaction are not included; these pressures are controlled by compacting backfill with light equipment near structures. The soil properties used in the calculation of lateral earth pressures are from Table 2.5-212.

For the active lateral earth pressure case, earthquake-induced horizontal ground accelerations are addressed by the application of $k_h \cdot g$. Vertical ground accelerations ($k_v \cdot g$) are considered negligible and were ignored (Reference 2.5-217). The peak LF acceleration of 0.31g was used for developing the seismic active earth pressure diagram. Use of the peak high frequency acceleration was considered overly conservative given the low magnitude (energy) of this earthquake.

The method described in ASCE 4-98 Section 3.5.3.2 (Reference 2.5-218) can be used to estimate the dynamic component of seismic at-rest lateral earth pressure for the below-grade walls of the power block structures. Reference 2.5-218 provides an elastic solution that is demonstrated by a nomograph. In the nomograph, a dimensionless normalized in-situ lateral stress at 1.0g horizontal earthquake acceleration is developed for a normalized depth at a given Poisson's ratio. The appropriate site specific at-rest pressure is calculated from the nomograph at various depths intervals using the site-specific acceleration and Poisson's ratio.

Figure 2.5-229 through Figure 2.5-234 illustrate the stage of construction where excavation is complete and the basement walls are in place. Although not shown in the figures, structural backfill will be placed around the basement walls up to the final grade. Referring to, for example, Section B-B' in Figure 2.5-230, the temporary vertical wall on the left side of the figure will be used to facilitate construction. This wall will hold back the natural in-situ soil (Zone IIA and IIB saprolites) which will be in an active condition. Once structural backfill is placed between this temporary wall and the wall of the R/B, the backfill against the R/B wall will be in an at-rest condition since the R/B wall will not deflect. In this situation, the lateral earth pressures against the vertical excavation support wall can have some influence on the earth pressure against the RB wall. Thus, active earth pressures due to the Zone IIA and IIB saprolites are included here.

The lateral earth pressure diagrams for the active cases (including seismic) is given in Figure 2.5-253. The lateral earth pressure diagram (static only) for the at-rest case is shown in Figure 2.5-254. The seismic component of the at-rest lateral earth pressure is presented in more detail in Appendix 3NN. A typical seismic lateral earth pressure diagram (based on the Reference 2.5-218 method) is shown in Figure 3NN-22. Figure 3NN-22 also includes plots of the site-specific total lateral earth pressure and the standard plant total lateral earth pressure (which include both the static and dynamic components). All of these figures show lateral pressures at about 40 ft depth, i.e., at about the bottom of the R/B (and the PS/B).

Note that the lateral pressures in Figures 2.5-253 and 2.5-254 are BE pressures with a factor of safety of 1. Appropriate safety factors need to be incorporated into the wall structural design. The factor of safety against a gravity wall or structure foundation sliding is normally taken as 1.1 when seismic pressures are included. The same factor of safety is applied against a wall overturning.

2.5.4.11 **Design Criteria**

NAPS ESP COL 2.5-7

Applicable design criteria are covered in various sections. The criteria summarized below are geotechnical criteria and also geotechnical-related criteria that pertain to structural design.

Section 2.5.4.8 specifies that the acceptable factor of safety against liquefaction of site soils is ≥1.1.

Bearing capacity and settlement criteria are presented in Section 2.5.4.10. Table 2.5-215 provides allowable bearing capacity values for the seismic category I and II structures. A minimum factor of safety of 3 is used when applying bearing capacity equations. This factor of safety is also applied against breakout failure due to uplift forces on buried piping.

Section 2.5.4.10 also discusses factors of safety related to lateral earth pressures. The lateral pressures shown in Figures 2.5-253 and 2.5-254 have a factor of safety of 1. A factor of safety of 1.1 should be used in the analyses of sliding and overturning due to these lateral loads when the seismic component is included.

Section 2.5.5.2 specifies that the minimum acceptable long-term static factor of safety against slope stability failure is 1.5. Section 2.5.5.3 specifies that the minimum acceptable long-term seismic factor of safety against slope stability failure is 1.1.

2.5.4.12 **Techniques to Improve Subsurface Conditions**

NAPS ESP COL 2.5-8

For Unit 3, any Zone IIA and Zone IIB saprolite beneath or within the zone of influence of seismic category I or II structures is removed and replaced with concrete fill. Improvement of the Zone IIA saprolite as described SSAR Section 2.5.4.12 is suitable for non-Seismic (NS) Category I and II structures.

Zones of weathered or fractured rock encountered immediately beneath the R/B, PS/B and PSFSV foundations are removed and replaced with concrete.

Appendix 2.5.4AA MACTEC Geotechnical Data Report, Rev. 1; September 28, 2007

Volume 1: Text, Figures, Tables and Appendices A and B

Volume 2: Appendices C and D

Volume 3: Appendix E

Appendix 2.5.4BB MACTEC Geotechnical Exploration and Testing Supplement 1, 2009

Appendix 2.5.4CC MACTEC Geotechnical Exploration and Testing Supplement 2, 2010

2.5.5 Stability of Slopes

NAPS COL 2.5(1)

The information needed to address DCD COL Item 2.5(1) is included in the following sections.

SSAR Section 2.5.5 is incorporated by reference with the following variances and/or supplements.

NAPS ESP VAR 2.5-1

SSAR Section 2.5.5 addressed the stability of slopes at the North Anna ESP site. However, the information presented in this FSAR section replaces the analyses presented in SSAR Section 2.5.5 because the slopes being considered have changed, and, for the seismic slope stability analysis, the PGA being applied is different. The method of analysis remains essentially the same. In summary, the slopes considered herein are lower, less steep, and have a smaller applied seismic acceleration than the slopes analyzed in SSAR Section 2.5.5. As a result, the slopes addressed in this section have a higher computed factor of safety against failure, and are stable under both long-term static and short-term seismic conditions.

This section presents information on the stability of permanent slopes at the Unit 3 site. The information was developed from a review of reports prepared for the existing units and the originally planned Units 3 and 4, geotechnical literature, the ESP subsurface investigation, and the Unit 3 subsurface investigation. The review included the site-specific reports from the UFSAR (SSAR Reference 5), and reports prepared by Dames and Moore regarding the design and construction of the existing units (SSAR Reference 7) and the originally planned Units 3 and 4 (SSAR Reference 8).

a. **Description of Slopes**

The grading plan for Unit 3 is shown in Figure 2.5-255. The design plant grade for the power block area is at Elevation 88.4 m (290 ft) with elevations around the perimeter of this area ranging from about Elevation 288 ft to 278 ft to allow for adequate surface drainage. The vertical datum is with reference to NAVD88 and directions are with reference to Plant North throughout Section 2.5.5, unless stated otherwise. To the south and southwest of the turbine building, going towards the existing Units 1 and 2, ground surface elevation reduces at a 5 percent slope down to the transformers and then at an 11 percent slope down to the plant access road. Stormwater management Pond #1 is between this access road and the boundary of Units 1 and 2 with yard grade at Elevation 82.3 m (270 ft). To attain these Unit 3 ground elevations, there is cut in the power block area. The cut reaches up to 12.2 m (40 ft) in the area of the UHSRS. However, as existing grade falls off towards the south and southwest of the power block area, there is as much as 6.1 m (20 ft) of fill needed around portions of the south and west ends of the turbine building. As much as 9.1 m (30 ft) of fill is provided to bring grade up to the planned ground surface in the area of the originally planned Units 3 and 4, where ground level is presently at around Elevation 76.2 m (250 ft).

All of the Seismic Category I and II structures at Unit 3 are founded directly on Zone III, Zone III-IV, or Zone IV rock or on concrete fill placed on rock. This is illustrated in the cross sections shown in Figures 2.5-229 through 2.5-234. The locations of these cross sections are shown in Figure 2.5-221. The concrete fill has a minimum strength of 2500 psi. Thus, there are no slopes that contribute to the support of any Unit 3 Seismic Category I and II structure or any other major power block structure.

The only slopes that could impact Unit 3 are cut slopes that surround and ascend from the northern and western edges of the plant, comprising existing and new cut slopes. As discussed in Section 2.5.5b, material from sloughing or collapse of certain of these slopes could impact adjacent facilities.

The existing slopes (see Slope ES in Figure 2.5-255, or refer to Section 2.5.5.1.1) run in a southwesterly direction, to the west of the originally planned Units 3 and 4 and existing Units 1 and 2. These slopes were excavated during construction of Units 1 and 2. Based on previous topographic maps, this slope was described in the SSAR as a 2h:1v slope, 55 ft high. A more recent topographic survey performed for Unit 3 shows that the slope is actually about 2.4h:1v with a maximum height of 52 ft (from Elevation 271 ft to Elevation 323 ft). Based on the final grade for Unit 3, the maximum height of this existing slope within the vicinity of any new structures is west of the IRSF, where the height is about 43 ft (from Elevation 280 ft to Elevation 323 ft).

The new cut slopes are north of the power block (see Slope I-I in Figure 2.5-255, or refer to Section 2.5.5.1.2), and as the slopes turn to the west, they merge into the existing slopes. These new slopes are cut at a 3-horizontal to 1-vertical (3h:1v) slope into the existing natural ground surrounding the plant, with a 4.6 m (15 ft) wide bench constructed at about 6.1 m (20 ft) height from the bottom of the slope. These slopes reach a maximum height of 40 ft (from Elevation 290 ft up to Elevation 330 ft) north of the plant, immediately north of the UHSRS. A typical maximum-height cross-section through this slope is shown as Slope I-I in Figure 2.5-255. As the slope turns from north of the UHSRS to west of the UHSRS, it reduces in height to about 34 ft (from Elevation 288 ft up to Elevation 322 ft).

The maximum depth of the storm water management Pond #1 to the south and southwest of the main plant area is 18 ft (from Elevation 278 ft down to Elevation 260 ft). This pond is cut at a 3h:1v slope.

SSAR Section 2.5.5 refers to slopes resulting from the nonsafety-related deepened intake channel. In fact, the intake channel for Unit 3 will not be deepened, and thus there will be no new slopes associated with the intake channel.

As shown in Figures 2.5-229 through 2.5-231 and Figures 2.5-233 and 2.5-234, temporary excavation for Unit 3 construction will be performed using vertical walls.

b. **Impact of Slope Instability**

Instability of the storm water management pond sides does not impact the safety of the plant, nor any of the other plant structures, therefore these slopes are not addressed further here. Failure of any temporary slope or excavation created for construction of the plant cannot adversely affect the safety of the nuclear power plant facilities, and likewise are not addressed further here.

The existing 2.4h:1v slope (Slope ES) was excavated during construction of the Units 1 and 2, and is almost entirely in cut material. The top of this slope is about 61 m (200 ft) from the top of the existing service water reservoir (SWR) embankment, and thus any potential instability of the slope will have no impact on the stability of the SWR embankment. However, material from sloughing or collapse of these slopes could potentially impact the IRSF, although the nearest point of the building is about 33.5 m (110 ft) from the bottom of the slope. Slope ES is a representative section along the approximately 215 m (700 ft) length of the existing slope.

Instability of the new 3h:1v slope north of the UHSRS (Slope I-I) does not impact the foundation stability of these Seismic Category I facilities since the facilities are founded on concrete fill on bedrock. However, material from sloughing or collapse of this slope could potentially impact the facility, even though the base of this new 40 ft high slope is about 115 ft from the UHSRS. As can be seen from Figure 2.5-255, the new slopes that extend to the west of Slope I-I and then south to the administration building, are not only slightly lower than Section I-I, but are also appreciably farther away from the farthest west of the UHSRS. Thus, Slope I-I is considered the critical slope in the area.

NAPS ESP COL 2.5-11 The stability of the existing slope closest to the IRSF (Slope ES), and the stability of the new slope closest to the UHSRS are addressed in the following subsections.

2.5.5.1 Slope characteristics

2.5.5.1.1 Existing Slope Characteristics

The location and direction of the existing 13.1 m (43 ft) high, 2.4h:1v slope to the southeast of the Units 1 and 2 SWR (Slope ES) is shown in plan view in Figure 2.5-255; the location is also shown in the photograph in SSAR Figure 2.5-66. The photograph in SSAR Figure 2.5-67 shows the existing slope clearly, descending from the SWR to close to the excavation for the originally planned Unit 3 and 4 containment buildings. The structure behind the slope on the SWR embankment is the Units 1 and 2 valve house, which was initially designed to be the originally planned Units 3 and 4 pump house. An approximate cross-section through the existing slope is shown in Figure 2.5-256.

As shown in Figures 2.5-255 and 2.5-256, a boring (B-18) was drilled close to the toe of the slope. This boring was made for the Units 1 and 2 investigation. During the Unit 3 subsurface investigation, CPT C-915 was performed near to the top of the slope. Also during the Unit 3 investigation, boring B-947 was drilled to the northeast of C-915, but at a similar elevation within the same original terrain as C-915. CPT C-916 and observation well OW-947 were located adjacent to B-947. The locations of boring B-18 and CPT C-915 are included in Figure 2.5-256, along with the ground water level measured in OW-947. The boring and CPT logs are presented in Section 2.5.5.3.

2.5.5.1.2 New Slope Characteristics

NAPS ESP COL 2.5-11 The location of the new 40 ft high, 3h:1v slope north of the UHSRS (Slope I-I) is shown in plan view in Figure 2.5-255. A cross-section through the new slope is shown in Figure 2.5-257. As shown in Figure 2.5-255, boring B-929 was drilled during the Unit 3 subsurface investigation in a location that would be just above the 4.6 m (15 ft) wide berm in the final slope configuration. The boring log is presented in Section 2.5.5.3.

2.5.5.1.3 Slope Subsurface Conditions

The site soils and bedrock are described in detail in Section 2.5.4.2.2. As can be seen from Figures 2.5-256 and 2.5-257, the materials in the existing and new slopes, respectively, consist mostly of Zone IIA saprolites. Saprolites are a further stage of weathering beyond weathered rock. They have been derived by in-place disintegration and decomposition and have not been transported. Saprolites are classified as soils but still contain the relict structure of the parent rock, and they also typically still contain some core stone of the parent rock. The North Anna saprolites in many instances maintain the foliation (banded texture) characteristics of the parent rock. The majority of the saprolites in the Unit 3 area are classified as silty sands, although there are also sands, clayey sands, sandy silts, clayey silts and clays, depending very much on their degree of weathering. The fabric is strongly anisotropic. The texture shows angular geometrically interlocking grains with a lack of void network, very unlike the well-pronounced voids found in marine or alluvial sands and silts. The Zone IIA saprolites comprise a large majority of the saprolitic materials onsite. Most of the saprolites obtained from the borings in the slope area are medium dense to dense silty sands. The underlying Zone IIB saprolites are generally very dense silty sands.

Boring B-18 in Figure 2.5-256 indicates top of bedrock levels rising significantly towards the toe of the existing slope, with top of weathered rock close to the slope surface at the B-18 location at around Elevation 88.4 m (290 ft). This is consistent with the top of bedrock levels shown in Figure 2.5-2, from SSAR Reference 5. For the new slope shown in Figure 2.5-257, the top of weathered rock at the B-929 location is at about Elevation 265 ft and ranges from about Elevation 77.7 m (255 ft) to Elevation 82.3 m (270 ft) in the Figure 2.5-257 section. The bedrock at North Anna ranges from moderately to severely weathered (Zone III) as encountered below the saprolite in B-18 and B-929, to fresh to slightly weathered (Zone IV) at greater depths. The bedrock throughout the North Anna site is classified as a gneiss, which is a metamorphic rock that exhibits foliation in which light and dark bands alternate. It is composed of feldspar, quartz, and one or more other minerals such as mica and hornblende.

The engineering properties of the site soils and bedrock are described in Section 2.5.4.2.5 and are tabulated in Table 2.5-212. These properties are based on extensive field and laboratory testing described in Section 2.5.4.2.

The liquefaction characteristics of all of the Zone IIA saprolites are thoroughly examined in Section 2.5.4.8. That section concludes that the results of the liquefaction analysis indicate that only a very limited amount of the Zone IIA saprolitic soil has a potential for liquefaction based on the Unit 3 seismic parameters. The liquefaction analysis did not take into account the beneficial effects of structure, fabric, and mineralogy of the saprolitic soils.

Details of the soils encountered in the new and existing slopes are outlined in the following paragraphs.

New Slope Subsurface Conditions

Boring B-929, on the new slope, indicates a predominantly silty sand profile, with the top 5 ft being clayey sand (boring logs are presented in Section 2.5.5.3). (Boring B-929A was drilled adjacent to B-929 to obtain intact samples.) Grain size analyses performed on 9 samples ranging in depth from 2.5 ft to 54 ft (see Section 2.5.5.3) showed fines contents varying from about 17 to 44 percent, with a median of about 21 percent. The bottom 18 ft of soil has a measured SPT N-value of over 50 blows/0.3 m (1 ft), which is characteristic of Zone IIB saprolite. The overlying soils are Zone IIA saprolites.

For stability analyses of the new slope presented in Section 2.5.5.2, based on the results of B-929, the new slope has the properties of Zone IIA silty sand saprolite given in Table 2.5-212 down to about 46 ft below existing ground level. The bottom 18 ft of saprolite above weathered rock has the Zone IIB saprolite properties given in Table 2.5-212.

Existing Slope Subsurface Conditions

Boring B-18 provides information on the subsurface materials at the toe of the slope, namely, weathered rock. There are no borings at or near the top of the slope, only CPT C-915. However, as noted in Section 2.5.5.1.1, boring B-947 was drilled to the northeast of C-915, but at a similar elevation within the same original terrain as C-915. B-947 shows a very similar profile to B-929, i.e., predominantly silty sands. Grain size analysis conducted on 10 samples ranging from 5 ft depth to 43 ft depth from B-947 showed fines contents with a median of about 29 percent. The log of CPT C-915 is similar to the log of CPT C-916 (immediately adjacent to B-947) and indicates a mainly silty clay and clay profile, in contrast with the actual silty sand samples obtained from B-947. CPTs provide valuable information on the soil by measuring cone tip resistance, sleeve friction, and pore-water pressure at very closely-spaced depth intervals throughout the soil profile. However, no samples were obtained with the CPT and so there is no direct evidence of the type of soil being measured. Instead, the soil type is selected based mainly on the friction ratio, which is the ratio, expressed as a percentage, of the measured sleeve friction to the tip resistance. The interpretation of soil type from friction ratio is empirical, based on historical correlations between ratio and soil type identified from adjacent borings. However, like most empirical correlations in geotechnical engineering, it is not exact for all soil types, and this was the case in C-916 (and presumably C-915). Thus, the silty sand profile in B-947 was the profile used in the slope stability analysis of the existing slope.

For the stability analysis of the existing slope presented in Section 2.5.5.2, As noted above, the existing slope has the properties of Zone IIA silty sand saprolite given in Table 2.5-212. This material extends down to about 53 ft below the ground level at the top of the slope. The thickness of Zone IIB saprolite below the Zone IIA material becomes less towards the toe of the slope and this layer eventually pinches out as the top of weathered rock rises, as postulated in Figure 2.5-256. The Zone IIB saprolite and the weathered rock have the properties given in Table 2.5-212.

2.5.5.1.4 **Slope Phreatic Surface**

The phreatic surfaces shown in Figure 2.5-256 for the existing slope (ES) and in Figure 2.5-257 for the new slope (I-I) have been developed from the water table levels measured in OW-947 and derived in Section 2.4.12. The depth of this phreatic surface precludes any potential for liquefaction of the near-surface soils in the slope.

2.5.5.2 Design Criteria and Analyses

2.5.5.2.1 Required Factor of Safety

Minimum required factors of safety for stability of slopes under long-term static (non-seismic) loading and for dynamic (seismic) loading are 1.5 and 1.1, respectively.

2.5.5.2.2 Stability of Existing Slope

The photograph in SSAR Figure 2.5-67 of the existing 2.4h:1v slope to the southeast of the SWR was taken over 20 years ago. The condition of the slope is essentially the same today. It was thoroughly inspected during the ESP site investigation. The slope shows no signs of distress.

2.5.5.2.3 Analysis of Existing Slope

The static and dynamic stability of existing Slope ES to the southeast of the SWR was analyzed using the computer program SLOPE/W (Reference 2.5-219).

a. **Long-Term Static Analysis**

The SLOPE/W Program uses the Bishop method of slices (SSAR Reference 185) for analysis of the long-term static condition. As noted in Section 2.5.5.1.3, the analysis assumed the saprolite was predominantly coarse grained. The effective strength parameters given in Table 2.5-212 are an angle of internal friction ϕ' = 33 degrees and effective cohesion c' = 6.0kPa (0.125 ksf) for the Zone IIA saprolite and ϕ' = 40 degrees and effective cohesion c' = 0 kPa (0 ksf) for the Zone IIB saprolite. The underlying weathered rock used c = 3350 kPa (70 ksf), approximately half of the value for unconfined compressive strength given in Table 2.5-212.

The input to the analysis and the results are shown in Figure 2.5-258. The computed factor of safety is 2.09. This value is above the minimum 1.5 factor of safety required.

b. **Seismic Slope Stability Analysis**

NAPS ESP COL 2.5-10 The pseudo-static approach is used as a first approximation for the seismic analysis of slopes. In this approach, the horizontal and vertical seismic forces are assumed to act on the slope in a static manner, that is, as a constant static force. This is an obviously conservative approach, since the actual seismic event occurs for only a short period of time, and during that time, the forces alternate their direction at a relatively high frequency. Also, the pseudo-static analysis tends to be run using the peak seismic acceleration; the mean acceleration during the design seismic event can be significantly less than the peak value. A pseudo-static analysis using peak acceleration values can be a useful tool in a limit analysis where the peak acceleration is relatively low. In such analyses, the computed factor of safety may well exceed the minimum of 1.1, thus requiring no further analysis. However, where the peak seismic acceleration values are high, the pseudo-static analysis produces unreasonably low safety factor values.

The pseudo-static analysis was run on the existing 13.1 m (43 ft) high slope (Slope ES) using SLOPE/W with the Bishop method of slices. For the LF earthquake, the peak horizontal acceleration used was about 0.23g. This is the average peak acceleration in the top 13.1 m (43 ft) of soil shown in Table 2.5-217. (The maximum horizontal acceleration is 0.31g at the ground surface.) The vertical acceleration used was about 0.115g. The computed factor of safety was 1.29, more than the minimum 1.1 required. For the high frequency earthquake, the equivalent peak horizontal acceleration used was 0.50g with a vertical acceleration of 0.25g. The maximum horizontal acceleration is 0.56g at the ground surface. The computed factor of safety was about 0.90, less than the minimum 1.1 required. The input to the analysis, and the results, are shown in Figure 2.5-259 for the LF earthquake and Figure 2.5-260 for the HF earthquake.

Seed (SSAR Reference 186), in the 19th Rankine Lecture, addressed the over-conservatism intrinsic in the pseudo-static analysis. He looked at the more rational approach proposed by Newmark (SSAR Reference 187), where the effective acceleration time-history is integrated to determine velocities and displacements of the slope. He also examined dams in California that had been subjected to seismic forces, including several dams that survived the 1906 San Francisco earthquake. Based on his studies, he concluded that for embankments that consist of materials that do not tend to build up large pore pressures or lose significant percentages of their shear strength during seismic shaking, seismic coefficients of only 0.15g are adequate to ensure acceptable embankment performance for earthquakes up to Magnitude M = 8.25 with PGAs of 0.75g. For earthquakes in the range of M = 6.5, Seed recommends a horizontal seismic coefficient of only 0.1g with a vertical seismic coefficient of zero. Note that it is the magnitude of the earthquake that determines the acceleration to be used here; magnitude is not part of the input to the pseudo-static analysis.

The liquefaction analysis of the Zone IIA saprolite indicated that only a very limited amount of the material has a potential for liquefaction. Also, because of its age, fabric and interlocking angular grain structure, this material does not lose a significant proportion of its shear strength during shaking. Thus, for the LF earthquake, with a design Magnitude M = 7.2, based on Seed's conclusions, the pseudo-static analysis should be limited to a horizontal acceleration of 0.15g. A pseudo-static design using an inertia force of 0.1g is adequate for the high frequency earthquake with M = 5.4.

The pseudo-static analysis was run again using SLOPE/W. This time the horizontal accelerations used were 0.1g and 0.15g, with zero vertical acceleration. The computed factors of safety were 1.63 and 1.47, respectively, greater than the minimum 1.1 required. The input to the analysis, and the results, for the 0.1g and 0.15g cases are shown in Figure 2.5-261 and 2.5-262, respectively.

Other researchers have also recommended substantially reducing the peak acceleration when applying the pseudo-static analysis. Kramer (SSAR Reference 188) recommends using an acceleration of 50 percent of the peak acceleration. For the LF earthquake, where the average peak acceleration in the top 13.1 m (43 ft) is about 0.23g, the horizontal input using Kramer's recommendations was about 0.113g and the vertical input was about 0.057g. This results in a factor of safety of 1.59. Using the average peak acceleration for the HF earthquake in the top 13.1 m (43 ft) of 0.50g, the horizontal input using Kramer's recommendation was 0.25g and the vertical input was 0.125g. This level of input provides a factor of safety against slope failure of 1.24. Thus the low and high frequency inputs give factors of safety above the minimum 1.1 required. The input to the analysis, and the results, for the LF and HF cases are shown in Figure 2.5-263 and 2.5-264, respectively.

In the preceding analyses (both long-term static, and seismic), the only case that gave a factor of safety lower than the required minimum was the pseudo-static analysis using the high frequency peak acceleration. As noted above, the pseudo-static analysis does not take into account the frequency of the motion nor the magnitude of the earthquake. For high frequency, low magnitude earthquakes, (as is the case at North Anna) the pseudo-static analysis is particularly conservative. Thus, it is concluded that the existing 2.4h:1v slope to the southeast of the SWR remains stable under long-term static and design seismic conditions.

2.5.5.2.4 Analysis of New Slope

The static and dynamic stability of the new 40 ft high 3h:1v slope (Slope I-I) to the north of the UHSRS was analyzed using the computer program SLOPE/W (Reference 2.5-219).

a. **Long-Term Static Analysis**

The SLOPE/W Program uses the Bishop method of slices (SSAR Reference 185) for analysis of the long-term static condition. As noted in Section 2.5.5.1.3, the properties assumed for the Zone IIA and Zone IIB saprolite are the same as those for the existing slope that was analyzed.

The input to the analysis and the results are shown in Figure 2.5-265. The computed factor of safety is 2.80. This value is above the minimum 1.5 factor of safety required.

b. **Seismic Slope Stability Analysis**

NAPS ESP COL 2.5-10

The pseudo-static analysis was run on the new 40 ft high slope using SLOPE/W with the Bishop method of slices. For the LF earthquake, the average peak horizontal acceleration in the top 40 ft used was about 0.22g with a vertical acceleration of about 0.11g. (The maximum horizontal acceleration is 0.31g at the ground surface.) The computed factor of safety was 1.45, greater than the minimum 1.1 required. For the high frequency earthquake, the peak horizontal acceleration used was about 0.54g. This is the average peak horizontal acceleration in the top 40 ft of soil shown in Table 2.5-217. (The maximum horizontal acceleration is 0.56g at the ground surface.) The vertical acceleration used was about 0.27g. The computed factor of safety was 0.85, less than the minimum 1.1 required. The input to the analysis, and the results, for the LF and HF cases are shown in Figure 2.5-266 and 2.5-267, respectively.

The pseudo-static analysis was run again using SLOPE/W and Seed's (SSAR Reference 186) approach described in Section 2.5.5.2.3. Again the horizontal accelerations used were 0.1g and 0.15g for the high and LF cases, respectively, with zero vertical acceleration. The computed factors of safety were 2.05 and 1.81, respectively, greater than the minimum 1.1. The input to the analysis, and the results, for the 0.1g and 0.15g cases are shown in Figure 2.5-268 and 2.5-269, respectively.

The pseudo-static analysis was then run using SLOPE/W and Kramer's (SSAR Reference 188) recommendations described in Section 2.5.5.2.3. For the LF earthquake, where the average peak acceleration in the top 40 ft is about 0.22g, the horizontal input using Kramer's recommendations was about 0.11g and the vertical input was about 0.055g. Using the average peak acceleration for the HF earthquake in the top 40 ft of about 0.54g, the horizontal input using Kramer's recommendation was 0.27g and the vertical input was 0.135g. These levels of input provide a factor of safety against slope failure of 1.92 and 1.32 for the low and high frequency cases, respectively, greater than the minimum 1.1 required. The input to the analysis, and the results, for the LF and HF cases are shown in Figure 2.5-270 and 2.5-271, respectively.

The results of the stability analyses for the new slope are similar to those for the existing slope, and the conclusion about stability is the same, i.e., the new 3h:1v slope to the north of the UHSRS remains stable under long-term static and design seismic conditions.

2.5.5.3 Logs of Borings

2.5.5.3.1 Boring Logs

As noted in Section 2.5.5.1, boring B-18 was drilled close to the toe of the existing 2.4h:1v slope to the southeast of the SWR, and boring B-947 was drilled to the northeast of the existing slope. B-929 was drilled on the proposed new 3h:1v slope immediately north of the UHSRS. The log of boring B-18 is reproduced in Figure 2.5-272 and the logs of borings B-929 and B-947 are reproduced in Figure 2.5-273a.

2.5.5.3.2 CPT Logs

As noted in Section 2.5.5.1, CPT C-915 was drilled close to the top of the existing 2.4h:1v slope to the southeast of the SWR and CPT C-916 was drilled adjacent to B-947 to the northeast of the existing slope. The logs of CPTs C-915 and C-916 are reproduced in Figures 2.5-274 and 2.5-275, respectively.

2.5.5.3.3 Observation Wells

As noted in Section 2.5.5.1, observation well OW-947 was installed adjacent to boring B-947 to the northeast of the existing 2.4h:1v slope. The log of OW-947 is reproduced in Figure 2.5-276. Water levels measured in this well over a 12-month period are shown in Table 2.5-218.

2.5.5.3.4 Laboratory Test Results

The grain size tests results for the saprolites in borings B-929 and B-947 and noted in Section 2.5.5.1 are provided in Table 2.5-219. Details of these test results are provided in Appendix 2.5.4AA.

2.5.5.4 Compacted Fill

The existing 2.4h:1v slope and the new 3h:1v slopes described and analyzed in the previous sections are cut slopes and do not contain fill materials in any significant quantity.

2.5.5.5 Conclusions

Existing slopes and embankments that are not impacted by Unit 3 (such as the SWR embankments) do not require analysis for Unit 3 and are not addressed here. New slopes, such as in storm water management Pond #1 that will not impact the safety of the plant or any other structure if they fail also do not require analysis and are not addressed here. Failure of any temporary slope or excavation created for construction of Unit 3 cannot adversely affect the safety of Unit 3; consequently, this is not addressed further here.

The only existing slope which, by its failure, could potentially adversely affect the safety of Unit 3, because of its proximity, is the 13.1 m (43 ft) high, 2.4h:1v slope that descends from southeast of the SWR down to west of the existing excavation made for the originally planned Units 3 and 4. The slope is made almost entirely in cut material. The stability of this existing slope was analyzed using the computer program SLOPE/W. The only case that gave a factor of safety lower than the required minimum was the pseudo-static analysis using the high frequency peak acceleration. This analysis does not take into account the frequency of the motion or the magnitude of the earthquake. For high frequency, low magnitude earthquakes, (as is the case at North Anna) the pseudo-static analysis is particularly conservative. Thus, based on less conservative analyses, it is concluded that this slope remains stable under long-term static and design seismic conditions.

The results of the stability analyses for the new 3h:1v slope to the north of the UHSRS are similar to those for the existing slope described above, and the conclusion about stability is the same, i.e., the new slope remains stable under long-term static and design seismic conditions.

2.5.6 Embankments and Dams

NAPS COL 2.5(1)

SSAR Section 2.5.6 is incorporated by reference with the following supplement.

This SSAR section is supplemented as follows with a new paragraph on Unit 3 embankments and dams.

Because Lake Anna is only used as a source of makeup water for Unit 3, the North Anna Dam, which is designed and constructed to meet requirements for a Seismic Category I structure in support of the existing Units 1 and 2, was not re-analyzed as part of this FSAR. Construction of Unit 3 does not adversely affect the slopes of the SWR for Units 1 and 2. There is an existing slope to the plant southeast of the SWR and a new slope to the plant north of the UHSRS. These slopes are described and analyzed in Section 2.5.5.

2.5.7 Combined License Information

Replace the content of DCD Subsection 2.5.6 with the following.

NAPS COL 2.5(1)

2.5(1) ***Seismic and Geological Characteristics of the Site and Region***

This COL item is addressed in Sections 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, and 2.5.6.

Section 2.5 References

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NAPS COL 2.5(1)
NAPS ESP VAR 2.0-4

Table 2.5-201 Horizontal Ground Motion Response Spectrum Amplitudes, V/H Spectral Ratios, and Resulting Vertical Ground Motion Response Spectrum Amplitudes at Selected Frequencies

Frequency [Hz]	Horizontal GMRS [g]	V/H Spectral Ratio[a]	Vertical GMRS [g]
0.1	0.00414	0.75	0.00311
0.125	0.00598	0.75	0.00448
0.15	0.00807	0.75	0.00605
0.2	0.01295	0.75	0.00971
0.3	0.0230	0.75	0.01727
0.4	0.0339	0.75	0.0254
0.5	0.0451	0.75	0.0339
0.6	0.0502	0.75	0.0376
0.7	0.0545	0.75	0.0409
0.8	0.0585	0.75	0.0439
0.9	0.0622	0.75	0.0467
1	0.0659	0.75	0.0494
1.25	0.0833	0.75	0.0625
1.5	0.1026	0.75	0.0769
2	0.1499	0.75	0.1124
2.5	0.1821	0.75	0.1366
3	0.210	0.75	0.1574
4	0.284	0.75	0.213
5	0.382	0.75	0.286
6	0.453	0.75	0.340
7	0.522	0.75	0.391
8	0.595	0.75	0.446
9	0.667	0.75	0.500
10	0.744	0.75	0.558

NAPS COL 2.5(1)
NAPS ESP VAR 2.0-4

Table 2.5-201 Horizontal Ground Motion Response Spectrum Amplitudes, V/H Spectral Ratios, and Resulting Vertical Ground Motion Response Spectrum Amplitudes at Selected Frequencies

12.5	0.935	0.77[b]	0.721
15	1.116	0.79[b]	0.879
20	1.337	0.83[b]	1.104
25	1.328	0.88	1.169
30	1.233	0.94[b]	1.155
35	1.143	0.98[b]	1.121
40	1.101	1.04[b]	1.148
45	1.077	1.10[b]	1.187
50	1.049	1.12[b]	1.180
60	0.886	1.14[b]	1.007
70	0.752	1.13[b]	0.848
80	0.648	1.09[b]	0.706
90	0.579	1.04[b]	0.600
100	0.535	1.00	0.535

a. From SSAR Reference 171
b. V/H ratios calculated by log-log interpolation

Table 2.5-202 [Deleted]

Table 2.5-203 [Deleted]

Table 2.5-204 [Deleted]

NAPS COL 2.5(1)

Table 2.5-205 Borehole Information

Boring Number	Coordinates (ft)		Ground Surface Elevation (ft)	Penetration Depth (ft)
	Northing	Easting		
B-901	3,909,777.72	11,685,928.59	309.42	300.0
B-902	3,909,874.19	11,685,884.28	302.20	201.7
B-903	3,909,812.10	11,686,028.80	301.59	151.0
B-904	3,909,692.47	11,685,970.43	316.75	151.7
B-905	3,909,732.86	11,685,821.97	306.75	150.4
B-906	3,909,670.03	11,685,795.34	311.72	150.5
B-907	3,909,607.90	11,685,938.35	322.71	200.5
B-908	3,909,716.65	11,686,060.89	307.71	151.4
B-909	3,909,695.46	11,686,107.40	304.90	201.9
B-910	3,909,667.63	11,685,883.11	316.54	148.4
B-911	3,909,919.91	11,685,992.68	299.79	101.0
B-911A	3,909,916.04	11,686,000.53	299.91	21.7
B-912	3,910,021.70	11,686,051.36	275.10	151.6
B-913	3,910,148.50	11,686,114.71	273.37	100.9
B-914	3,909,939.55	11,685,922.35	297.45	200.5
B-915	3,909,877.48	11,686,088.55	301.79	112.8
B-916	3,910,049.54	11,686,008.70	276.24	100.3
B-917	3,910,160.68	11,686,029.45	274.85	150.8
B-918	3,910,115.28	11,686,194.05	272.13	150.1
B-919	3,909,575.39	11,685,764.67	317.79	76.2
B-920	3,909,545.07	11,685,980.20	327.17	150.7
B-921	3,909,680.19	11,686,162.71	307.96	73.9
B-921A	3,909,686.89	11,686,161.68	307.39	40.4
B-922	3,909,943.65	11,686,232.99	271.30	26.5
B-922A	3,909,949.30	11,686,244.02	271.33	76.5
B-923	3,910,076.97	11,686,309.48	272.00	75.4
B-924	3,909,969.53	11,686,475.40	271.52	75.6
B-925	3,910,036.67	11,686,576.27	270.01	75.8

NAPS COL 2.5(1)

Table 2.5-205 Borehole Information

Boring Number	Coordinates (ft)		Ground Surface Elevation (ft)	Penetration Depth (ft)
	Northing	Easting		
B-926	3,910,043.20	11,685,709.26	289.03	155.5
B-927	3,909,966.07	11,685,878.59	292.51	100.4
B-928	3,910,222.75	11,686,159.07	272.17	75.2
B-928A	3,910,220.39	11,686,165.35	271.82	37.5
B-929	3,909,214.44	11,685,654.82	329.02	74.0
B-929A	3,909,214.15	11,685,665.51	329.03	52.5
B-930	3,909,275.95	11,685,842.87	326.12	123.6
B-931	3,910,152.94	11,685,921.54	278.52	74.0
B-932	3,910,444.31	11,686,415.70	249.88	35.1
B-933	3,909,827.41	11,685,790.97	296.48	100.2
B-933A	3,909,826.28	11,685,802.01	296.58	27.5
B-934	3,909,860.37	11,685,686.09	294.80	101.6
B-936	3,910,745.87	11,685,929.15	286.56	100.7
B-937	3,910,688.52	11,686,672.12	270.25	55.3
B-939	3,911,317.60	11,686,605.91	254.03	76.1
B-940	3,910,266.77	11,688,901.02	268.32	76.1
B-941	3,910,403.63	11,688,912.87	267.19	75.8
B-942	3,909,614.69	11,684,326.45	291.85	100.8
B-943	3,909,355.39	11,683,892.47	300.40	101.9
B-944	3,908,772.38	11,684,127.62	334.69	86.4
B-945	3,910,135.55	11,683,779.79	281.51	100.6
B-946	3,908,787.24	11,683,810.59	333.36	100.7
B-947	3,909,574.53	11,686,367.21	312.48	88.8
B-948	3,909,619.26	11,685,565.69	310.41	100.6
B-949	3,909,018.09	11,685,157.27	334.82	106.4
B-950	3,910,835.82	11,686,282.11	282.50	100.8
B-951	3,910,548.26	11,686,821.80	249.93	101.0

NAPS COL 2.5(1)

Table 2.5-205 Borehole Information

Boring Number	Coordinates (ft) Northing	Coordinates (ft) Easting	Ground Surface Elevation (ft)	Penetration Depth (ft)
Supplement 1				
W-1	3,909,853.0	11,685,959.0	306.2	154.0
W-2	3,909,822.0	11,685,864.0	298.4	143.3
W-3	3,909,714.5	11,685,899.0	312.3	150.7
W-4	3,909,749.0	11,686,002.0	311.9	150.6
W-5	3,909,978.5	11,686,141.5	273.0	100.4
W-6	3,909,830.5	11,686,205.5	301.9	123.9
W-7	3,909,730.5	11,686,146.5	303.1	151.2
W-8	3,909,767.5	11,686,273.0	307.8	150.6
W-9	3,909,600.5	11,686,022.0	320.2	151.0
W-10	3,909,598.5	11,685,820.0	319.1	153.0
Supplement 2				
M-1	3,909,611.0	11,685,483.5	314.1	151.1
M-2	3,909,531.0	11,685,586.0	315.3	153.4
M-3	3,909,538.5	11,685,678.5	313.9	152.6
M-4	3,909,456.0	11,685,694.5	321.8	154.0
M-6	3,909,401.0	11,685,759.5	327.8	150.4
M-7	3,909,504.0	11,685,835.5	326.0	151.5
M-8	3,909,413.5	11,685,847.0	329.3	150.6
M-9	3,909,333.5	11,685,946.0	327.3	153.6
M-10	3,909,243.5	11,685,962.0	323.6	201.9
M-11	3,909,351.5	11,686,038.5	325.9	148.7
M-12	3,909,723.0	11,685,560.0	307.0	151.2
M-13	3,909,519.5	11,686,025.0	326.8	151.6
M-14	3,909,451.5	11,686,111.0	323.8	60.3
M-15	3,909,531.0	11,686,166.0	311.3	60.0
M-16	3,909,989.5	11,685,801.5	284.6	61.9
M-17	3,909,775.0	11,686,213.5	306.2	151.9

NAPS COL 2.5(1)

Table 2.5-205 Borehole Information

Boring Number	Coordinates (ft)		Ground Surface Elevation (ft)	Penetration Depth (ft)
	Northing	Easting		
M-18	3,909,608.0	11,686,213.5	304.2	60.4
M-19	3,910,052.5	11,685,855.5	280.4	151.4
M-20	3,909,793.5	11,686,067.5	302.6	151.0
M-21	3,909,811.0	11,686,269.5	303.9	151.8
M-27	3,909,426.0	11,685,937.5	330.2	151.4
M-28	3,909,635.5	11,685,672.0	308.2	150.0
M-29	3,909,710.5	11,685,460.0	309.3	151.2
M-30	3,909,695.0	11,685,381.5	313.3	201.7
M-31	3,909,799.0	11,685,459.5	306.9	151.5
M-32	3,909,875.5	11,685,526.5	313.2	62.2
M-33	3,909,983.5	11,685,614.5	303.8	64.9
M-34	3,910,122.0	11,685,736.0	280.9	63.0

Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

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Table 2.5-206 Observation Well Information

Well Number	Coordinates (ft)		Surface Elev. (ft)	Depth (ft)	Elev. of Top of Screen (ft)	Screen Length (ft)
	Northing	Easting				
OW-901	3,909,772	11,685,917	309.6	108.0	214.6	10
OW-945	3,910,136	11,683,793	281.6	54.5	240.1	10
OW-946	3,908,788	11,683,823	334.0	43.4	303.6	10
OW-947	3,909,580	11,686,372	313.3	58.0	268.3	10
OW-949	3,909,025	11,685,153	335.7	105.0	243.2	0
OW-950	3,910,842	11,686,285	283.0	92.0	203.0	10
OW-951	3,910,521	11,686,786	249.7	67.0	194.6	10

Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

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Table 2.5-207 Information on the CPTs Performed

CPT Number	Coordinates (ft) Northing	Coordinates (ft) Easting	Ground Surface Elevation (ft)	Depth (ft)
C-901	3,909,627.77	11,686,012.67	318.56	20.0
C-902	3,909,552.59	11,685,842.21	323.66	29.0
C-903	3,909,719.02	11,685,775.66	306.84	29.0
C-904	3,910,026.29	11,685,793.52	283.92	35.5
C-905	3,910,137.61	11,685,857.21	279.29	45.6
C-906	3,910,013.77	11,686,269.94	270.75	2.6
C-907	3,910,174.67	11,686,277.14	271.66	13.1
C-908	3,910,326.76	11,686,187.39	271.91	28.1
C-909	3,909,346.74	11,685,717.77	330.26	60.0
C-910	3,909,154.43	11,685,782.42	326.99	25.1
C-911	3,910,716.79	11,685,941.76	286.69	15.3
C-912	3,909,959.42	11,686,349.77	271.16	2.8
C-913	3,910,999.95	11,686,812.54	268.65	20.0
C-914	3,910,360.20	11,688,917.62	267.86	31.0
C-915	3,909,784.60	11,686,794.40	320.92	54.0
C-916	3,909,584.68	11,686,372.70	312.91	49.1
C-917	3,909,337.29	11,686,293.79	320.37	49.2
C-918	3,909,151.49	11,685,509.11	329.55	25.1
C-919	3,909,154.30	11,685,255.41	338.06	25.1
C-920	3,909,071.70	11,685,870.40	324.73	25.1
C-921	3,910,112.20	11,685,717.17	281.10	30.0
C-922	3,909,889.28	11,684,055.95	311.73	20.3
C-923	3,910,107.49	11,683,828.42	283.03	22.2

Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS COL 2.5(1)

Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
B-901	309.4	309.4	279.9	269.5	229.4	174.4	0.0	0.0	29.5	39.9	80.0	135.0	0.0	29.5	10.4	40.1	55.0
B-902	302.2	302.2	283.0	283.0	-	278.4	0.0	0.0	19.2	19.2	-	23.8	0.0	19.2	0.0	4.6	-
B-903	301.6	301.6	281.9	279.0	220.8	185.6	0.0	0.0	19.7	22.6	80.8	116.0	0.0	19.7	2.9	58.2	35.2
B-904	316.8	316.8	288.3	270.0	235.1	195.1	0.0	0.0	28.5	46.8	81.7	121.7	0.0	28.5	18.3	34.9	40.0
B-905	306.7	306.7	286.8	282.9	271.4	176.2	0.0	0.0	19.9	23.8	35.3	130.5	0.0	19.9	3.9	11.5	95.2
B-906	311.7	311.7	282.8	276.8	262.0	176.2	0.0	0.0	28.9	34.9	49.7	135.5	0.0	28.9	6.0	14.8	85.8
B-907	322.7	322.7	287.7	283.7	207.2	177.2	0.0	0.0	35.0	39.0	115.5	145.5	0.0	35.0	4.0	76.5	30.0
B-908	307.7	307.7	280.7	245.0	-	241.3	0.0	0.0	27.0	62.7	-	66.4	0.0	27.0	35.7	3.7	-
B-909	304.9	304.9	275.9	248.0	225.0	195.0	0.0	0.0	29.0	56.9	-	81.9	0.0	29.0	27.9	25.0	-
B-910	316.5	316.5	294.5	274.5	226.1	-	0.0	0.0	22.0	42.0	90.4	-	0.0	22.0	20.0	48.4	-
B-911	299.8	299.8	282.8	278.8	268.7	233.8	0.0	0.0	17.0	21.0	31.1	66.0	0.0	17.0	4.0	10.1	34.9
B-911A	299.9	299.9	282.9	278.8	268.7	233.8	0.0	0.0	17.0	21.1	31.2	66.1	0.0	17.0	4.1	10.1	34.9
B-912	275.1	275.1	255.5	251.0	-	238.3	0.0	0.0	19.6	24.1	-	36.8	0.0	19.6	4.5	12.7	-
B-913	273.4	273.4	223.4	217.9	-	215.5	0.0	0.0	50.0	55.5	-	57.9	0.0	50.0	5.5	2.4	-
B-914	297.4	297.4	275.4	275.4	236.9	202.1	0.0	0.0	22.0	22.0	60.5	95.3	0.0	22.0	0.0	38.5	34.8
B-915	301.8	301.8	288.3	284.8	279.4	-	0.0	0.0	13.5	17.0	22.4	-	0.0	13.5	3.5	5.4	-
B-916	276.2	276.2	251.1	-	-	250.6	0.0	0.0	25.1	-	-	25.6	0.0	25.1	0.5	-	-
B-917	274.9	274.9	217.9	206.4	187.1	178.8	0.0	0.0	57.0	68.5	87.8	96.1	0.0	57.0	11.5	19.3	8.3
B-918	272.1	271.1	267.0	245.8	-	239.8	0.0	1.0	5.1	26.3	-	31.3	1.0	4.1	21.2	6.0	-
B-919	317.8	317.8	294.8	279.9	264.7	-	0.0	0.0	23.0	37.9	53.1	-	0.0	23.0	14.9	15.2	-

NAPS COL 2.5(1)

Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
B-920	327.2	324.8	289.2	274.2	-	221.5	0.0	2.4	38.0	53.0	-	103.3	2.4	35.6	15.0	52.7	-
B-921	308.0	308.0	260.0	236.2	-	-	0.0	0.0	48.0	71.8	-	-	0.0	48.0	23.8	-	-
B-921A	307.4	307.4	259.4	236.2	-	-	0.0	0.0	48.0	71.2	-	-	0.0	48.0	23.2	-	-
B-922	271.3	271.3	265.0	262.5	257.3	-	0.0	0.0	6.3	8.8	14.0	-	0.0	6.3	2.5	5.2	-
B-922A	271.3	271.3	271.3	263.1	254.8	209.8	0.0	0.0	0.0	8.2	16.5	61.5	0.0	0.0	8.2	8.3	45.0
B-923	272.0	269.2	266.8	-	266.8	260.3	0.0	2.8	5.2	-	5.2	8.9	2.8	2.4	0.0	-	6.5
B-924	271.5	271.1	265.0	265.0	252.9	227.9	0.0	0.4	6.5	6.5	18.6	43.2	0.4	6.1	0.0	12.1	25.0
B-925	270.0	270.0	253.0	-	249.6	213.7	0.0	0.0	17.0	-	20.4	56.3	0.0	17.0	3.4	-	35.9
B-926	289.0	289.0	235.0	235.0	225.2	179.5	0.0	0.0	54.0	54.0	63.8	109.5	0.0	54.0	0.0	9.8	45.7
B-927	292.5	292.5	268.5	-	252.7	217.9	0.0	0.0	24.0	-	39.8	74.6	0.0	24.0	15.8	-	34.8
B-928	272.2	272.2	244.2	235.1	220.1	212.0	0.0	0.0	28.0	37.1	52.1	60.2	0.0	28.0	9.1	15.0	8.1
B-928A	271.8	271.8	243.8	235.1	220.1	212.0	0.0	0.0	28.0	36.7	51.7	59.8	0.0	28.0	8.7	15.0	8.1
B-929	329.0	329.0	283.0	265.0	-	-	0.0	0.0	46.0	64.0	-	-	0.0	46.0	18.0	-	-
B-929A	329.0	329.0	283.0	265.0	-	-	0.0	0.0	46.0	64.0	-	-	0.0	46.0	18.0	-	-
B-930	326.1	323.7	265.1	244.1	-	-	0.0	2.4	61.0	82.0	-	-	2.4	58.6	21.0	-	-
B-931	278.5	278.5	228.7	221.5	-	-	0.0	0.0	49.8	57.0	-	-	0.0	49.8	7.2	-	-
B-932	249.9	231.9	221.9	-	-	-	0.0	18.0	28.0	-	-	-	18.0	10.0	-	-	-
B-933	296.5	291.0	274.5	269.5	248.3	239.6	0.0	5.5	22.0	27.0	48.2	51.4	5.5	16.5	5.0	21.2	8.7
B-933A	296.6	291.1	274.6	269.5	248.3	239.6	0.0	5.5	22.0	27.1	48.3	51.5	5.5	16.5	5.1	21.2	8.7
B-934	294.8	294.8	252.8	252.8	-	246.4	0.0	0.0	42.0	42.0	-	48.4	0.0	42.0	0.0	6.4	-

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Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
B-936	286.6	286.6	266.3	253.1	190.6	-	0.0	0.0	20.3	33.5	96.0	-	0.0	20.3	13.2	62.5	-
B-937	270.3	270.3	245.3	237.0	220.0		0.0	0.0	25.0	33.3	50.3	-	0.0	25.0	8.3	17.0	-
B-939	254.0	254.0	215.2				0.0	0.0	38.8	-	-	-	0.0	38.8	-	-	-
B-940	268.3	268.3	249.8	249.8	212.1		0.0	0.0	18.5	18.5	56.2	-	0.0	18.5	0.0	37.7	-
B-941	267.2	267.2	258.7	219.3	-	205.8	0.0	0.0	8.5	47.9	-	61.4	0.0	8.5	39.4	13.5	-
B-942	291.8	291.8	285.8			263.0	0.0	0.0	6.0	-	-	28.8	0.0	6.0	22.8	-	-
B-943	300.4	300.4	283.9	278.0	268.5	220.1	0.0	0.0	16.5	22.4	31.9	80.3	0.0	16.5	5.9	9.5	48.4
B-944	334.7	334.7	299.7	-	281.2		0.0	0.0	35.0	-	53.5	-	0.0	35.0	18.5	-	-
B-945	281.5	281.5	228.1		221.0	210.6	0.0	0.0	53.4	-	60.5	70.9	0.0	53.4	7.1	-	10.4
B-946	333.4	333.4	301.2	-	291.6	-	0.0	0.0	32.2	-	41.8	-	0.0	32.2	9.6	-	-
B-947	312.5	312.5	260.8	248.8	-	-	0.0	0.0	51.7	63.7	-	-	0.0	51.7	12.0	-	-
B-948	310.4	310.4	288.4	281.9	274.7	-	0.0	0.0	22.0	28.5	35.7	-	0.0	22.0	6.5	7.2	-
B-949	334.8	334.8	281.9	-	258.4	-	0.0	0.0	52.9	-	76.4	-	0.0	52.9	23.5	-	-
B-950	282.5	282.5	261.8	-	232.2	218.7	0.0	0.0	20.7	-	50.3	63.8	0.0	20.7	29.6	-	13.5
B-951	249.9	249.9	230.4	209.3	-	179.9	0.0	0.0	19.5	40.6	-	70.0	0.0	19.5	21.1	29.4	-
Supplement 1 Borings Data																	
W-1	306.2	306.2	284.2	277.9	211.2	-	0.0	0.0	22.0	28.3	95.0	-	0.0	22.0	6.3	66.7	-
W-2	298.4	298.4	279.9	275.6	275.6	212.3	0.0	0.0	18.5	22.8	22.8	86.1	0.0	18.5	4.3	0.0	63.3
W-3	312.3	312.3	283.7	278.7	241.6	231.6	0.0	0.0	28.6	33.6	70.7	80.7	0.0	28.6	5.0	37.1	10.0
W-4	311.9	311.9	275.9	273.0	241.3	201.3	0.0	0.0	36.0	38.9	70.6	110.6	0.0	36.0	2.9	31.7	40.0

NAPS COL 2.5(1)

Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
W-5	273.0	273.0	273.0	269.1	268.8	228.8	0.0	0.0	0.0	3.9	4.2	44.2	0.0	0.0	3.9	0.3	40.0
W-6	301.9	301.9	263.2	248.2	208.0	-	0.0	0.0	38.7	53.7	93.9	-	0.0	38.7	15.0	40.2	-
W-7	303.1	303.1	253.8	243.8	226.9	201.9	0.0	0.0	49.3	59.3	76.2	101.2	0.0	49.3	10.0	16.9	25.0
W-8	307.8	307.8	253.5	233.5	227.8	216.4	0.0	0.0	54.3	74.3	80.0	91.4	0.0	54.3	20.0	5.7	11.4
W-9	320.2	320.2	291.9	251.9	187.2	-	0.0	0.0	28.3	68.3	133.0	-	0.0	28.3	40.0	64.7	-
W-10	319.1	319.1	276.1	275.8	226.1	-	0.0	0.0	43.0	43.3	93.0	-	0.0	43.0	0.3	49.7	-
Supplement 2 Borings Data																	
M-1	314.1	314.1	280.9	273.1	260.6	255.6	0.0	0.0	33.2	41.0	53.5	58.5	0.0	33.2	7.8	12.5	5.0
M-2	315.3	315.3	282.5	272.5	251.4	241.9	0.0	0.0	32.8	42.8	63.9	73.4	0.0	32.8	10.0	21.1	9.5
M-3	313.9	313.9	299.1	289.6	274.8	171.3	0.0	0.0	14.8	24.3	39.1	142.6	0.0	14.8	9.5	14.8	103.5
M-4	321.8	321.8	292.9	287.9	252.8	207.8	0.0	0.0	28.9	33.9	69.0	114.0	0.0	28.9	5.0	35.1	45.0
M-6	327.8	327.8	263.7	253.7	231.4	211.4	0.0	0.0	64.1	74.1	96.4	116.4	0.0	64.1	10.0	22.3	20.0
M-7	326.0	326.0	302.0	291.9	219.7	184.7	0.0	0.0	24.0	34.1	106.3	141.3	0.0	24.0	10.1	72.2	35.0
M-8	329.3	329.3	275.6	250.6	242.9	-	0.0	0.0	53.7	78.7	86.4	-	0.0	53.7	25.0	7.7	-
M-9	327.3	327.3	264.6	244.6	-	203.7	0.0	0.0	62.7	82.7	-	123.6	0.0	62.7	20.0	40.9	-
M-10	323.6	323.6	264.5	221.5	212.8	172.0	0.0	0.0	59.1	102.1	110.8	151.6	0.0	59.1	43.0	8.7	40.8
M-11	325.9	325.9	232.3	212.3	-	-	0.0	0.0	93.6	113.6	-	-	0.0	93.6	20.0	-	-
M-12	307.0	305.0	269.0	263.5	243.1	240.8	0.0	2.0	38.0	43.5	63.9	66.2	2.0	36.0	5.5	20.4	2.3
M-13	326.8	326.8	-	274.8	255.8	182.7	0.0	0.0	-	52.0	71.0	144.1	0.0	52.0	-	19.0	73.1

NAPS COL 2.5(1)

Table 2.5-208 Elevation, Depth, and Thickness of the Subsurface Zones

Boring Number	Top Elevation of Zones (ft)						Top Depth of Zones (ft)						Thickness of Zones (ft)				
	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV	IV	I	IIA	IIB	III	III-IV
M-14	323.8	323.8	265.0	-	-	-	0.0	0.0	58.8	-	-	-	0.0	58.8	-	-	-
M-15	311.3	311.3	267.8	-	-	-	0.0	0.0	43.5	-	-	-	0.0	43.5	-	-	-
M-16	284.6	283.8	235.3	230.3	-	224.4	0.0	0.8	49.3	54.3	-	60.2	0.8	48.5	5.0	5.9	-
M-17	306.2	305.7	-	252.1	214.3	204.3	0.0	0.5	-	54.1	91.9	101.9	0.5	53.6	-	37.8	10.0
M-18	304.2	304.2	245.7	244.0	-	-	0.0	0.0	58.5	60.2	-	-	0.0	58.5	1.7	-	-
M-19	280.4	280.4	222.1	-	213.8	206.7	0.0	0.0	58.3	-	66.6	73.7	0.0	58.3	8.3	-	7.1
M-20	302.6	302.1	-	265.6	246.6	193.6	0.0	0.5	-	37.0	56.0	109.0	0.5	36.5	-	19.0	53.0
M-21	303.9	303.9	260.4	255.4	222.1	207.1	0.0	0.0	43.5	48.5	81.8	96.8	0.0	43.5	5.0	33.3	15.0
M-27	330.2	330.2	286.5	261.5	215.2	208.8	0.0	0.0	43.7	68.7	115.0	121.4	0.0	43.7	25.0	46.3	6.4
M-28	308.2	308.2	292.6	284.4	265.2	183.2	0.0	0.0	15.6	23.8	43.0	125.0	0.0	15.6	8.2	19.2	82.0
M-29	309.3	309.3	277.3	-	268.3	265.1	0.0	0.0	32.0	-	41.0	44.2	0.0	32.0	9.0	-	3.2
M-30	313.3	313.3	279.6	274.6	269.6	266.6	0.0	0.0	33.7	38.7	43.7	46.7	0.0	33.7	5.0	5.0	3.0
M-31	306.9	306.9	-	-	247.9	245.4	0.0	0.0	-	-	59.0	61.5	0.0	59.0	-	-	2.5
M-32	313.2	313.2	264.6	259.6	256.0	-	0.0	0.0	48.6	53.6	57.2	-	0.0	48.6	5.0	3.6	-
M-33	303.8	303.8	259.7	-	-	-	0.0	0.0	44.1	-	-	-	0.0	44.1	-	-	-
M-34	280.9	280.9	252.1	237.0	232.9	220.9	0.0	0.0	28.8	43.9	48.0	60.0	0.0	28.8	15.1	4.1	12.0

Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

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Table 2.5-209 Type and Number of Laboratory Tests Performed

Material	Test	Number
Soil	Natural moisture content	111
	Specific gravity	6
	Sieve and hydrometer analysis	57
	Grain size analysis with no. 200 wash	72
	Atterberg limits	23
	Chemical analysis (pH, chloride, sulfate)	20
	Triaxial C-U compression	6
	Resonant column torsional shear	5
	California bearing ratio	5
	Moisture density (modified Proctor)	9
Rock	Unit weight	82
	Unconfined compression	65
	Unconfined compression with stress-strain measurements	27

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel [1] (%)	Sand [1] (%)	Fines [2] (%)	Silt [1] (%)	0.005 mm Clay [1] (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH [3]	Chloride (mg/kg) [3], [6], [7]	Sulfate (mg/kg) [3], [6], [7]
B-901	B-901-2	3.5-5.0	SPT	0.0	53.6	46.4	10.8	35.6	[8]	21.5	[8]	[8]	[8]	[8]	[8]	[8]
B-901	B-901-4	11.5-13.0	SPT	0.0	76.6	23.4	16.0	7.4		10.2				5.8	ND [5]	ND [5]
B-901	B-901-6	22.2-23.7	SPT	0.0	76.8	23.2				16.4						
B-901	B-901-9	37.2-38.7	SPT	0.7	71.9	22.5	15.2	7.3		16.4						
B-901	UD-2	9.5-11.5 [4]	UD	0.0	78.0	22.0	12.6	9.4		15.0						
B-902	B-902-2	3.5-5.0	SPT	0.0	86.1	13.9				5.6						
B-902	B-902-4	8.5-10.0	SPT	1.3	71.0	29.0	13.4	15.6	SM	23.9	33	7				
B-902	B-902-6	13.5-15.0	SPT	0.0	80.0	20.0				14.0						
B-907	B-907-2	3.5-5.0	SPT	0.0	67.0	33.0	17.7	15.3	SM	14.0	33	8				
B-907	B-907-3	5.5-7.0	SPT	0.0	74.9	25.1				16.4				4.8	51.1 [J]	ND [5]
B-907	B-907-5	11.0-12.5	SPT	0.0	76.0	24.0				20.2						
B-907	B-907-7	17.5-19.0	SPT	0.0	80.9	19.1	11.7	7.4		12.3						
B-907	B-907-9	27.5-29.0	SPT	0.0	73.9	26.1										
B-907	B-907-10	32.5-34.0	SPT	0.0	66.6	23.4										
B-908	B-908-3	6.0-7.5	SPT	2.0	72.6	25.4	11.6	13.8		12.3			2.62			
B-908	B-908-6	13.5-15.0	SPT	0.0	76.6	23.4							2.69			
B-908	B-908-8	23.7-25.2	SPT	0.0	68.1	31.9										
B-908	B-908-13	47.1-48.6	SPT	0.0	76.0	24.0	18.9	5.1		14.5						
B-909	B-909-3	6.0-7.5	SPT	0.0	66.9	33.1	19.3	13.8	SM	25.9	57	12				

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel [1] (%)	Sand [1] (%)	Fines [2] (%)	Silt [1] (%)	0.005 mm Clay [1] (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-909	B-909-5	11.0-12.5	SPT	0.0	77.6	22.4				31.4				5.4	137 [J]	6.7
B-909	B-909-7	18.5-20.0	SPT	0.0	63.7	36.3	29.0	7.3	SM	25.1	30	4				
B-909	B-909-8	23.5-25.0	SPT	1.7	56.1	42.2				35.4						
B-909	B-909-12	41.9-43.4	SPT	0.0	75.3	24.7				17.6						
B-910	B-910-2	3.5-5.0	SPT	4.0	31.9	64.1	12.1	52.0		27.7						
B-910	B-910-5	11.0-12.5	SPT							30.5	45	13		5.8	3.6 [J]	5.1 [B]
B-910	B-910-7	18.5-20.0	SPT	0.0	46.4	53.6	43.1	10.5		33.1						
B-910	B-910-9	25.9-27.4	SPT	2.3	76.3	21.4				14.6				6.7	5.2 [J]	4.2 [B]
B-911	B-911-2	3.5-5.0	SPT	0.3	59.1	40.6				12.8						
B-911	B-911-4	8.0-9.5	SPT	0.0	70.6	29.4	13.6	15.8		19.6						
B-911	B-911-5	11.0-12.5	SPT	0.0	78.3	21.7								5.6	3.4 [J]	ND [5]
B-911	B-911-7	18.5-20.0	SPT	0.1	80.0	19.9				11.1						
B-912	B-912-1	9.1-10.6	SPT	0.0	73.7	26.3	20.8	5.5		24.0						
B-912	B-912-3	14.1-15.6	SPT	0.0	72.6	27.4				15.2						
B-912	B-912-4	19.1-19.9	SPT	14.5	84.9	0.6				15.7						
B-913	B-913-8	43.5-48.5	SPT	0.0	72.3	27.7										
B-914	B-914-2	3.5-5.0	SPT	0.1	52.9	47.0	21.0	26.0	SC	16.6	27	10				
B-914	B-914-3	6.0-7.5	SPT	4.0	63.0	33.0										
B-914	B-914-5	11.0-13.5	SPT	2.1	78.0	19.9										

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel [(1)] (%)	Sand [(1)] (%)	Fines [(2)] (%)	Silt [(1)] (%)	0.005 mm Clay [(1)] (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-914	B-914-7	19.0-20.5	SPT	27.8	61.0	11.2	8.6	2.6		20.8						
B-914	B-914-9	35.6-37.1	SPT	5.7	70.1	24.2								6.8	8.4 [J]	ND [(5)]
B-914	B-914-10	40.6-42.1	SPT	0.1	74.4	25.5	19.5	6.0		20.5						
B-917	B-917-13	48.5-53.5	SPT	0.0	81.9	18.1	15.0	3.1								
B-918	B-918-2	1.8-3.2	SPT	1.2	85.7	13.1	7.3	5.8		15.8			2.68			
B-918	B-918-3	5.1-6.6	SPT	0.0	85.0	15.0				13.3				6.9	8.0 [J]	9.4
B-918	B-918-4	9.3-10.8	SPT	0.0	80.6	19.4	13.4	6.0		13.7						
B-918	B-918-6	13.2-14.7	SPT	0.0	77.7	22.3				13.9						
B-918	B-918-8	22.4-23.9	SPT	1.4	79.4	19.2				17.8						
B-919	B-919-1	1.5-3.0	SPT							18.6	32	11				
B-919	B-919-3	5.9-7.4	SPT	2.5	80.9	16.6				11.1						
B-919	B-919-5	11.0-12.5	SPT	0.6	80.4	19.0				11.2						
B-919	B-919-7	18.9-19.4	SPT	3.7	75.5	20.8	10.8	10.0		13.8						
B-919	B-919-13	51.3-52.8	SPT	0.0	65.9	34.1	26.0	8.1		17.9						
B-920	B-920-1	2.0-3.5	SPT							25.2						
B-920	B-920-2	3.8-5.3	SPT											5.9	1.5 [B J]	7.5
B-920	B-920-3	6.0-7.5	SPT	0.3	58.9	40.8				24.1						
B-920	B-920-6	13.8-15.3	SPT							15.7				6.5	63.0 [J]	7.5
B-920	B-920-7	18.8-20.3	SPT	0.0	72.3	27.7	21.3	6.4		15.4						

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel [(1)] (%)	Sand [(1)] (%)	Fines [(2)] (%)	Silt [(1)] (%)	0.005 mm Clay [(1)] (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-920	B-920-9	27.3-28.8	SPT	0.0	79.9	20.1				19.5						
B-920	B-920-12	43.5-44.7	SPT							12.9				6.9	1.4 [B J]	2.3 [B]
B-921	B-921-1	1.5-3.0	SPT	11.5	52.1	36.4				12.0						
B-921	B-921-3	6.0-7.5	SPT	0.0	41.3	58.7	29.2	29.5	CL	24.8	34	14				
B-921	B-921-4	8.5-10.0	SPT	0.0	53.5	46.5	37.3	9.2		28.0				7.0	4.4 [J]	10.8
B-921	B-921-6	13.5-15.0	SPT	0.0	74.2	25.8	16.1	9.7		26.0						
B-921	B-921-8	23.8-25.3	SPT							32.1	38	NP				
B-921	B-921-10	33.8-35.3	SPT	0.0	75.5	24.5				20.4						
B-921	B-921-11	38.8-40.3	SPT	0.0	81.3	18.7				15.8						
B-921	B-921-16	63.8-65.3	SPT	0.0	75.1	24.9	18.2	6.7		8.5						
B-923	B-923-2	3.3-4.8	SPT	10.9	55.5	33.6	16.7	16.9	SC	22.5	33	10				
B-924	B-924-2	3.5-5.0	SPT	23.2	65.8	11.0	7.9	3.1		2.1						
B-924	B-924-3	6.0-7.5	SPT	11.1	74.5	14.4				4.8						
B-927	B-927-1	1.5-3.0	SPT	0.0	61.4	38.6	12.6	26.0	SC	14.1	28	10				
B-927	B-927-2	3.5-5.0	SPT	0.0	75.8	24.2				11.7						
B-927	B-927-3	6.0-7.5	SPT	0.0	73.2	26.8	17.1	9.7		12.2						
B-927	B-927-4	8.5-10.0	SPT	0.0	83.3	16.7				6.8				5.8	2.8 [J]	4.3 [B]
B-927	B-927-6	13.5-15.0	SPT	0.0	81.2	18.8				11.2						
B-927	B-927-7	18.5-20.0	SPT	0.0	76.2	23.8				11.4						

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-927	B-927-8	23.5-25.0	SPT	0.0	79.7	20.3				15.7				7.4	5.6 [J]	3.4 [B]
B-928	B-928-2	3.5-5.0	SPT	0.0	78.4	21.6				17.9						
B-928	B-928-4	8.3-9.8	SPT	0.0	73.4	26.6				18.5				6.8	120.0 [J]	4.9 [B]
B-928	B-928-6	14.0-15.5	SPT	0.0	77.0	23.0	17.8	5.2		24.5						
B-928	B-928-8	22.1-23.6	SPT	0.0	78.7	21.3				17.0						
B-928	B-928-9	27.1-28.6	SPT	0.0	74.7	25.3	19.2	6.1		16.4						
B-928 A	UD-3	20-22 [4]	UD	0.0	82.0	18.0	13.2	4.8								
B-929	B-929-1	1.5-3.0	SPT	12.2	43.7	44.1	16.6	27.5	SC	14.5	36	17				
B-929	B-929-2	3.5-5.0	SPT								54	16				
B-929	B-929-4	8.7-10.2	SPT	0.0	65.5	34.5				18.9				5.9	2.8 [J]	2.7 [B]
B-929	B-929-5	13.5-15.0	SPT	0.0	73.8	26.2				19.6						
B-929	B-929-7	23.0-24.5	SPT	0.0	76.9	23.1	17.0	6.1		18.8						
B-929	B-929-9	33.0-34.5	SPT	0.0	82.7	17.3				16.9						
B-929	B-929-11	43.0-44.5	SPT	0.7	81.4	17.9				17.2						
B-929	B-929-13	53.0-54.5	SPT	0.0	80.0	20.0				13.8						
B-929A	UD-1	15.0-16.8 [4]	UD	0.0	78.6	21.4	15.1	6.3		13.1						
B 929A	UD-6	40-41.8 [4]	UD	0.0	83.3	16.7	11.7	5.0		16.9						
B-931	B-931-10	47.3-48.8	SPT	0.0	78.5	21.5	15.9	5.6								
B-932	B-932-5	19.0-20.5	SPT	0.0	77.7	22.3	15.7	6.6		21.5						

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-933	B-933-3	6.0-7.5	SPT	0.0	62.3	37.7	22.6	15.1	SM	24.2	28	3				
B-933	B-933-5	11.2-12.7	SPT	0.0	58.8	41.2				25.9				5.4	210 [J]	3.0 [B]
B-933	B-933-7	19.5-21.0	SPT	0.0	76.6	23.4				26.7						
B-933	B-933-8	24.5-25.0	SPT	0.0	80.5	19.5				18.7						
B-945	B-945-1	1.5-3.0	SPT	0.0	82.0	18.0				14.5						
B-945	B-945-3	4.7-6.2	SPT	0.0	75.5	24.5	16.2	8.3		15.9						
B-945	B-945-5	11.3-12.8	SPT	0.0	84.2	15.8				21.6				6.4	6.9 [J]	3.1 [B]
B-945	B-945-7	19.4-20.9	SPT	0.0	84.8	15.2				27.6			2.58			
B-945	B-945-9	27.8-29.4	SPT	0.0	82.9	17.1	10.2	6.9		24.1						
B-945	B-945-11	39.4-40.9	SPT	0.0	90.1	9.9				20.4						
B-945	B-945-13	49.4-50.9	SPT	0.0	90.3	9.7				15.6						
B-947	B-947-1	1.5-3.0	SPT							16.7	55	25	2.60			
B-947	B-947-3	4.5-6.0	SPT	0.0	38.3	61.7	23.5	38.2	MH	36.0	56	19				
B-947	B-947-4	8.5-10.0	SPT	0.0	60.0	40.0			SM	20.7	38	9				
B-947	B-947-5	9.5-11.0	SPT	1.6	55.9	42.5	21.1	21.4		28.2			2.78			
B-947	B-947-6	13.5-15.0	SPT	0.0	30.5	69.5				22.5						
B-947	B-947-7	17.2-18.7	SPT	0.0	75.8	24.2				21.1				6.4	21.4 [J]	6.4
B-947	B-947-8	22.2-23.7	SPT	0.6	79.4	20.0	10.7	9.3		24.3						
B-947	B-947-9	28.7-30.2	SPT	0.0	66.6	33.4				28.8	33	NP				

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Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
B-947	B-947-10	33.7-35.2	SPT	0.0	81.3	18.7				20.2						
B-947	B-947-11	38.7-40.2	SPT	0.0	85.8	14.2				16.9						
B-947	B-947-12	42.2-43.7	SPT	0.0	79.7	20.3	13.4	6.9		20.5						
B-948	B-948-1	1.5-3.0	SPT	0.0	54.7	45.3				83.7						
B-948	B-948-3	6.0-7.5	SPT	0.0	51.1	48.9				16.2				5.7	3.8 J	ND (5)
B-948	B-948-5	9.5-11.0	SPT	0.0	31.0	69.0	61.9	7.1		13.7						
B-948	B-948-7	18.5-20.0	SPT	0.0	35.9	64.1				15.2						
B-948	B-948-8	23.5-24.4	SPT	0.0	77.7	22.3				13.6						
B-951	B-951-8	23.0-24.5	SPT	0.2	82.9	16.9	10.5	6.4		13.9						
M-10 (DH)	SS-2	11.7-13.2		0	57.5	42.5	30.2	12.3	SM	48.5	59	9				
M-10 (DH)	SS-4	19.2-20.7		0	61.9	38.1	29.4	8.7	SM	35.9	54	6				
M-10 (DH)	SS-5	24.2-25.7		0	61.3	38.7	28.4	10.3	SM	53.7	59	12				
M-10 (DH)	SS-6	29.2-30.7		0	56.6	43.4	31.9	11.5	SM	66.7	51	7				
M-10 (DH)	SS-8	39.1-40.6		0	53.5	46.5	42.4	4.1	SM	30.6	42	6				
M-10 (DH)	SS-10	49.1-50.6		0	79.9	20.1			SM(9)	16.4						

NAPS COL 2.5(1)

Table 2.5-210 Results of Laboratory Tests on Soil Samples

Boring Number	Sample Number	Depth (ft)	Sample Type	Gravel (1) (%)	Sand (1) (%)	Fines (2) (%)	Silt (1) (%)	0.005 mm Clay (1) (%)	USCS Symbol	Natural Moisture (%)	LL	PI	G_s	pH (3)	Chloride (mg/kg) (3), (6), (7)	Sulfate (mg/kg) (3), (6), (7)
M-10 (DH)	SS-12	59.1-60.6		0.7	77.2	22.1			SM(9)	15.1						
M-10 (DH)	SS-15	74.1-75.6		0	72.6	27.4			SM(9)	29.9						
M-10 (DH)	SS-17	84.1-85.6		0	79	21			SM(9)	15.1						
M-30 (DH)	SS-1	8.7-10.2		0.6	72.3	27.1			SM(9)	17						
M-30 (DH)	SS-3	13.7-15.2		0	64	36			SM(9)	19.8						
M-30 (DH)	SS-5	23.7-25.2		0	82	18			SM(9)	18.5						
M-30 (DH)	SS-7	33.7-35.2		0	77.1	22.9			SM(9)	14.8						

(1) Due to computer roundoff, particle size fractions may total 100 ±1. Fines include silt plus clay.
(2) Fines include silt plus clay.
(3) Tests performed by STL - St. Louis, MO
(4) Depth interval shown reflects total pushed depth of UD tube.
(5) ND indicates analyte not detected at or above the Method Detection Limit
(6) B = Estimated Result. Analyte detected above the Method Detection Limit but not above the Reporting Limit.
(7) J = Method blank contamination. The associated method blank contains the target analyte at a reportable level
(8) Shaded cells indicate that information not obtained.
(9) Classification is based on quantitative and qualitative (visual inspection) information. LL= Liquid Limit, PI = Plasticity Index, Gs = Specific Gravity

NAPS COL 2.5(1)

Table 2.5-210 Results of Laboratory Tests on Soil Samples; Consolidated-Undrained Triaxial Tests

Source of Sample	Sample No.	Sample Depth (1) (ft)	Sample Type	Test Type	C' (psf)	Φ' (degree)	C (psf)	Φ' (degree)	Comment
B-901	UD-2	9.5-11.5	UD Tube	CU	0.0	33.6	0.0	37.5	
B-928 A	UD-3	20-22	UD Tube	CU	423.4	31.4	103.7	41.2	
B-929 A	UD-1	15-16.75	UD Tube	CU	5.4	32.4	178.6	35.8	Only 2 points tested due to limited sample
B-929 A	UD-4	30-31.5	UD Tube	CU	0.0	33.0	0.0	33.0	Only 2 points tested due to limited sample
B-929 A	UD-6	40-41.5	UD Tube	CU	0.0	36.1	318.2	36.4	
B-933 A	UD-2	15-16.25	UD Tube	CU	55.0	32.6	479.5	30.5	Only 2 points tested due to limited sample

(1) Sample depth shown reflects the depth of start of push plus the length of the recovered sample

NAPS COL 2.5(1)

Table 2.5-210 Results of Laboratory Tests on Soil Samples Moisture-Density and CBR Tests

		Moisture/Density Results [A]			CBR Results [B]			
Source of Sample	Sample No.	Natural Moisture (%)	Maximum Dry Density (pcf)	Optimum Moisture (%)	Molded Density (pcf)	Molded Moisture (%)	Soaked CBR (0.10") (%)	Soaked CBR (0.20") (%)
Test Pit 1	TP-1-1	23.4	108.7	17.6	Not Tested			
Test Pit 1	TP-1-2	22.6	108.8	17.1	90.3	17.0	1.2	1.6
					94.4	17.0	6.3	5.5
					105.3	17.2	14.7	15.6
Test Pit 2	TP-2	22.6	100.4	22.3	83.0	22.8	1.1	1.1
					89.1	22.0	1.3	1.2
					101.0	22.0	6.2	6.5
Test Pit 3	TP 3-1	16.1	124.9	9.5	Not Tested			
Test Pit 3	TP 3-2	12.4	124.5	10.9	117.5	10.7	5.9	6.0
					122.9	10.6	3.2	5.0
					125.6	10.5	4.2	8.4
Test Pit 4	TP 4-1	30.2	108.6	17.1	Not Tested			
Test Pit 4 [C]	TP 4-2	15.2	125.5	10.8	119.4	11.0	4.9	7.3
					121.5	10.6	8.8	11.9
Test Pit 5	TP 5	9.4	126	9.2	Not Tested			
Test Pit 6	TP 6	18.2	116.1	13.2	110.3	12.3	6.9	8.0
					111.7	12.7	6.4	9.5
					115.1	12.3	12.1	13.8

A Proctor Test results, ASTM D 1557-02 Method A Modified

B California Bearing Ratio Test results, ASTM D 1883-05 (Section 7.12)

C Insufficient Material for three tests

NAPS COL 2.5(1)

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break [(1)]	Unconfined Compressive Strength (psi)[(2)]	Young's Modulus (psi)	Poisson's Ratio
B-901	5	54.0	5.27	2.49	2.1	160	Shear	4,375	(ND) [3]	(ND)
B-901	7	60.3	5.27	2.49	2.1	162	Columnar	15,425	3,970,000	* [(4)]
B-901	14	97.9	5.34	2.50	2.1	162	C&S	12,629	(ND)	(ND)
B-901	25	129.5	5.35	2.49	2.1	164	C&S	14,171	(ND)	(ND)
B-901	34	170.5	5.33	2.40	2.2	168	Shear	10,865	5,360,000	0.31
B-901	42	208.5	5.32	2.40	2.2	163	Shear	12,777	(ND)	(ND)
B-901	51	240.5	5.35	2.39	2.2	165	C&S	23,619	(ND)	(ND)
B-901	59	280.5	5.36	2.39	2.2	164	C&S	25,335	8,320,000	0.39
B-902	3	27.3	5.29	2.38	2.2	162	C&S	14,947	4,090,000	* [(4)]
B-902	9	47.4	5.35	2.40	2.2	163	Shear	21,007	(ND)	(ND)
B-902	14	72.3	5.34	2.40	2.2	164	C&S	25,100	(ND)	(ND)
B-902	18	92.8	5.32	2.40	2.2	164	Shear	6,030	1,840,000	0.42
B-902	28	141.9	5.31	2.40	2.2	170	Shear	6,982	(ND)	(ND)
B-902	38	184.6	5.36	2.40	2.2	163	C&S	27,303	(ND)	(ND)
B-907	3	51.9	5.29	2.45	2.2	152	Shear	957	(ND)	(ND)
B-907	12	90.0	5.23	2.46	2.1	155	Shear	751	(ND)	(ND)
B-907	24	116.8	5.27	2.47	2.1	173	Shear	4,599	(ND)	(ND)
B-907	27	131.8	5.32	2.48	2.1	173	C&S	8,519	(ND)	(ND)
B-907	33	160.8	5.32	2.50	2.1	163	Columnar	19,333	7,700,000	0.30

NAPS COL 2.5(1)

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break (1)	Unconfined Compressive Strength (psi)(2)	Young's Modulus (psi)	Poisson's Ratio
B-907	40	200.0	5.35	2.50	2.1	165	C&S	20,166	(ND)	(ND)
B-908	2	67.5	5.32	2.38	2.2	163	Shear	5,476	(ND) 3	(ND)
B-908	4	79.4	5.25	2.39	2.2	164	C&S	14,695	3,400,000	0.41
B-908	7	96.0	5.31	2.39	2.2	163	Shear	17,164	(ND)	(ND)
B-908	11	112.7	5.32	2.38	2.2	178	Shear	15,284	(ND)	(ND)
B-908	17	135.7	5.28	2.38	2.2	187	Shear	5,670	3,180,000	0.21
B-908	20	146.8	5.31	2.38	2.2	173	Shear	7,687	(ND)	(ND)
B-909	11	82.4	5.32	2.39	2.2	176	C&S	9,464	3,520,000	* (4)
B-909	14	96.5	5.28	2.39	2.2	190	Shear	5,897	(ND)	(ND)
B-909	17	107.4	5.35	2.39	2.2	179	Shear	3,938	(ND)	(ND)
B-909	21	127.4	5.35	2.39	2.2	174	Shear	8,167	(ND)	(ND)
B-909	26	152.3	5.27	2.38	2.2	184	C&S	6,467	4,600,000	0.39
B-909	33	187.3	5.32	2.39	2.2	175	Shear	9,305	(ND)	(ND)
B-910	5	53.1	5.27	2.15	2.2	159	Shear	6,935	(ND)	(ND)
B-910	13	91.1	5.24	2.15	2.2	159	Shear	4,821	670,000	* (4)
B-910	20	120.9	5.27	2.40	2.2	163	Columnar	9,395	(ND)	(ND)
B-910	24	142.1	5.35	2.40	2.2	168	C&S	28,834	(ND)	(ND)
B-911	3	34.3	5.27	2.37	2.2	161	Shear	5,558	1,230,000	* (4)
B-911	5	44.3	5.28	2.38	2.2	162	Cone	10,209	(ND)	(ND)

NAPS COL 2.5(1)

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break [(1)]	Unconfined Compressive Strength (psi)[(2)]	Young's Modulus (psi)	Poisson's Ratio
B-911	10	66.5	5.35	2.39	2.2	164	Cone	24,646	(ND)	(ND)
B-911	13	82.1	5.36	2.40	2.2	164	C&S	20,431	5,730,000	0.40
B-911	16	97.6	5.36	2.40	2.2	163	Shear	6,561	(ND) [3]	(ND)
B-912	3	37.1	5.32	2.39	2.2	170	C&S	3,524	2,570,000	(ND)
B-912	5	48.9	5.26	2.40	2.2	163	C&S	12,992	(ND)	(ND)
B-912	8	62.2	5.26	2.40	2.2	164	C&S	32,680	(ND)	(ND)
B-912	12	82.4	5.25	2.40	2.2	163	Shear	27,356	(ND)	(ND)
B-912	17	111.4	5.32	2.40	2.2	163	Shear	16,702	8,220,000	0.31
B-912	24	143.9	5.26	2.40	2.2	161	Columnar	15,996	(ND)	(ND)
B-914	8	63.8	5.34	2.40	2.2	169	Cone	17,866	(ND)	(ND)
B-914	10	75.3	5.32	2.40	2.2	164	C&S	36,600	(ND)	(ND)
B-914	15	95.8	5.37	2.40	2.2	164	C&S	29,776	8,980,000	0.31
B-914	20	120.6	5.32	2.39	2.2	169	C&S	17,942	(ND)	(ND)
B-914	26	151.4	5.31	2.40	2.2	166	C&S	16,517	8,930,000	0.32
B-914	34	192.7	5.32	2.40	2.2	163	Cone	30,162	(ND)	(ND)
B-918	2	31.7	5.29	2.39	2.2	164	Shear	19,038	(ND)	(ND)
B-918	4	37.1	5.32	2.40	2.2	164	C&S	29,636	9,530,000	0.35
B-918	7	51.6	5.29	2.40	2.2	165	Cone	15,409	(ND)	(ND)
B-918	9	60.7	5.32	2.40	2.2	164	Columnar	21,064	(ND)	(ND)

NAPS COL 2.5(1)

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break [(1)]	Unconfined Compressive Strength (psi)[(2)]	Young's Modulus (psi)	Poisson's Ratio
B-918	15	88.1	5.28	2.40	2.2	165	Shear	21,944	7,850,000	0.24
B-918	22	122.0	5.25	2.40	2.2	166	C&S	33,610	(ND)	(ND)
B-920	7	90.2	5.28	2.39	2.2	160	Shear	1,021	(ND)	(ND)
B-920	11	107.7	5.32	2.39	2.2	163	Cone	29,621	8,500,000	0.34
B-920	13	119.1	5.33	2.39	2.2	181	Shear	9,456	(ND)	(ND)
B-920	18	141.1	5.35	2.40	2.2	166	Cone	18,040	5,970,000	* [(4)]
B-923	6	20.0	5.35	2.39	2.2	164	C&S	28,911	8,510,000	0.28
B-923	9	30.8	5.35	2.39	2.2	162	C&S	26,779	(ND)	(ND)
B-923	12	45.7	5.33	2.39	2.2	163	Shear	13,477	(ND)	(ND)
B-923	16	65.7	5.35	2.39	2.2	164	Cone	21,069	7,150,000	0.29
B-924	1	21.7	5.33	2.39	2.2	162	Shear	10,588	(ND) [3]	(ND)
B-924	3	30.2	5.35	2.39	2.2	163	C&S	15,110	(ND)	(ND)
B-924	6	44.0	5.33	2.39	2.2	174	Shear	6,384	2,620,000	* [(4)]
B-924	12	75.1	5.33	2.40	2.2	179	C&S	5,681	(ND)	(ND)
B-927	2	43.0	5.35	2.39	2.2	163	C&S	19,288	(ND)	(ND)
B-927	6	51.6	5.35	2.39	2.2	163	C&S	27,239	6,550,000	0.49
B-927	13	74.9	5.33	2.39	2.2	164	Cone	30,297	(ND)	(ND)
B-927	18	96.3	5.35	2.39	2.2	164	C&S	28,266	(ND)	(ND)
B-928	2	52.6	5.33	2.39	2.2	153	Shear	1,318	(ND)	(ND)

NAPS COL 2.5(1)

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break [(1)]	Unconfined Compressive Strength (psi)[(2)]	Young's Modulus (psi)	Poisson's Ratio
B-928	6	74.7	5.35	2.39	2.2	162	Cone	20,333	5,070,000	0.35
B-933	3	50.5	5.33	2.39	2.2	163	Cone	19,395	(ND)	(ND)
B-933	7	66.6	5.34	2.38	2.2	162	Columnar	15,764	8,600,000	* [(4)]
B-933	11	90.1	5.32	2.39	2.2	164	Cone	30,993	(ND)	(ND)
B-948	6	56.8	5.28	2.39	2.2	162	C&S	17,089	(ND)	(ND)
B-948	10	76.1	5.25	2.40	2.2	167	C&S	22,435	(ND)	(ND)
M-10 (DH)	R-7	117.45	5.15	2.41	2.1	160.1	S	7960	(ND)	(ND)
M-10 (DH)	R-10	133.75	5.09	2.41	2.1	161.9	S	19640[(5)]	(ND)	(ND)
M-10 (DH)	R-15	153.7	5.08	2.41	2.1	163.5	C	33830[(5)]	(ND)	(ND)
M-10 (DH)	R-20	177.6	5.14	2.39	2.2	163.3	S	20880[(5)]	(ND)	(ND)
M-10 (DH)[(6)]	R-24	196.7	5.18	2.39	2.2	163.7	C	30780	(ND)	(ND)
M-30 (DH)[(6)]	R-4	57	5.18	2.4	2.2	162.8	C	28650	(ND)	(ND)
M-30 (DH)	R-18	95.4	5.06	2.39	2.1	162.7	C	23700	(ND)	(ND)
M-30 (DH)[(6)]	R-26	134.9	5.26	2.39	2.2	163.7	S	26200	(ND)	(ND)

NAPS COL 2.5(1)

Table 2.5-211 Results of Unconfined Compression Tests on Rock

Boring No.	Run Number	Sample Top Depth (ft)	Sample Length (L) (Inches)	Sample Diameter (D) (inches)	L/D Ratio	Unit Weight (pcf)	Type of Break (1)	Unconfined Compressive Strength (psi)(2)	Young's Modulus (psi)	Poisson's Ratio
M-30 (DH)	R-34	166.9	5.06	2.4	2.1	164.6	C/S	24820	(ND)	(ND)
M-30 (DH)	R-40	197.05	5.16	2.4	2.2	162.6	C	33040	(ND)	(ND)

(1) Type of Breaks: Columnar; Cone (C); Shear (S); Cone & Shear (C&S)

(2) Unconfined compressive strength corrected for L/D Ratio Compressive strength testing was performed in general accordance with ASTM D 7012-04.

(3) (ND) indicates that information was not determined

(4) Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.

(5) Test duration exceeded 15 minute maximum time as indicated by ASTM D 7012-07e1.

(6) Core samples did not meet the dimensional tolerances for straightness or perpendicularity per ASTM D 4543-08.

NAPS COL 2.5(1)

Table 2.5-212 Engineering Properties of Subsurface Materials

Stratum	Structural Fill	Concrete Fill	Zone IIA	Zone IIB	Zone III	Zone III-IV	Zone IV
Description	Gravelly materials derived from crushing rock material		Saprolite – core stone less than 10% of volume of overall mass	Saprolite – core stone 10% to 50% of volume of overall mass	Weathered rock – core stone more than 50% of volume of overall mass	Moderately weathered to slightly weathered rock	Parent rock – slightly weathered to fresh rock
USCS symbol	GW	-	SM, SC	SM	-	-	-
Total unit weight, γ (pcf)	130	145	125	130	150	163	164
Fines Content (%)	6-12	-	25	20	-	-	-
Natural water content, w_N (%)	-	-	19	15	-	-	-
Atterberg limits		-					
Liquid limit, LL	-	-	-	-	-	-	-
Plastic limit, PL	-	-	-	-	-	-	-
Plasticity index, PI	-	-	-	-	-	-	-
Measured SPT N-value (blows/ft)	-	-	15	74	Ref	-	-
Adjusted SPT N_{60}-value (blows/ft)	50	-	20	100	Ref	-	-
Undrained properties							
Undrained shear strength, s_u (ksf)	-	-	-	-	-	-	-
Unconfined compressive strength, q_u(ksi)	-	2.5	-	-	1.0	9.0	17.0

NAPS COL 2.5(1)

Table 2.5-212 Engineering Properties of Subsurface Materials

Stratum	Structural Fill	Concrete Fill	Zone IIA	Zone IIB	Zone III	Zone III-IV	Zone IV
Description	**Gravelly materials derived from crushing rock material**		**Saprolite – core stone less than 10% of volume of overall mass**	**Saprolite – core stone 10% to 50% of volume of overall mass**	**Weathered rock – core stone more than 50% of volume of overall mass**	**Moderately weathered to slightly weathered rock**	**Parent rock – slightly weathered to fresh rock**
Drained properties							
Effective cohesion, c' (ksf)	0	-	0.125	0	-	-	-
Effective friction angle, ' (degrees)	40	-	33	40	-	-	-
Shear wave velocity, V_s (ft/sec)	1,100	7,000*	850	1,600	3,000	4,500	9,000
Compression wave velocity, V_p (ft/sec)	2,400	10,900*	1,800	3,500	7,300	9,000	16,000
Poisson's ratio, u (high strain)	0.3	0.15	0.35	0.3	0.4	0.33	0.27
Poisson's ratio, u (low strain)	0.37	0.15	0.35	0.37	0.4	0.33	0.27
Elastic modulus (high strain), E_h	1,800 ksf	2,850 ksi	720 ksf	3,600 ksf	400 ksi	1,900 ksi	7,250 ksi
Elastic modulus (low strain), E_l	13,000 ksf	2,850 ksi	7,500 ksf	28,000 ksf	800 ksi	1,900 ksi	7,250 ksi
Shear modulus (high strain), G_h	700 ksf	1,240 ksi	270 ksf	1,400 ksf	150 ksi	700 ksi	2,900 ksi
Shear modulus (low strain), G_l	5,000 ksf	1,240 ksi	2,800 ksf	10,000 ksf	300 ksi	700 ksi	2,900 ksi

* BE Value

NAPS COL 2.5(1)

Table 2.5-212 Engineering Properties of Subsurface Materials

Stratum	Structural Fill	Concrete Fill	Zone IIA	Zone IIB	Zone III	Zone III-IV	Zone IV
Description	**Gravelly materials derived from crushing rock material**		**Saprolite – core stone less than 10% of volume of overall mass**	**Saprolite – core stone 10% to 50% of volume of overall mass**	**Weathered rock – core stone more than 50% of volume of overall mass**	**Moderately weathered to slightly weathered rock**	**Parent rock – slightly weathered to fresh rock**
Consolidation characteristics							
Compression ratio, CR		-			-	-	-
Recompression ratio, RR		-			-	-	-
Coefficient of subgrade reaction, k_1 (kcf)	2,000	-	260	2,000	-	-	-
Coefficient of sliding	0.55	0.7	0.35	0.45	0.6	0.65	0.7
Static earth pressure coefficients							
Active, K_a	0.22	-	0.30	0.22	-	-	-
Passive, K_p	4.60	-	3.40	4.60	-	-	-
At-rest, K_0	0.36	-	0.50	0.36	-	-	-
Optimum moisture content, w_{opt} (%)	-	-	14	-	-	-	-
Maximum dry unit weight, g_{max} (pcf)	-	-	116	-	-	-	-
Rock Quality Designation, RQD (%)	-	-	-	-	20	65	95

NAPS ESP COL 2.5-6

Table 2.5-213 Average Subsurface Profiles Beneath Structures

Structure	N-S x E-W Dimensions (ft)	Base of Foundation (ft)		Avg. Stratum Bottom Elevation (Stratum Thickness) (ft)		
		Elevation	Depth	Concrete Fill	Zone III	Zone III-IV
R/B	309 x 213	251	39	236 (15)	replaced	205 (31)
West PS/B	69 x 115	251	39	228 (23)	replaced	193 (35)
East PS/B	69 x 115	251	39	241 (10)	replaced	217 (24)
West PSFSV	107 x 86	272	18	218 (54)	replaced	201 (17)
East PSFSV	107 x 86	272	18	234 (42)	replaced	225 (9)
UHSRS A	158 x 135	277	13	270 (7)	258 (12)	255 (3)
UHSRS B	158 x 135	277	13	271 (6)	259 (12)	231 (28)
UHSRS C	158 x 135	277	13	269 (8)	249 (20)	194 (55)
UHSRS D	158 x 135	277	13	257 (20)	222 (35)	202 (20)
UHSRS Pipe Chase	25 x 59(1)	286	4	283 (3)	267 (16)	177 (90)
West ESWPT	25 x 542(1)	259	31	244 (15)	227 (17)	201 (26)
East ESWPT	25 x 448(1)	259	31	247 (12)	240 (7)	222 (18)
A/B	235 x 130	253	37	248 (5)	230 (18)	220 (10)
T/B	370 x 180	253	37	245 (8)	235 (10)	225 (10)

(1) width x length

Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-6

Table 2.5-214 Allowable Bearing Capacities of Rock and Concrete

Rock Type	q_u (ksi)	$q_a = 0.2\ q_u$ (ksf)	q_a (VA Code) (ksf)	Recommended q_a (ksf)	
				Static	Dynamic/ Seismic
Zone III	1	28.8	20	20	29
Zone III-IV	9	259.2	80	80	259
Zone IV	17	489.6	200	160	490
Concrete	2.5	214[(1)]	n/a	214	214

(1) $q_a = \varphi \times 0.85\ f'c$

NAPS COL 3.7(7)
NAPS COL 3.8(25)
NAPS ESP COL 2.5-6

Table 2.5-215 Bearing Pressures and Capacities

Structure	ABP (ksf)		Applied Bearing Capacity (ABC) (ksf)		Ratio ABC:ABP	
	Static	Dynamic	Static	Dynamic	Static	Dynamic
R/B	13.05	30.12	80	214	6.1	7.1
PS/B	5.10	60.81	80	214	15.7	3.5
PSFSV	5.11	9.36	80	214	15.7	22.9
UHSRS	7.27	8.65	20	29	2.8	3.4
ESWPT	3.17	5.89	20	29	6.3	4.9
A/B	7.11	-	20	29	2.8	-
T/B	4.27	-	20	29	4.7	-

NAPS ESP COL 2.5-6

Table 2.5-216 Estimated Settlements of Seismic Category I and II Structures

Structure	Applied Load (ksf)	Settlement (in.)			
		Center	Edge	Corner	Average (1)
R/B	13.05	0.052	0.032	0.019	0.042
West PS/B	5.10	0.011	0.007	0.005	0.009
East PS/B	5.10	0.009	0.006	0.003	0.007
West PSFSV	5.11	0.011	0.007	0.004	0.009
East PSFSV	5.11	0.010	0.006	0.003	0.008
UHSRS A	7.27	0.030	0.017	0.009	0.023
UHSRS B	7.27	0.035	0.019	0.011	0.027
UHSRS C	7.27	0.051	0.028	0.015	0.039
UHSRS D	7.27	0.063	0.036	0.019	0.049
UHSRS Pipe Chase	3.17	0.012	0.007	0.004	0.009
West ESWPT	3.17	0.010	0.007	0.004	0.008
East ESWPT	3.17	0.007	0.005	0.002	0.006
A/B	7.11	0.040	0.022	0.012	0.031
T/B	4.27	0.021	0.013	0.007	0.017

(1) Average is the average of center and edge settlements

NAPS ESP COL 2.5-10

Table 2.5-217 Maximum Acceleration Results

Depth (ft)	LF Max. Acc. (g)	HF Max. Acc. (g)
0.0	0.2964	0.5531
2.5	0.2693	0.5237
5.0	0.2338	0.4691
7.5	0.2200	0.4461
10.0	0.2099	0.4356
12.5	0.2065	0.4444
15.0	0.2065	0.4692
17.5	0.2079	0.4761
20.0	0.2088	0.4841
22.5	0.2112	0.4831
25.0	0.2200	0.4975
27.5	0.2266	0.5042
30.0	0.2291	0.5180
32.5	0.2279	0.5366
35.0	0.2273	0.5510
37.5	0.2265	0.5467
40.0	0.2219	0.5367
42.5	0.2164	0.5275
45.0	0.2091	0.5115
50.0	0.1881	0.4395
55.0	0.1794	0.4085

NAPS COL 2.5(1)

Table 2.5-218 Water Level Measurements for Well OW-947

Date	Groundwater Elevation, Ft
11/29/2006	297.61
2/28/2007	297.81
5/30/2007	297.92
8/29/2007	296.00

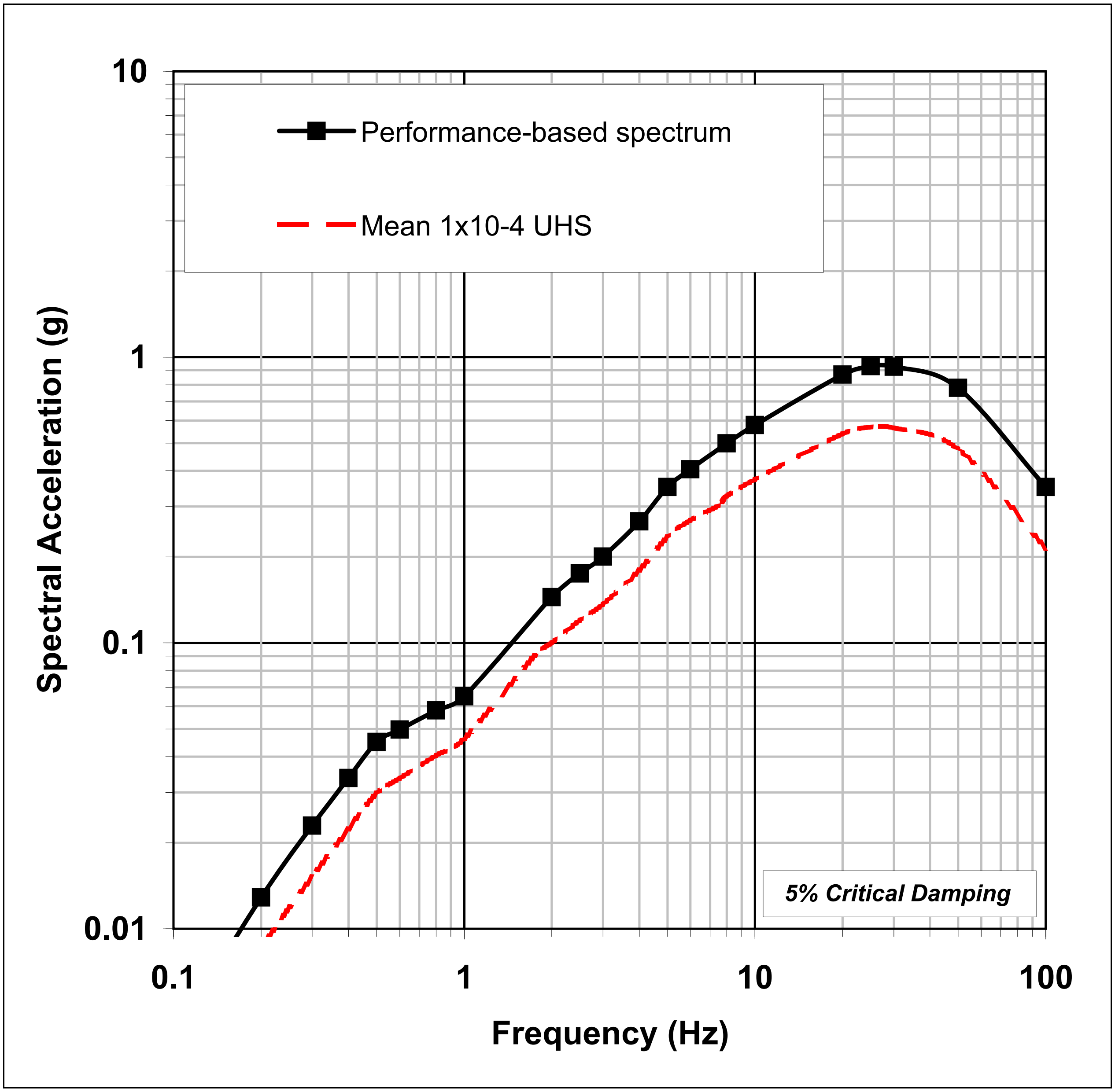
NAPS COL 2.5(1)

Table 2.5-219 Grain-Size Test Results for Slope Borings

Sample No.	Depth (Ft)	Gravel (%)	Sand (%)	Fines (%)	Silt (%)	Clay (%)
B-929-1	1.5–3.0	12.2	43.7	44.1	16.6	27.5
B-929-4	8.7–10.2	0.0	65.5	34.5	—	—
B-929-5	13.5–15.0	0.0	73.8	26.2	—	—
B-929-7	23.0–24.5	0.0	76.9	23.1	17.0	6.1
B-929-9	33.0–34.5	0.0	82.7	17.3	—	—
B-929-11	43.0–44.5	0.7	81.4	17.9	—	—
B-929-13	53.0–54.5	0.0	80.0	20.0	—	—
B-929A-UD1	15.0–16.8	0.0	78.6	21.4	15.1	6.3
B-929A-UD6	40.0–41.8	0.0	83.3	16.7	11.7	5.0
B-947-3	4.5–6.0	0.0	38.3	61.7	23.5	38.2
B-947-4	8.5–10.0	0.0	60.0	40.0	—	—
B-947-5	9.5–11.0	1.6	55.9	42.5	21.1	21.4
B-947-6	13.5–15.0	0.0	30.5	69.5	—	—
B-947-7	17.2–18.7	0.0	75.8	24.2	—	—
B-947-8	22.2–23.7	0.6	79.4	20.0	10.7	9.3
B-947-9	28.7–30.2	0.0	66.6	33.4	—	—
B-947-10	33.7–35.2	0.0	81.3	18.7	—	—
B-947-11	38.7–40.2	0.0	85.8	14.2	—	—
B-947-12	42.2–43.7	0.0	79.7	20.3	13.4	6.9

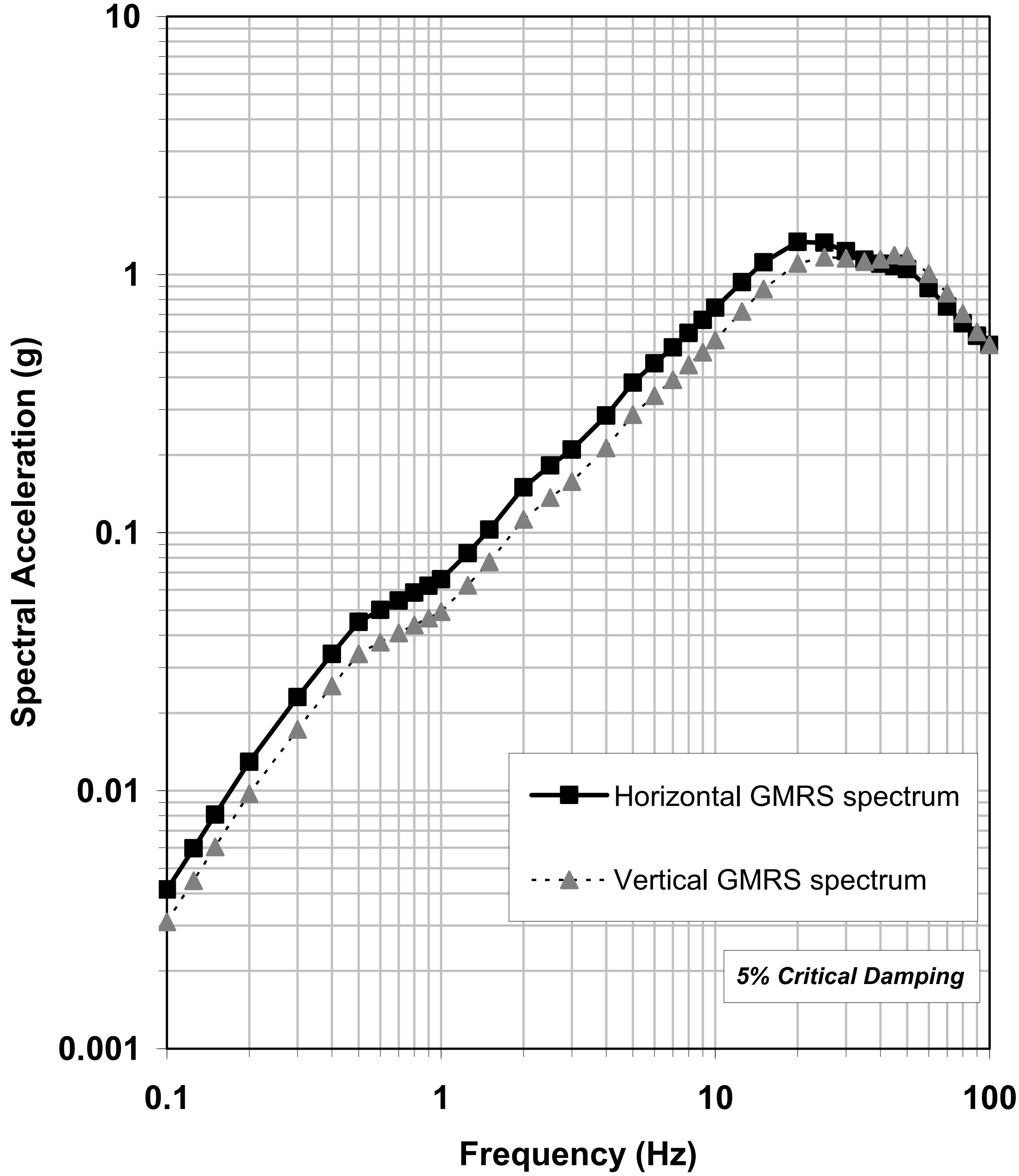
NAPS COL 2.5(1)
ESP COR

Figure 2.5-53R Performance-Based Horizontal Hard Rock SSE Spectrum and Mean 1 x 10^{-4} Horizontal Uniform Hazard Spectrum



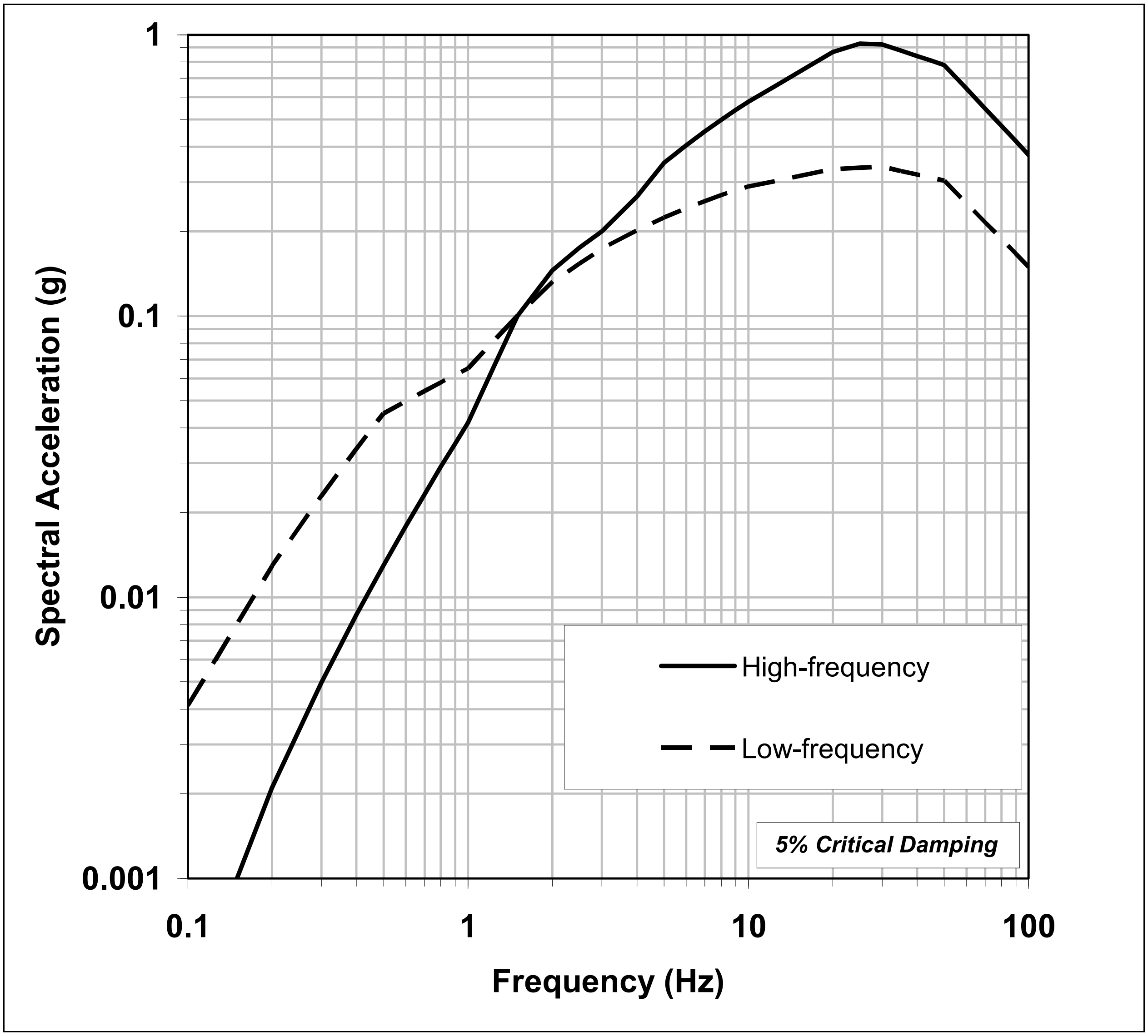
NAPS COL 2.5(1)
NAPS ESP VAR 2.0-4

Figure 2.5-201 Horizontal and Vertical Ground Motion Response Spectra



NAPS COL 2.5(1)
NAPS ESP VAR 2.0-4

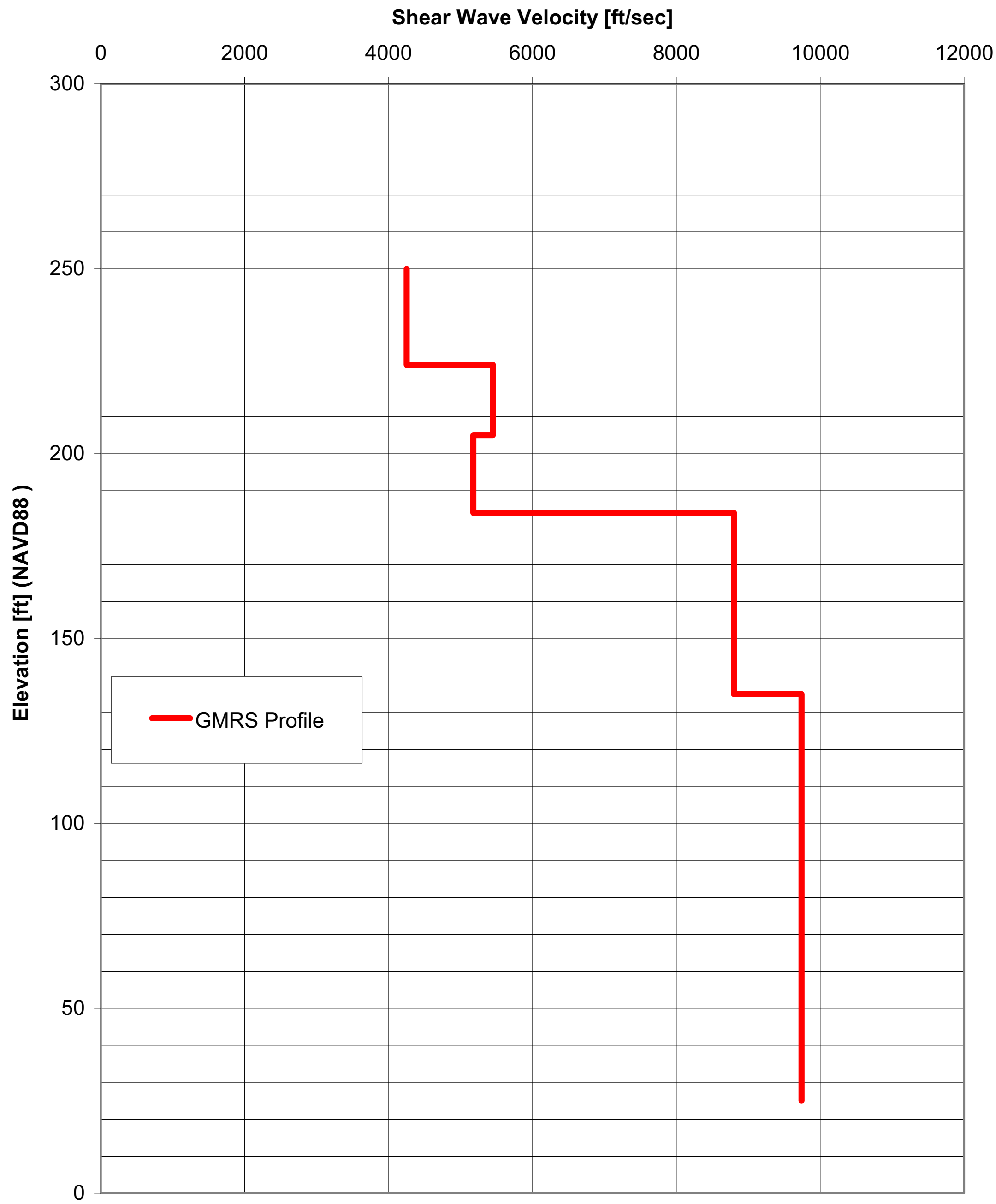
Figure 2.5-202a HF and LF Hard Rock Horizontal Response Spectra



Note: The envelope of these response spectra gives the horizontal GMRS in Figure 2.5-201.

NAPS COL 2.5(1)

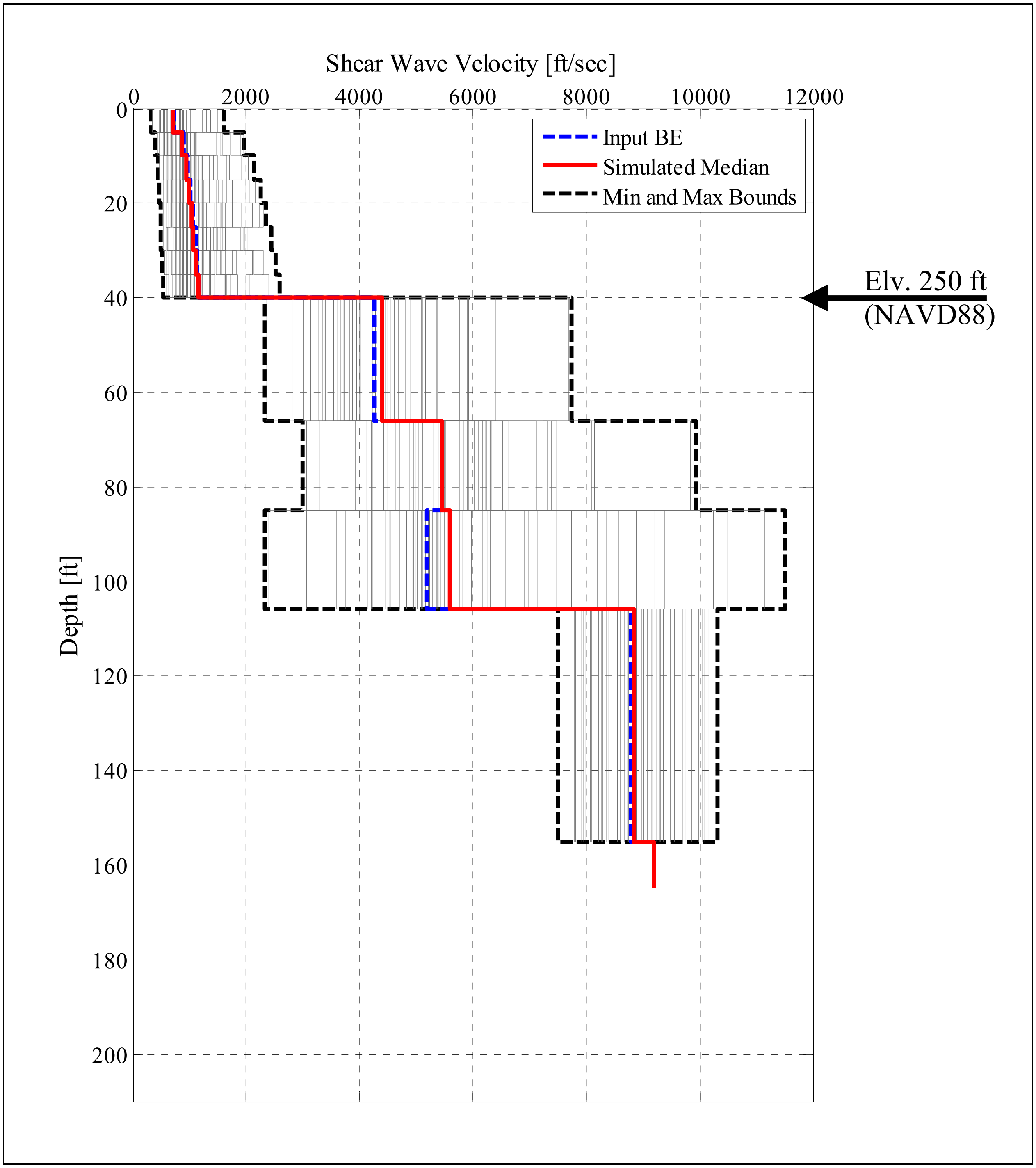
Figure 2.5-202b Best Estimate Shear Wave Velocity Profile for GMRS Calculation



Note: The conversion from NAVD88 Datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS COL 2.5(1)

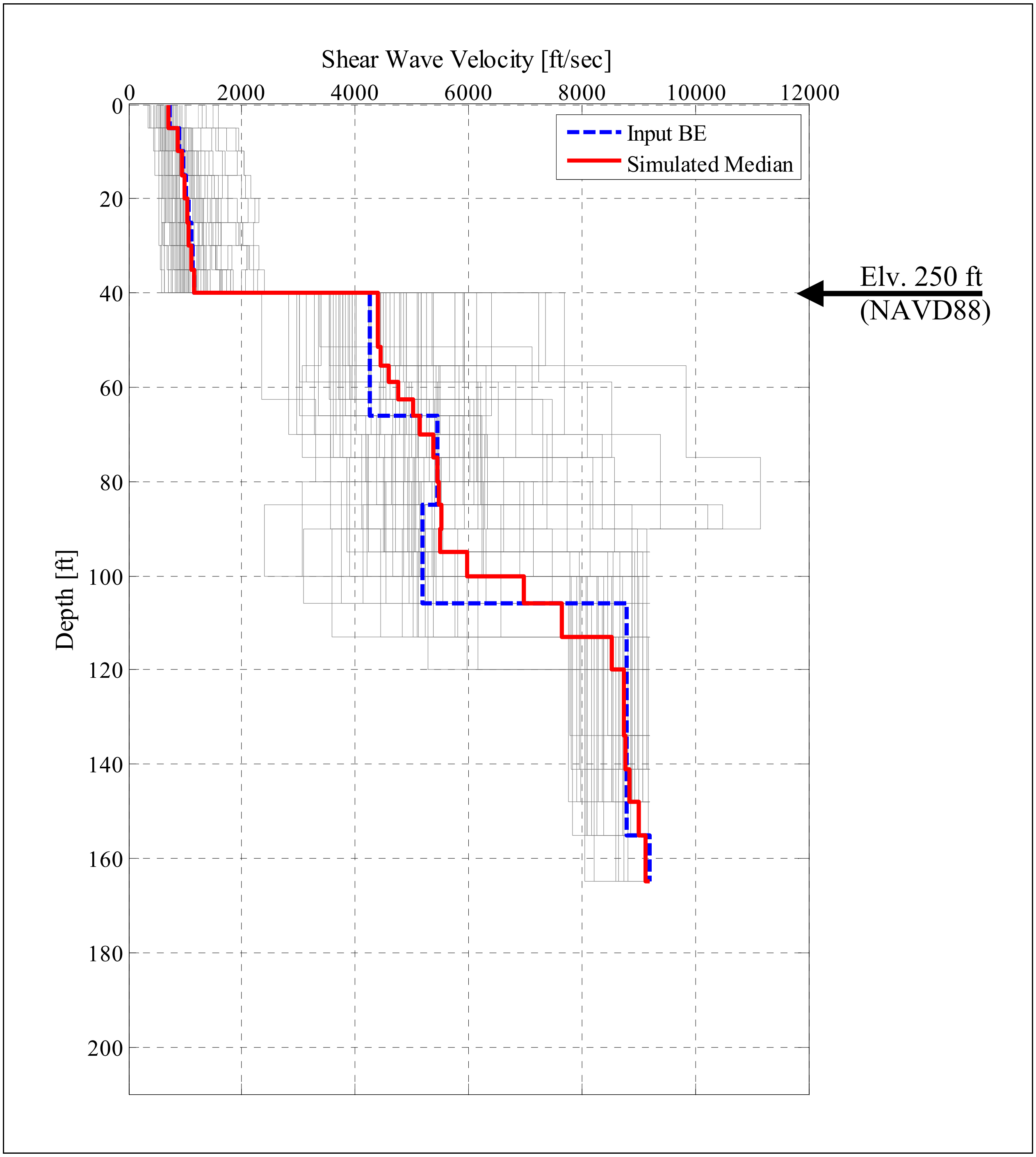
Figure 2.5-202c Low-Strain Shear-Wave Velocity for 60 Simulated Profiles for GMRS Calculation Not Including Thickness Variation (Halfspace at V_s = 9200 ft/sec)



Note: The top 40 ft of backfill is removed in the TSCR analysis performed for calculation of GMRS.

NAPS COL 2.5(1)

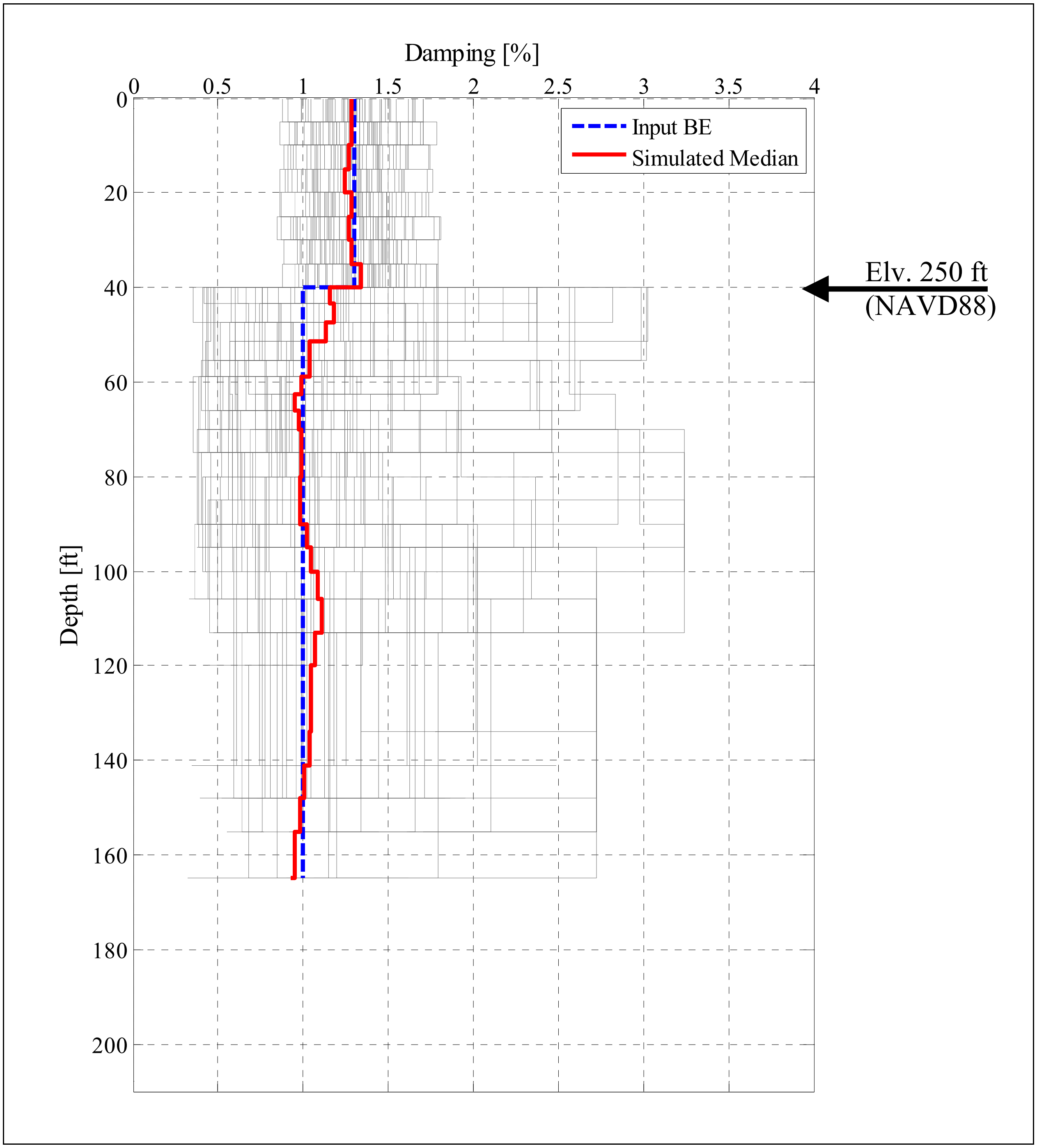
Figure 2.5-202d Low-Strain Shear-Wave Velocity for 60 Simulated Profiles for GMRS Calculation Including Thickness Variation (Halfspace at V_S = 9200 ft/sec)



Note: The top 40 ft of backfill is removed in the TSCR analysis performed for calculation of GMRS.

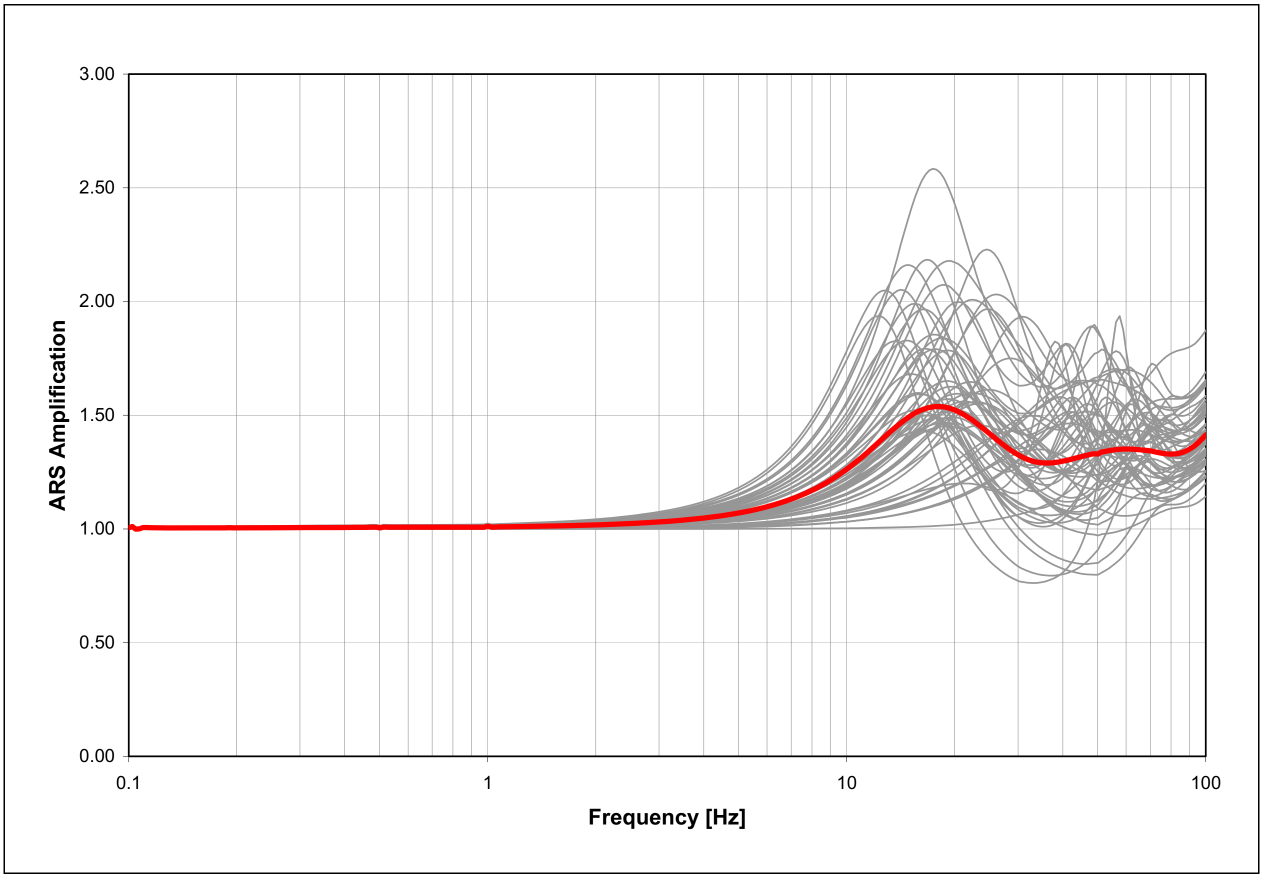
NAPS COL 2.5(1)

Figure 2.5-202e Low-Strain Damping Ratio for 60 Simulated Profiles for GMRS Calculation

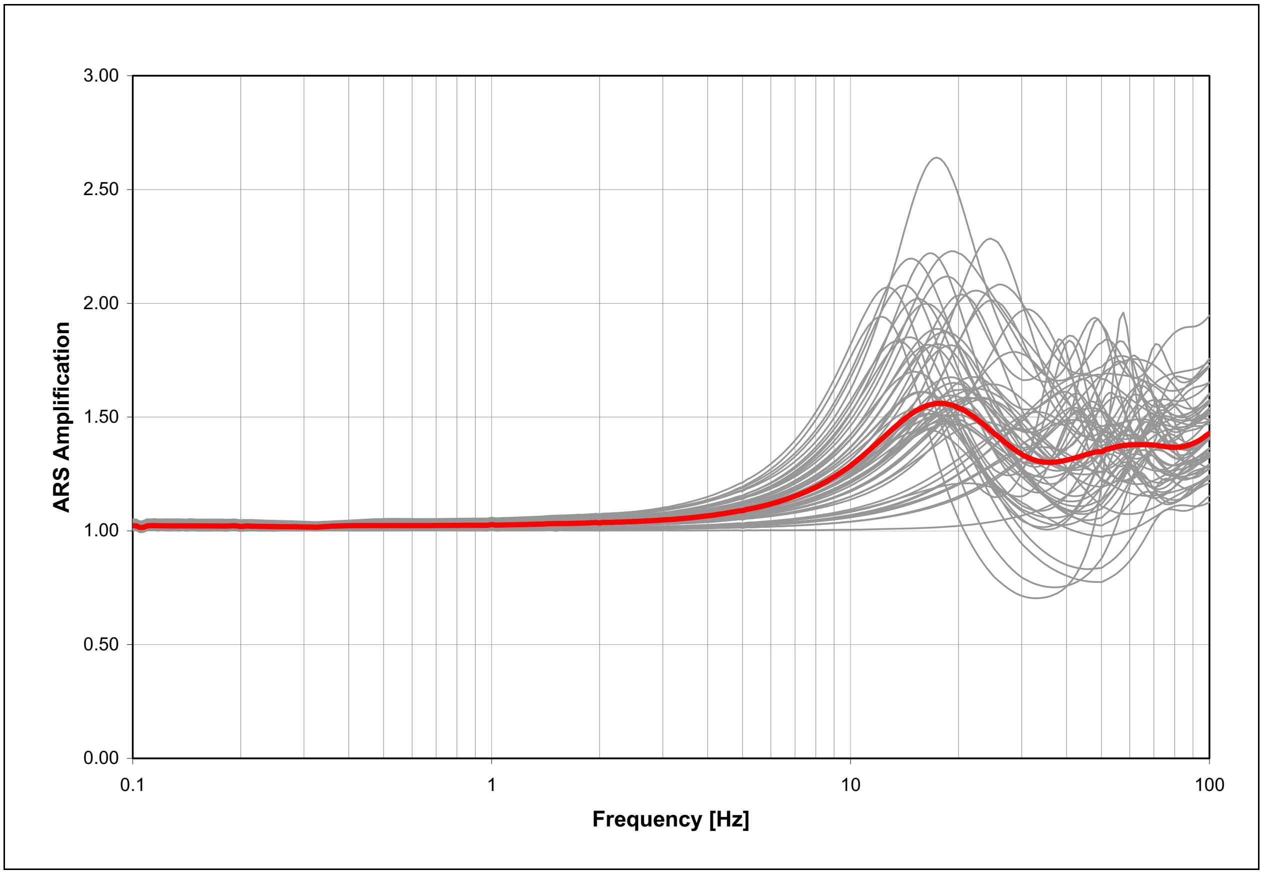


Note: The top 40 ft of backfill is removed in the TSCR analysis performed for calculation of GMRS.

NAPS COL 2.5(1) **Figure 2.5-202f Geologic Outcrop ARS Amplification Functions at Elevation 250 ft NAVD88 for GMRS Calculation - LF**

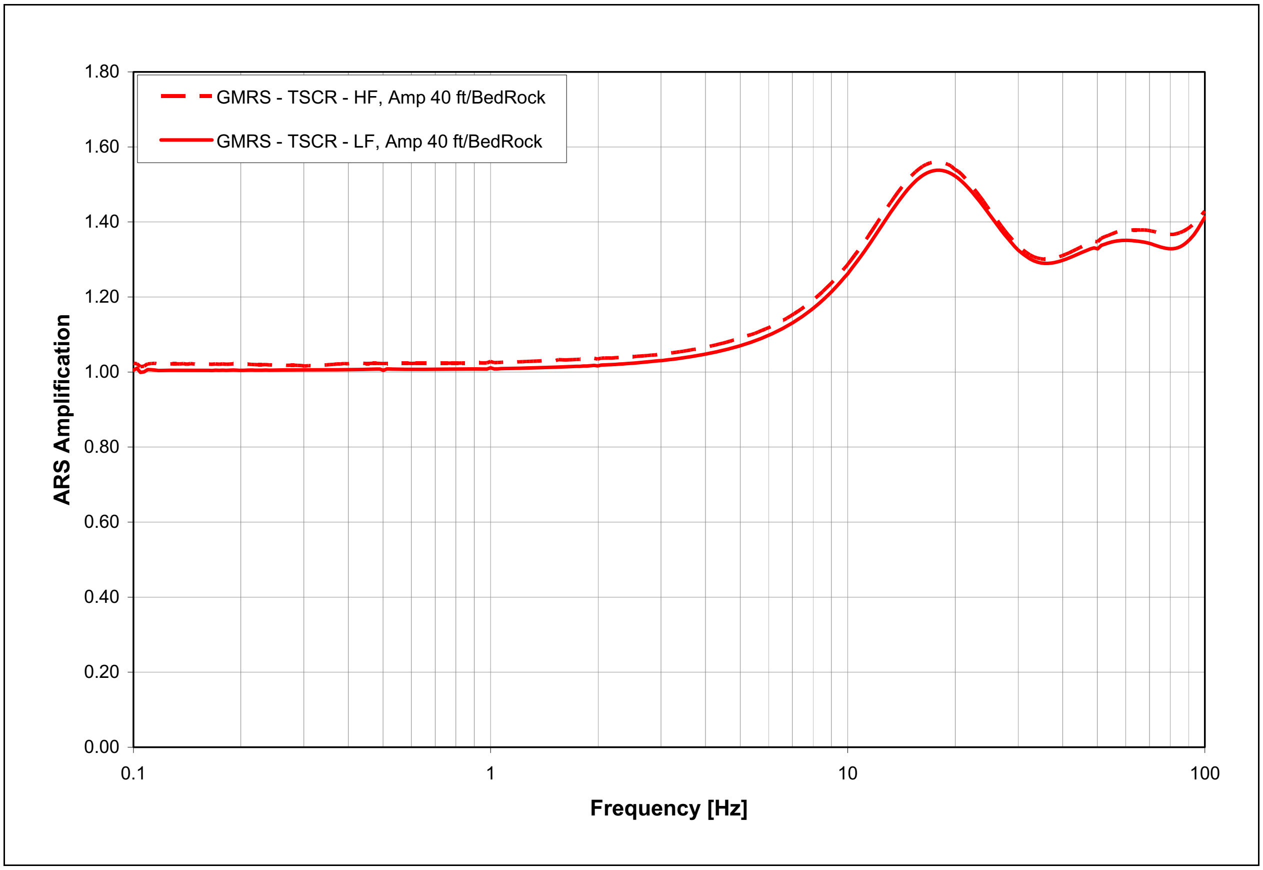


NAPS COL 2.5(1) **Figure 2.5-202g Geologic Outcrop ARS Amplification Functions at Elevation 250 ft NAVD88 for GMRS Calculation - HF**



NAPS COL 2.5(1)

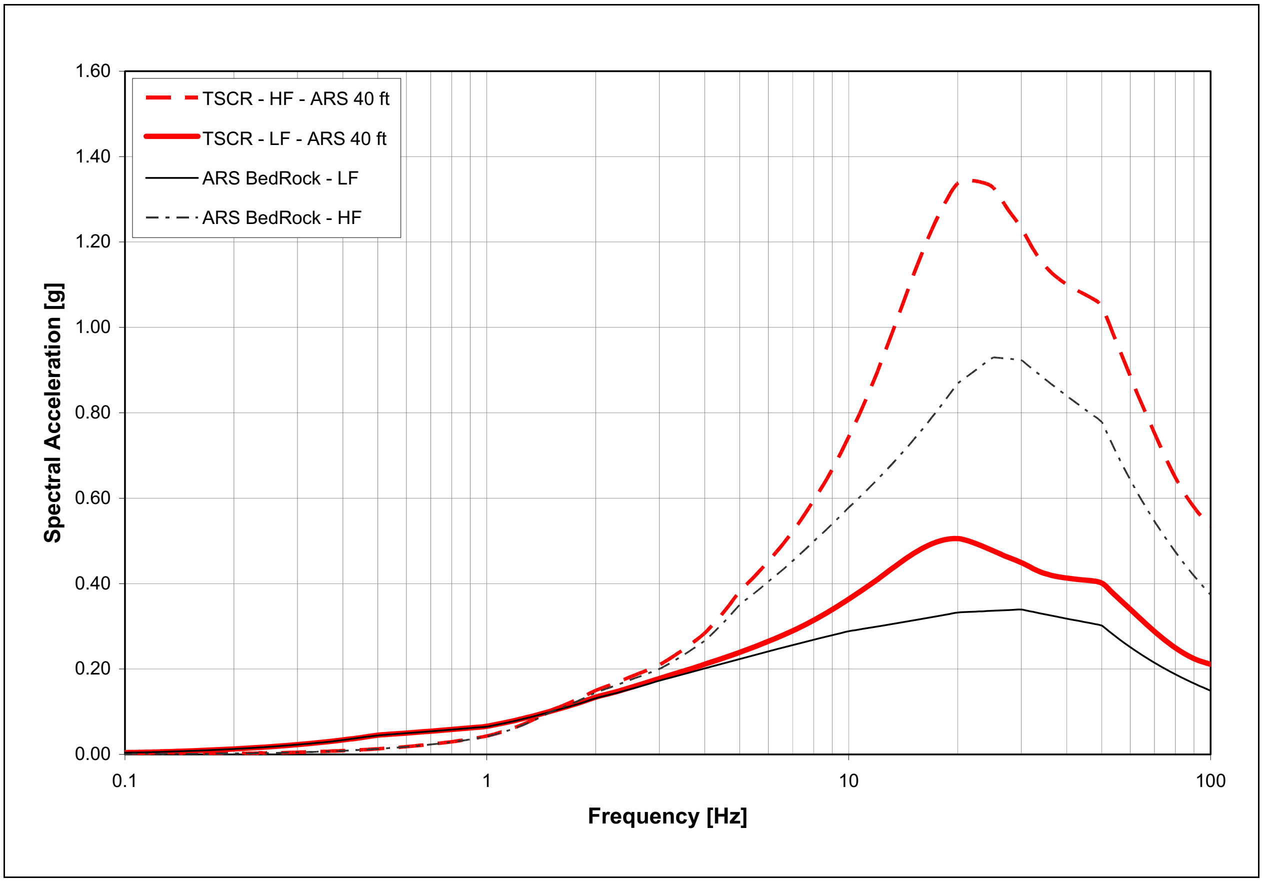
Figure 2.5-202h Geologic Outcrop (TSCR) Log-Mean 5% Damped ARS Amplification Functions for GMRS Calculation



Note: In the legend, 40 ft refers to the depth with respect to the finished ground surface (Elevation 290 ft NAVD88) at which the ARS amplification is calculated and it corresponds to Elevation 250 ft NAVD88.

NAPS COL 2.5(1)

Figure 2.5-202i Geologic Outcrop Log-Mean 5% Damped ARS for GMRS Calculation



Note: In the legend, 40 ft refers to the depth with respect to the finished ground surface (Elevation 290 ft NAVD88) at which the ARS amplification is calculated and it corresponds to Elevation 250 ft NAVD88.

NAPS COL 2.5(1)

Figure 2.5-202j Horizontal GMRS

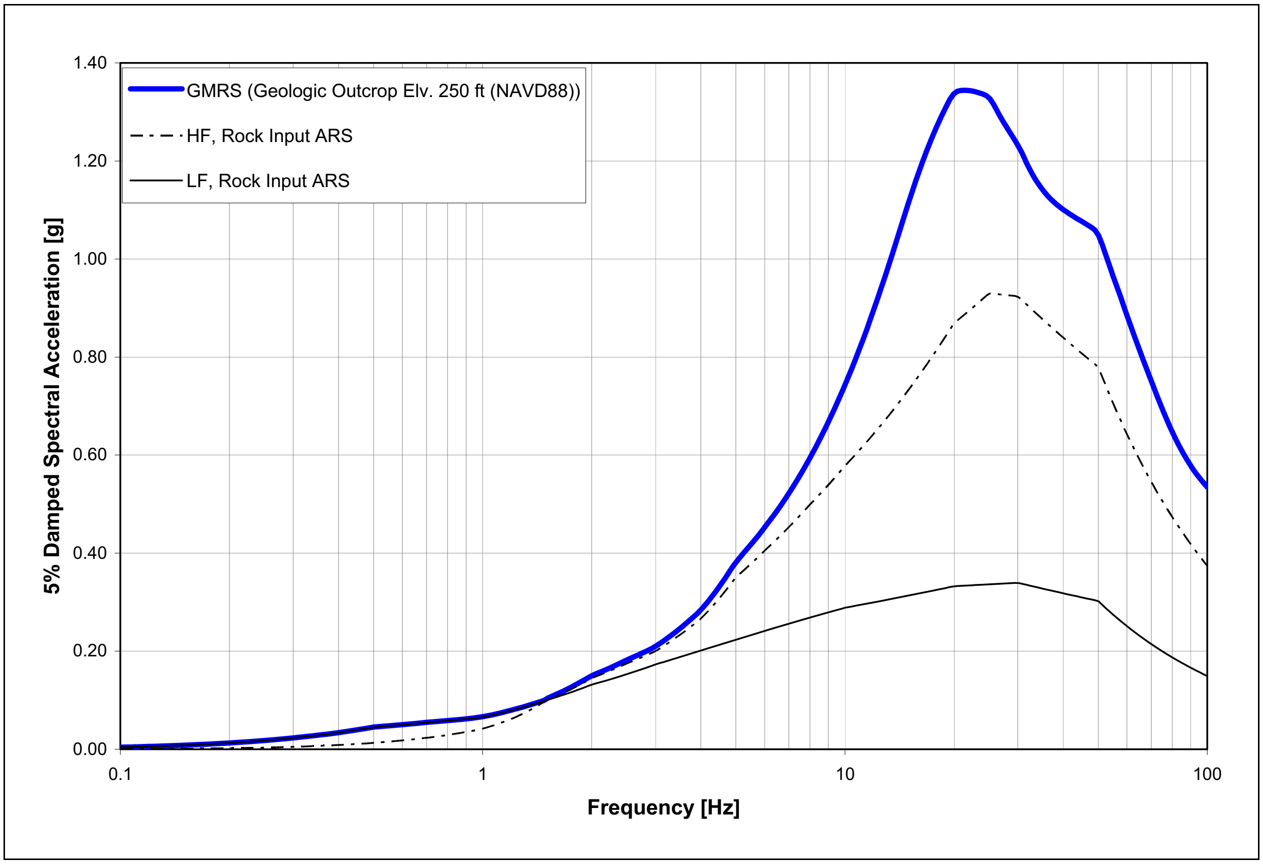


Figure 2.5-203 [Deleted]

Figure 2.5-204 [Deleted]

Figure 2.5-205 [Deleted]

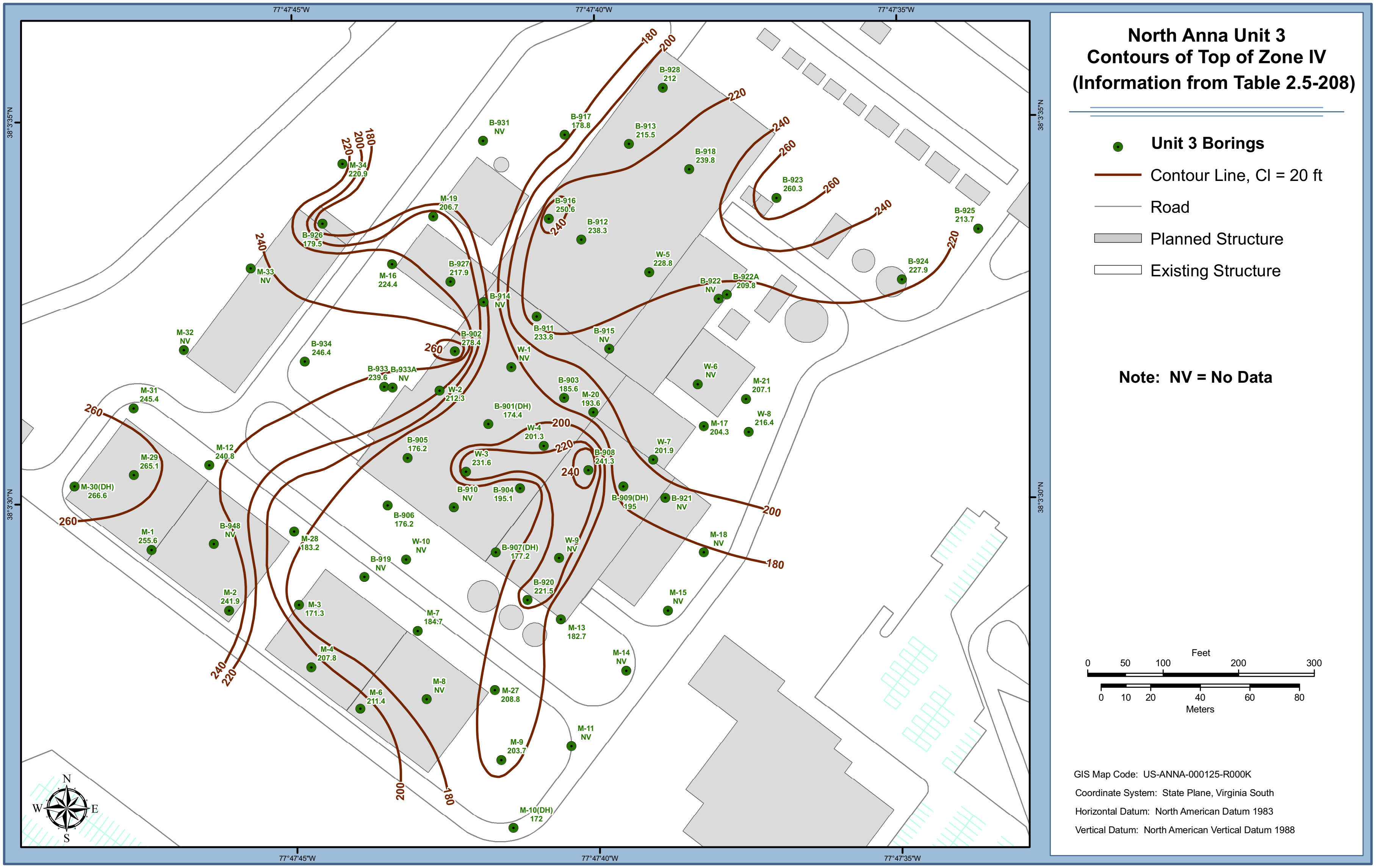
Figure 2.5-206 [Deleted]

Figure 2.5-207 [Deleted]

Figure 2.5-208 [Deleted]

NAPS COL 2.5(1)

Figure 2.5-209 Contours of Top of Zone IV



NAPS COL 2.5(1) **Figure 2.5-210 Contours of Top of Zone III-IV**

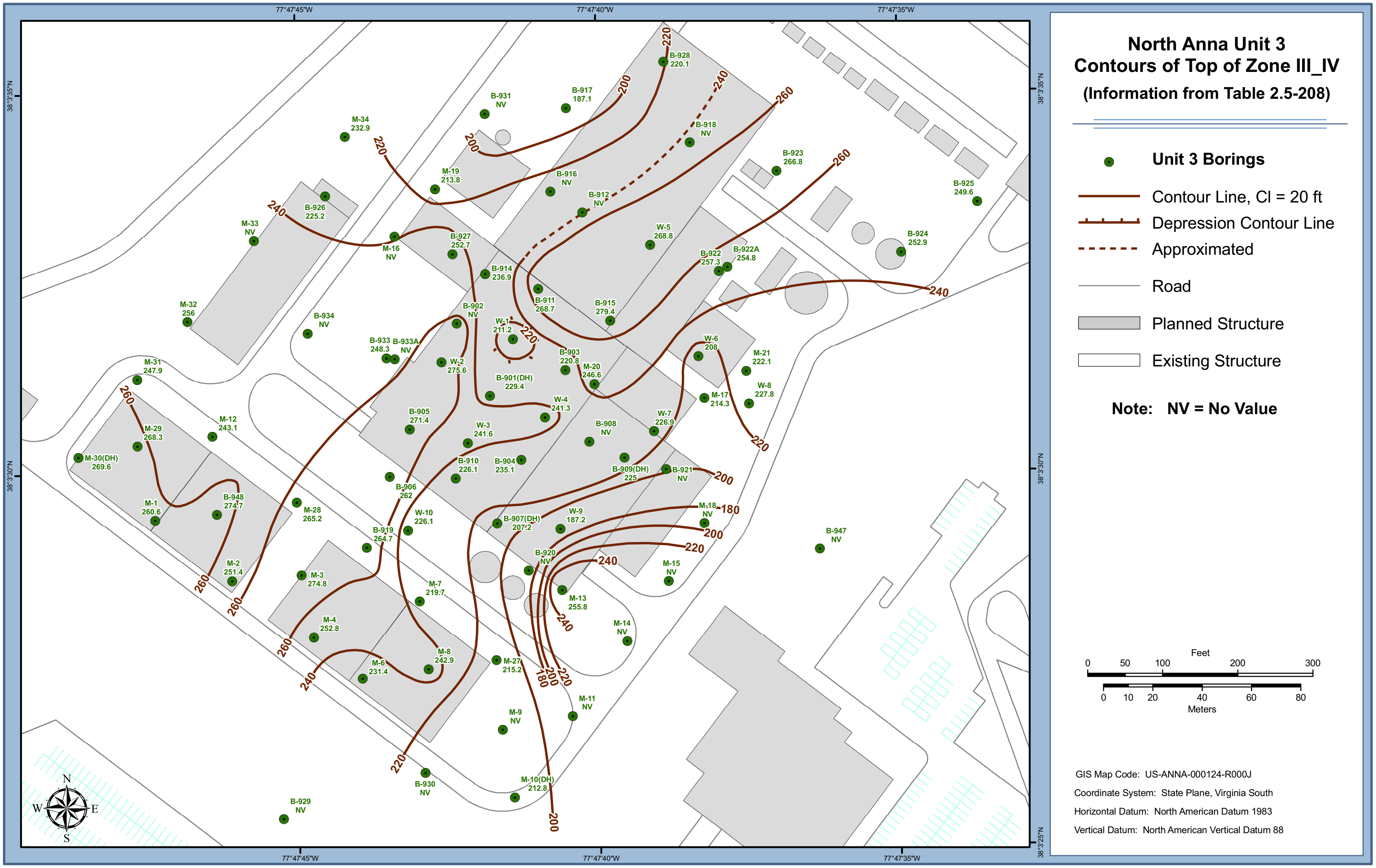
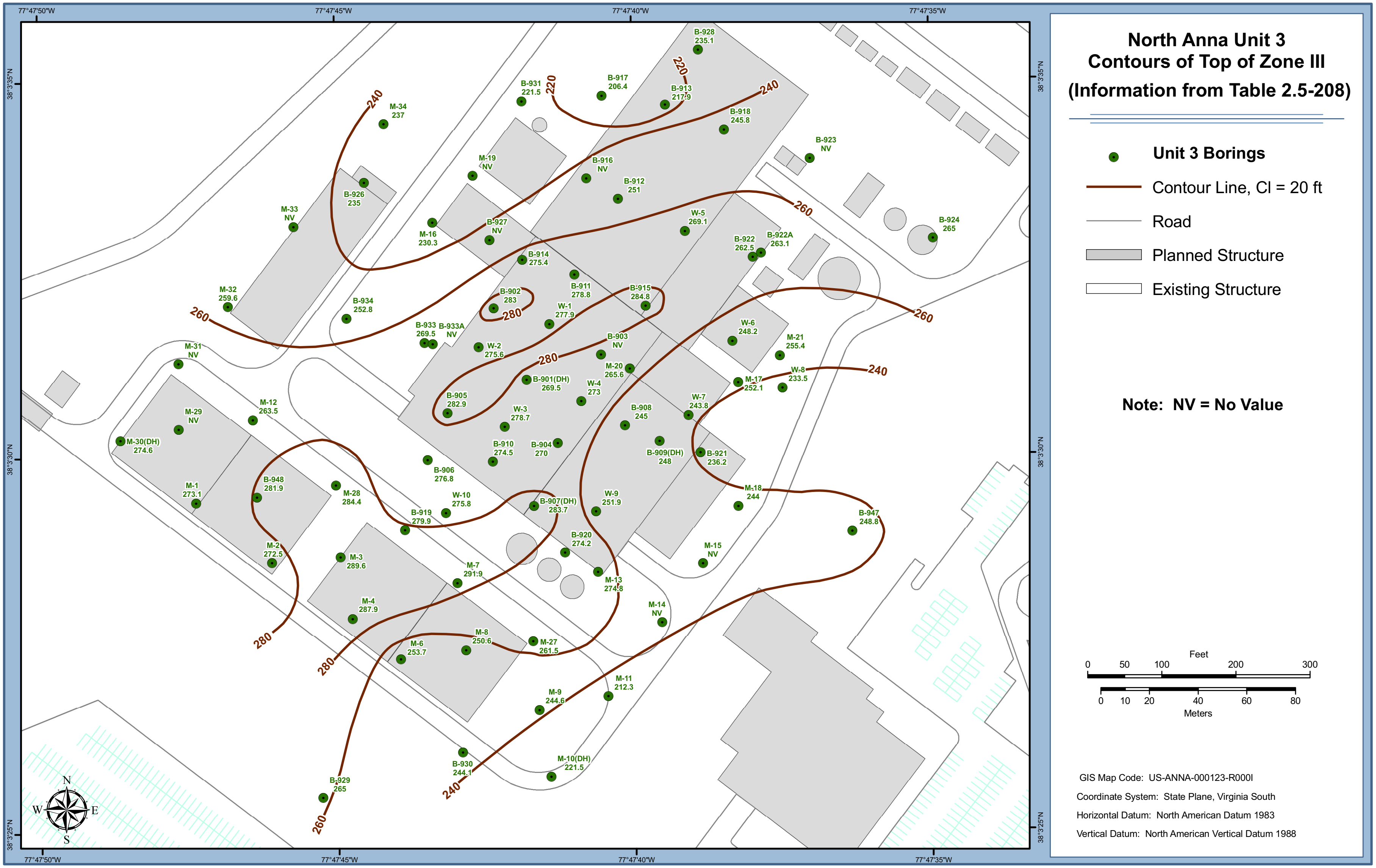


Figure 2.5-211 Contours of Top of Zone III



NAPS COL 2.5(1)

Figure 2.5-212 Contours of Top of Zone IIB

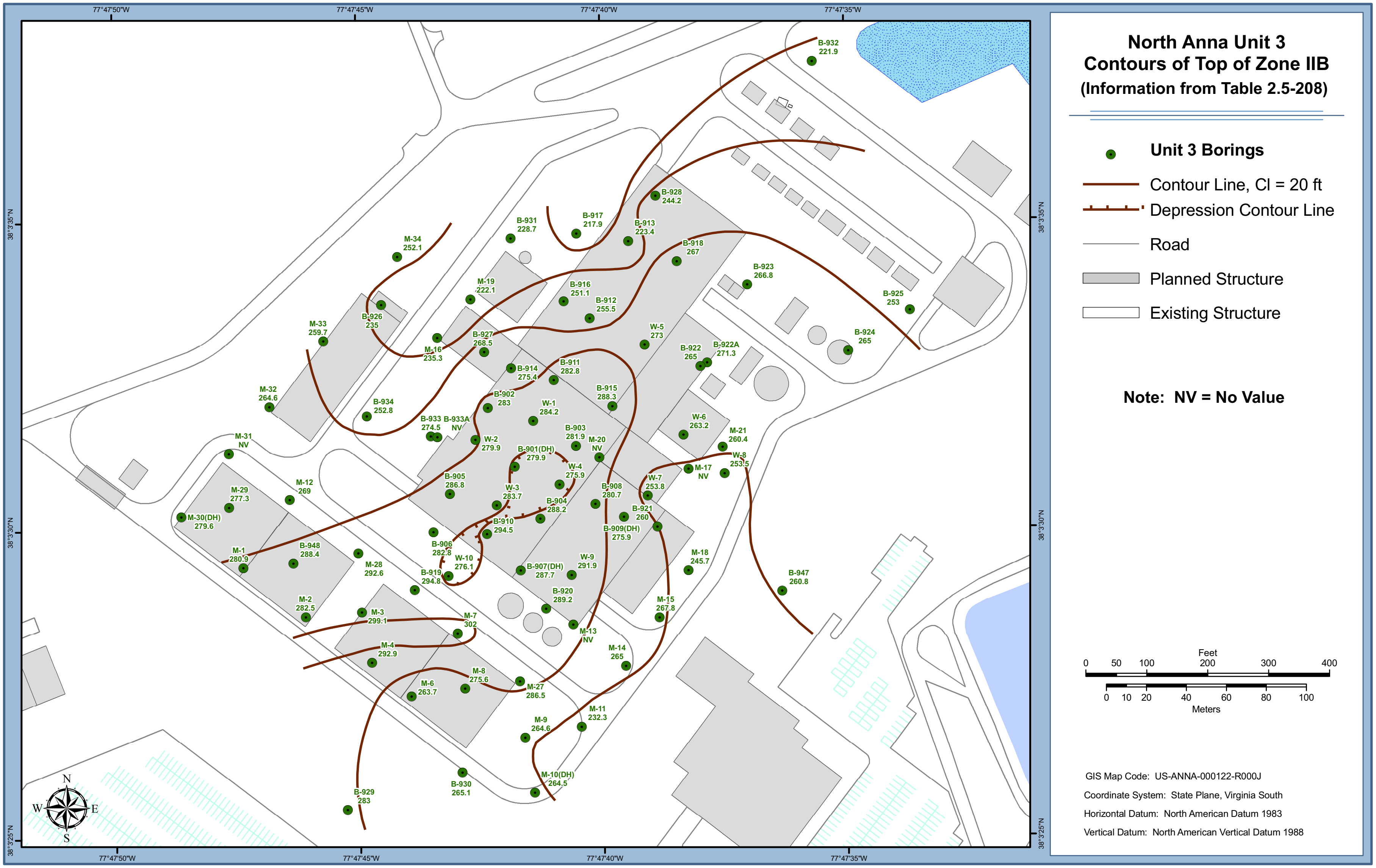
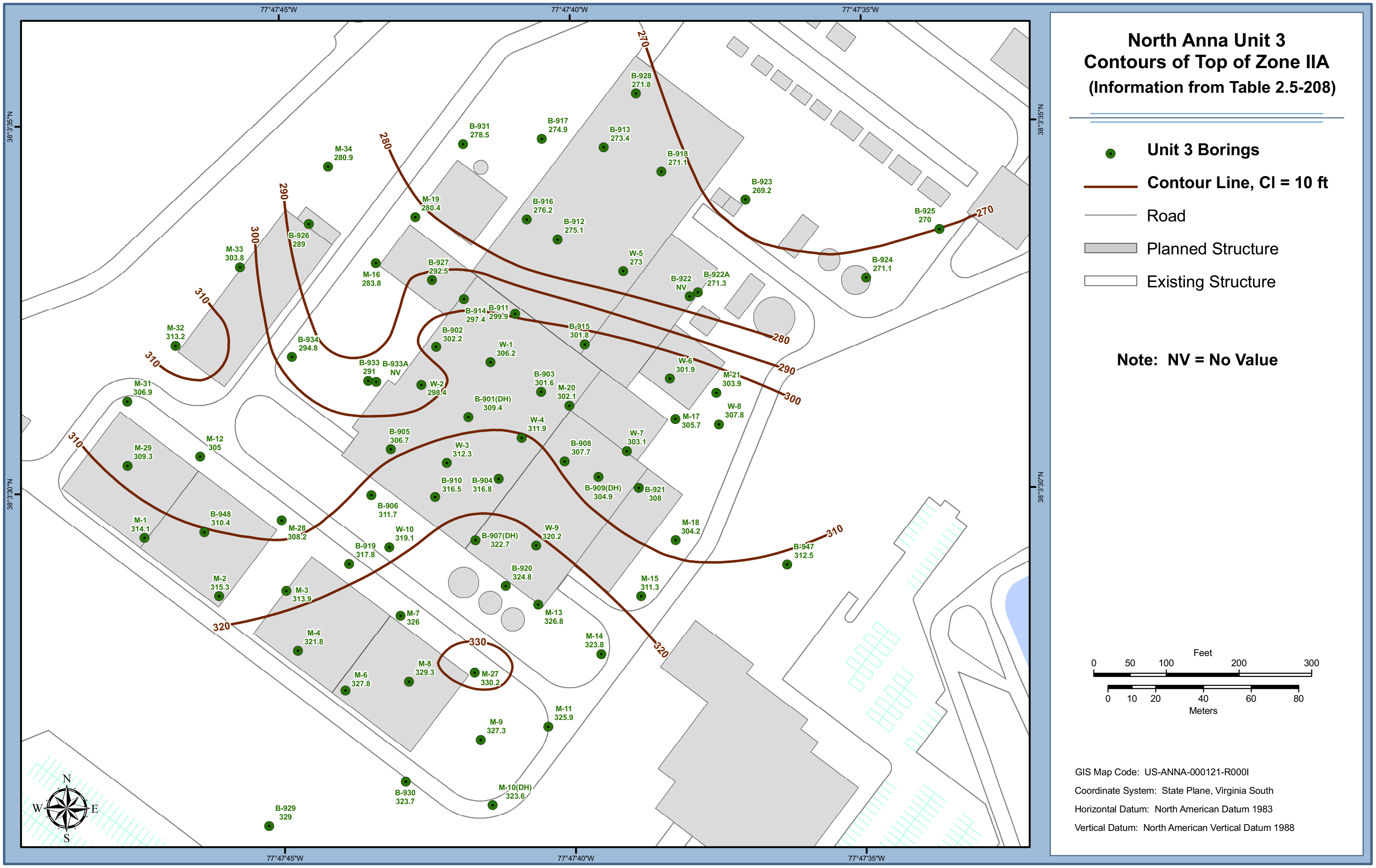
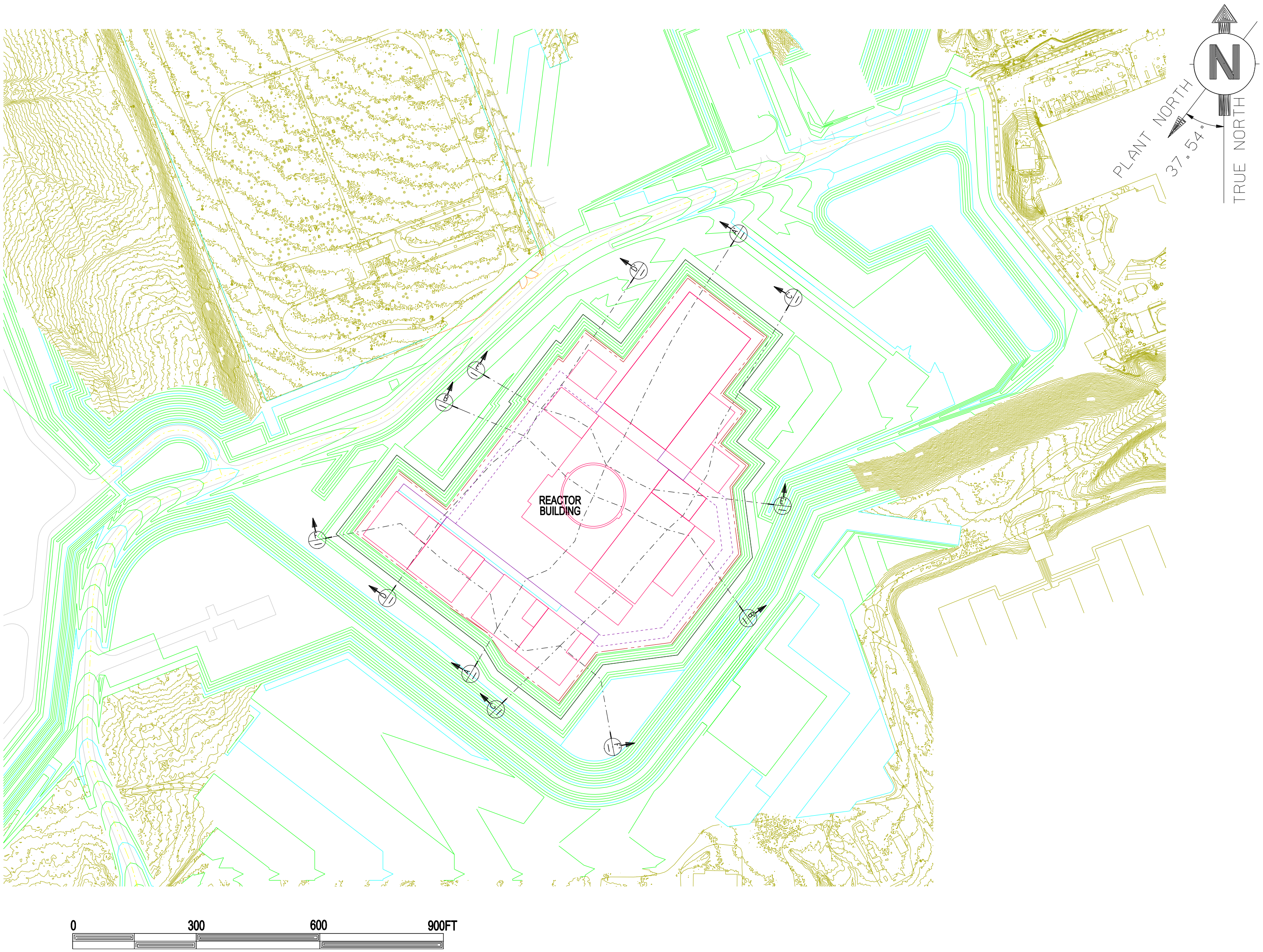


Figure 2.5-213 Contours of Top of Zone IIA



NAPS COL 2.5(1) **Figure 2.5-214 Plan Locations of Profiles**



NAPS COL 2.5(1) **Figure 2.5-215 Subsurface Profile A-A'**

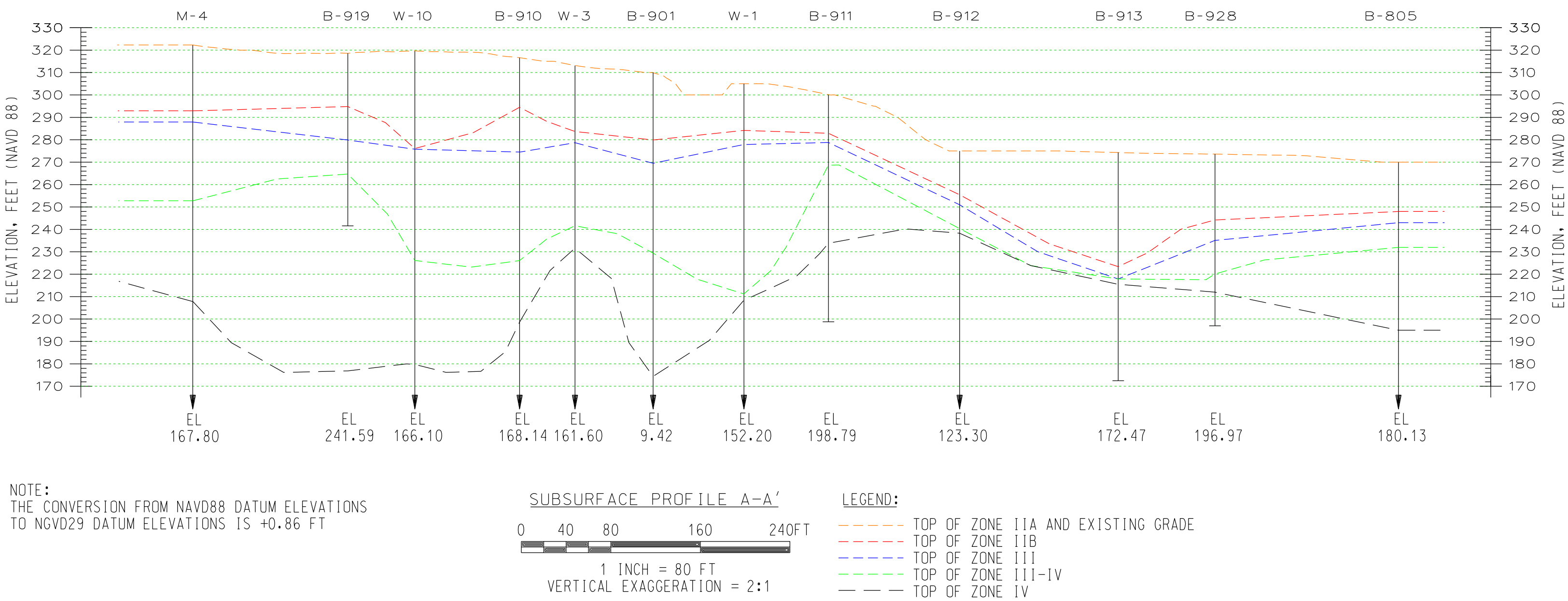
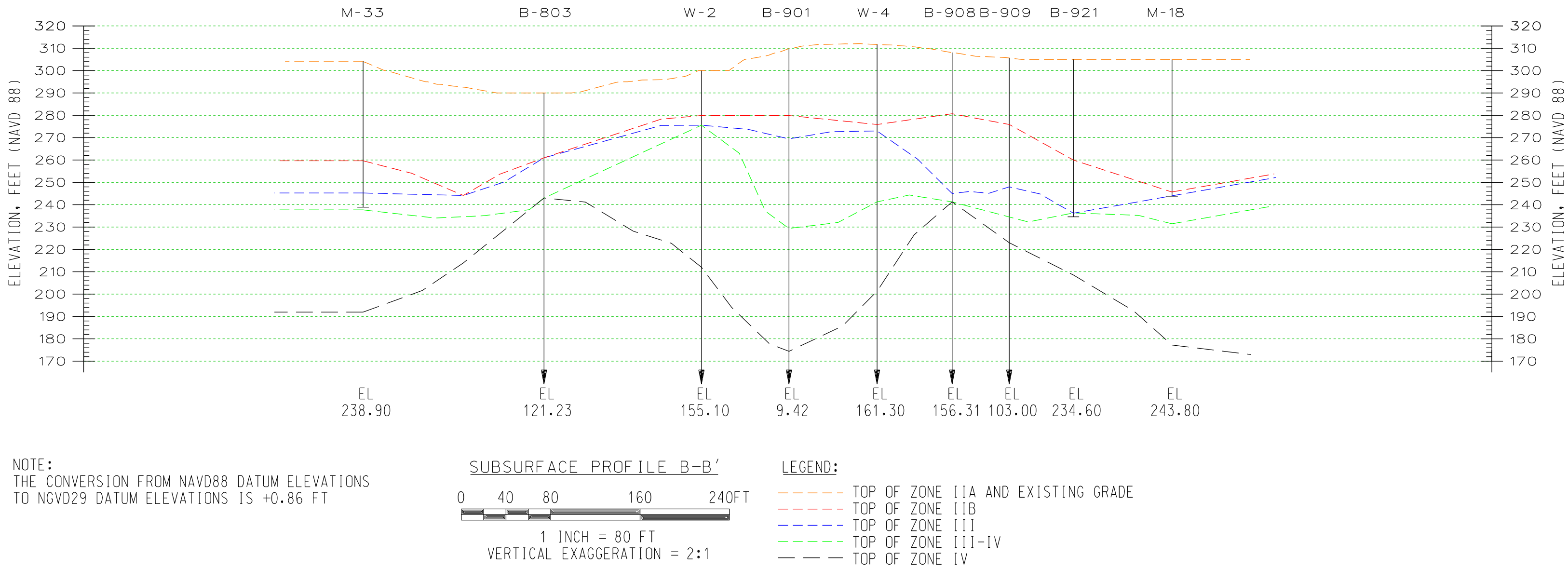
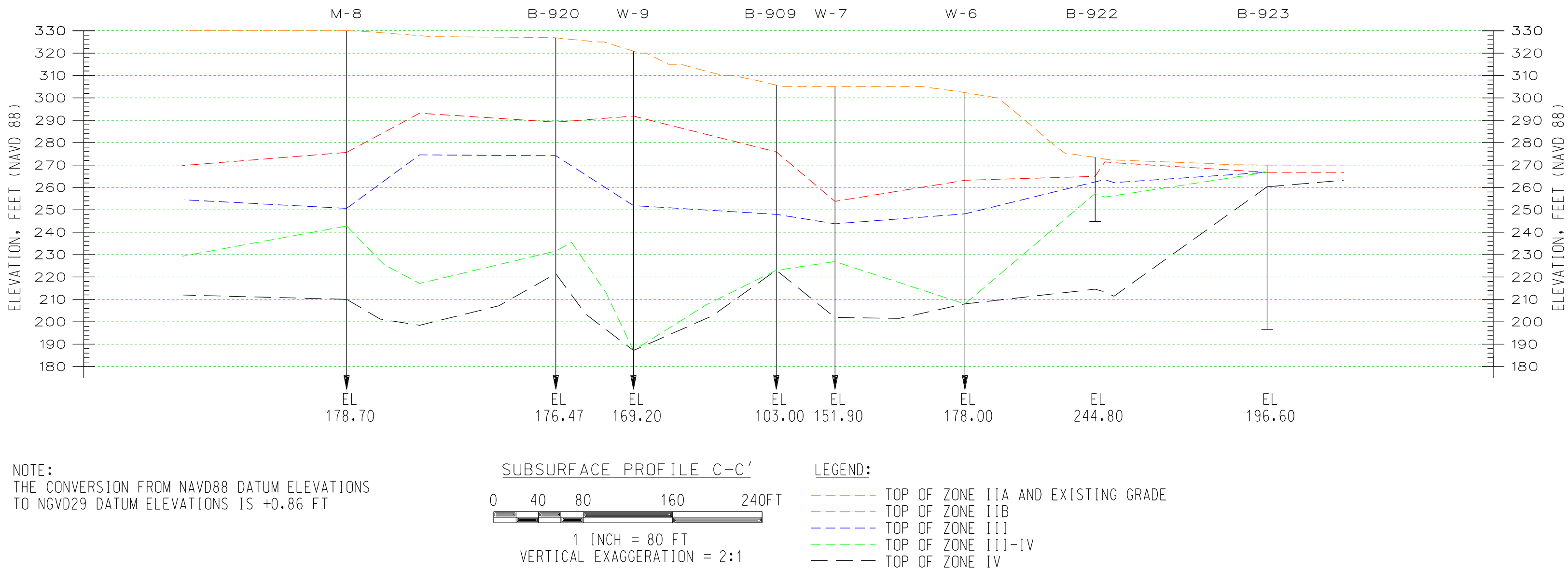


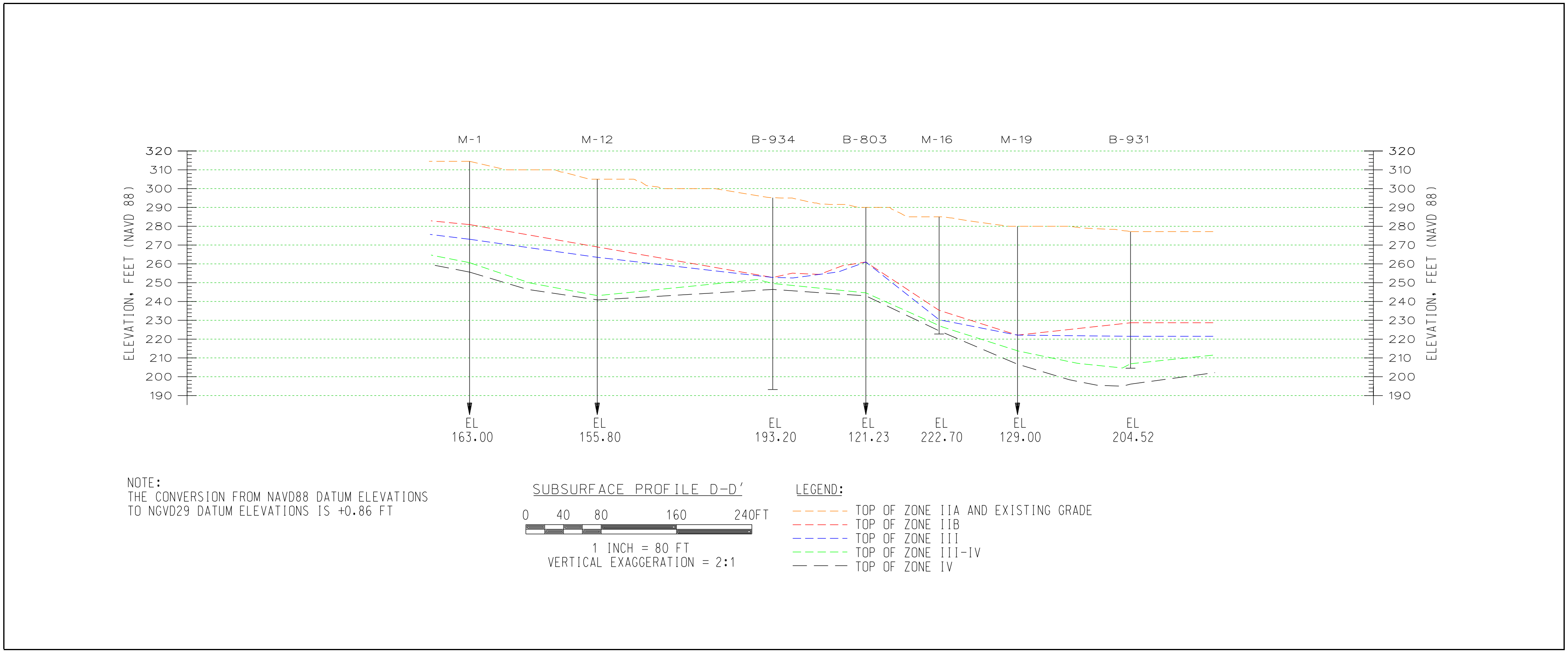
Figure 2.5-216 Subsurface Profile B-B'



NAPS COL 2.5(1) **Figure 2.5-217 Subsurface Profile C-C'**



NAPS COL 2.5(1) **Figure 2.5-218 Subsurface Profile D-D'**



NAPS COL 2.5(1) **Figure 2.5-219 Subsurface Profile E-E'**

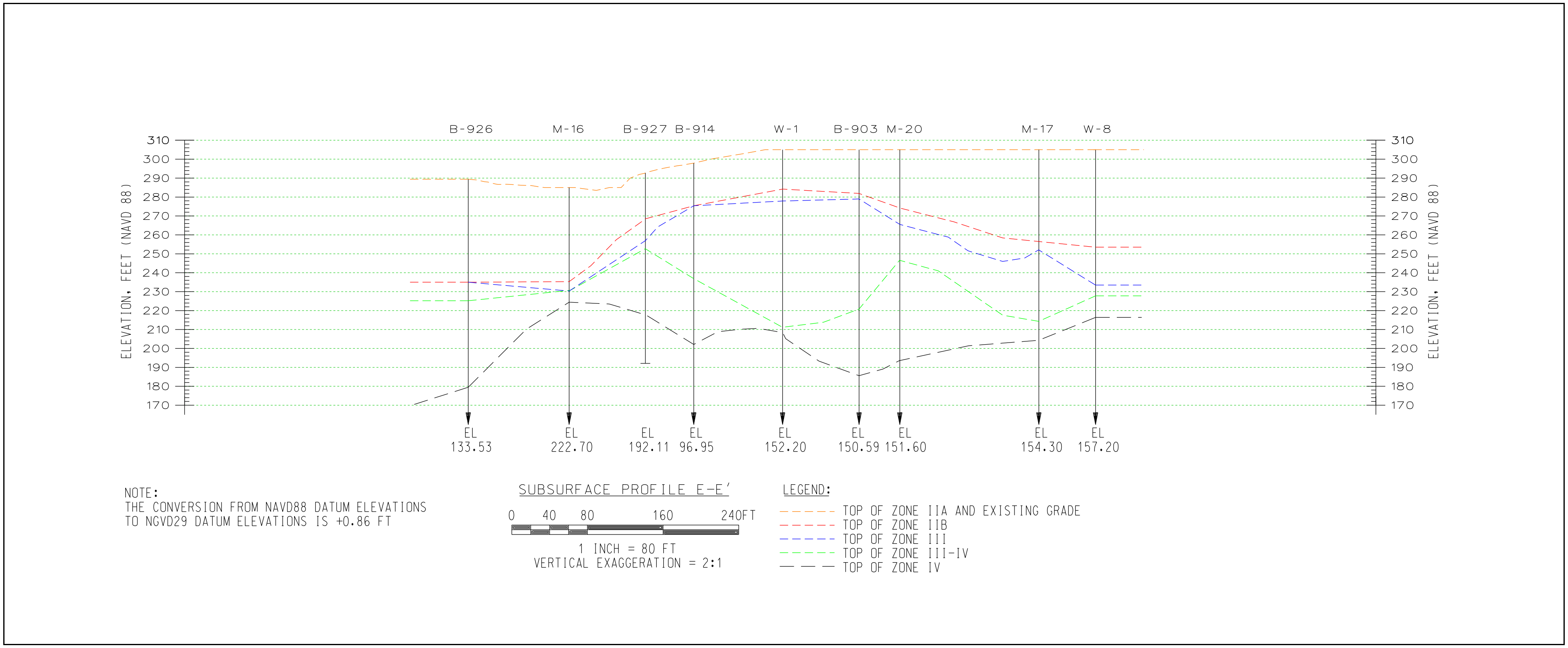


Figure 2.5-220 Subsurface Profile F-F'

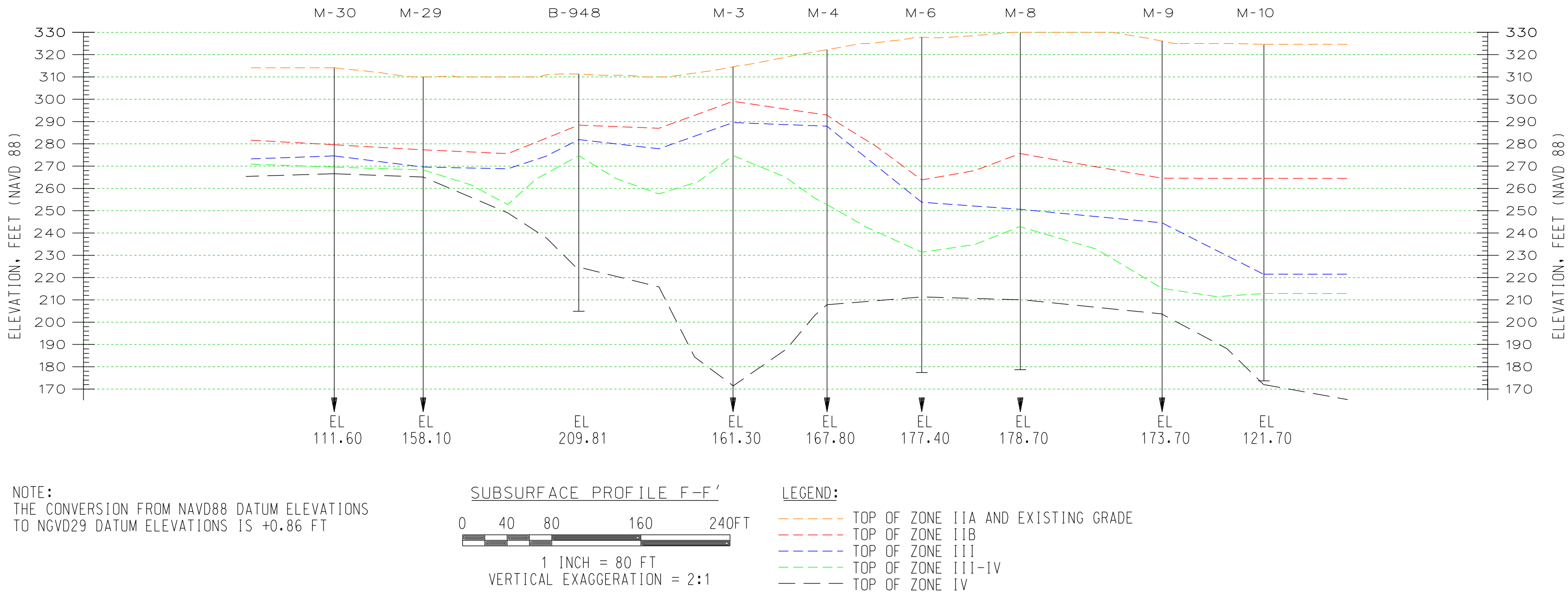
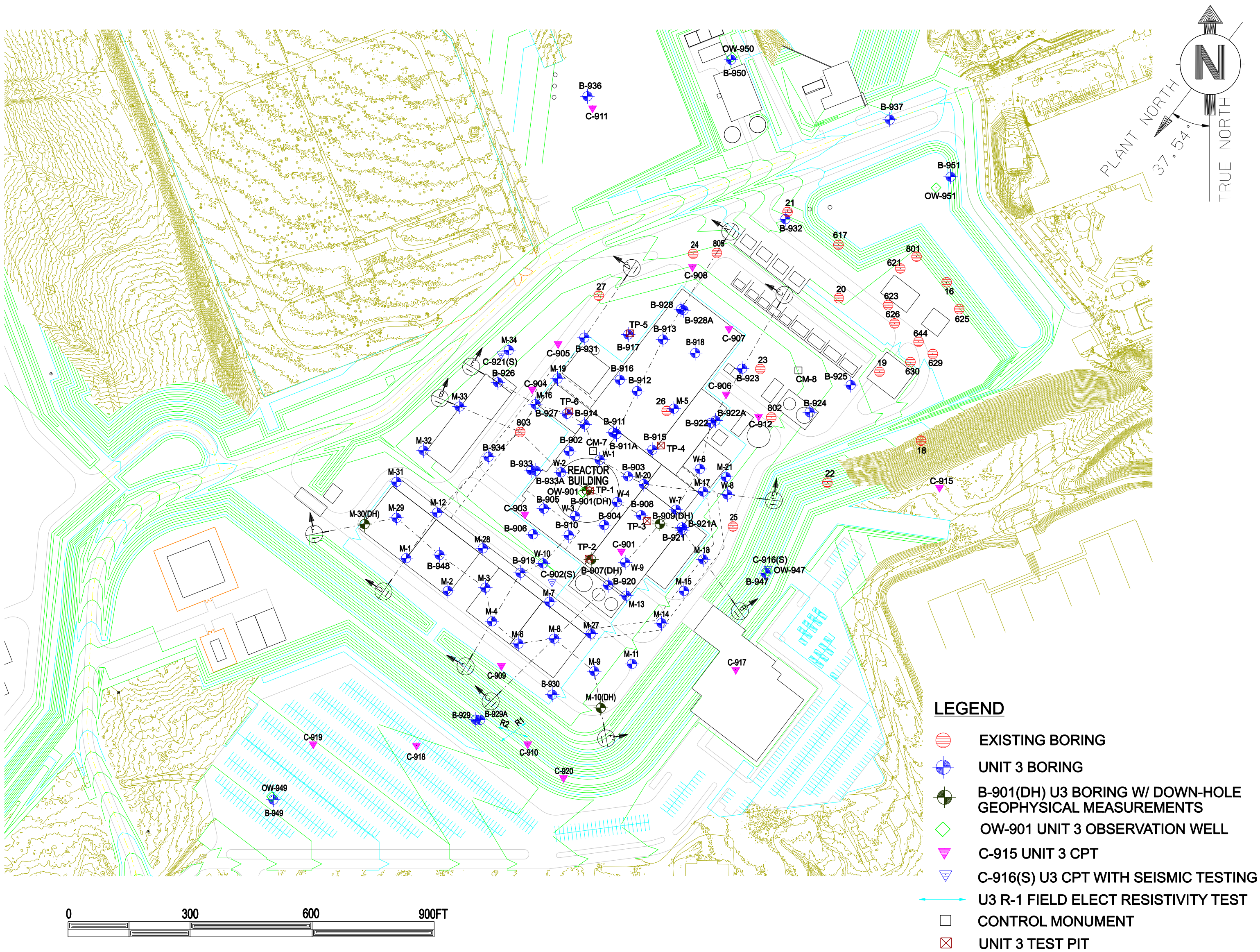
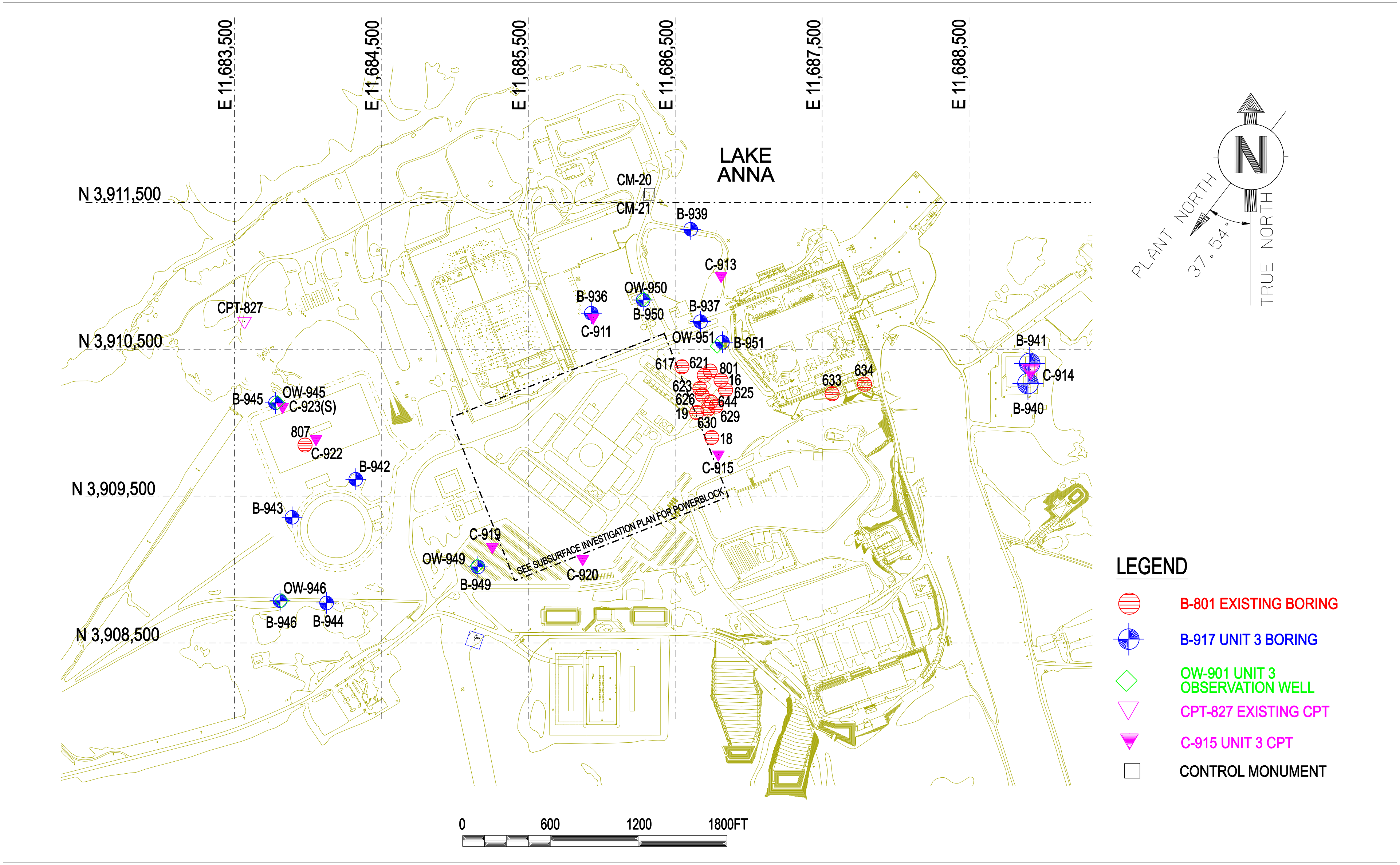


Figure 2.5-221 Unit 3 Boring Locations – Power Block

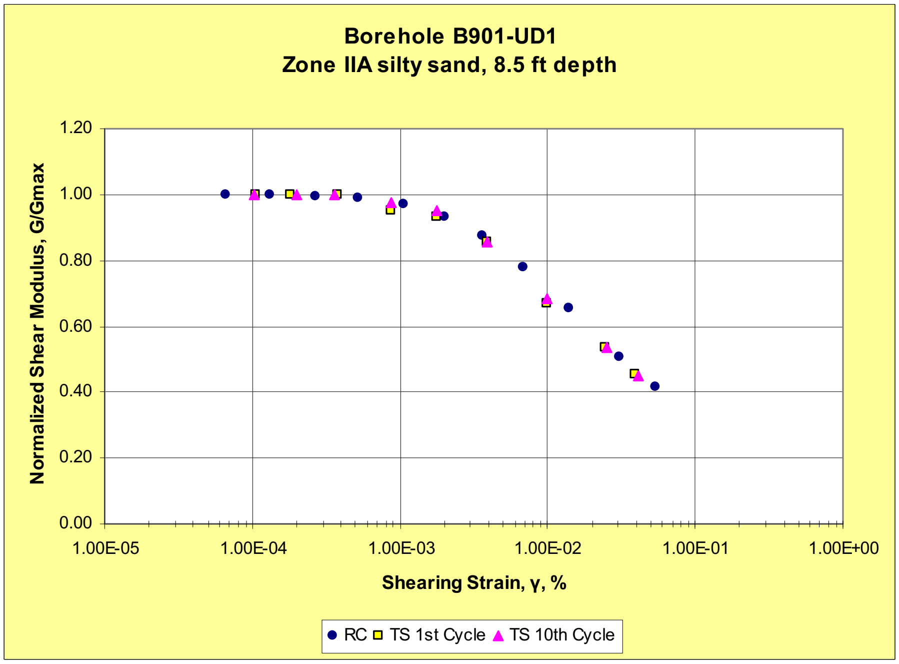


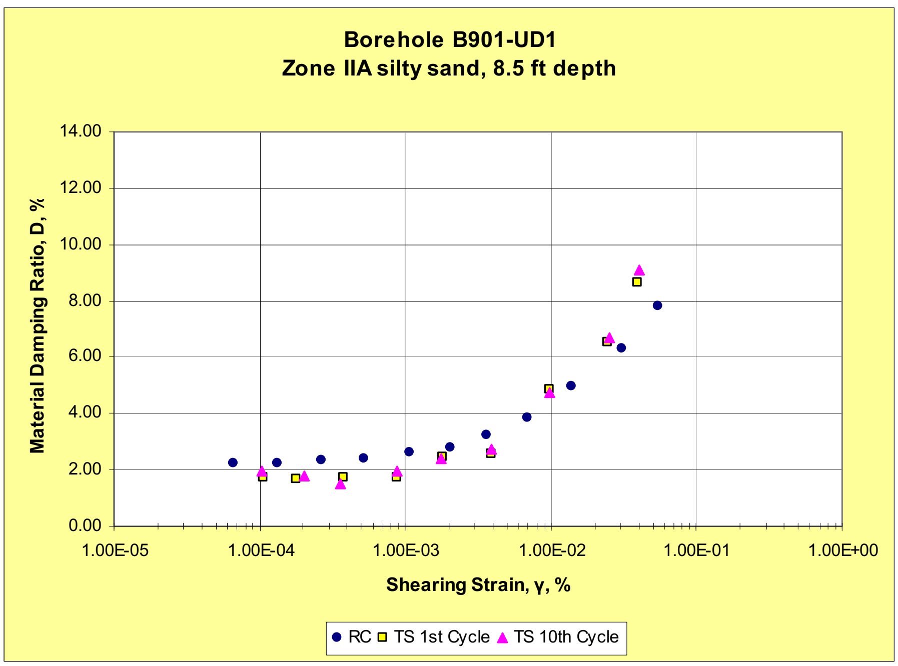
NAPS COL 2.5(1)

Figure 2.5-222 Unit 3 Boring Locations – Site



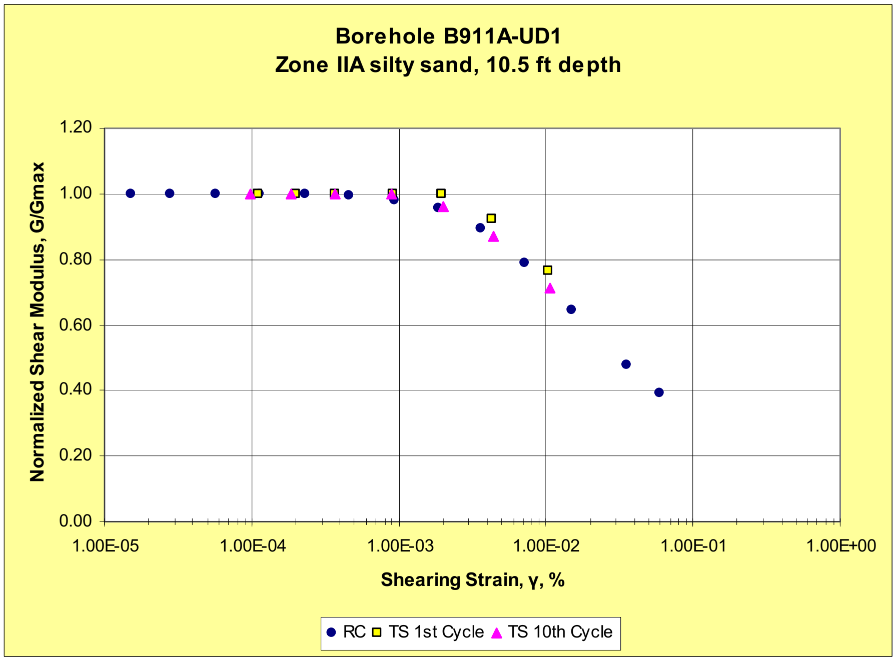
NAPS COL 2.5(1) **Figure 2.5-223 RCTS Test Results (Sheet 1 of 3) G/G_{max} and D vs. Strain, B-901 UD-1: 4.3 psi Confining Pressure**

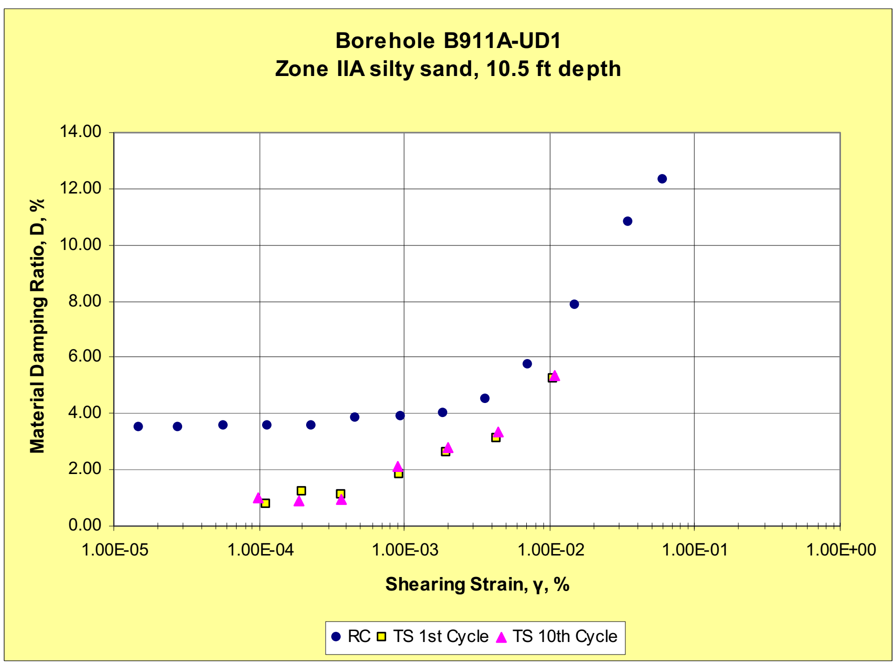




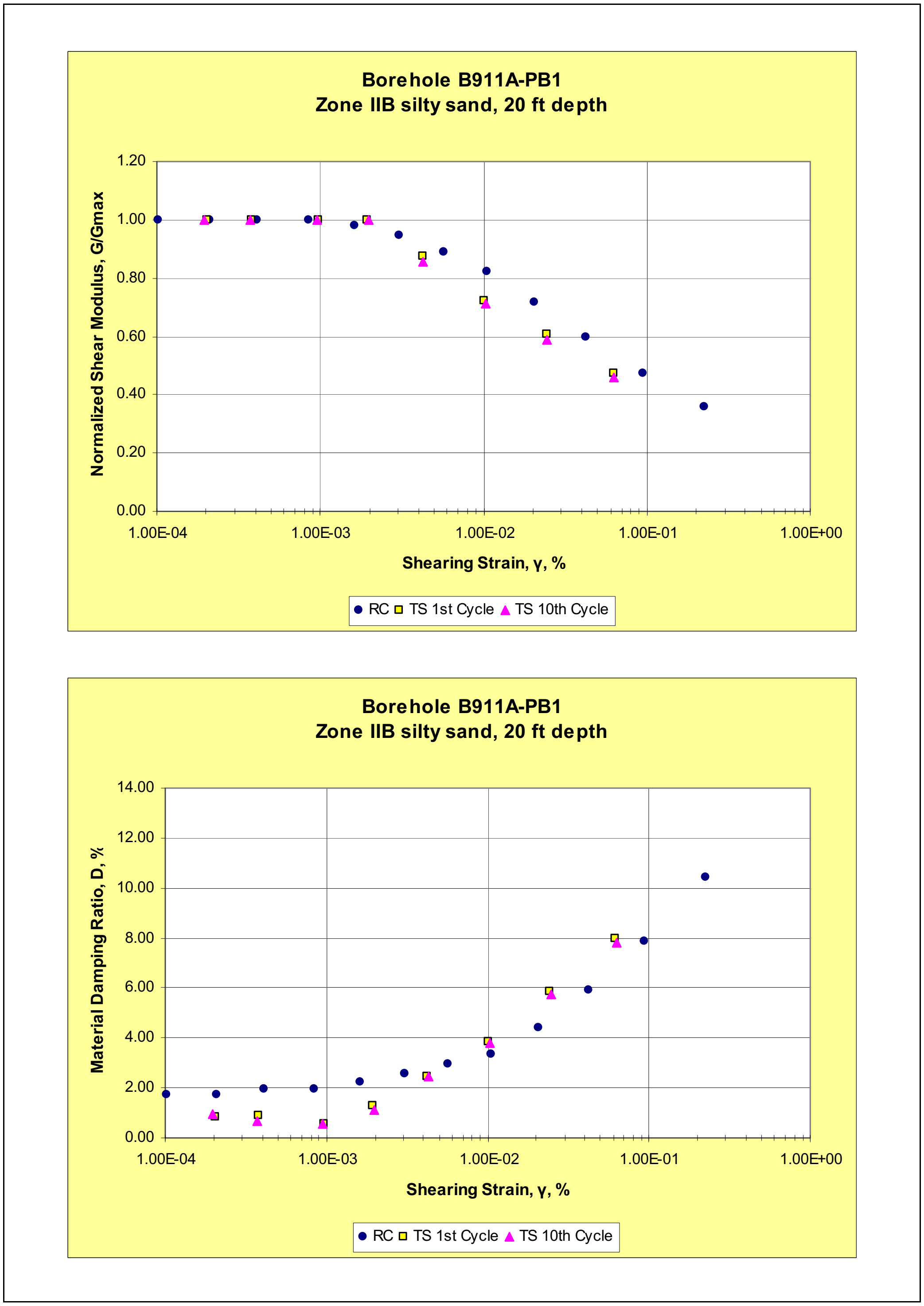
NAPS COL 2.5(1)

Figure 2.5-223 RCTS Test Results (Sheet 2 of 3) G/G_{max} and D vs. Strain, B-911A UD-1: 5.6 psi Confining Pressure



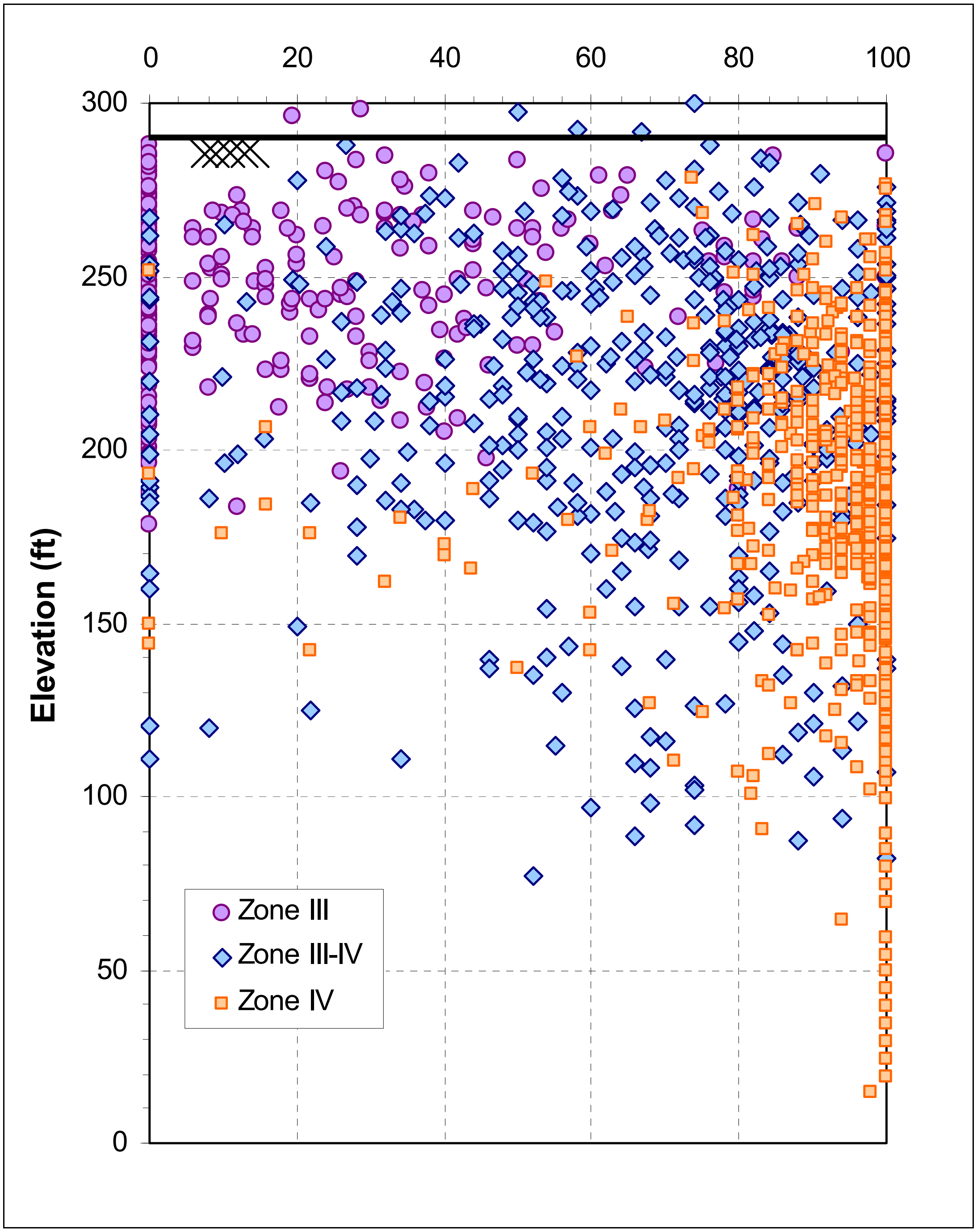


NAPS COL 2.5(1) **Figure 2.5-223 RCTS Test Results (Sheet 3 of 3) G/G_{max} and D vs. Strain, B-911A PB-1: 11.4 psi Confining Pressure**



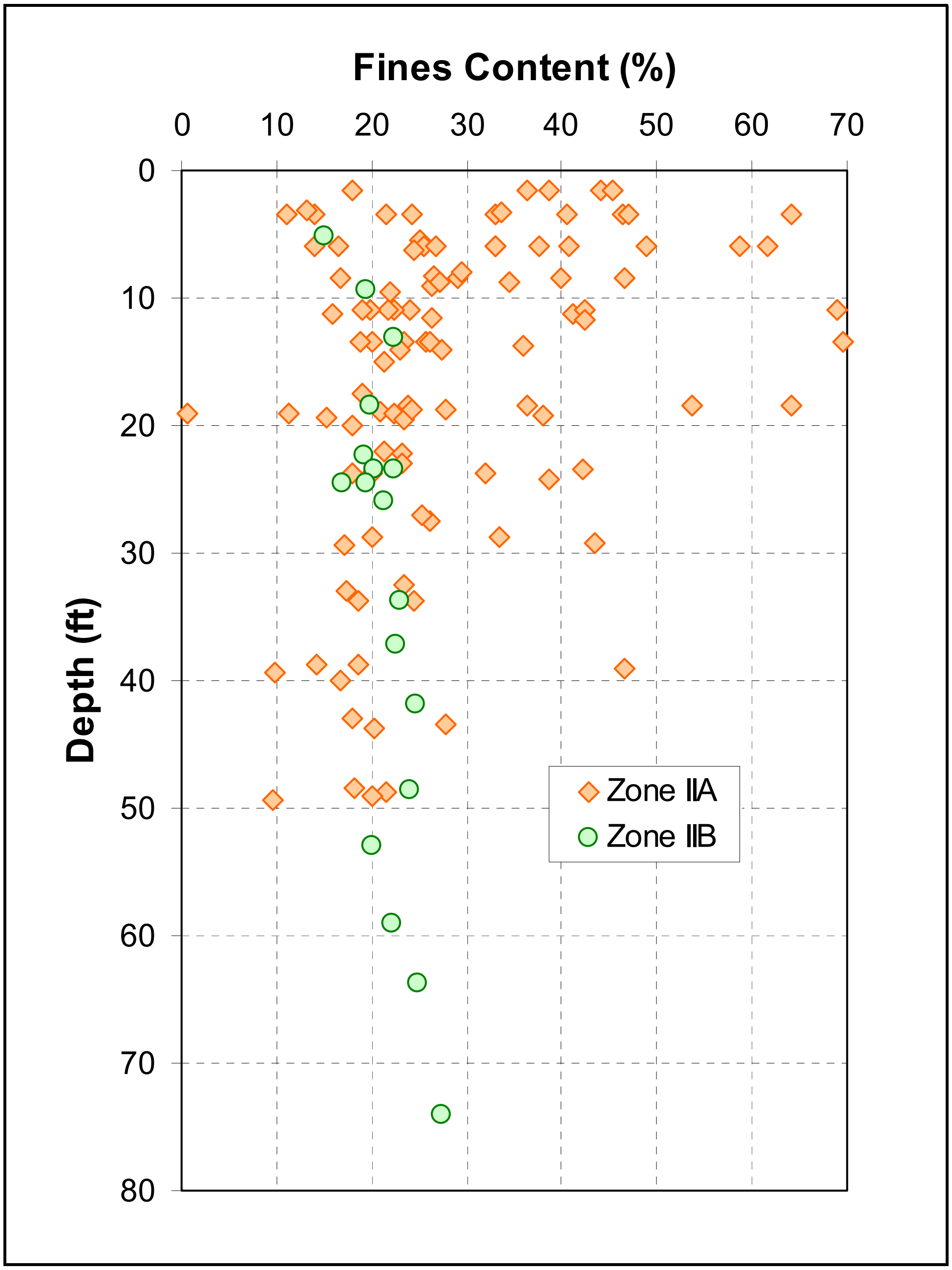
NAPS COL 2.5(1)

Figure 2.5-224 Rock Quality Designation versus Elevation



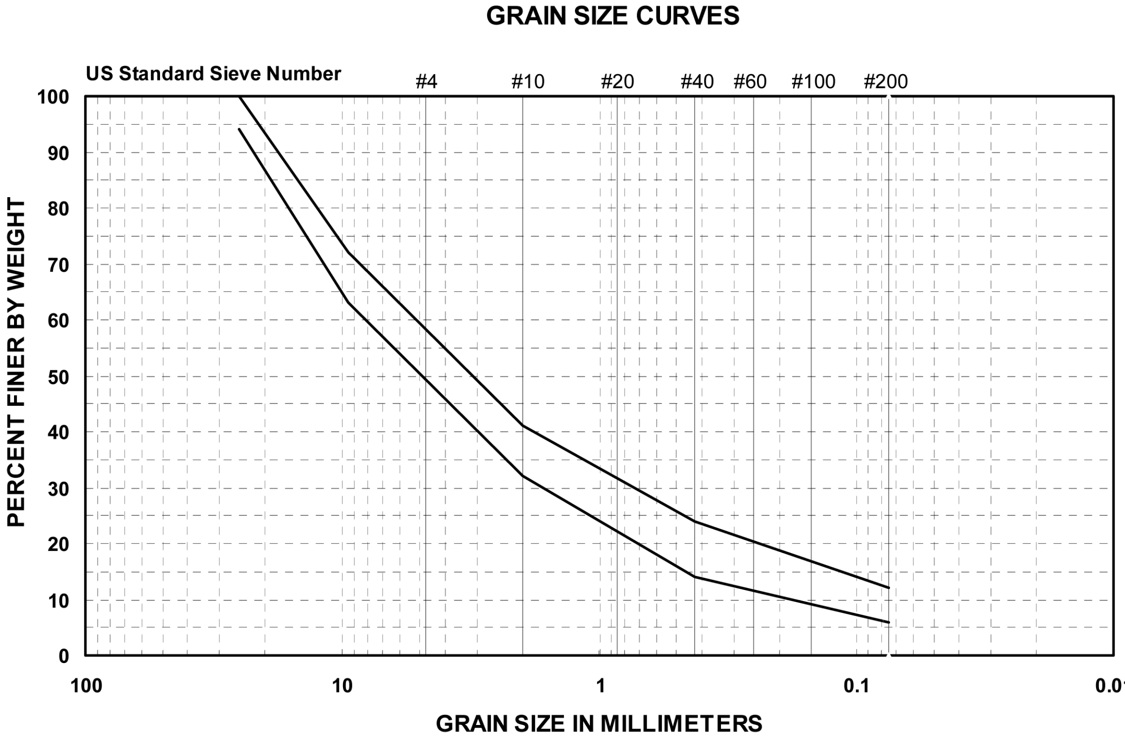
Note: The conversion fro NAVD88 datum elevations to NGVD29 datum elevations is =0.86 ft.

NAPS COL 2.5(1) **Figure 2.5-225a Fines Content of Saprolite versus Depth**



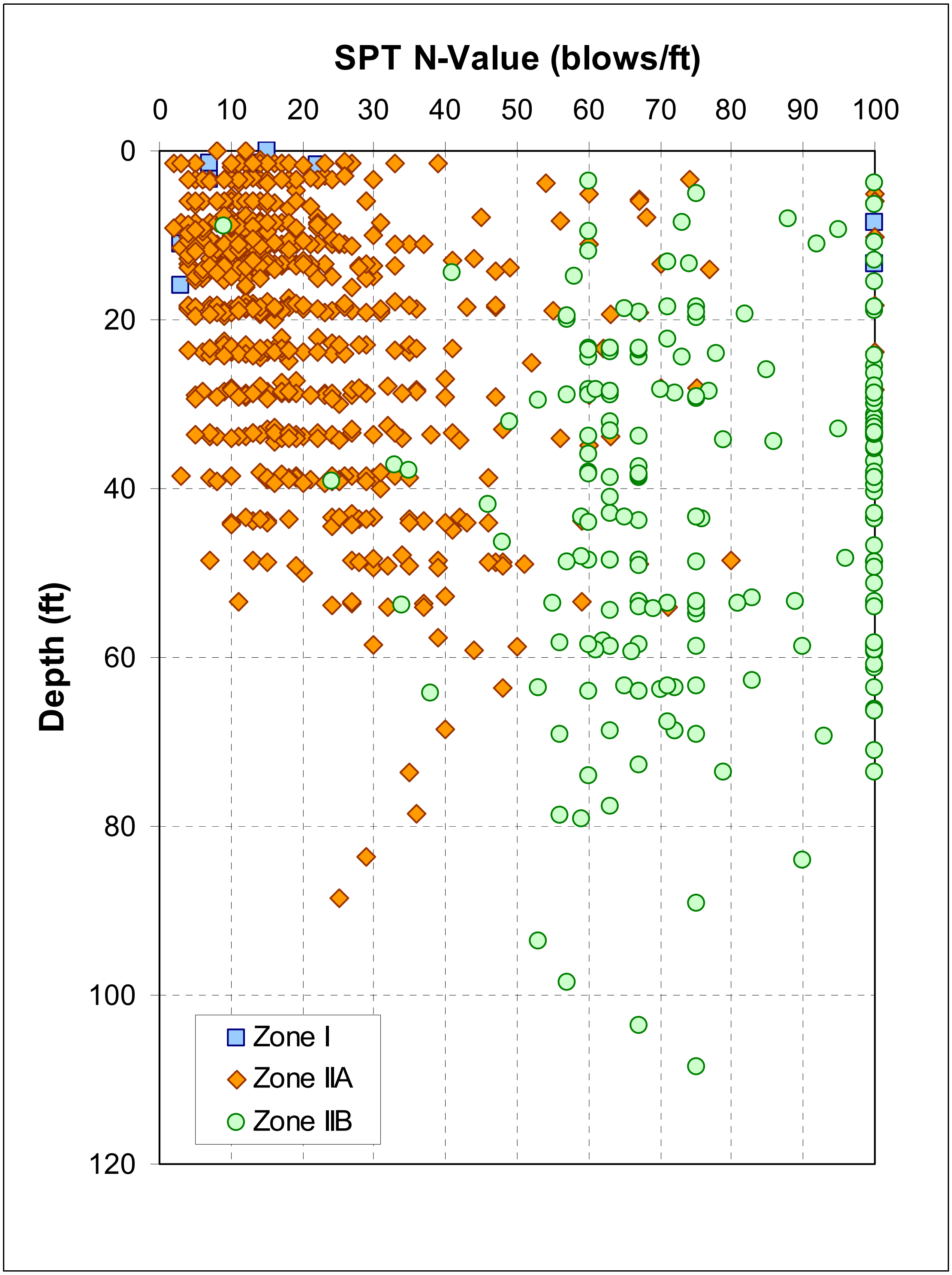
NAPS COL 2.5(1)

Figure 2.5-225b VDOT Size No. 21A

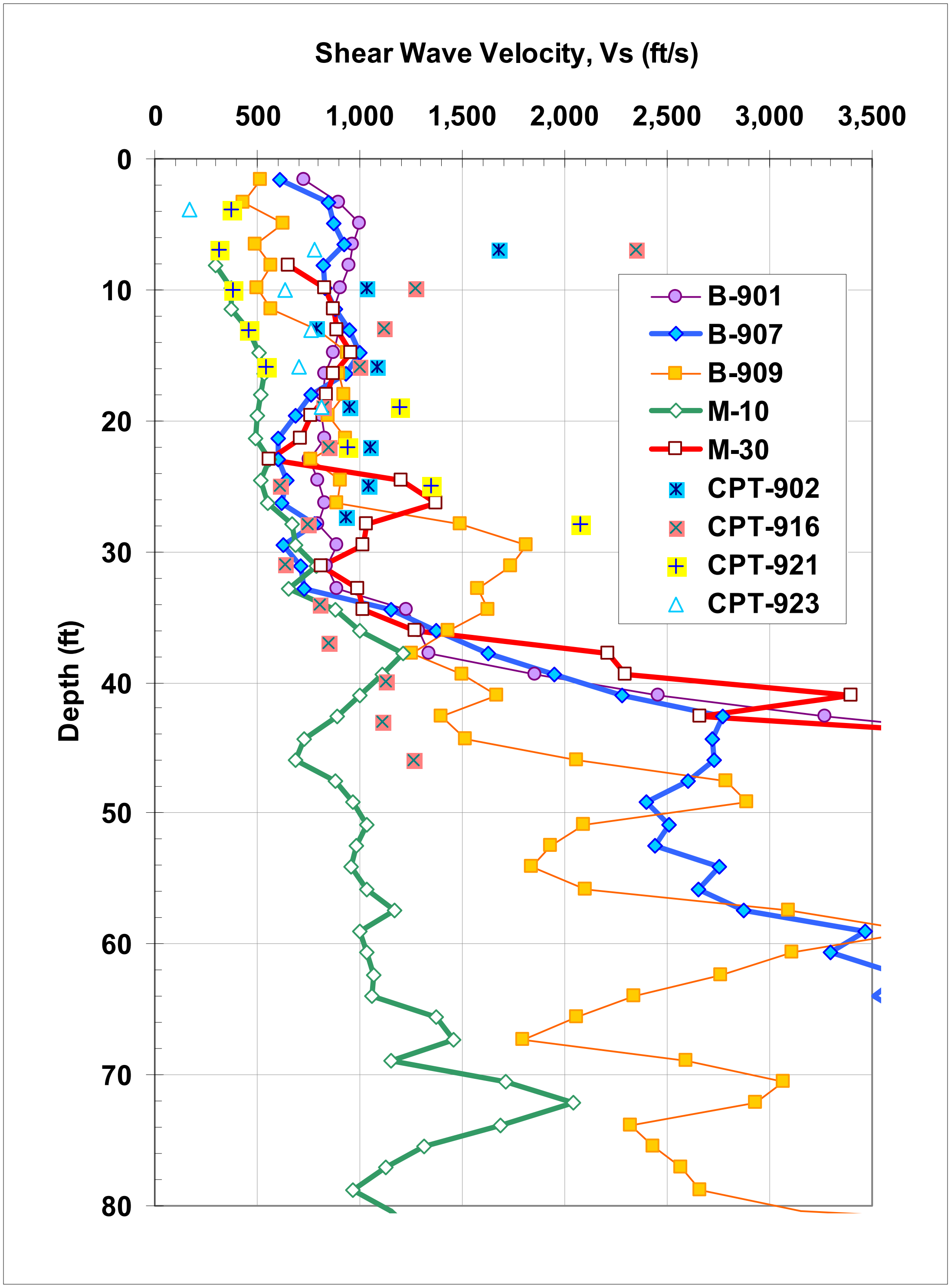


NAPS COL 2.5(1)

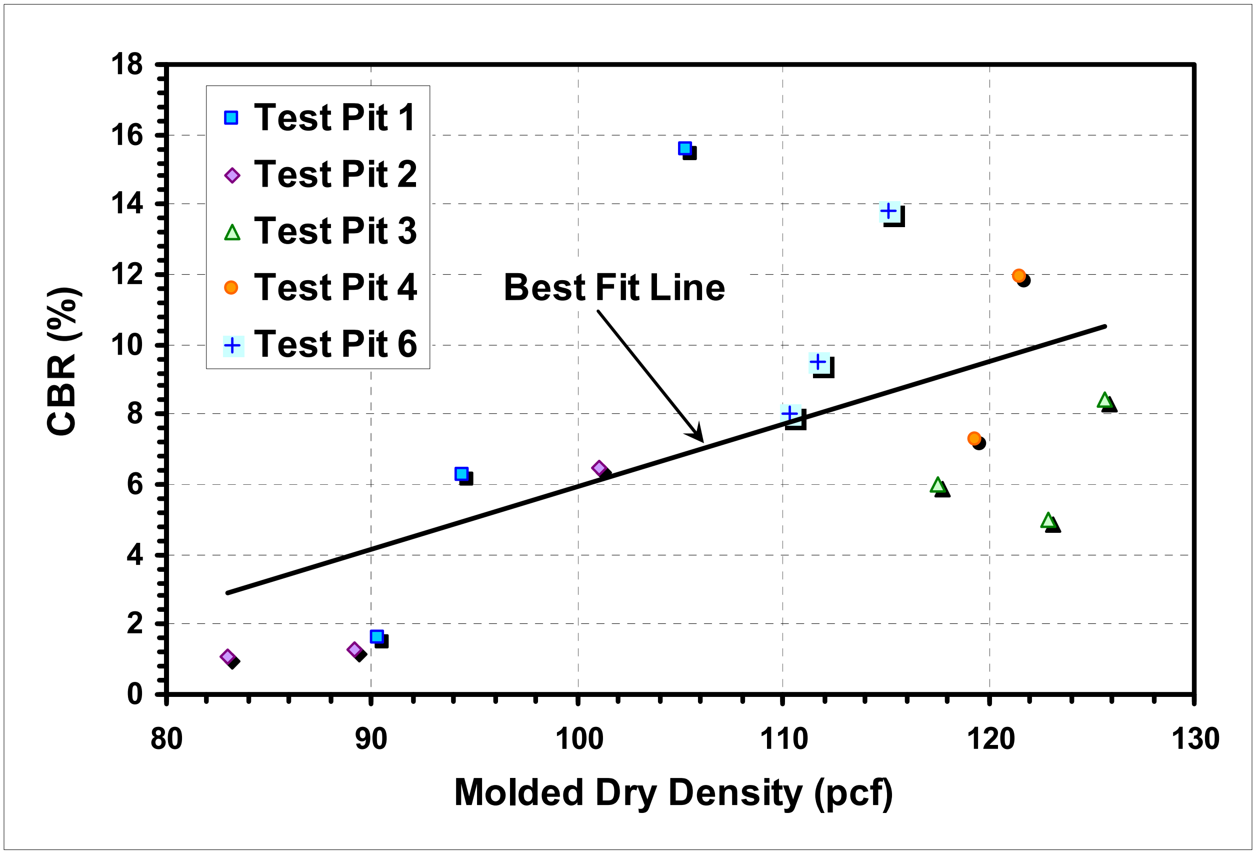
Figure 2.5-226 Measured SPT N-Value versus Depth



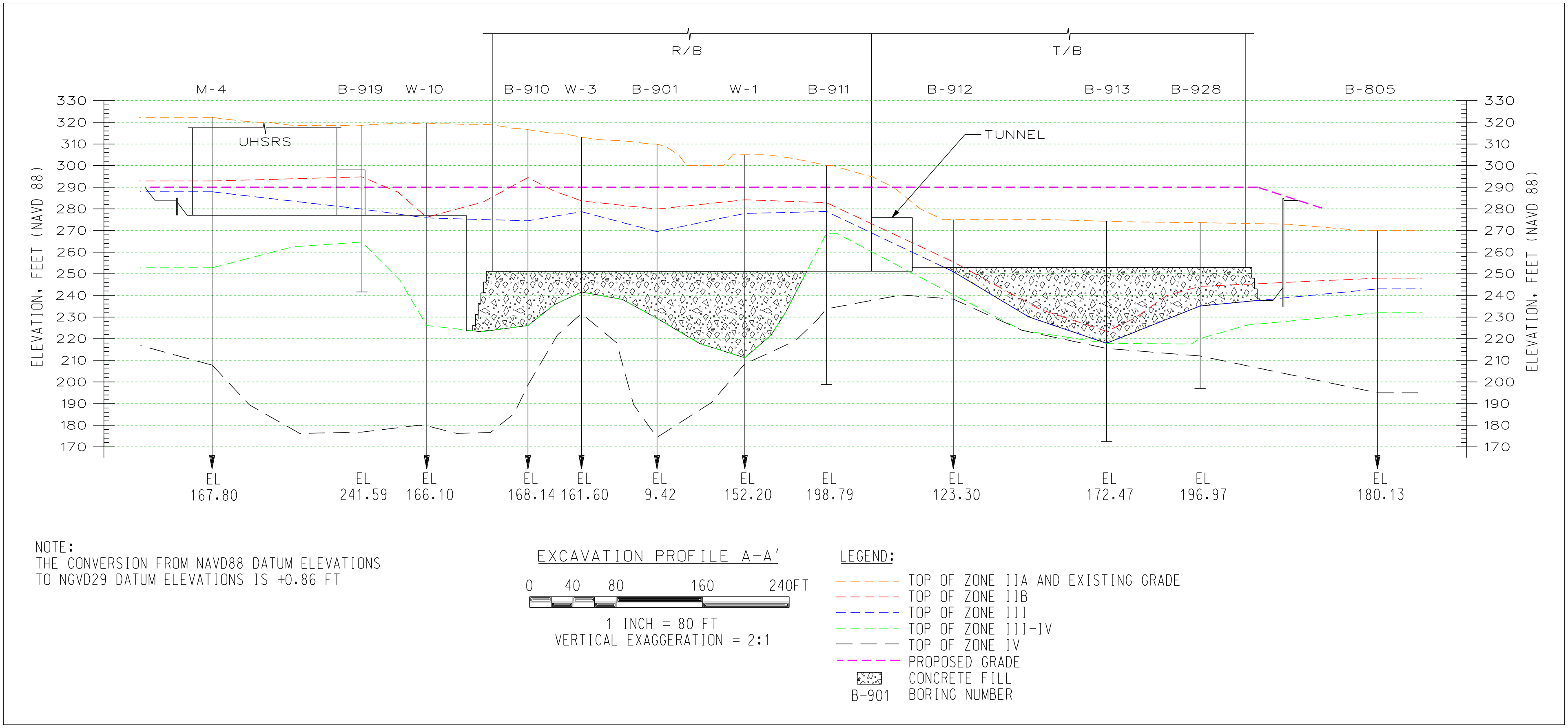
NAPS COL 2.5(1) **Figure 2.5-227 Measured Soil Shear Wave Velocity versus Depth**



NAPS COL 2.5(1) **Figure 2.5-228 Relationship between CBR and Molded Dry Density**



NAPS ESP COL 2.5-3 **Figure 2.5-229 Cross-Section A-A'**



Note: A minimum of 3 ft of concrete fill is immediately below each UHSRS as described in Section 2.5.4.7.1.

 Figure 2.5-230 Cross-Section B-B'

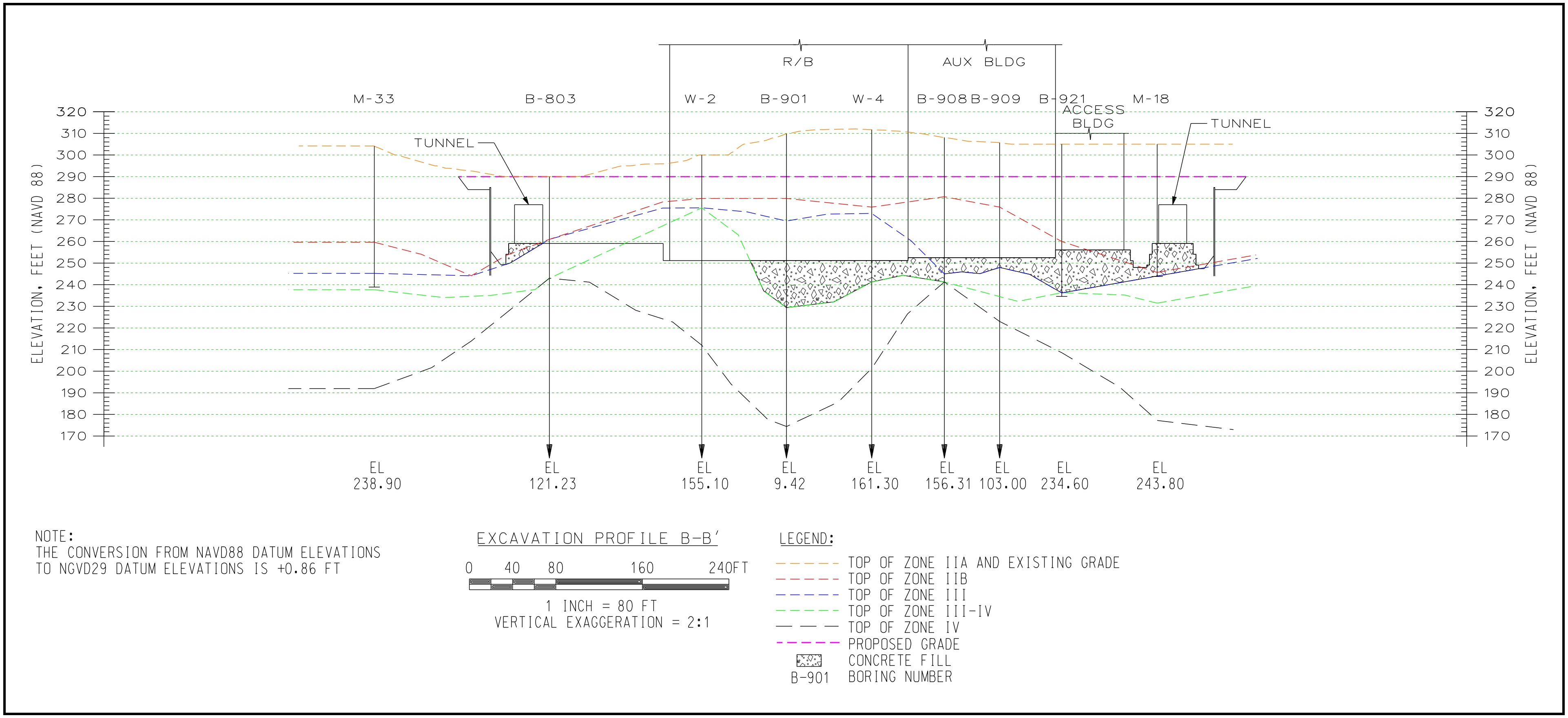
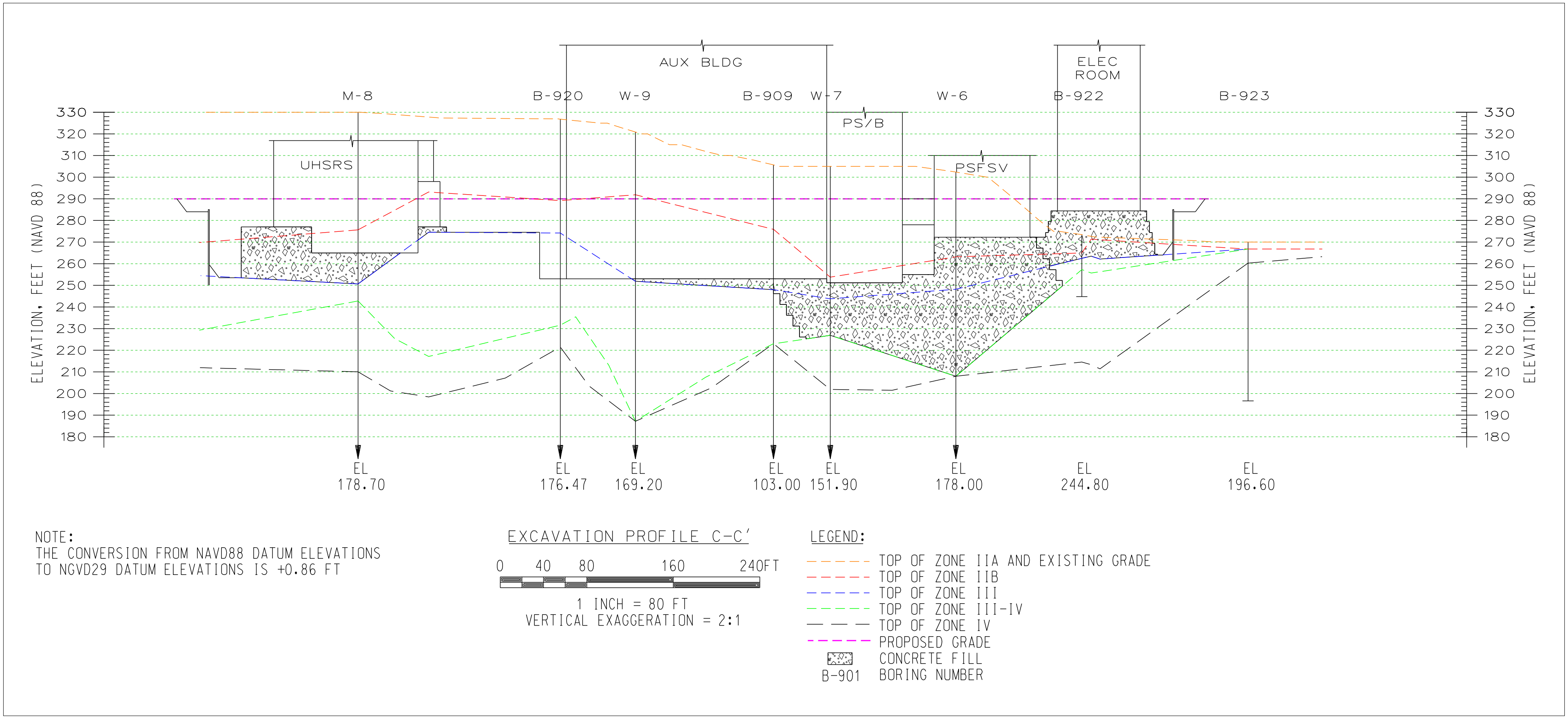
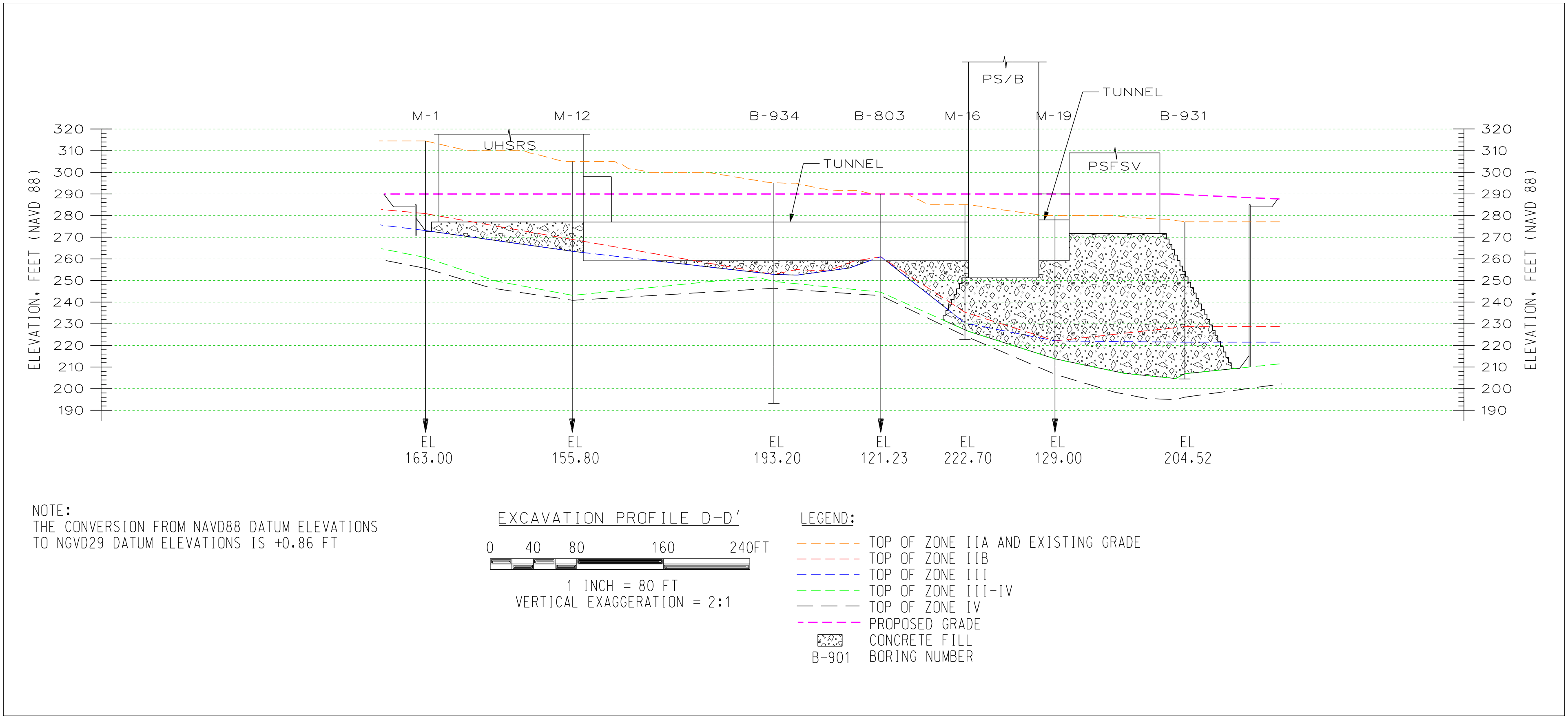


 Figure 2.5-231 Cross-Section C-C'



Note: A minimum of 3 ft of concrete fill is immediately below each UHSRS as described in Section 2.5.4.7.1.

NAPS ESP COL 2.5-3 **Figure 2.5-232 Cross-Section D-D'**



Note: A minimum of 3 ft of concrete fill is immediately below each UHSRS as described in Section 2.5.4.7.1.

NAPS ESP COL 2.5-3 **Figure 2.5-233 Cross-Section E-E'**

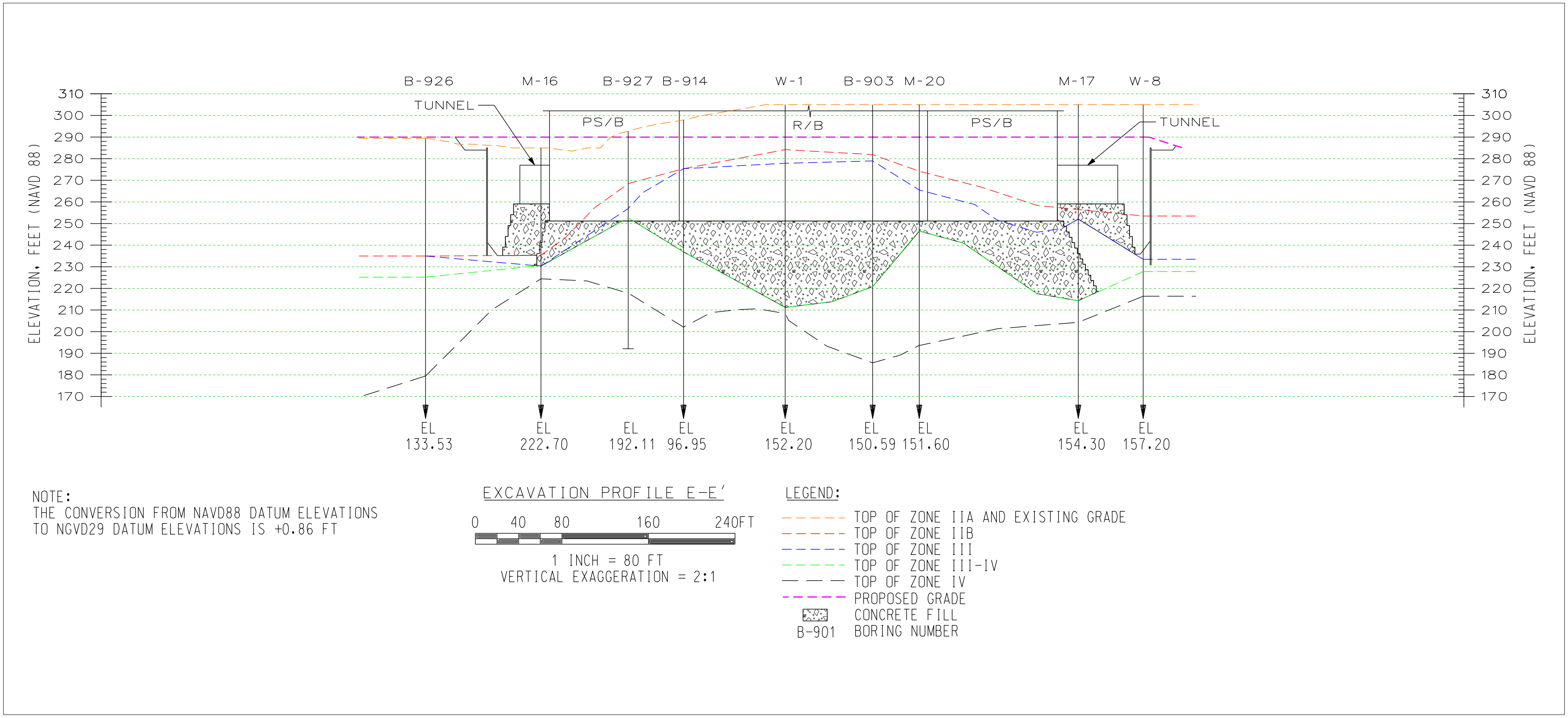
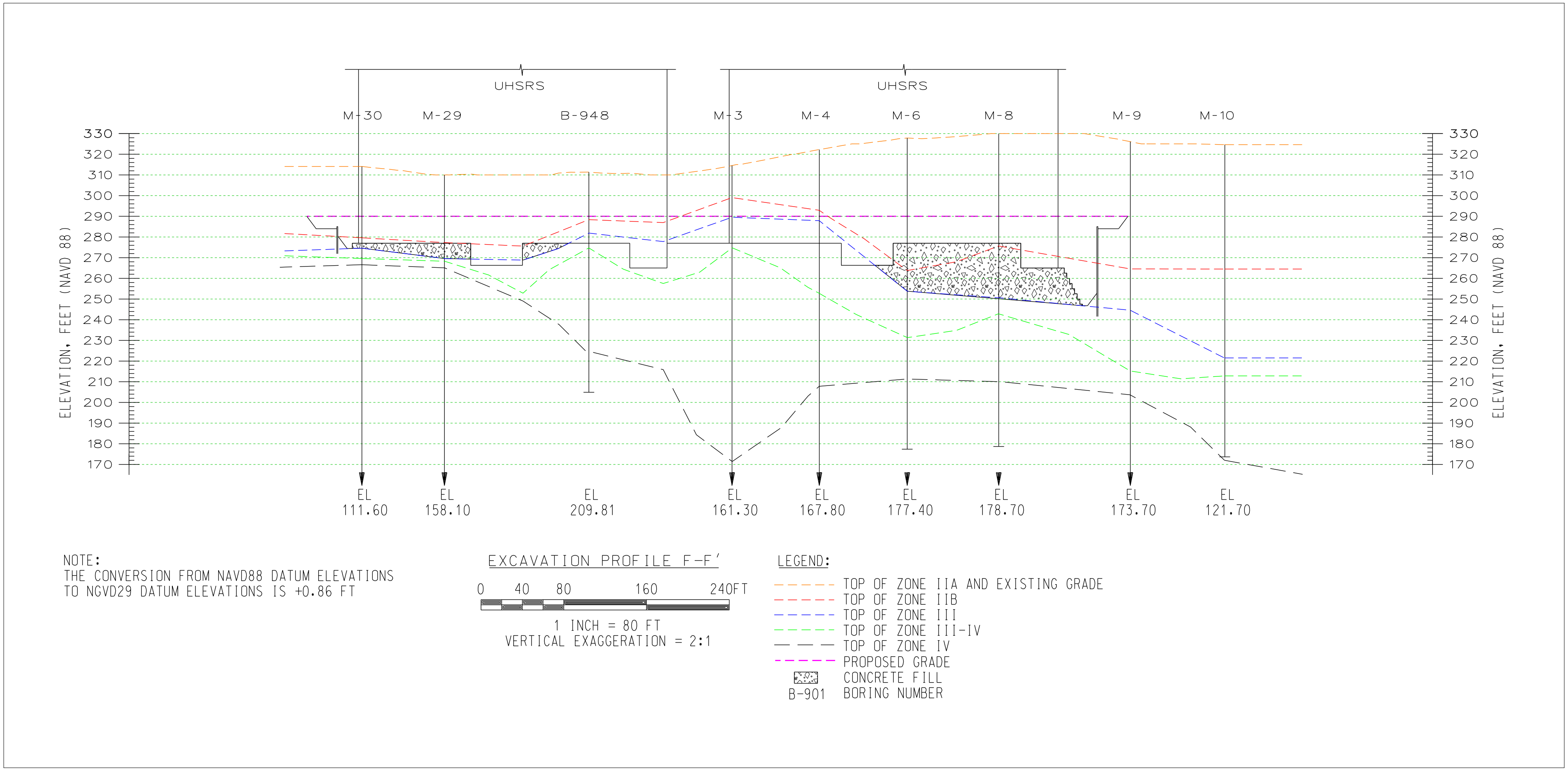


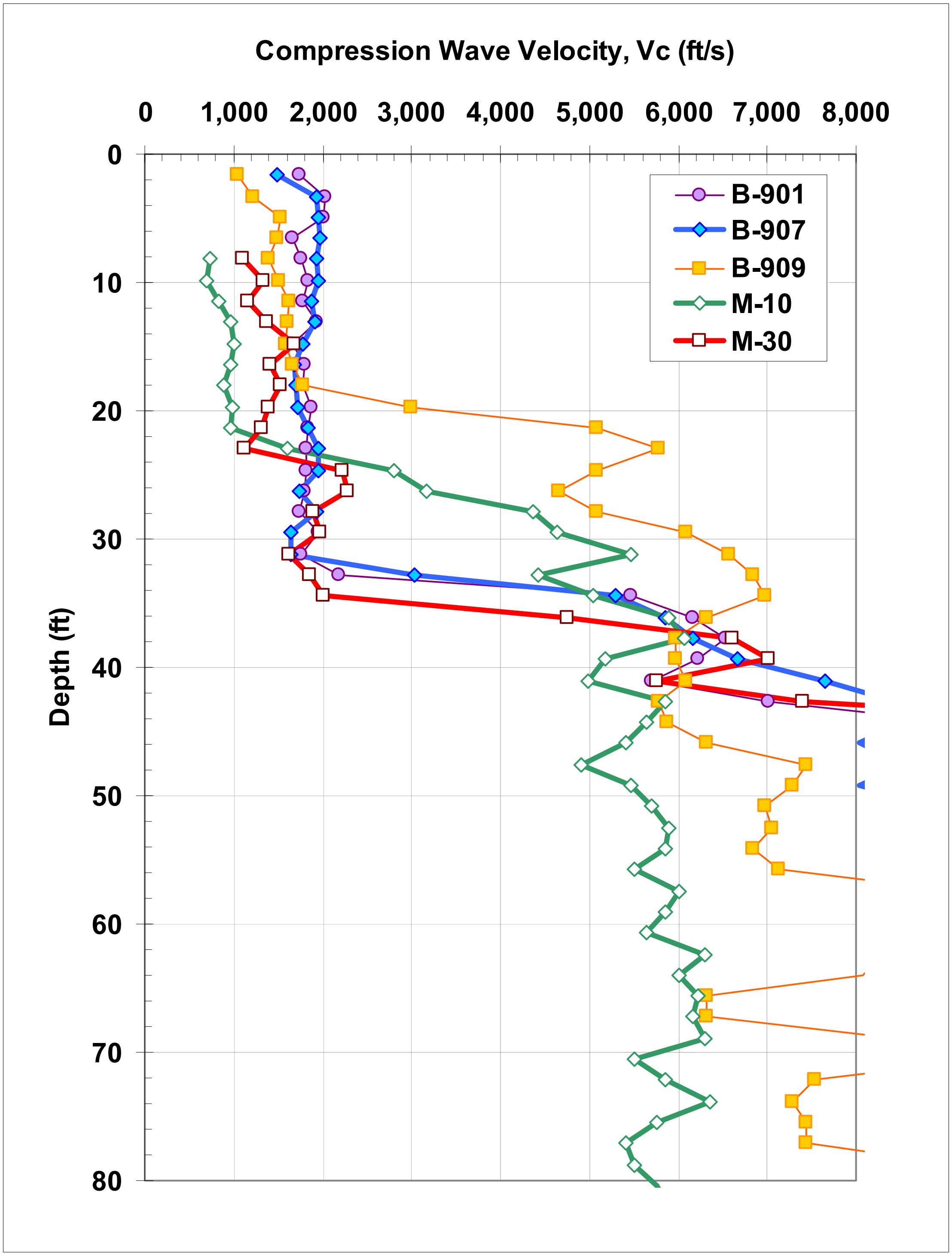
Figure 2.5-234 Cross-Section F-F'



Note: A minimum of 3 ft of concrete fill is immediately below each UHSRS as described in Section 2.5.4.7.1.

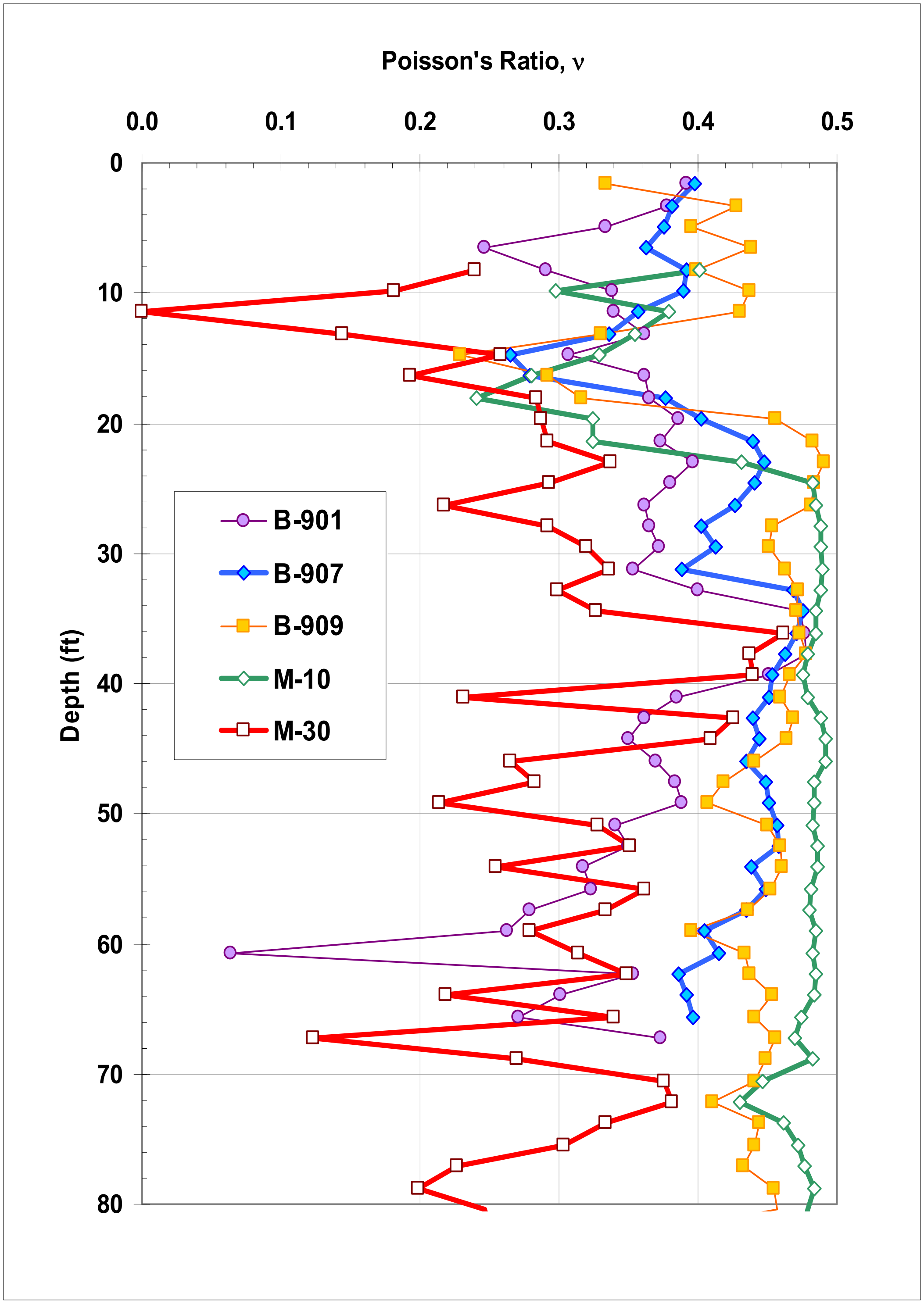
NAPS COL 2.5(1)

Figure 2.5-235 Measured Compression Wave Velocity versus Depth



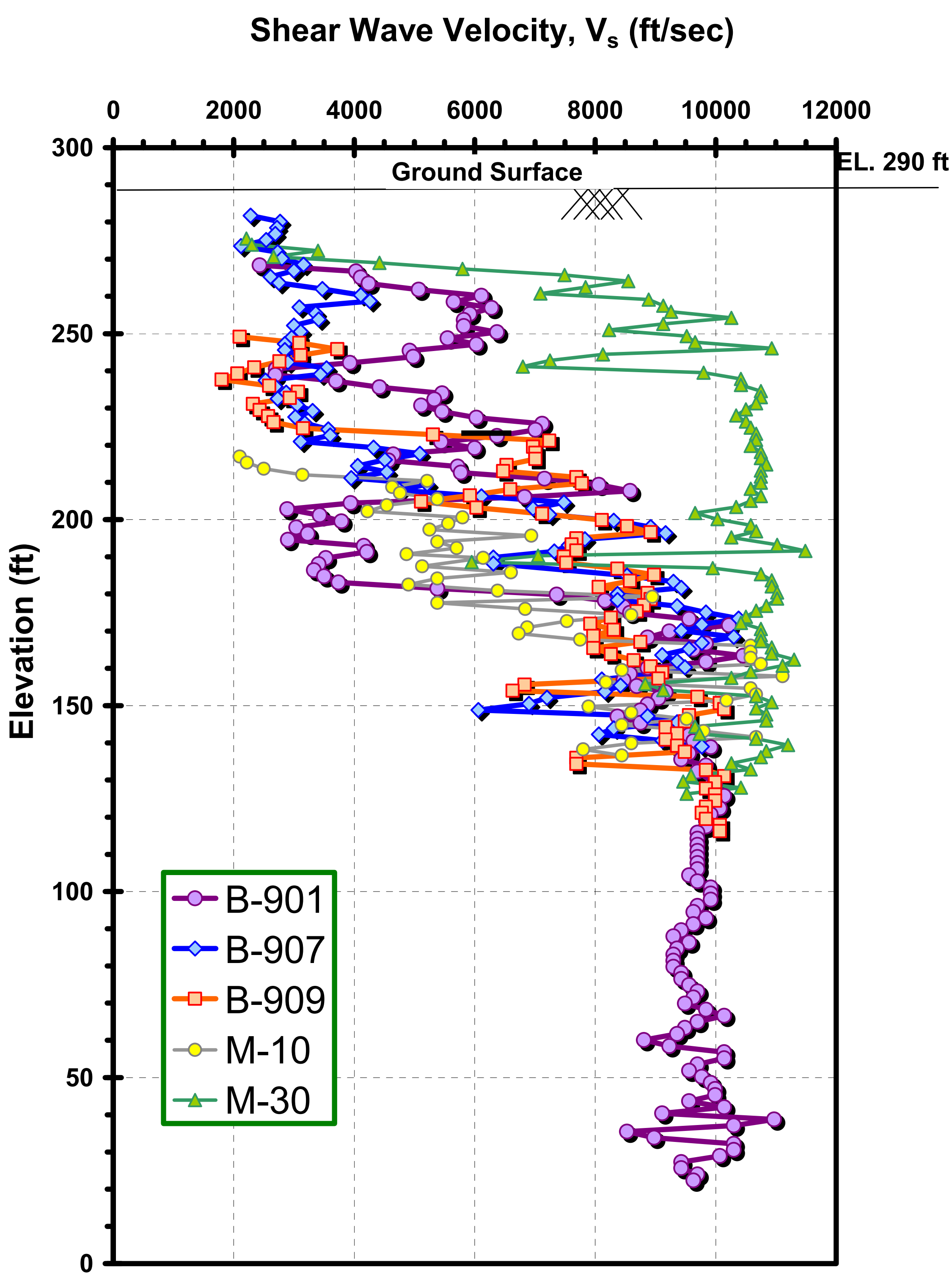
NAPS COL 2.5(1)

Figure 2.5-236 Soil Poisson's Ratio versus Depth

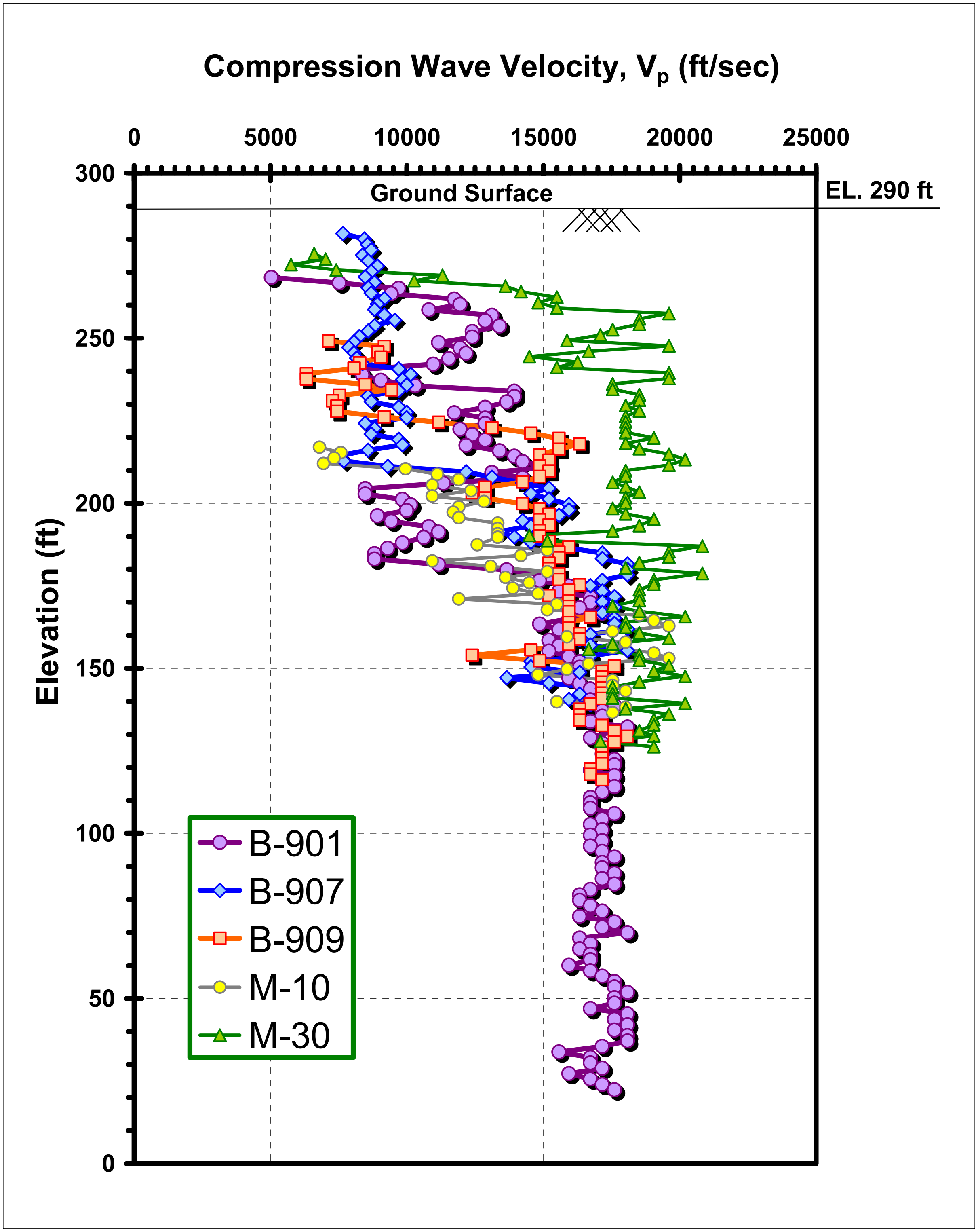


NAPS COL 2.5(1)

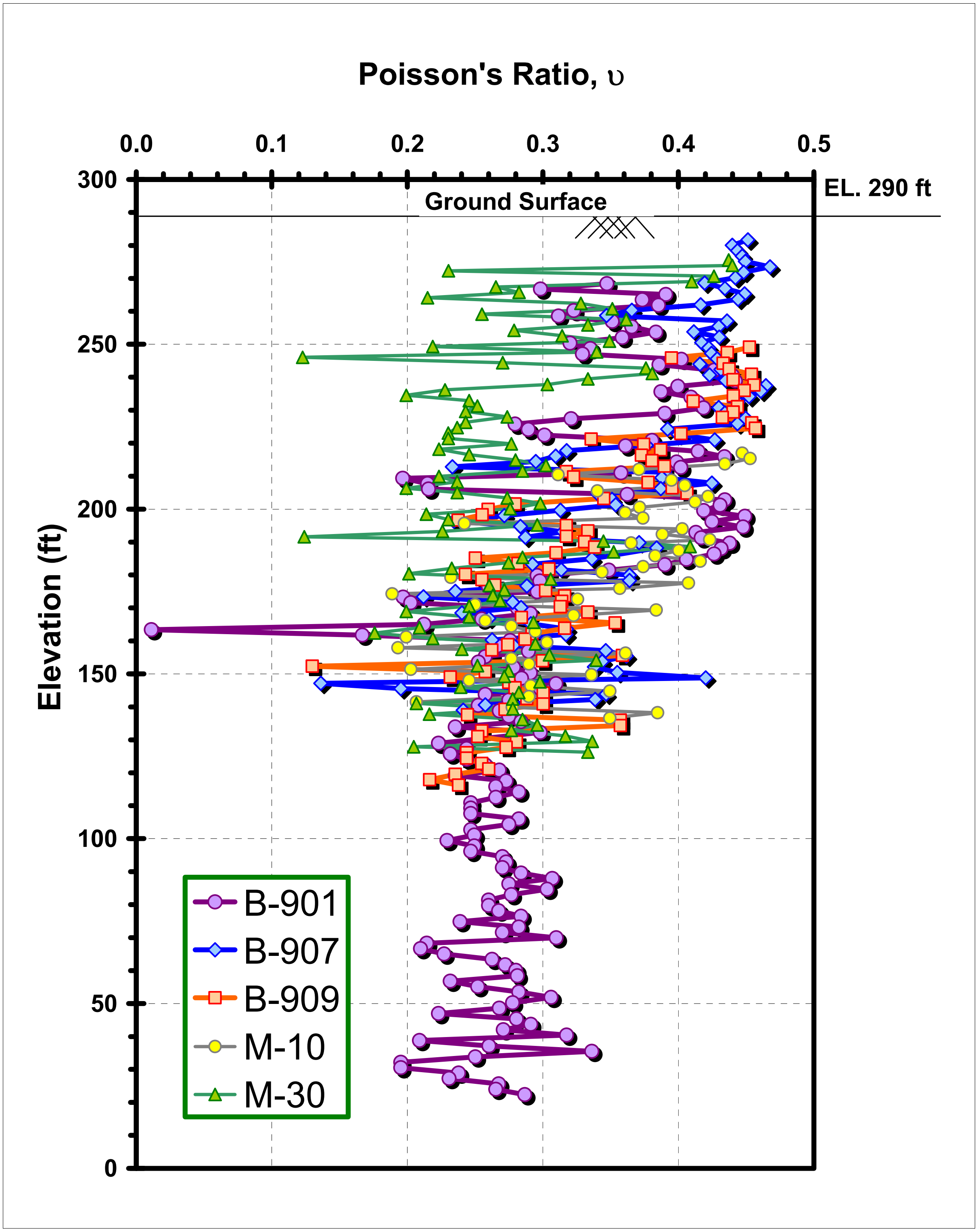
Figure 2.5-237 Bedrock Shear Wave Velocity versus Elevation



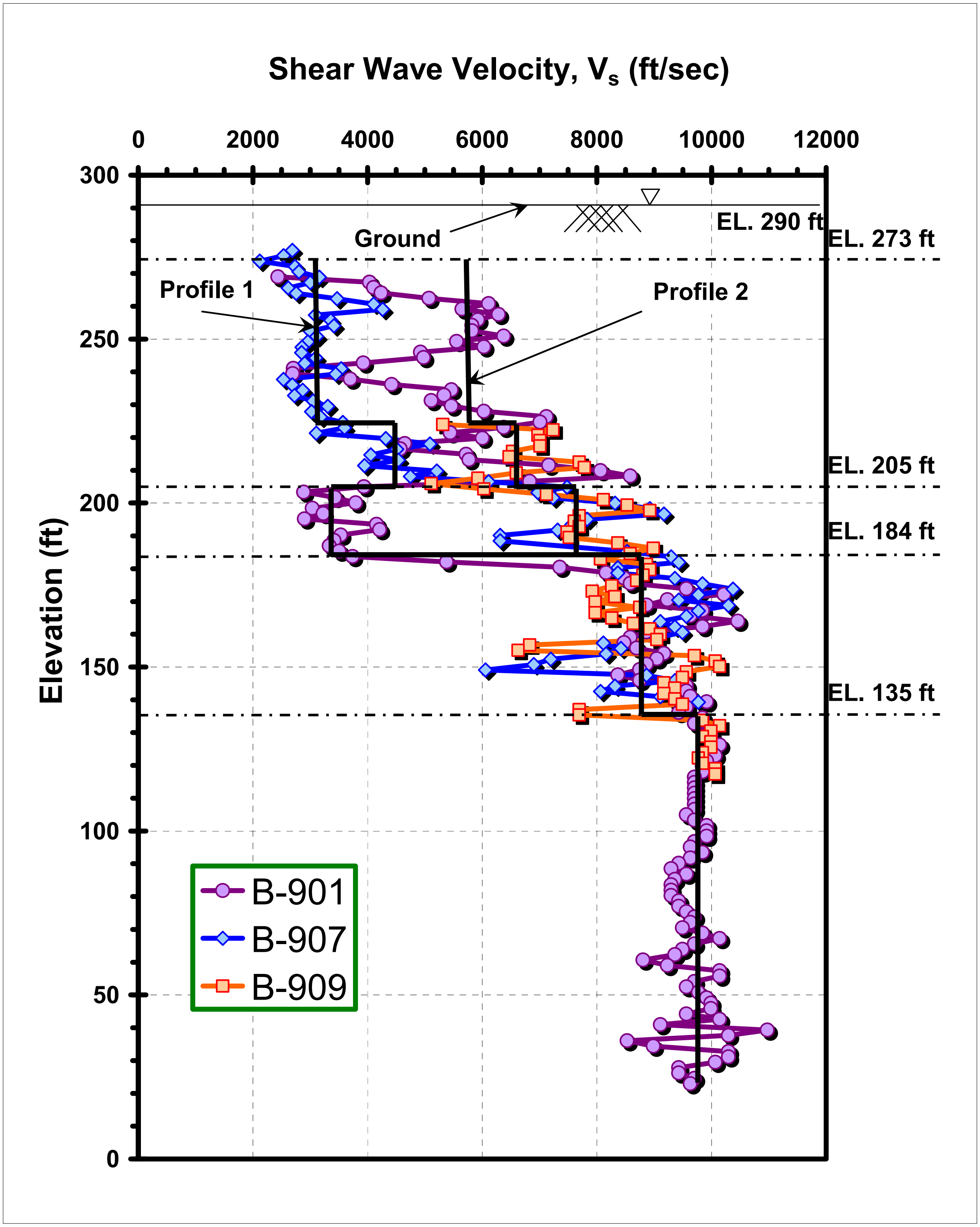
NAPS COL 2.5(1) **Figure 2.5-238 Bedrock Compression Wave Velocity versus Elevation**



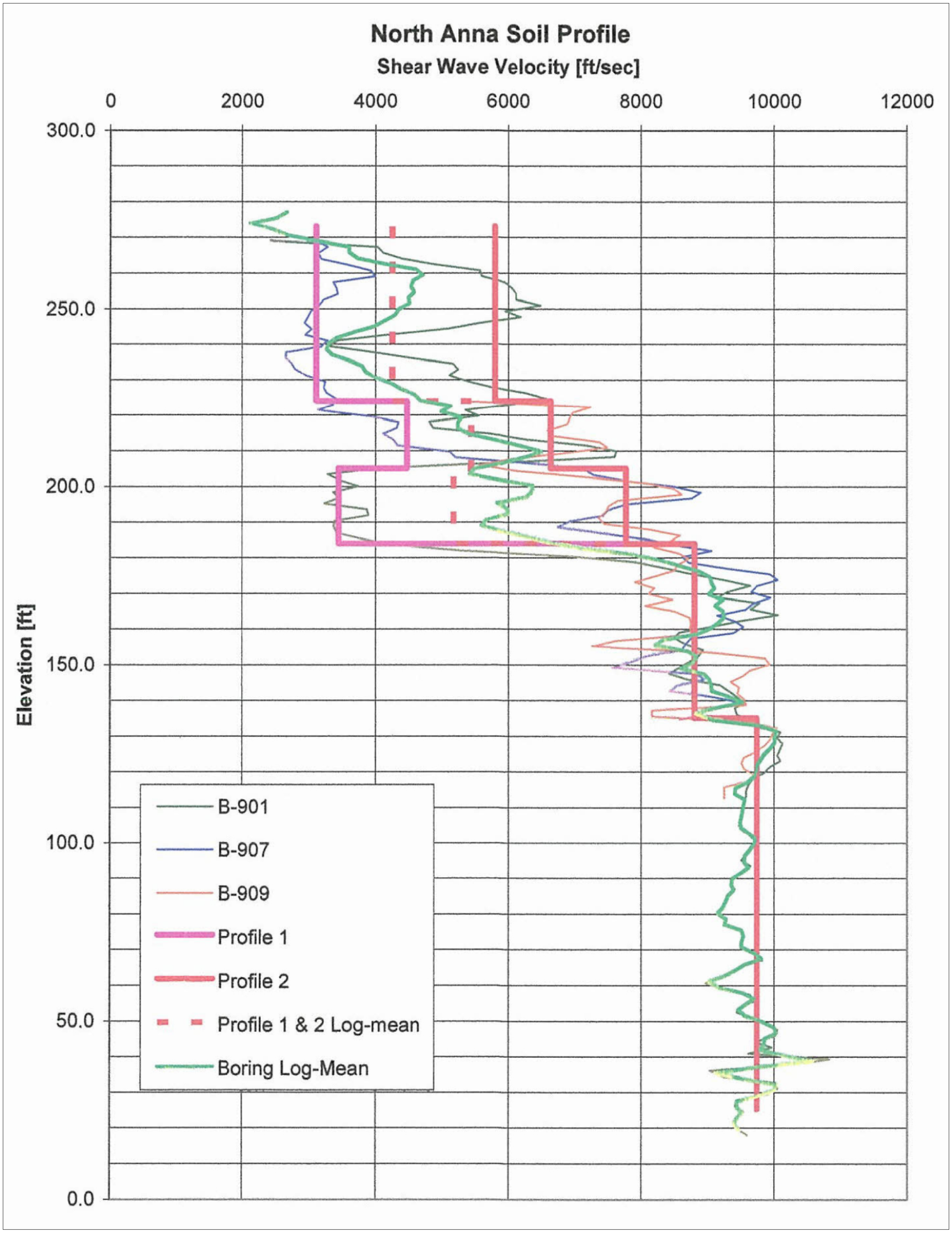
NAPS COL 2.5(1) **Figure 2.5-239 Bedrock Poisson's Ratio versus Elevation**



NAPS COL 2.5(1) **Figure 2.5-240 Design Bedrock Shear Wave Velocity versus Elevation**

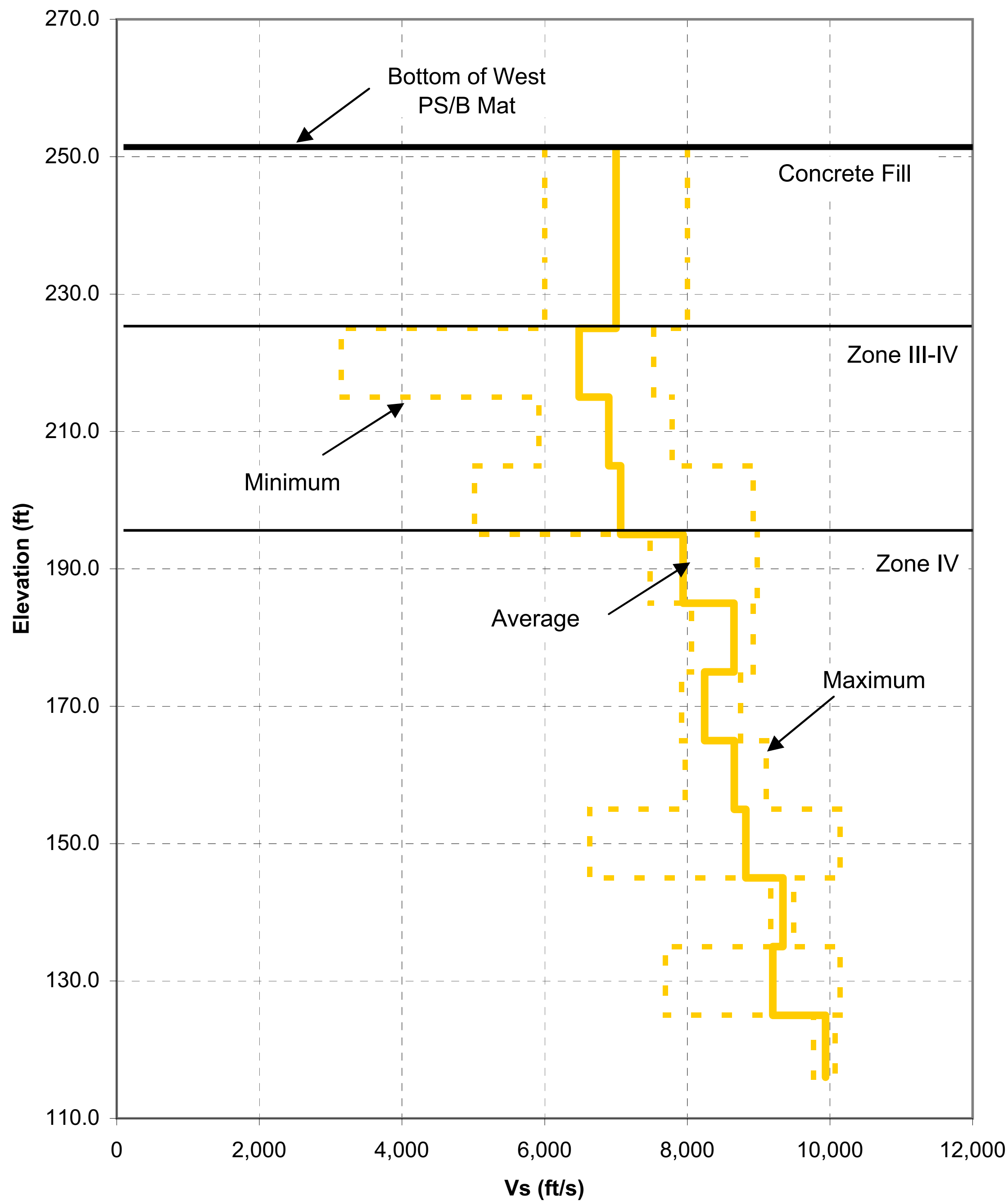


NAPS COL 2.5(1) **Figure 2.5-241a Bedrock Shear Wave Velocity Profiles**



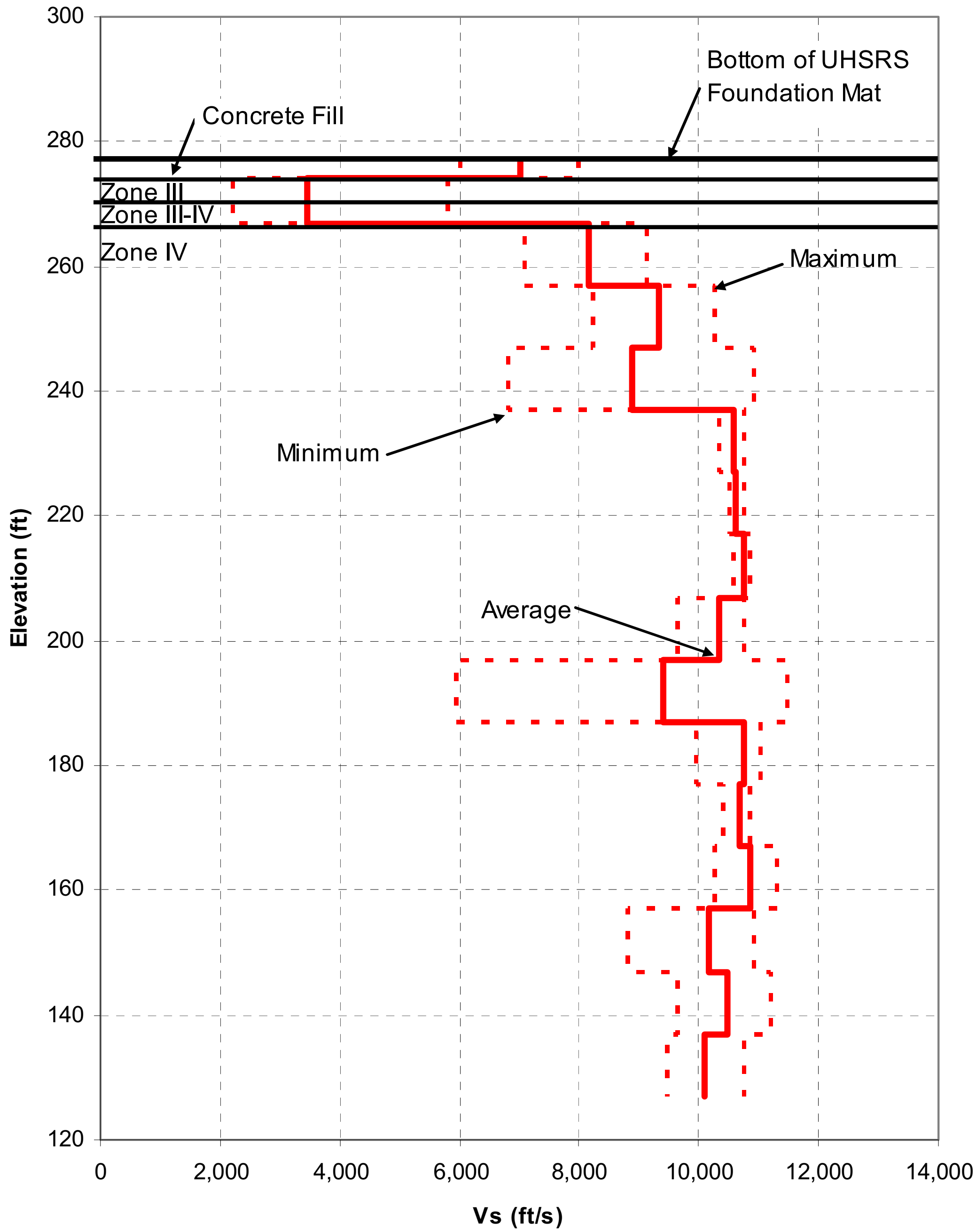
NAPS COL 2.5(1)

Figure 2.5-241b Shear Wave Velocity Profile beneath the West PS/B (B-909)

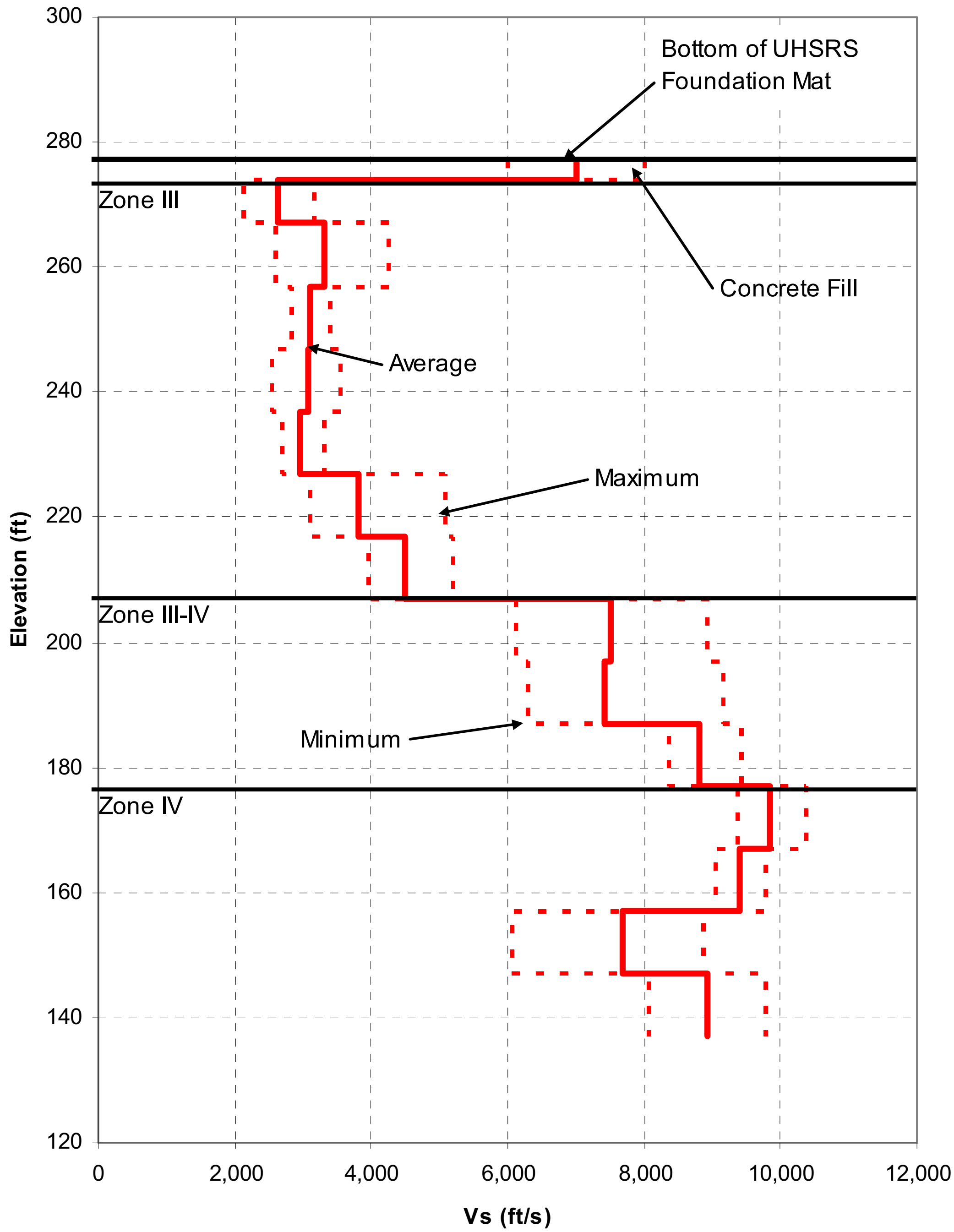


NAPS COL 2.5(1)

Figure 2.5-241c Shear Wave Velocity Profile Beneath UHSRS A and B (M-30)

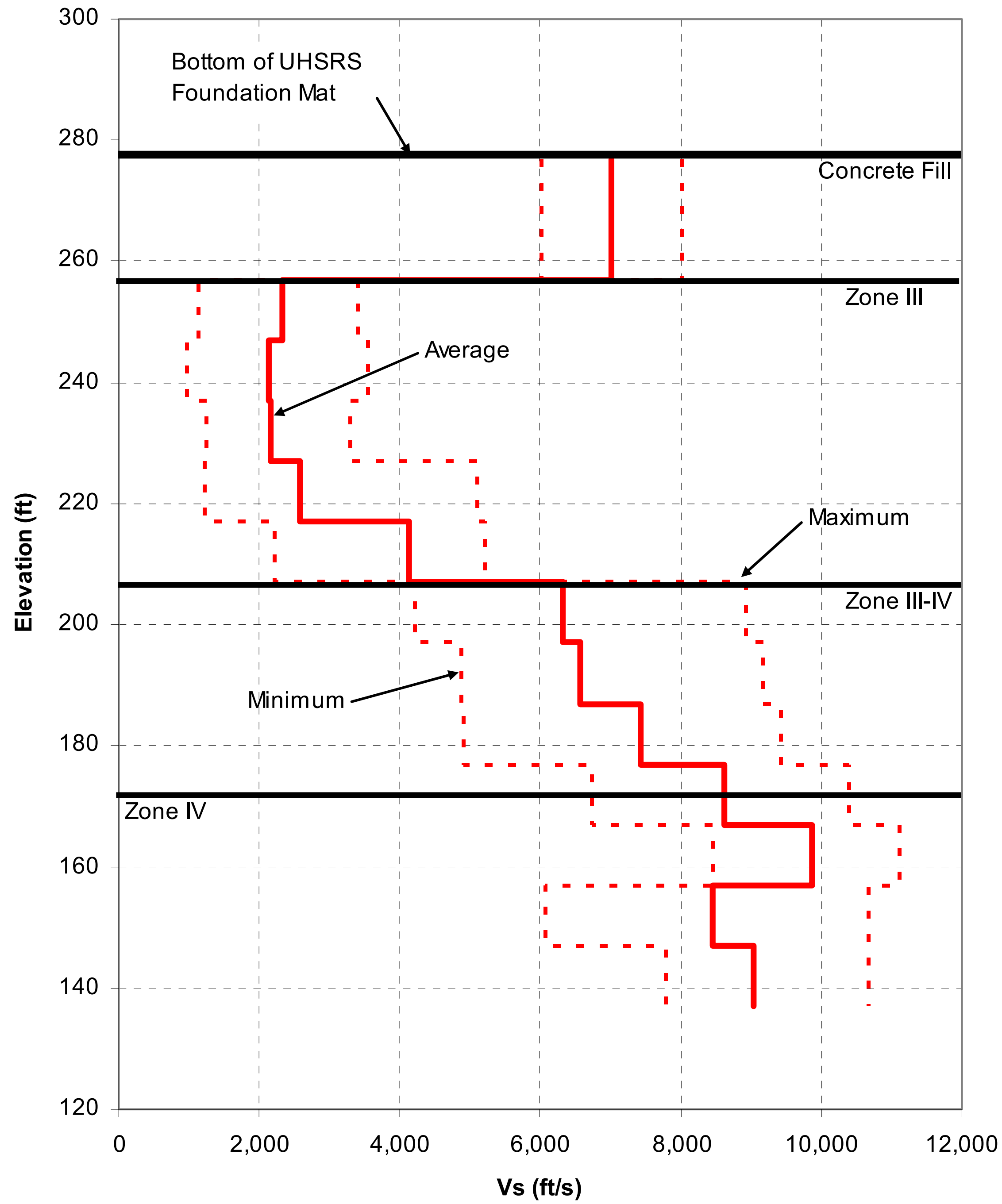


NAPS COL 2.5(1) **Figure 2.5-241d Shear Wave Velocity Profile beneath UHSRS C (B-907)**

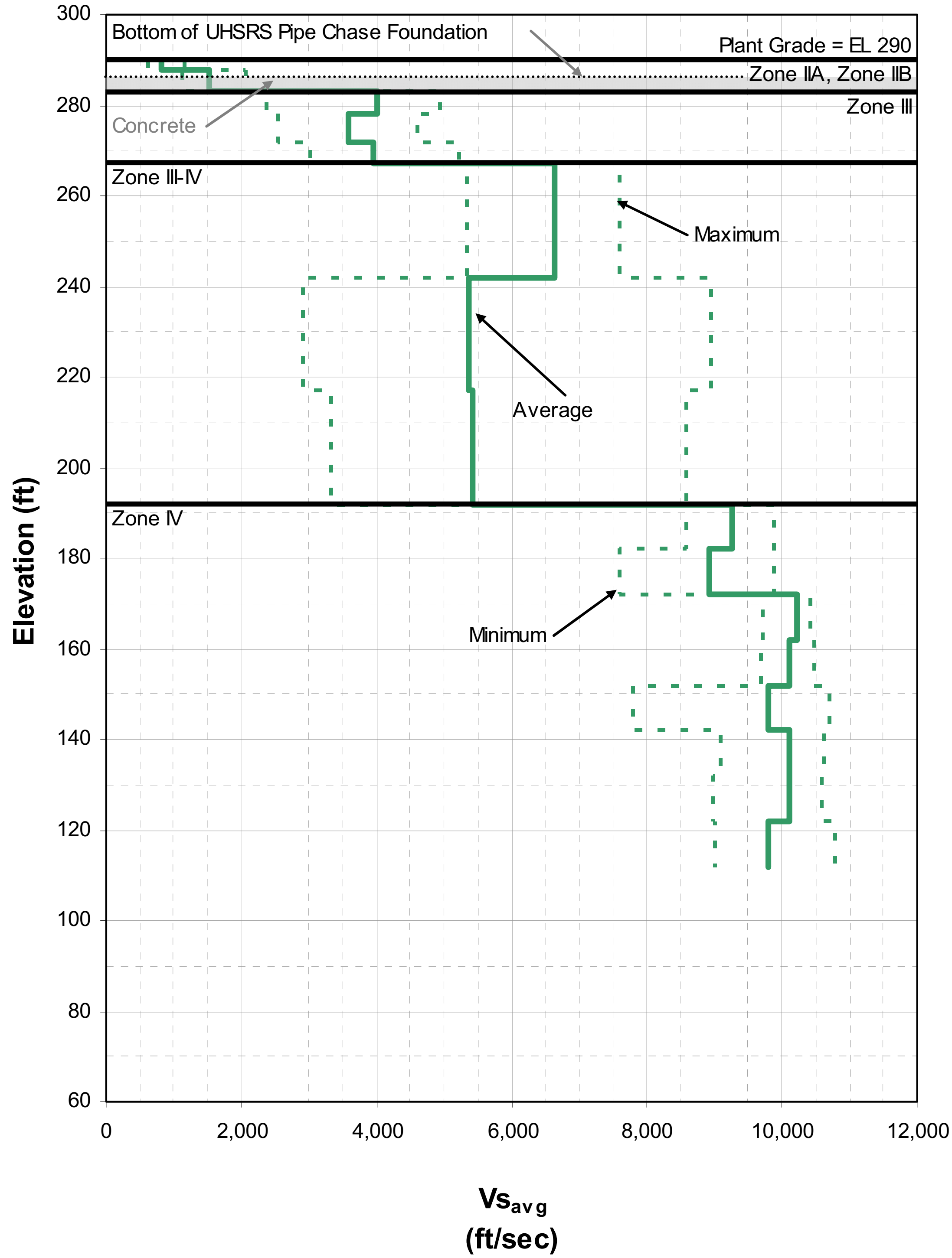


NAPS COL 2.5(1)

Figure 2.5-241e Shear Wave Velocity Profile beneath UHSRS D (M-10 and B-907)

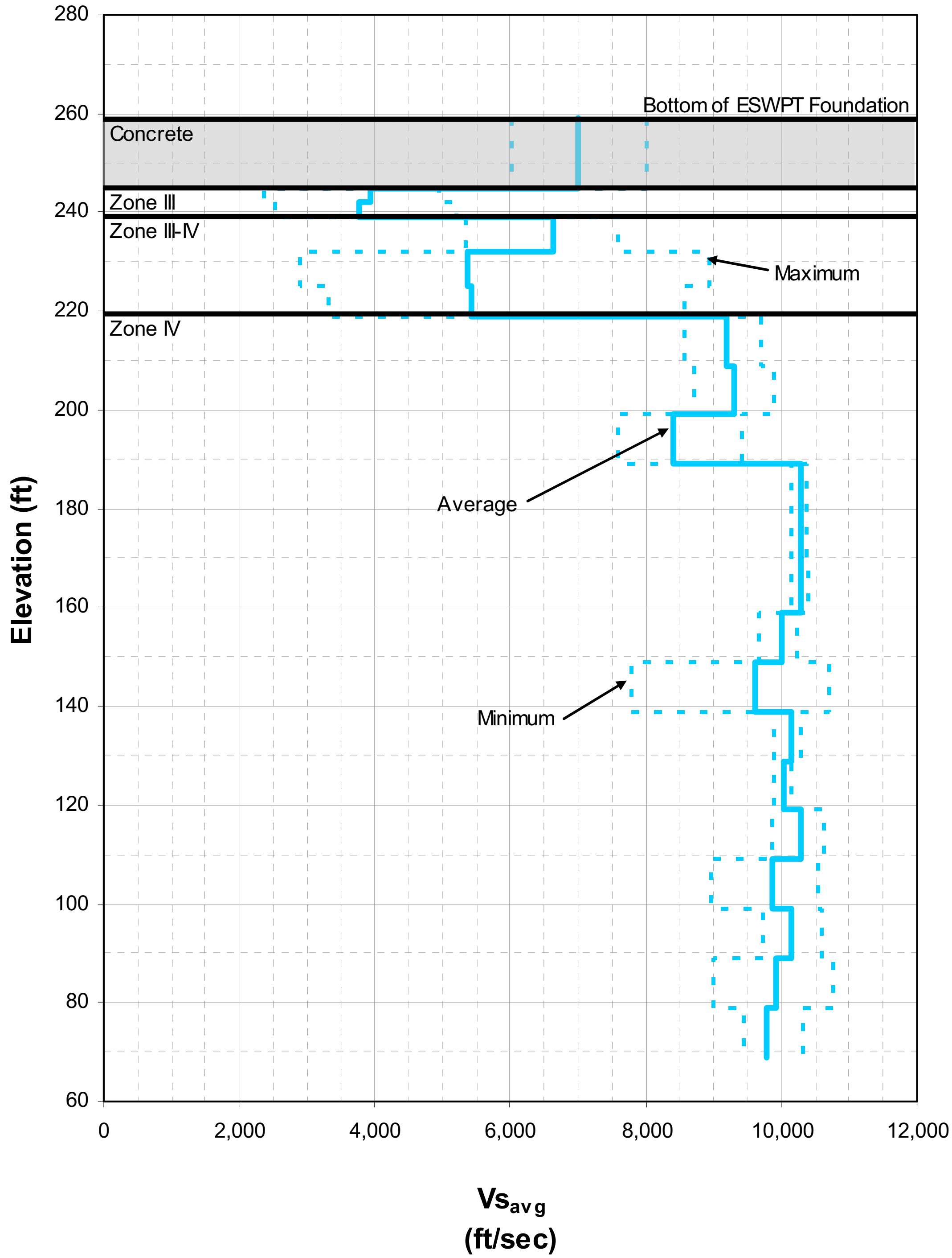


NAPS COL 2.5(1) **Figure 2.5-241f Shear Wave Velocity Profile beneath the UHSRS Pipe Chase Foundation**



NAPS COL 2.5(1)

Figure 2.5-241g Shear Wave Velocity Profile beneath the East ESW Pipe Tunnel Foundation



NAPS COL 2.5(1)

Figure 2.5-241h Shear Wave Velocity Profile beneath the West ESW Pipe Tunnel Foundation

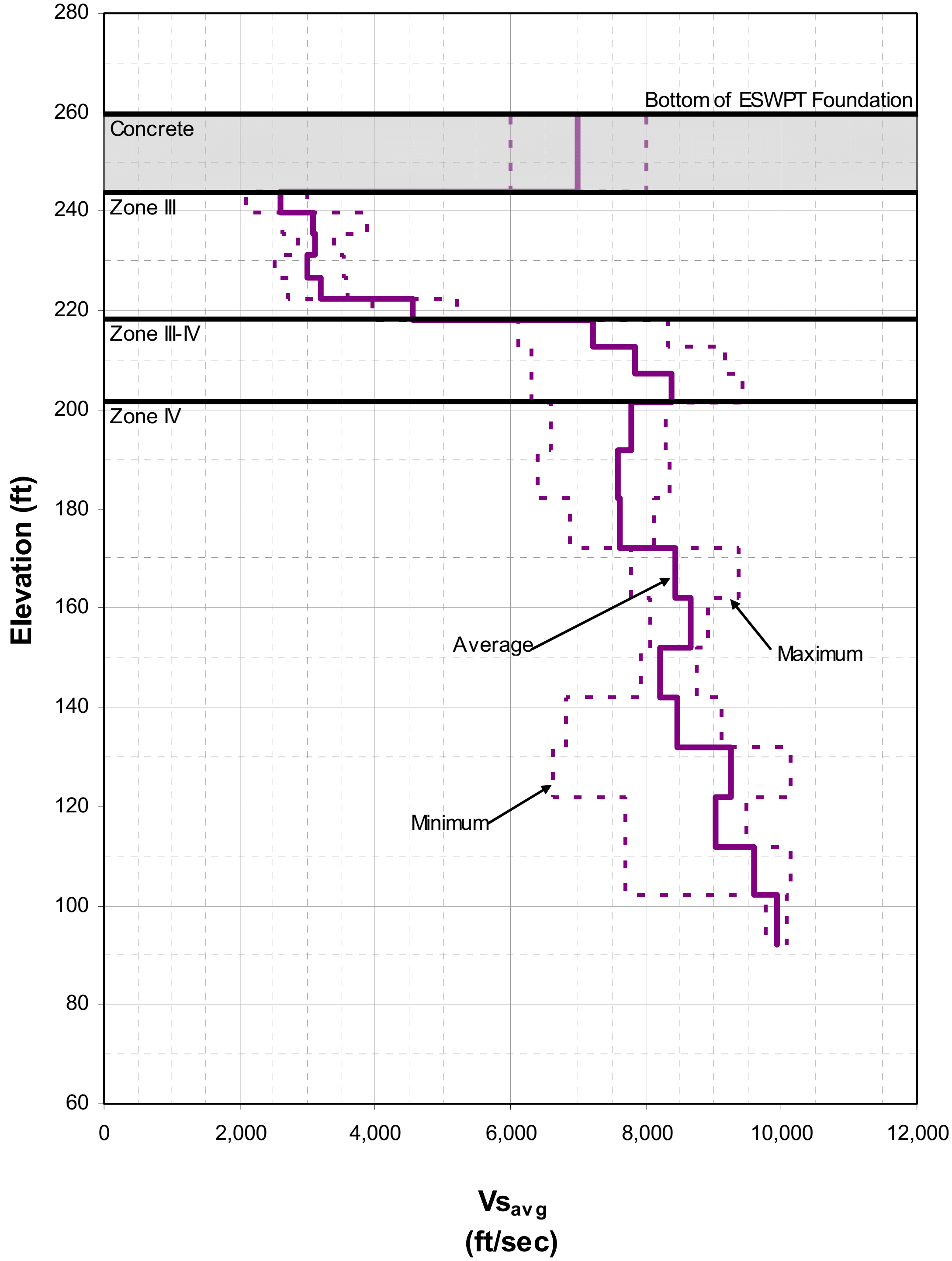
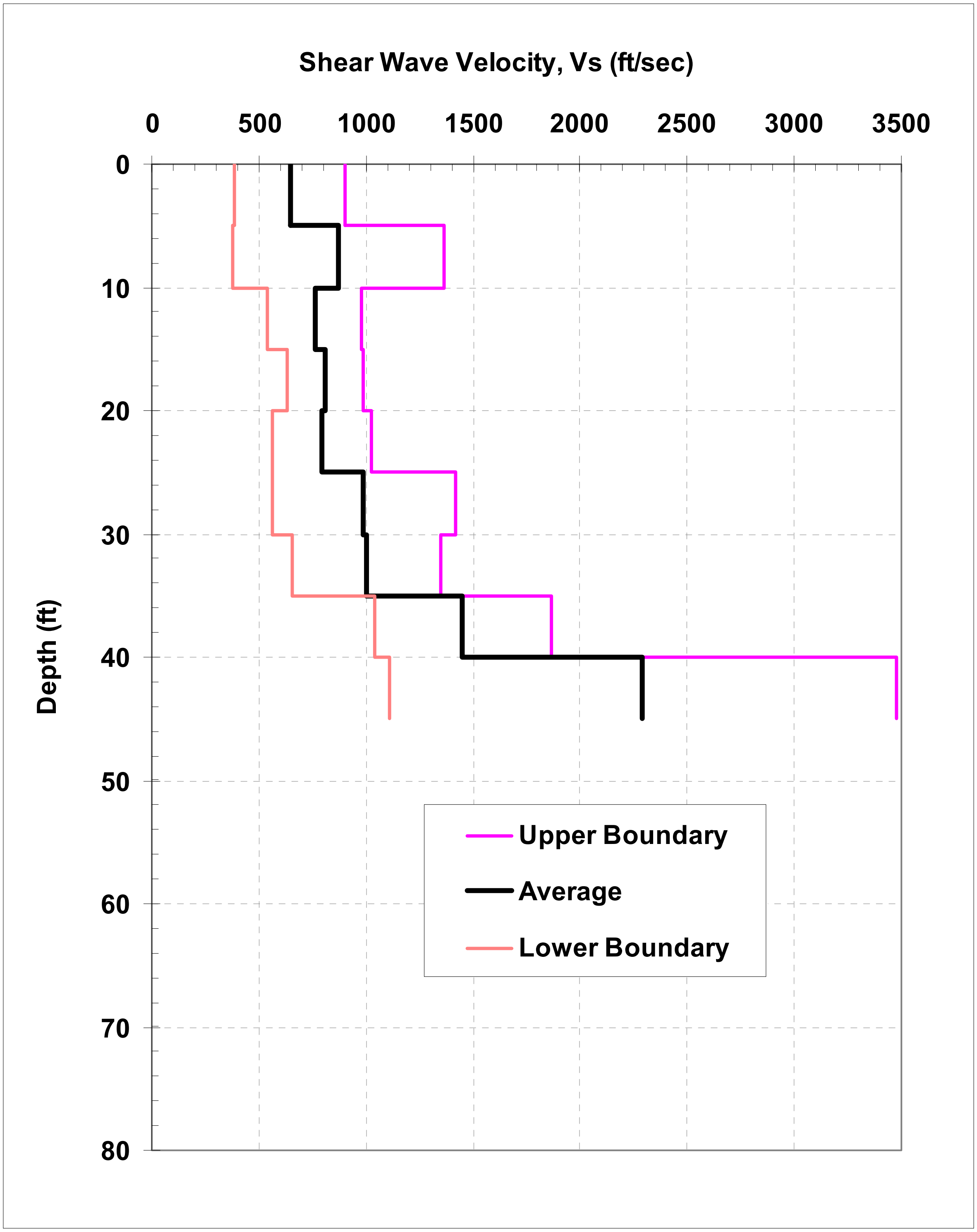


Figure 2.5-242 [Deleted]

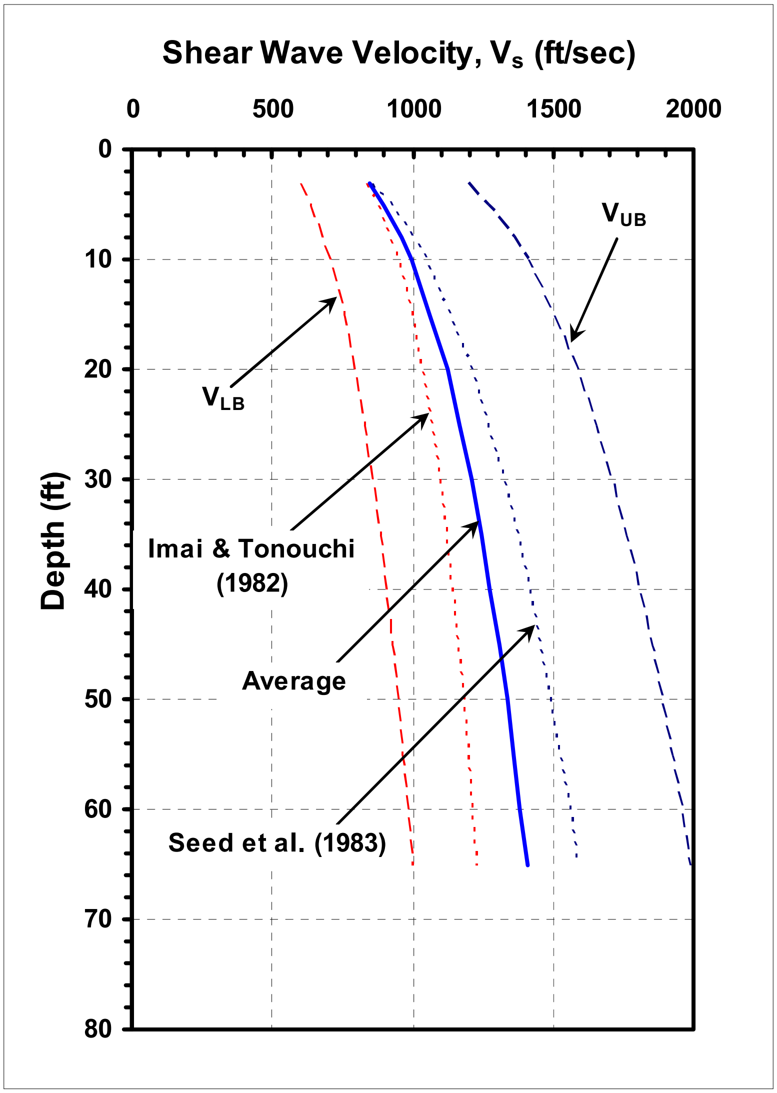
NAPS COL 2.5(1)

Figure 2.5-243 Shear Wave Velocity versus Elevation for In-Situ Soils Averaged Over 5-Foot Intervals

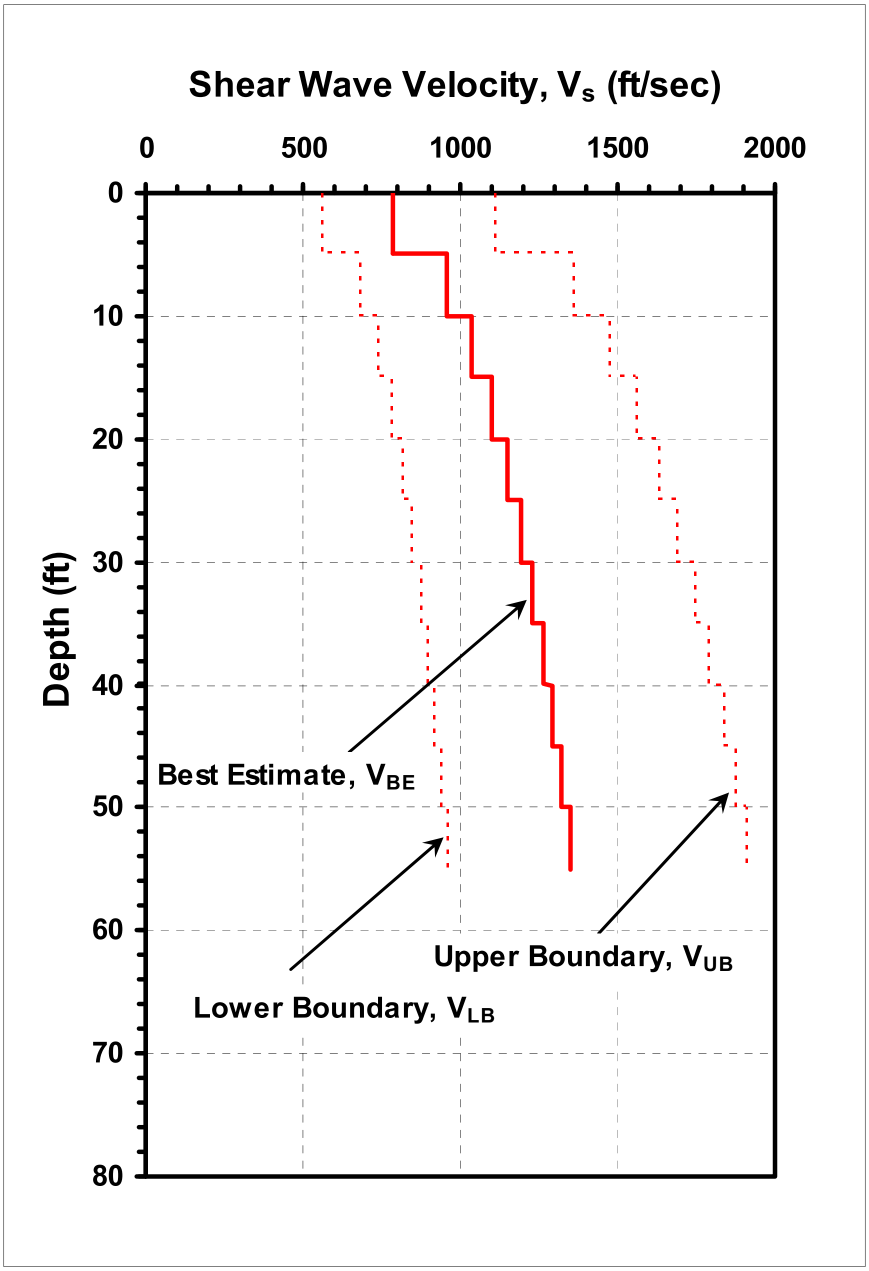


NAPS COL 2.5(1)

Figure 2.5-244 Estimated Shear Wave Velocity versus Depth for Structural Fill

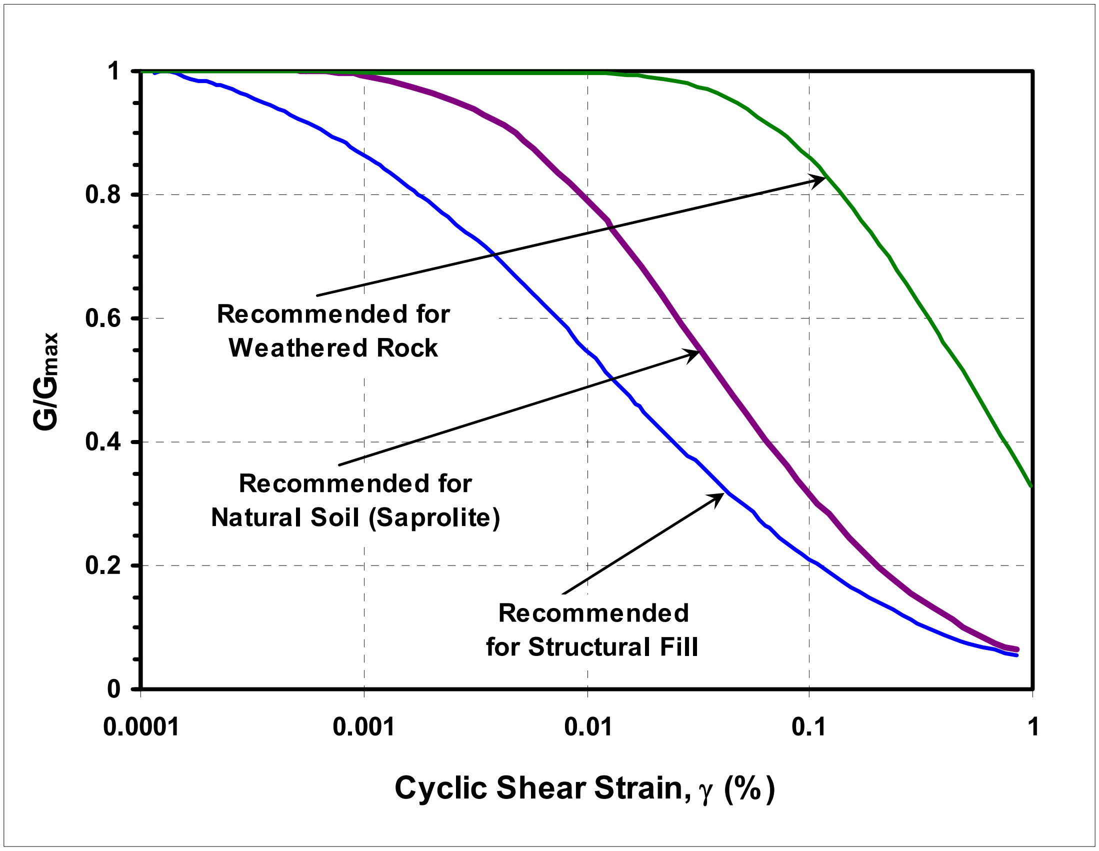


NAPS ESP COL 2.5-9 **Figure 2.5-245 Shear Wave Velocity versus Elevation for Structural Fill Averaged Over 5-Foot Intervals**



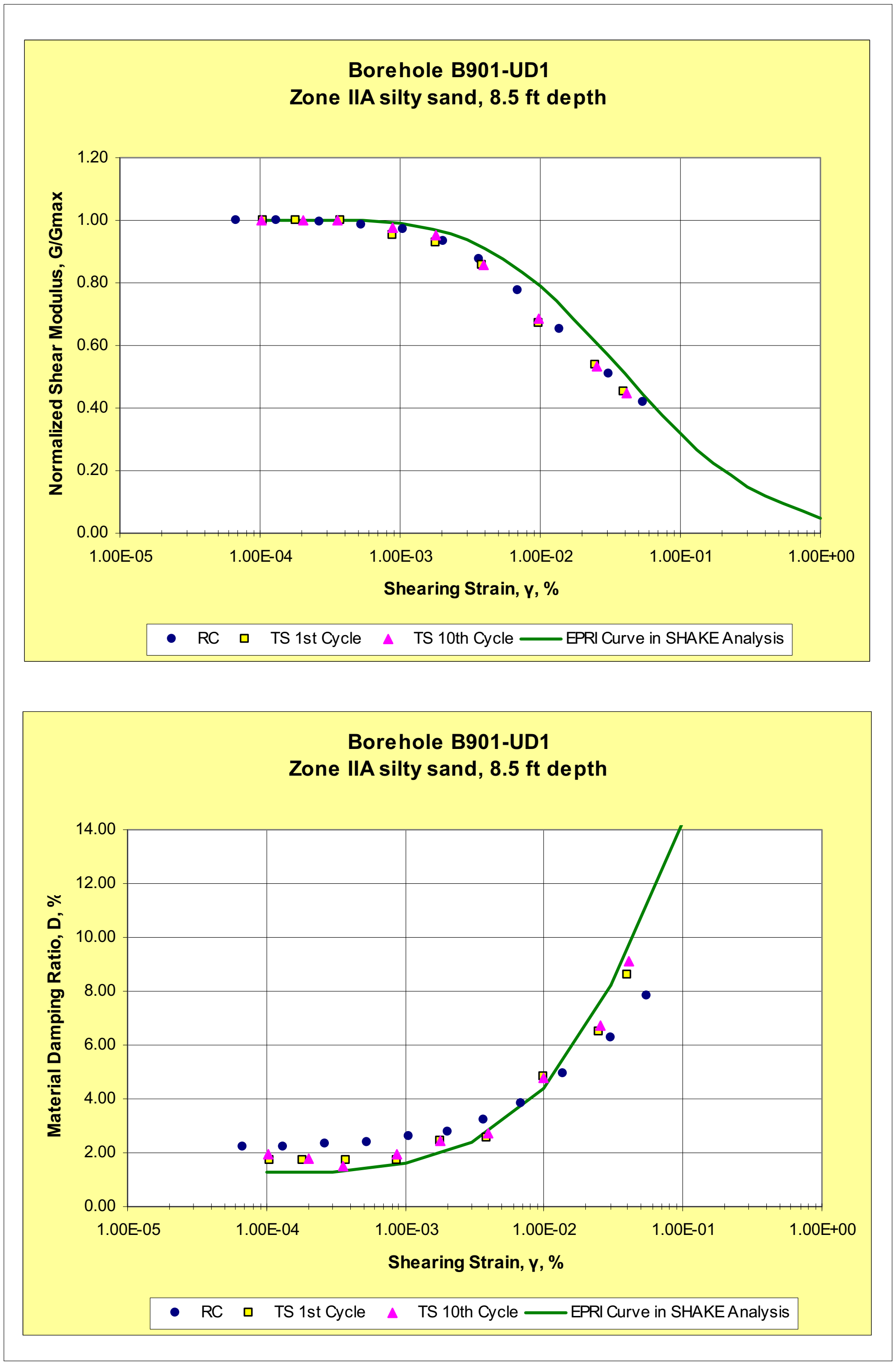
NAPS COL 2.5(1)

Figure 2.5-246 Shear Modulus Reduction Design Curves



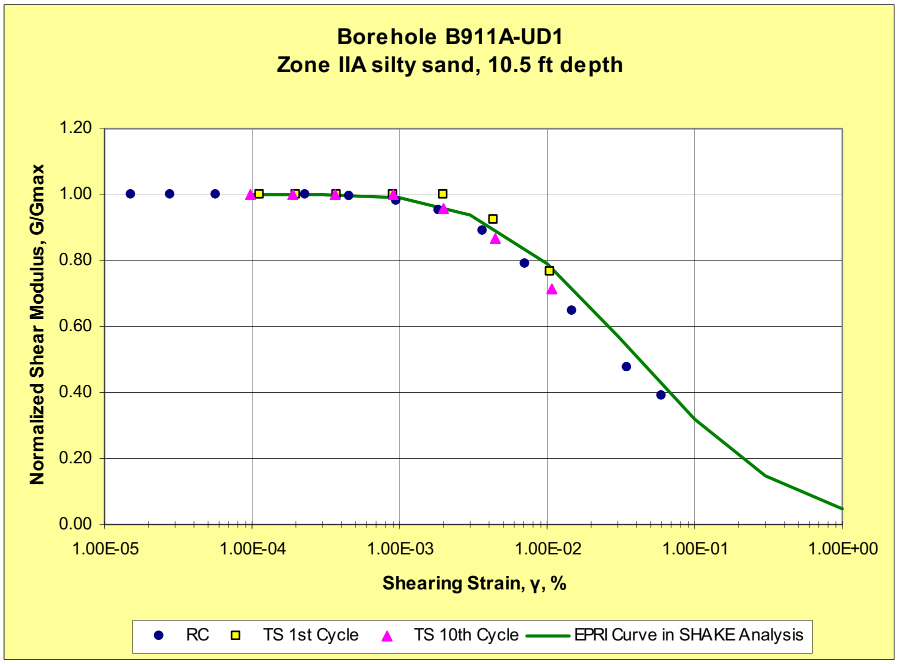
NAPS COL 2.5(1)

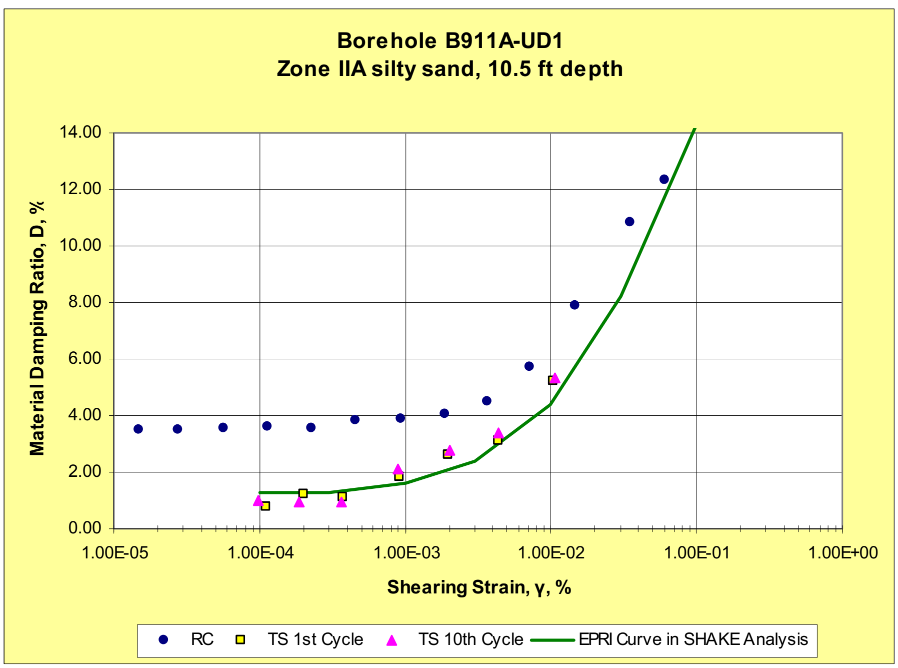
Figure 2.5-247 RCTS Results with G/G_{max} and D Curve G/G_{max} vs. Strain, B-901 UD-1: 4.3 psi Confining Pressure (Sheet 1 of 3)



NAPS COL 2.5(1)

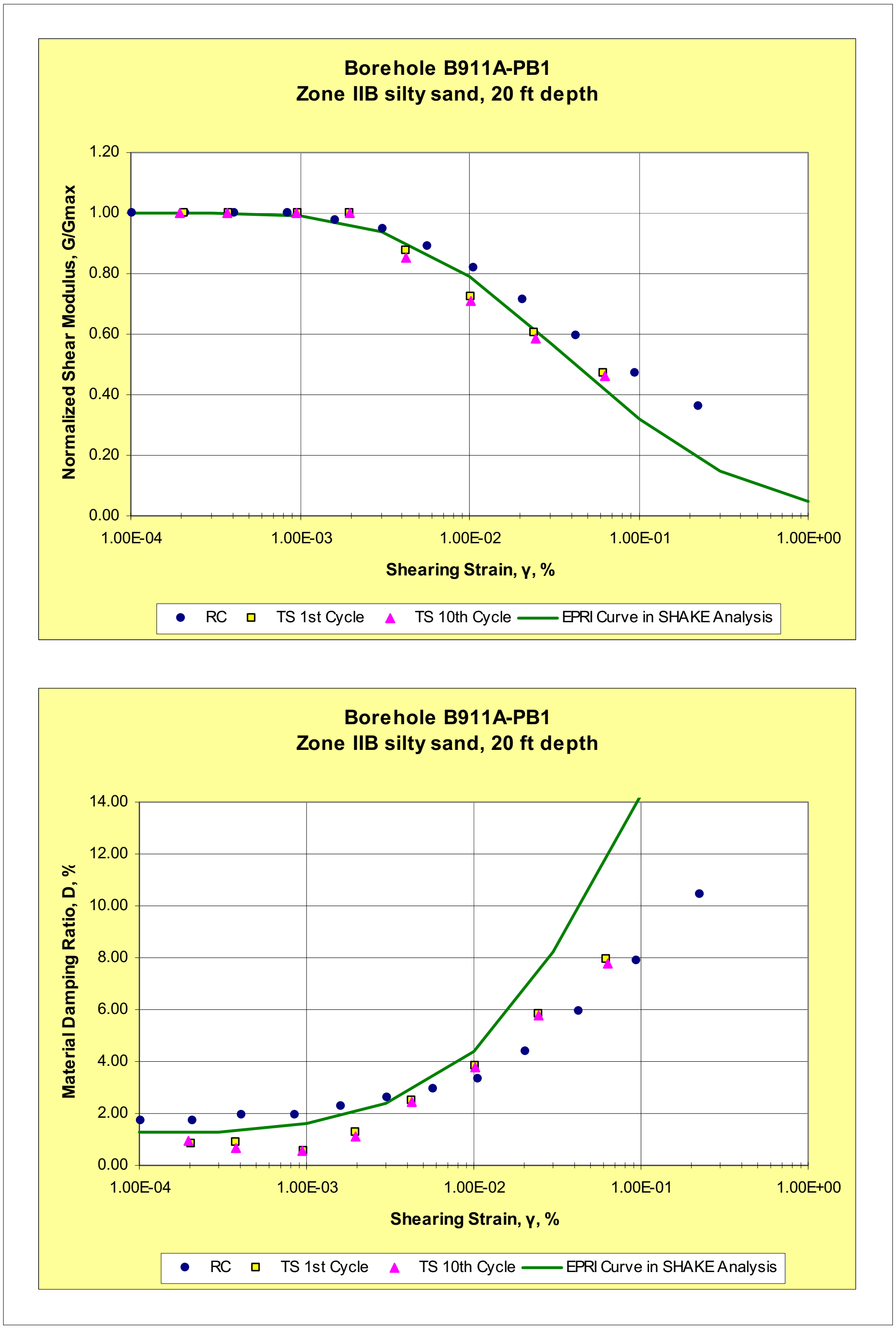
Figure 2.5-247 RCTS Results with G/G_{max} and D Curve G/G_{max} vs. Strain, B-911A UD-1: 5.6 psi Confining Pressure (Sheet 2 of 3)





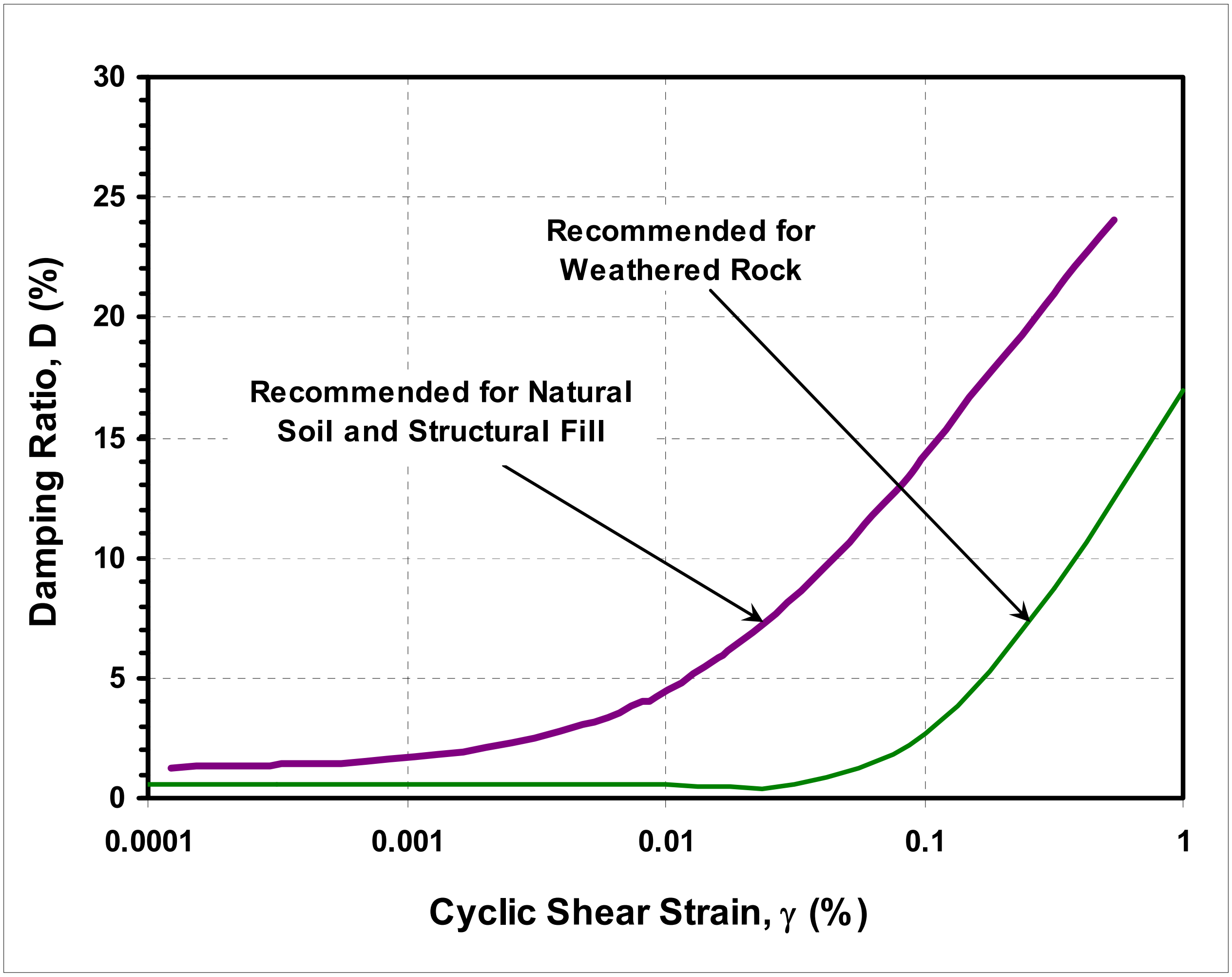
NAPS COL 2.5(1)

Figure 2.5-247 RCTS Results with G/G_{max} and D Curve G/G_{max} vs. Strain, B-911A PB-1: 11.4 psi Confining Pressure (Sheet 3 of 3)

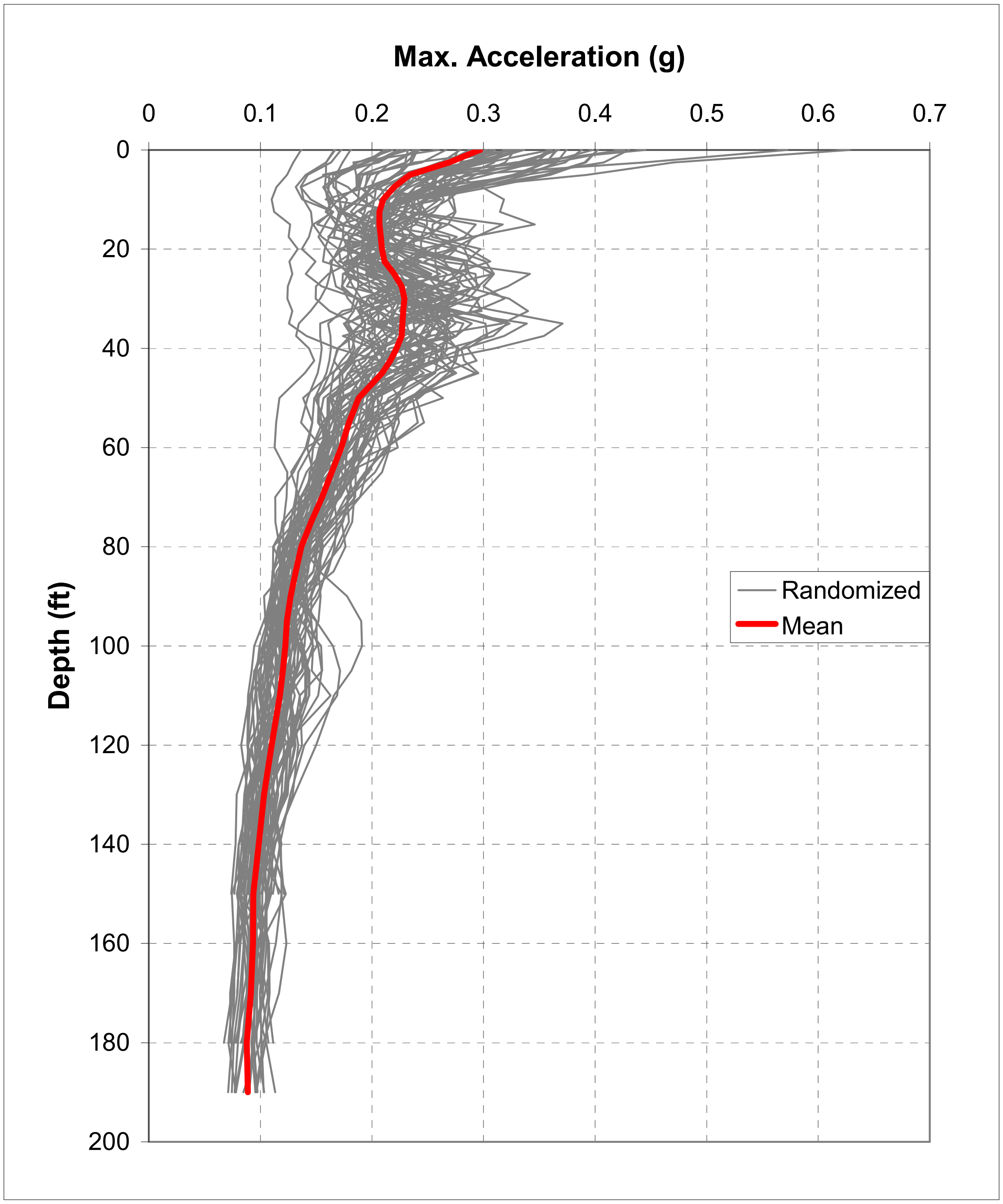


NAPS COL 2.5(1)

Figure 2.5-248 Damping Ratio versus Cyclic Shear Strain



NAPS ESP COL 2.5-5 **Figure 2.5-249 Maximum Acceleration versus Depth, Natural Soil Profile, Low Frequency Input**



NAPS ESP COL 2.5-5 **Figure 2.5-250 Maximum Acceleration versus Depth, Natural Soil Profile, High Frequency Input**

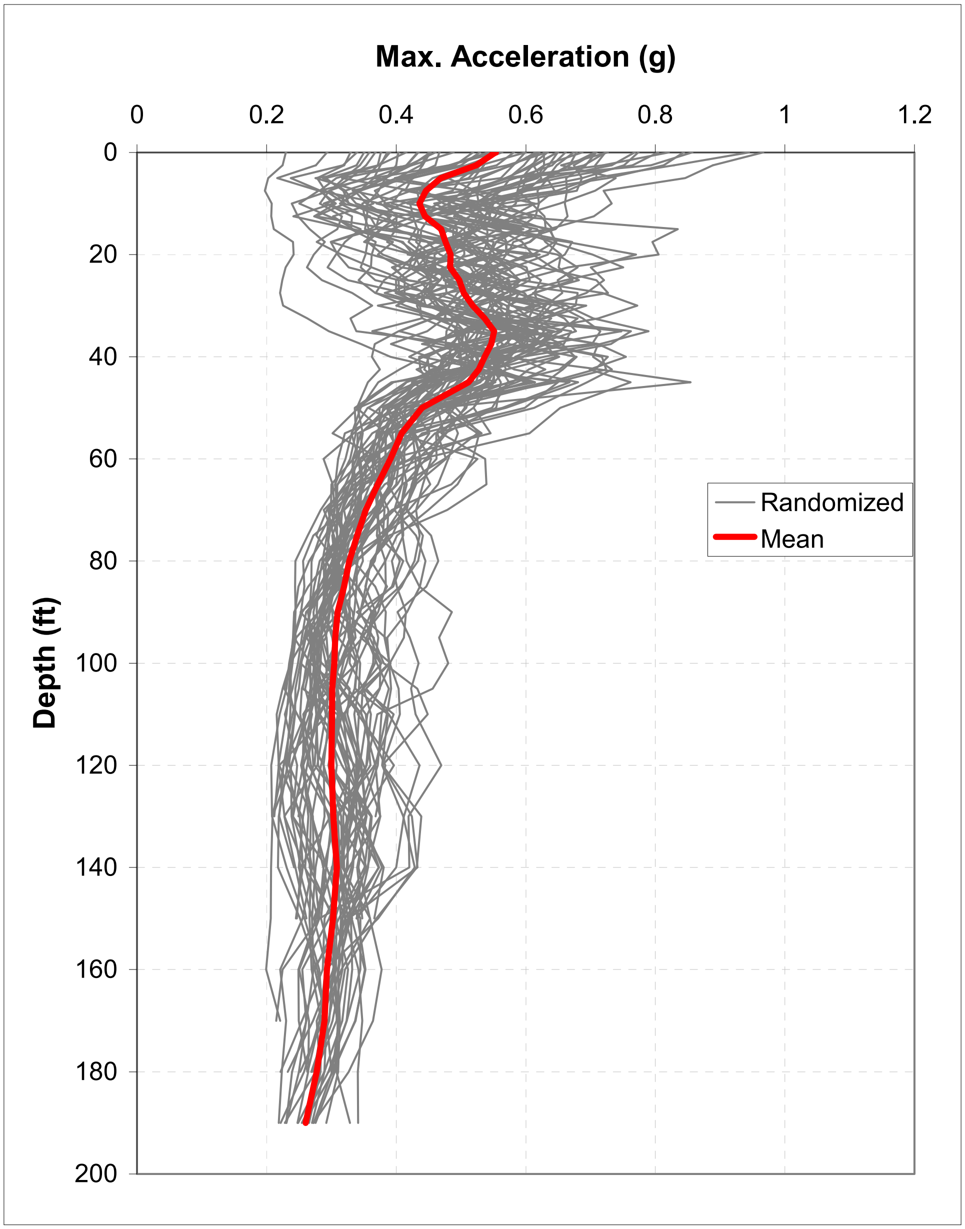
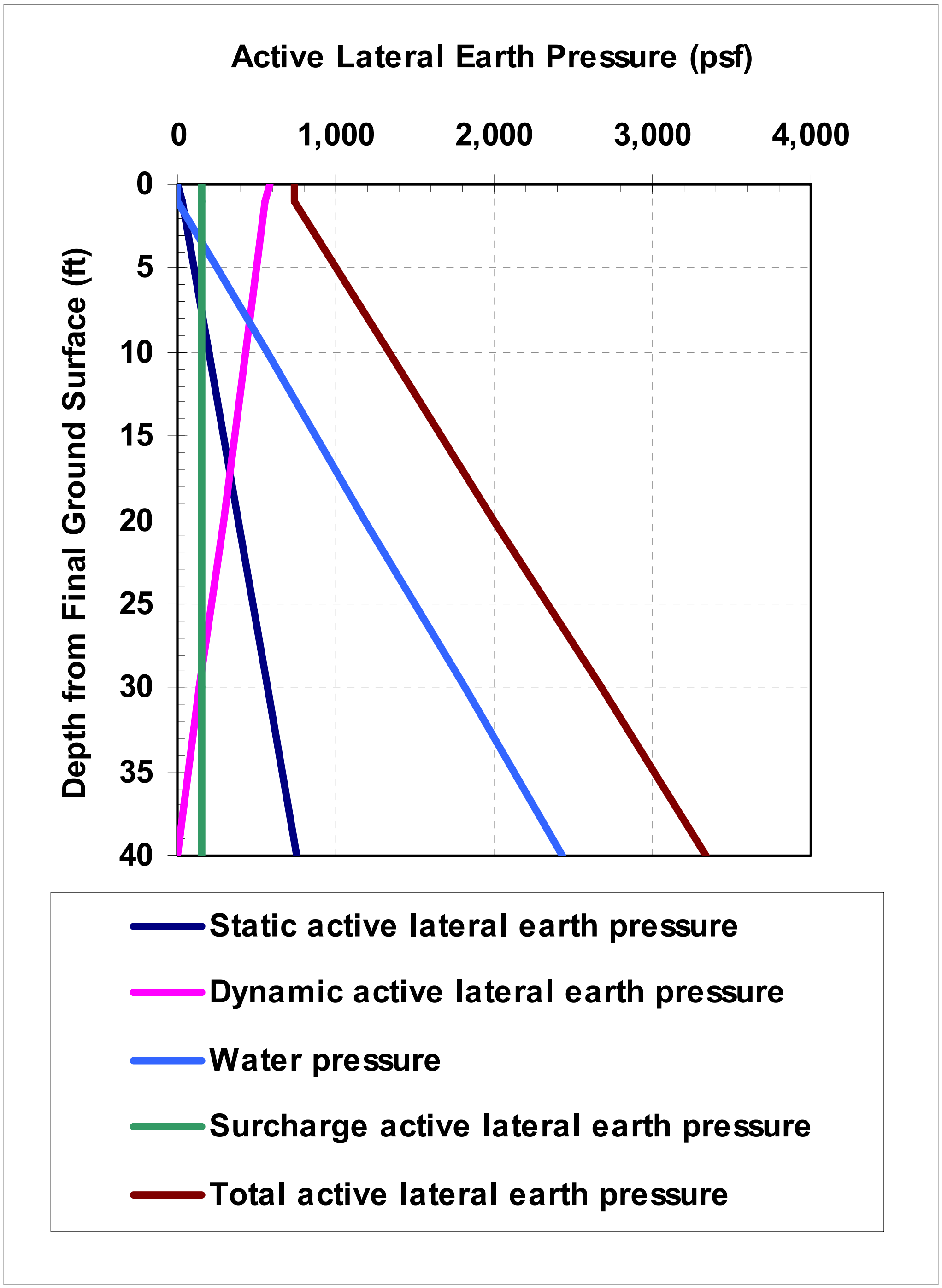


Figure 2.5-251 [Deleted]

Figure 2.5-252 [Deleted]

NAPS ESP COL 2.5-6 Figure 2.5-253 Active Earth Pressure on Yielding Walls From In-Situ Zone IIA Saprolite (Low Frequency Earthquake)



NAPS ESP COL 2.5-6 **Figure 2.5-254 Lateral Earth Pressure on Non-Yielding Walls (LF Earthquake)**

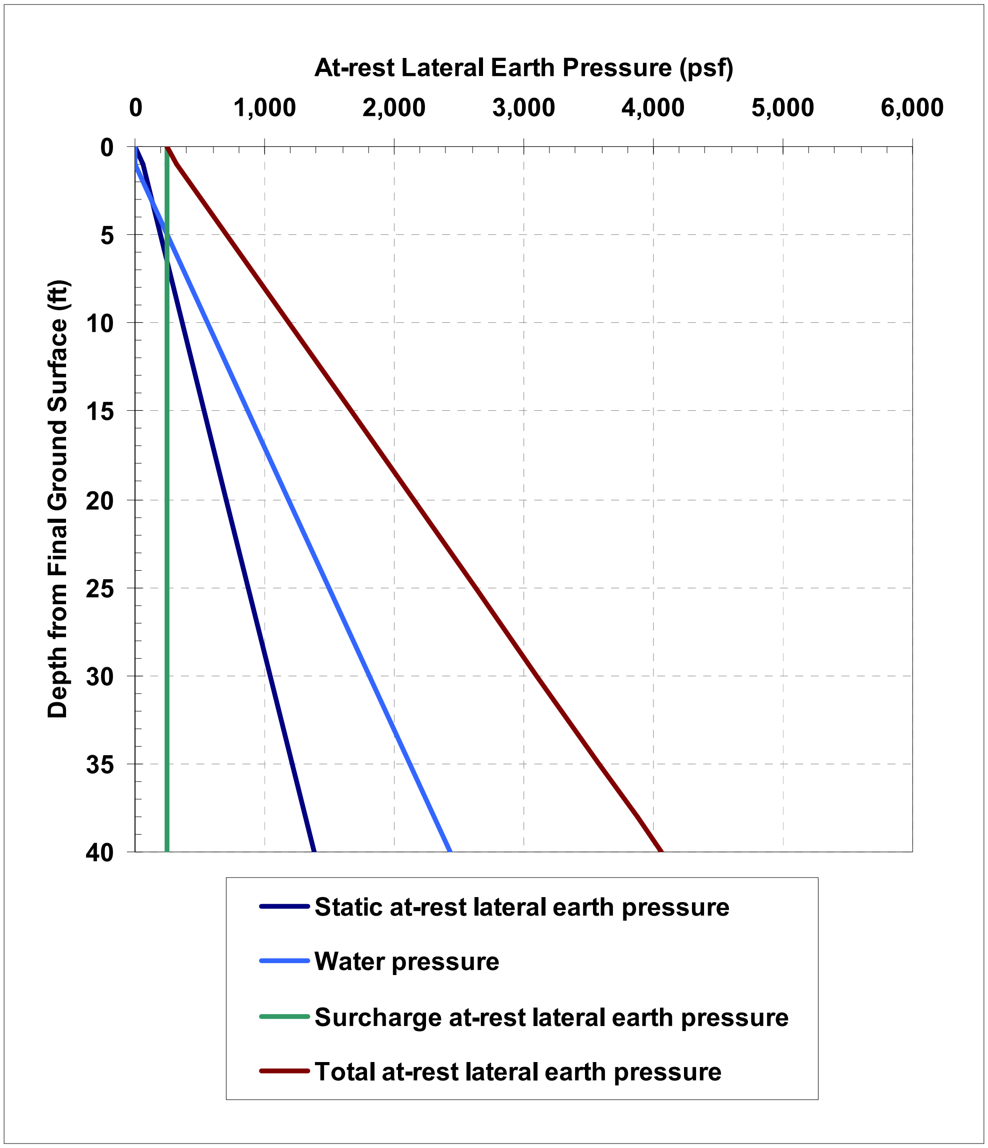
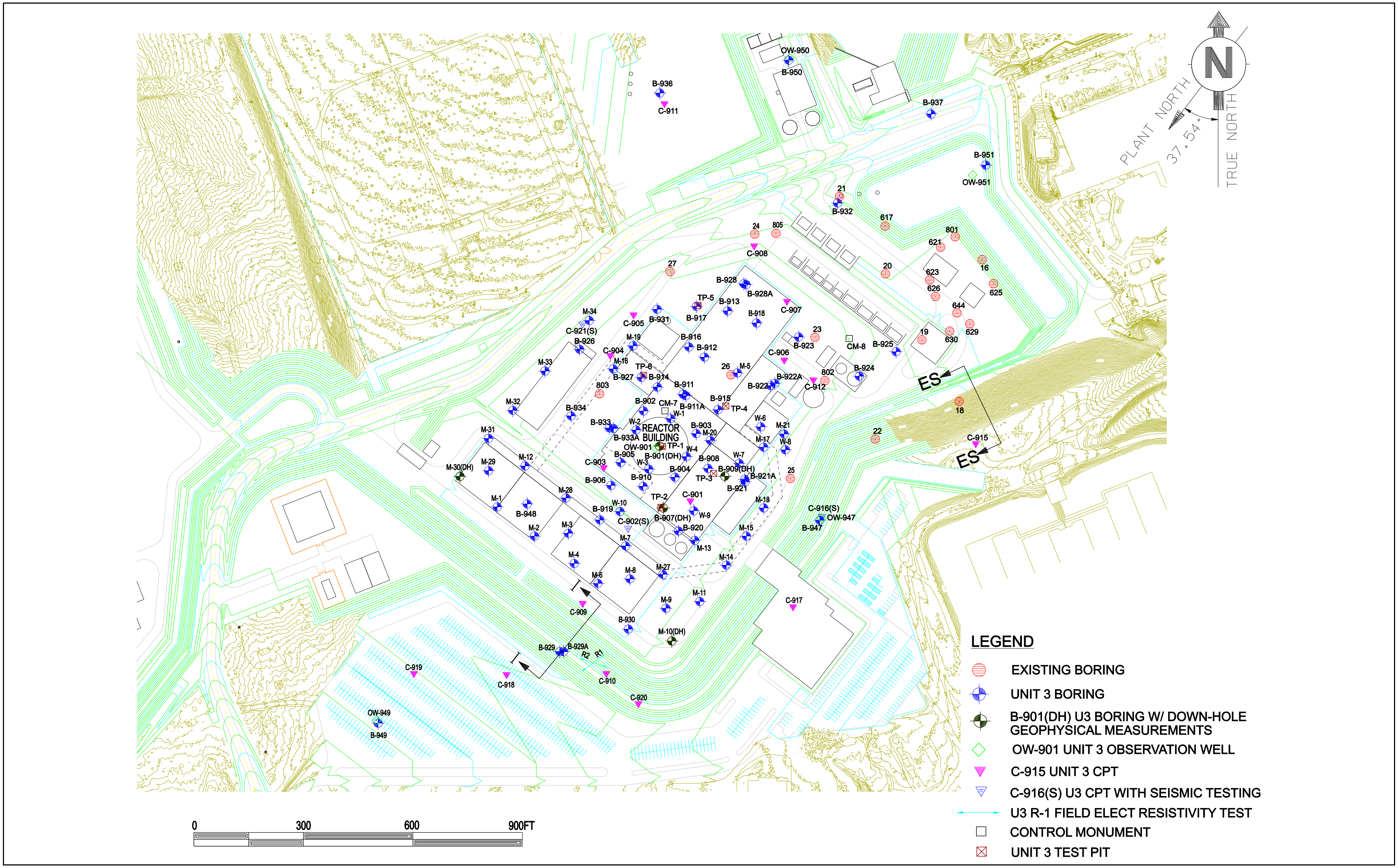
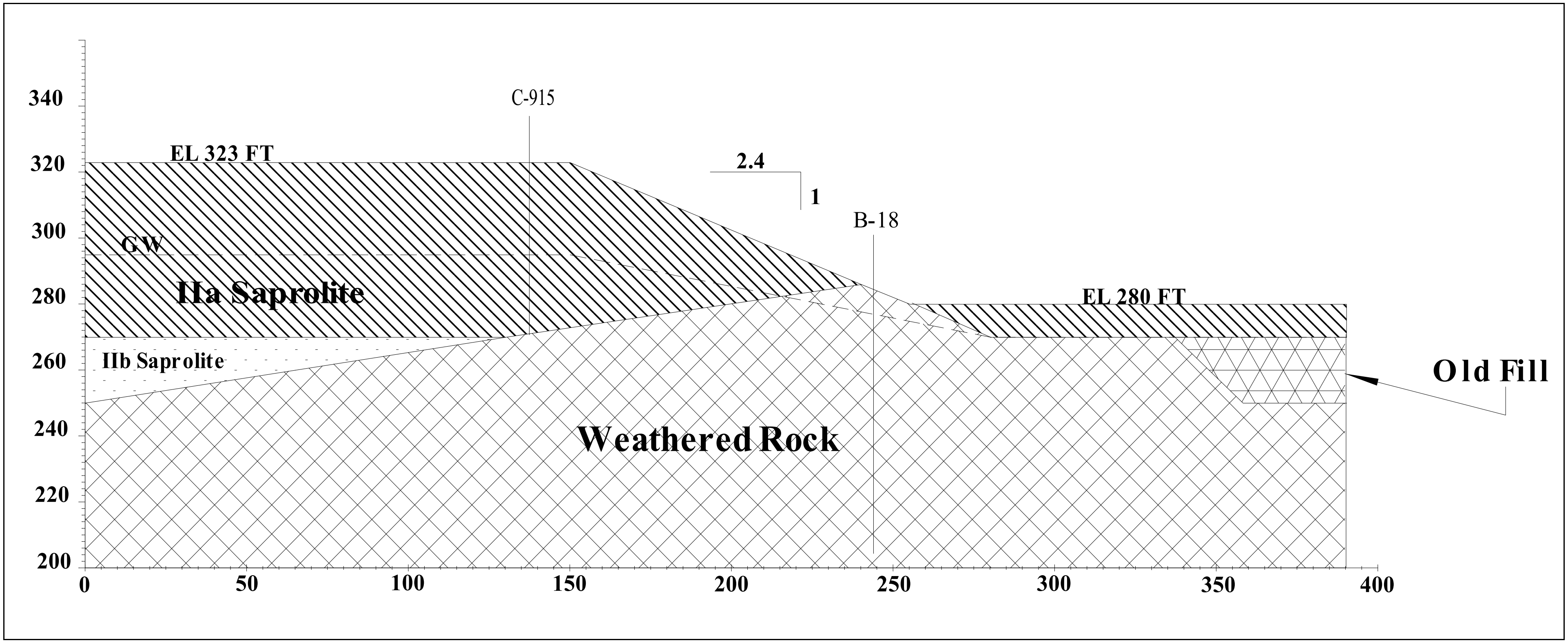


Figure 2.5-255 Grading Plan with Boring Locations



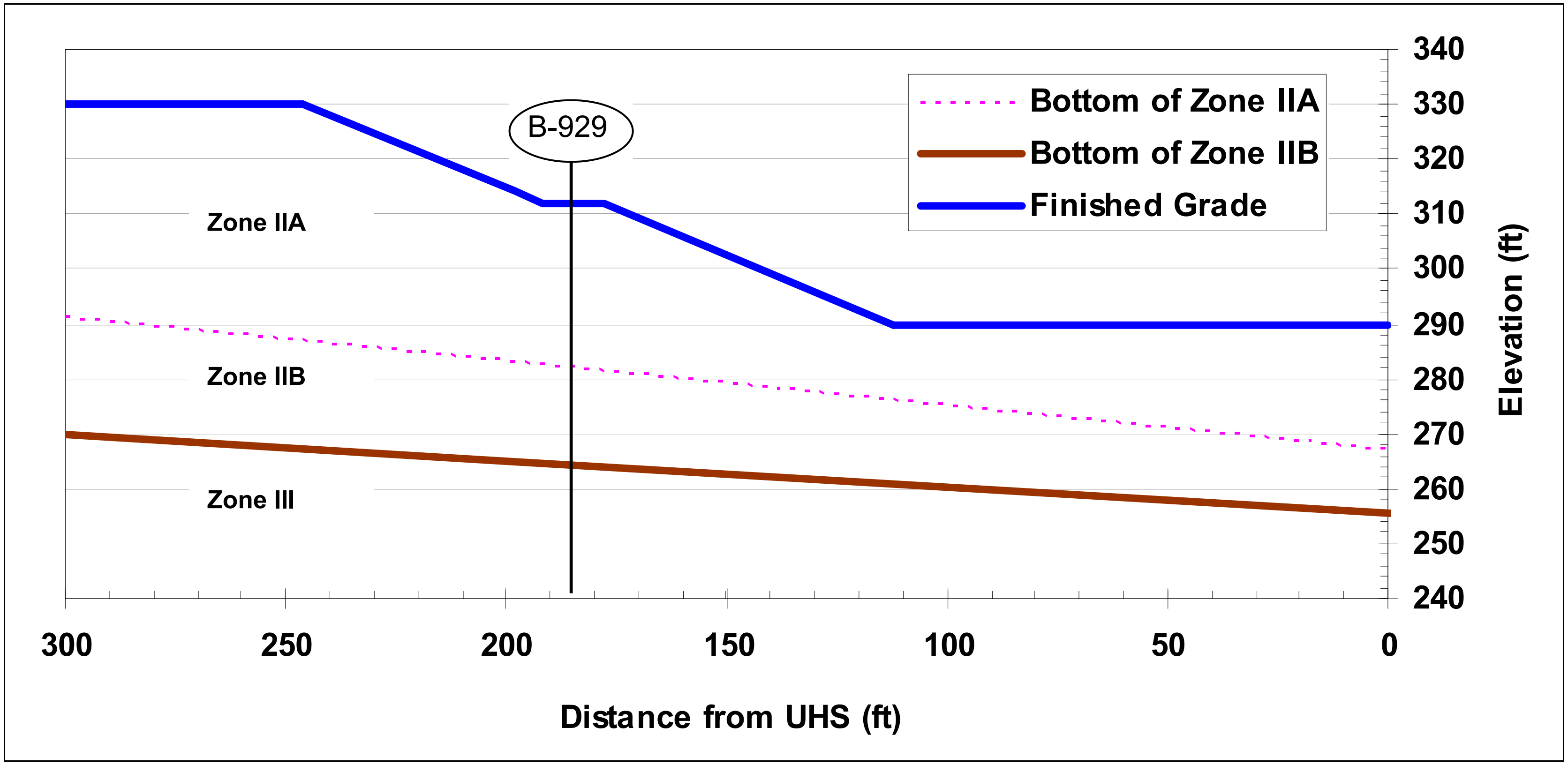
NAPS COL 2.5(1)

Figure 2.5-256 Cross-Section of Slope ES



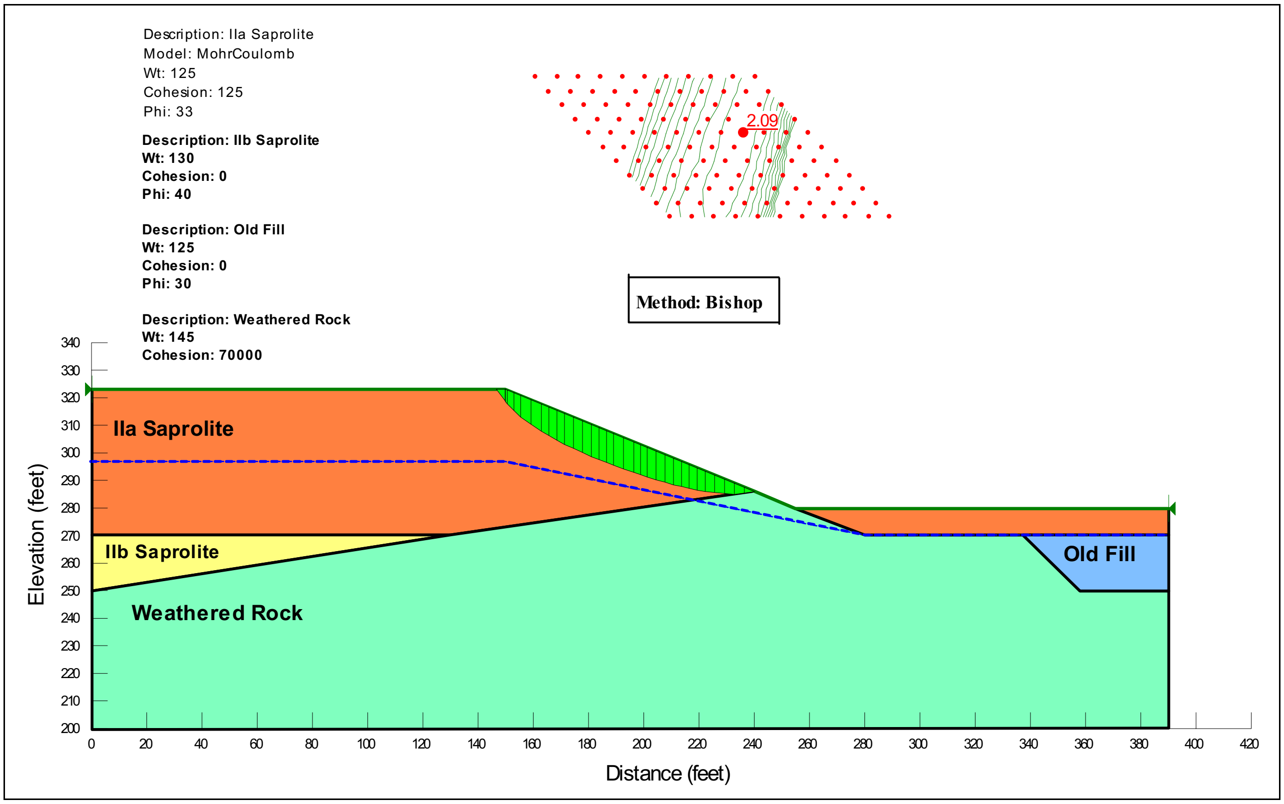
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-11 Figure 2.5-257 Cross-Section of Slope (I-I)



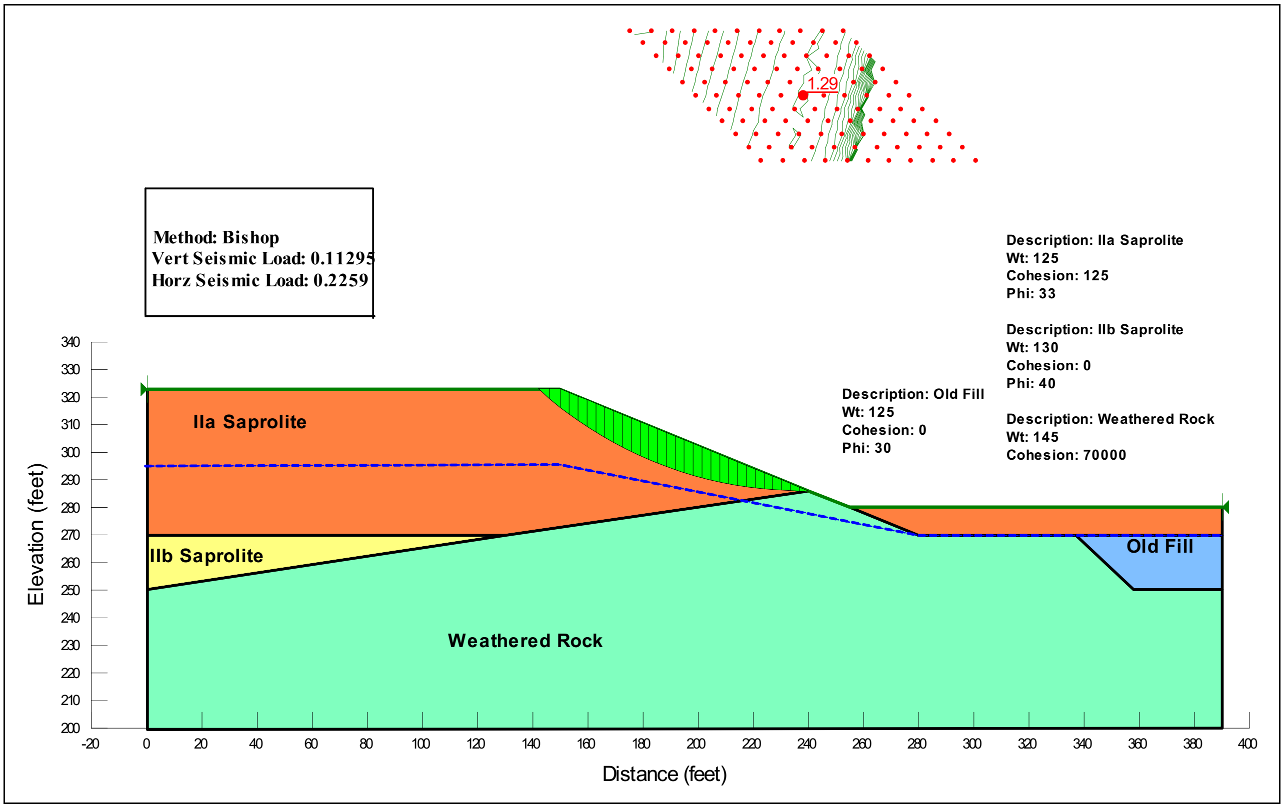
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS COL 2.5(1) **Figure 2.5-258 Slope Stability Analysis; Slope ES; Long-Term Static**



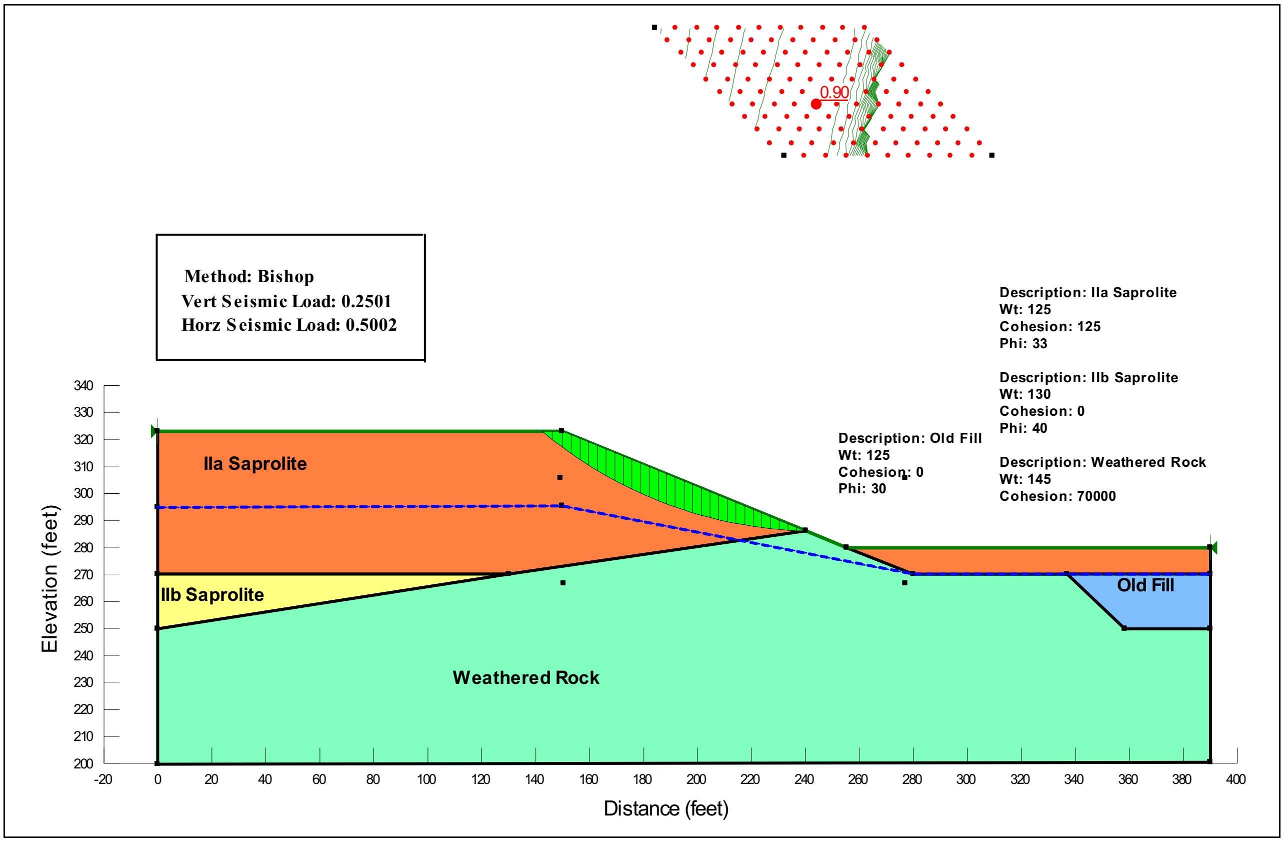
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-259 Slope Stability Analysis; Slope ES; Pseudo-Static; Low Frequency



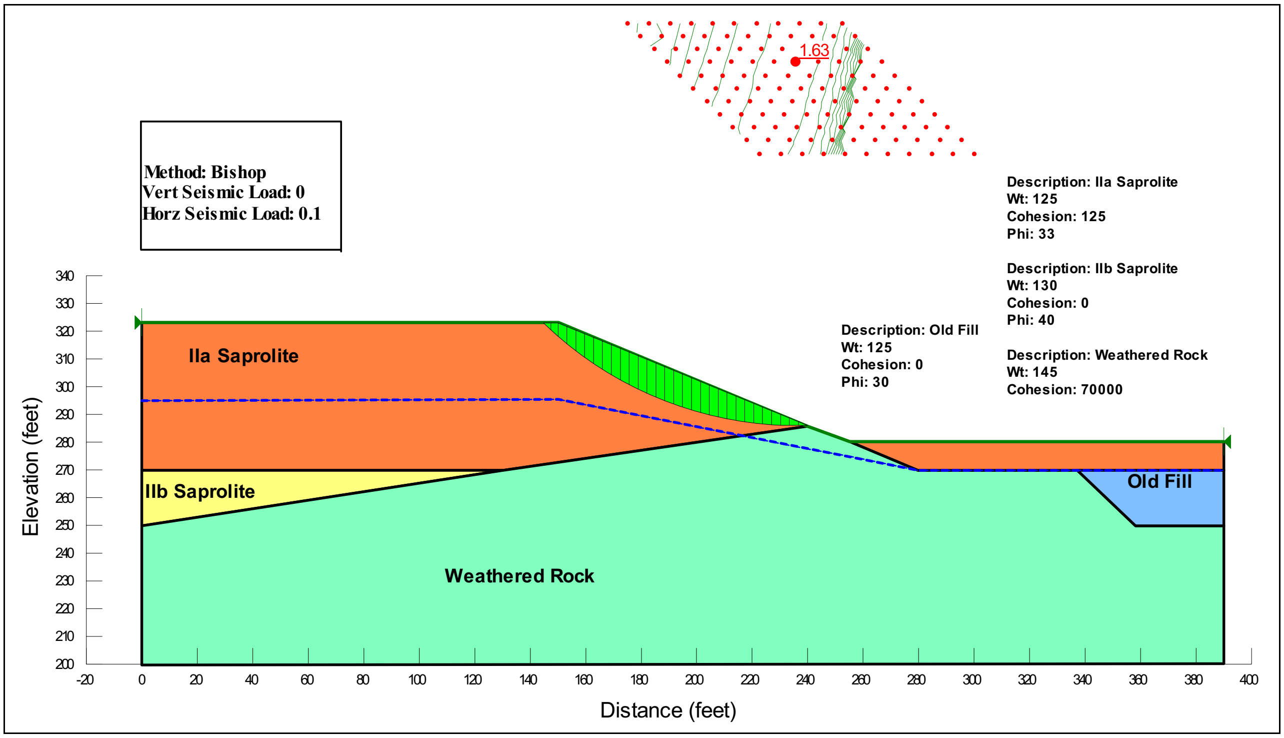
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-260 Slope Stability Analysis; Slope ES; Pseudo-Static; High Frequency



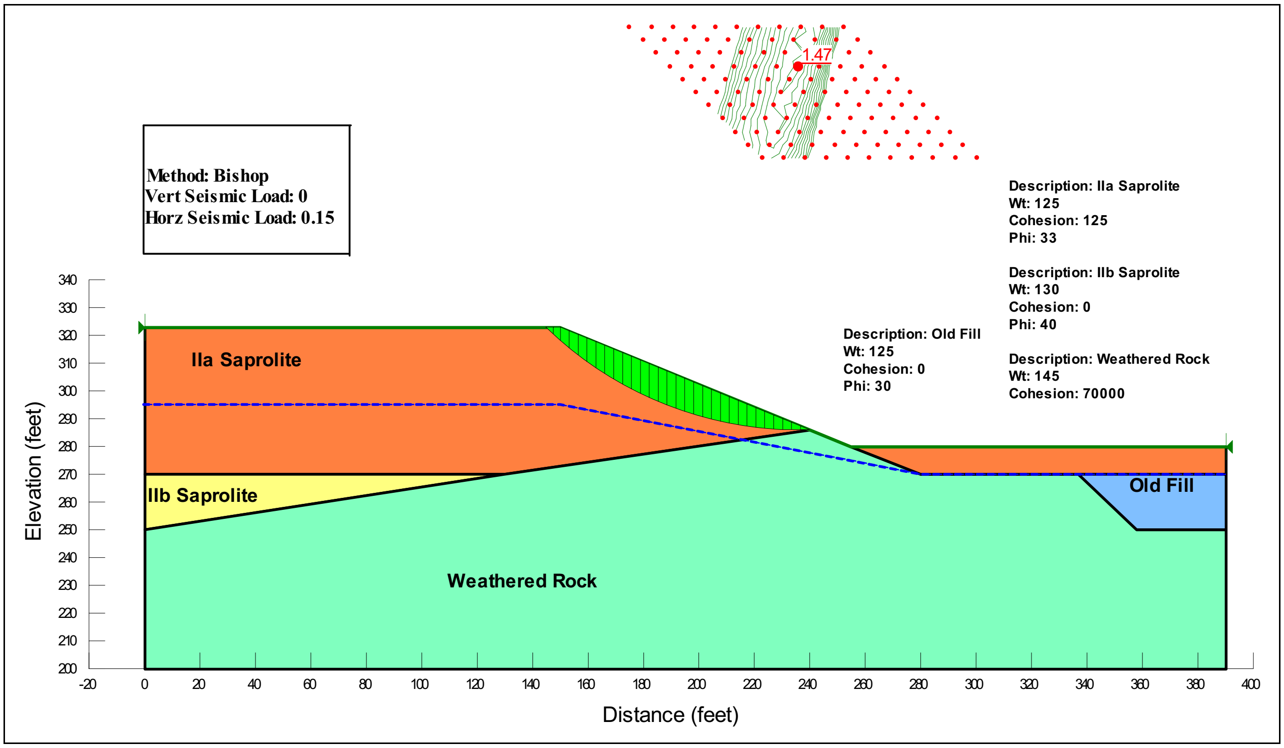
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-261 Slope Stability Analysis; Slope ES; Seed Approach; Acceleration of 0.1g



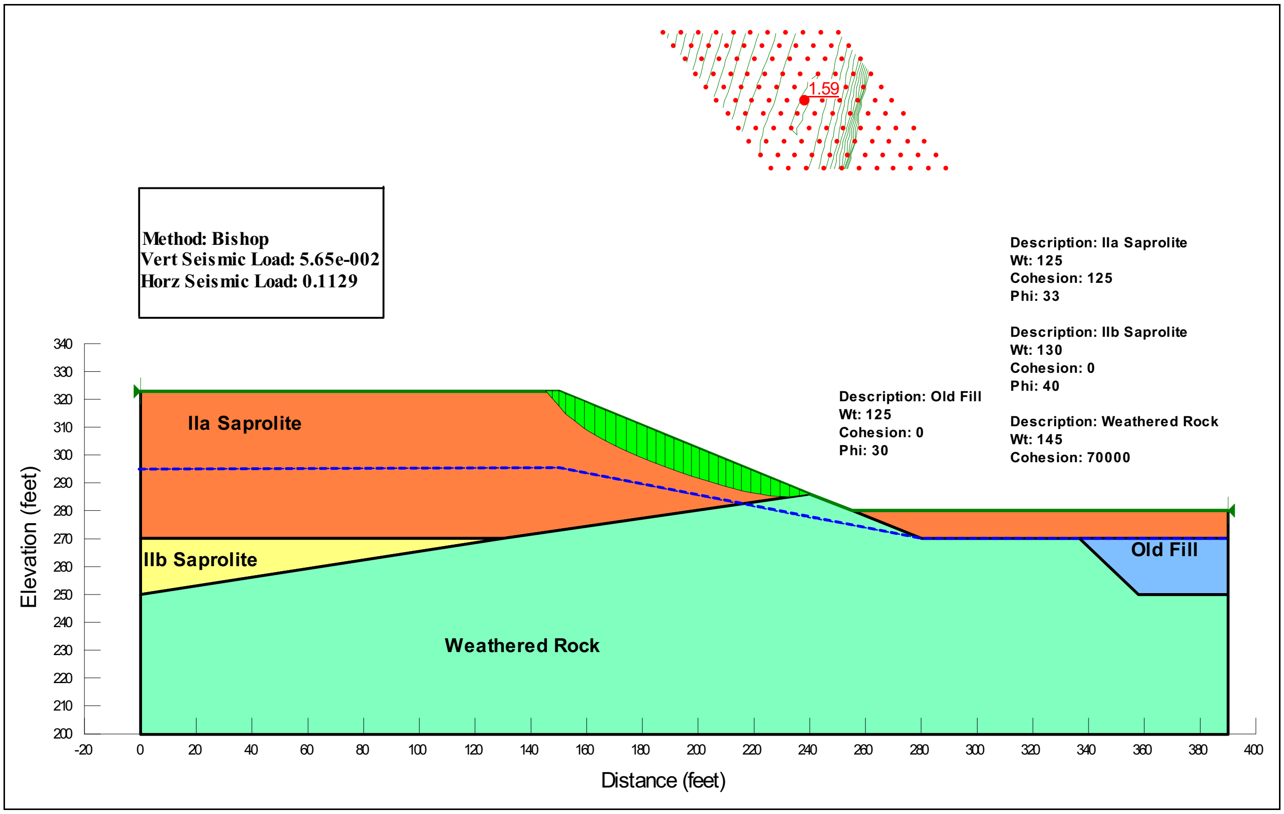
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-262 Slope Stability Analysis; Slope ES; Seed Approach; Acceleration of 0.15g



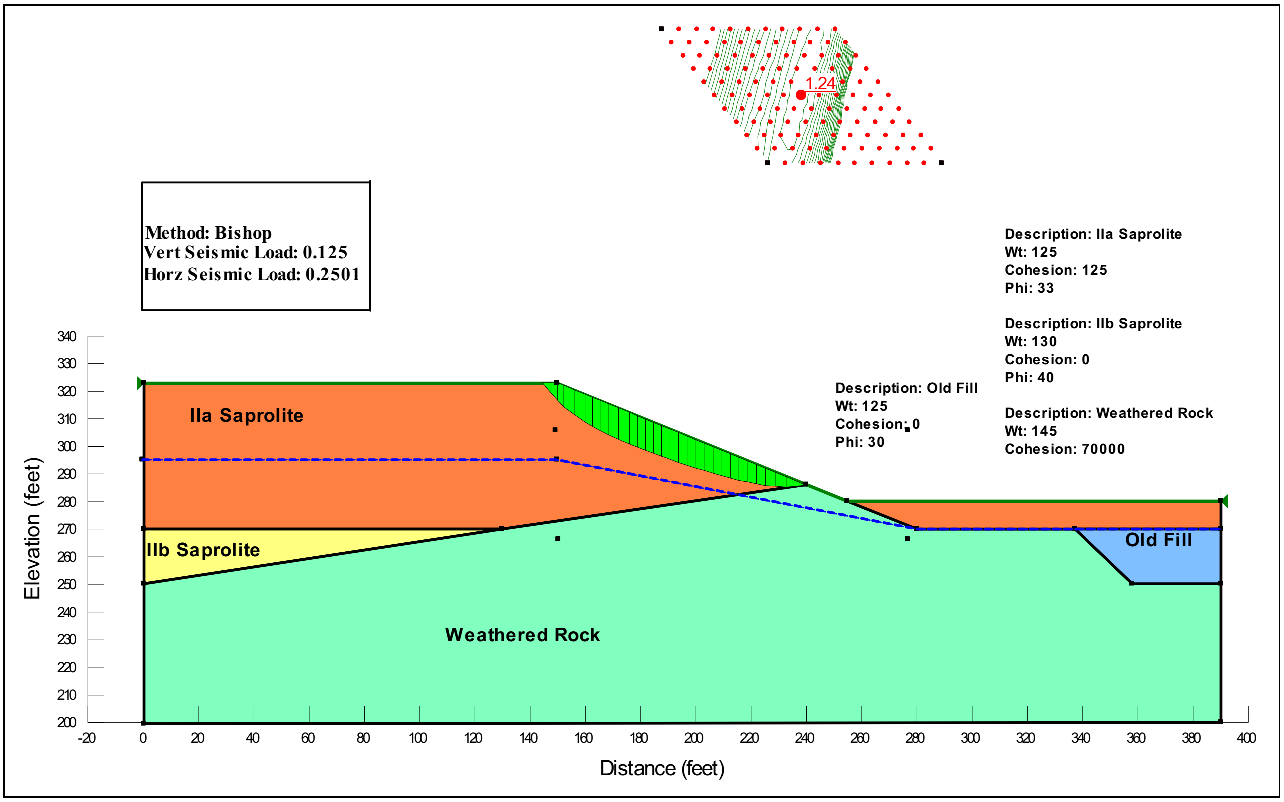
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-263 Slope Stability Analysis; Slope ES; Kramer Approach; Low Frequency



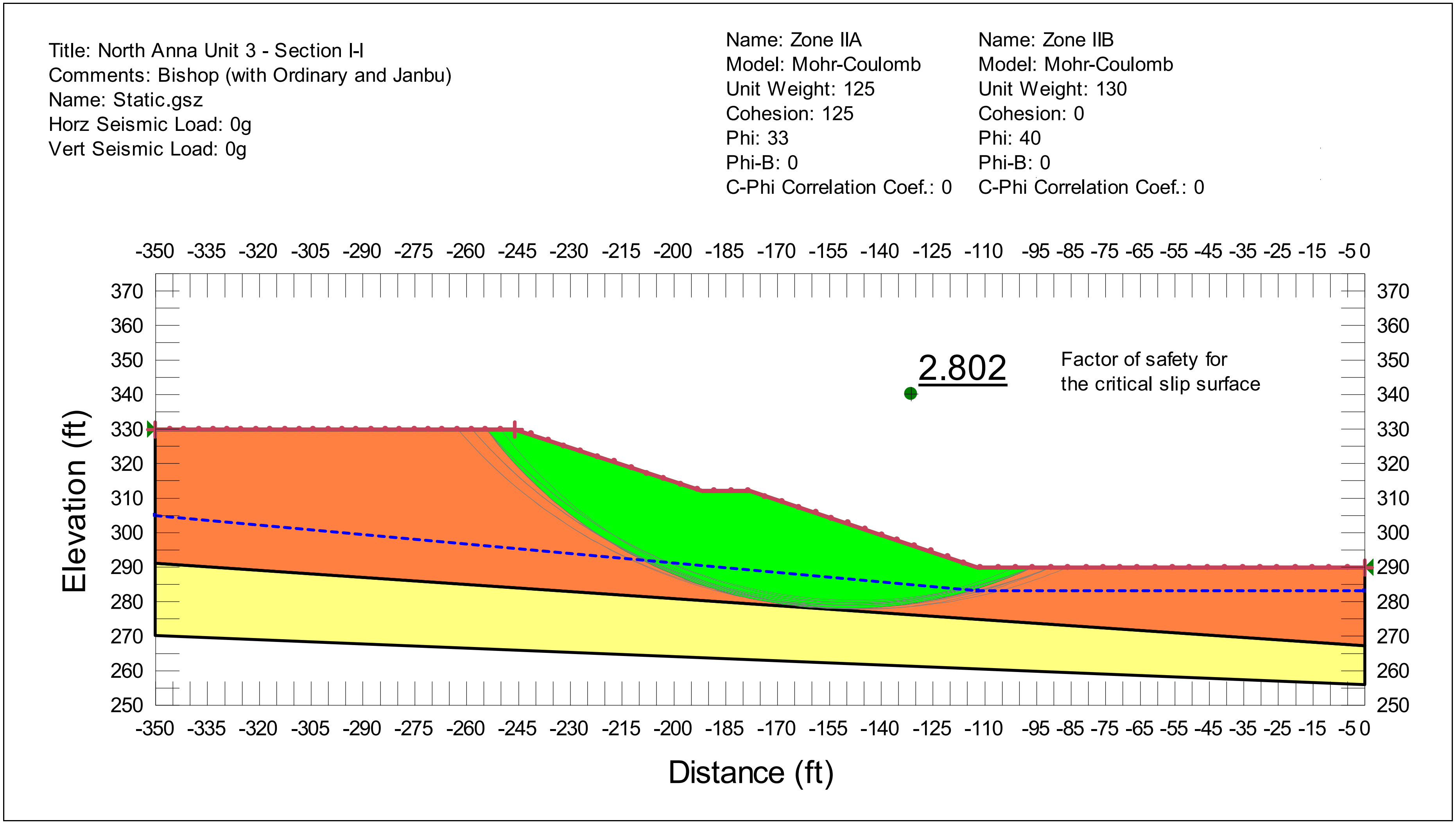
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-264 Slope Stability Analysis; Slope ES; Kramer Approach; High Frequency



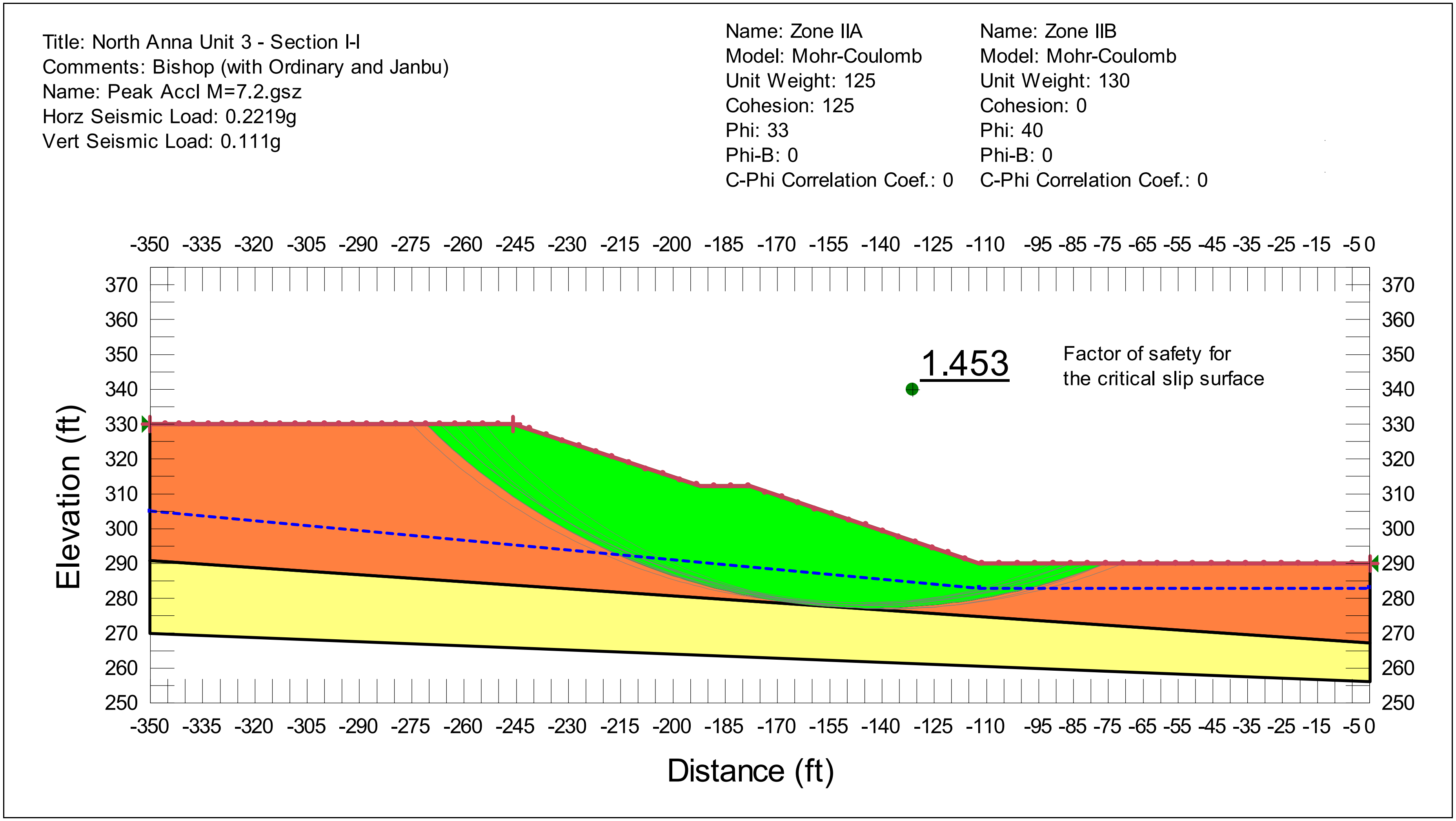
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS COL 2.5(1) **Figure 2.5-265 Slope Stability Analysis; Slope I-I; Long-Term Static**



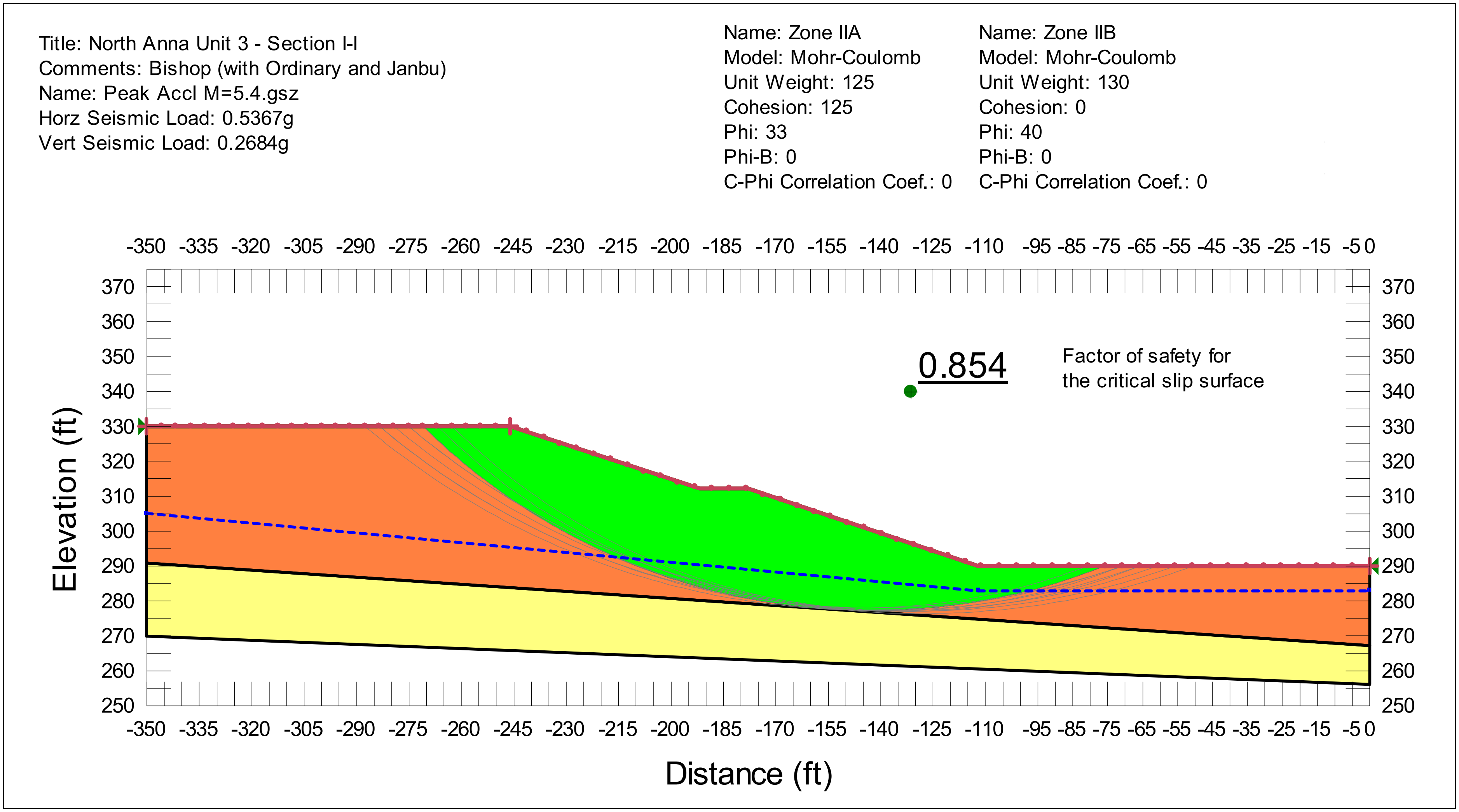
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

 Figure 2.5-266 Slope Stability Analysis; Slope I-I; Pseudo-Static; Low Frequency



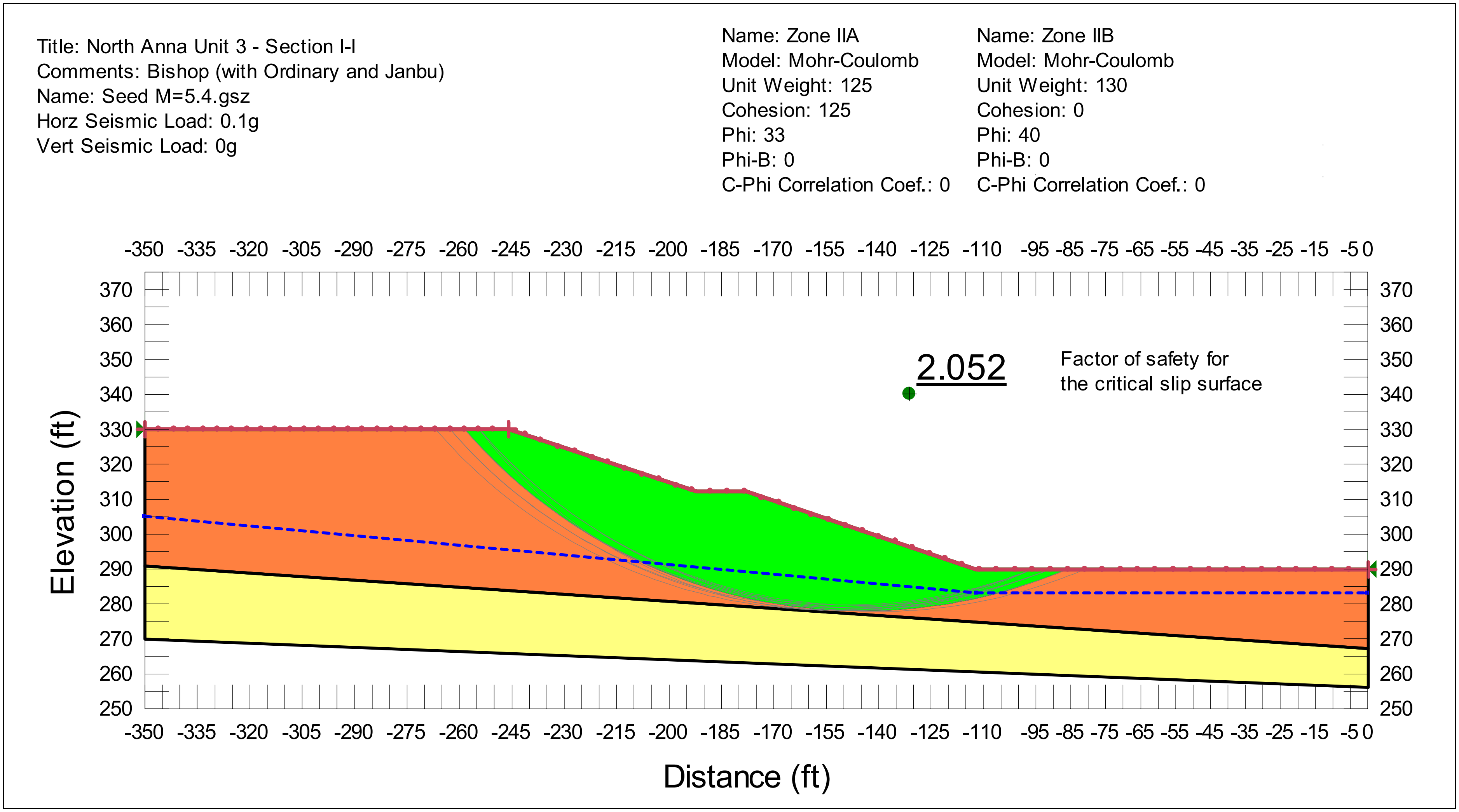
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

 Figure 2.5-267 Slope Stability Analysis; Slope I-I; Pseudo-Static; High Frequency



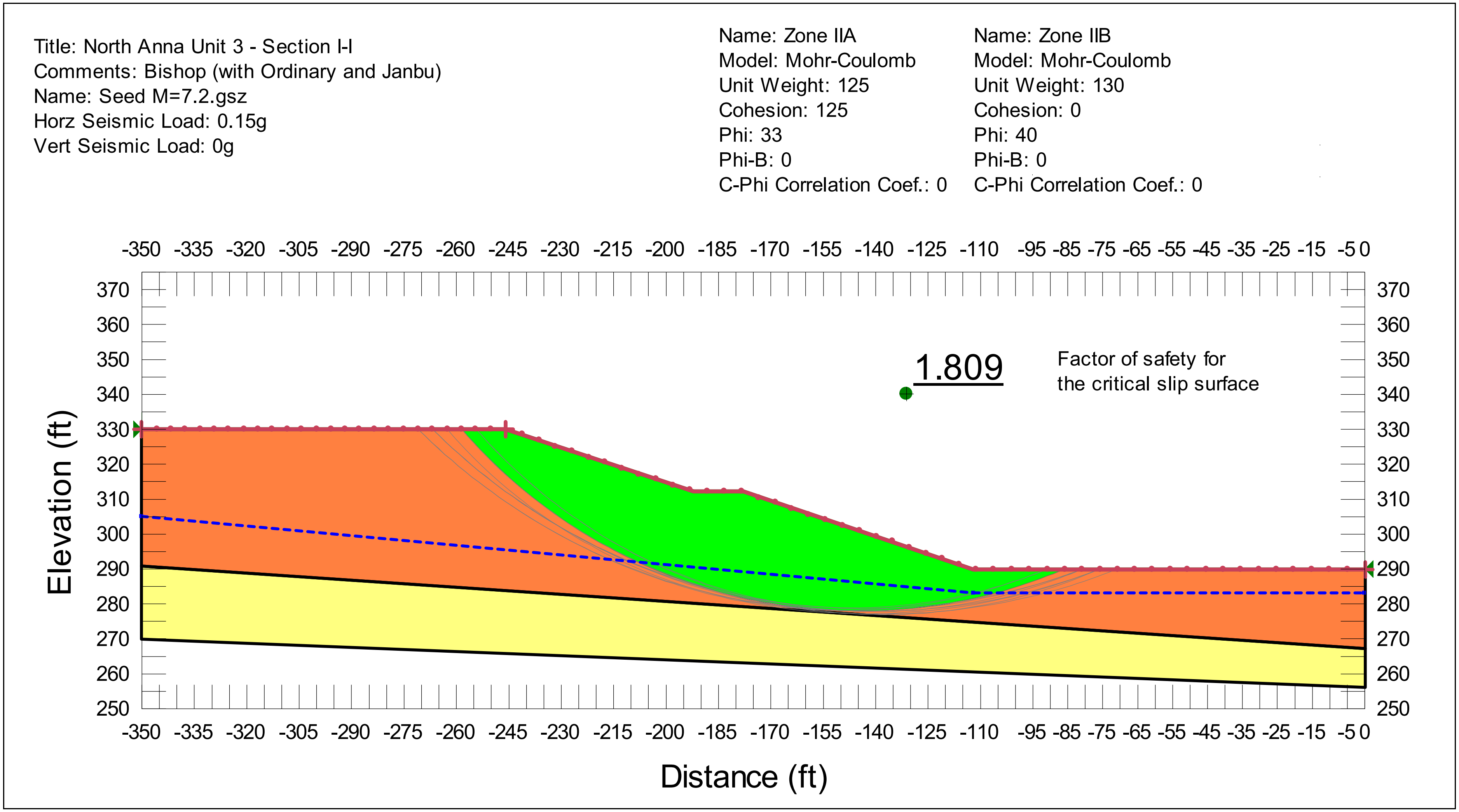
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-268 Slope Stability Analysis; Slope I-I; Seed Approach; Acceleration of 0.1g



Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-269 Slope Stability Analysis; Slope I-I; Seed Approach; Acceleration of 0.15g

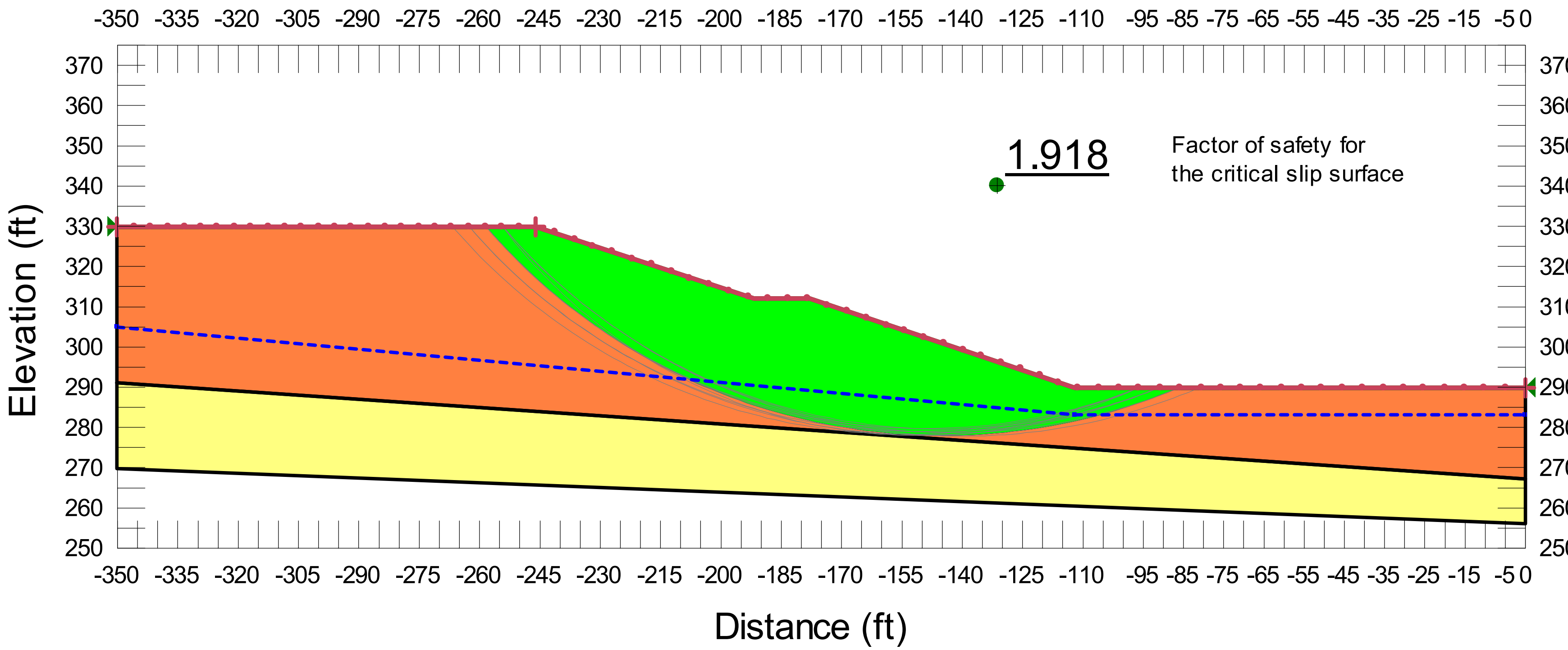


Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS ESP COL 2.5-10 Figure 2.5-270 Slope Stability Analysis; Slope I-I; Kramer Approach; Low Frequency

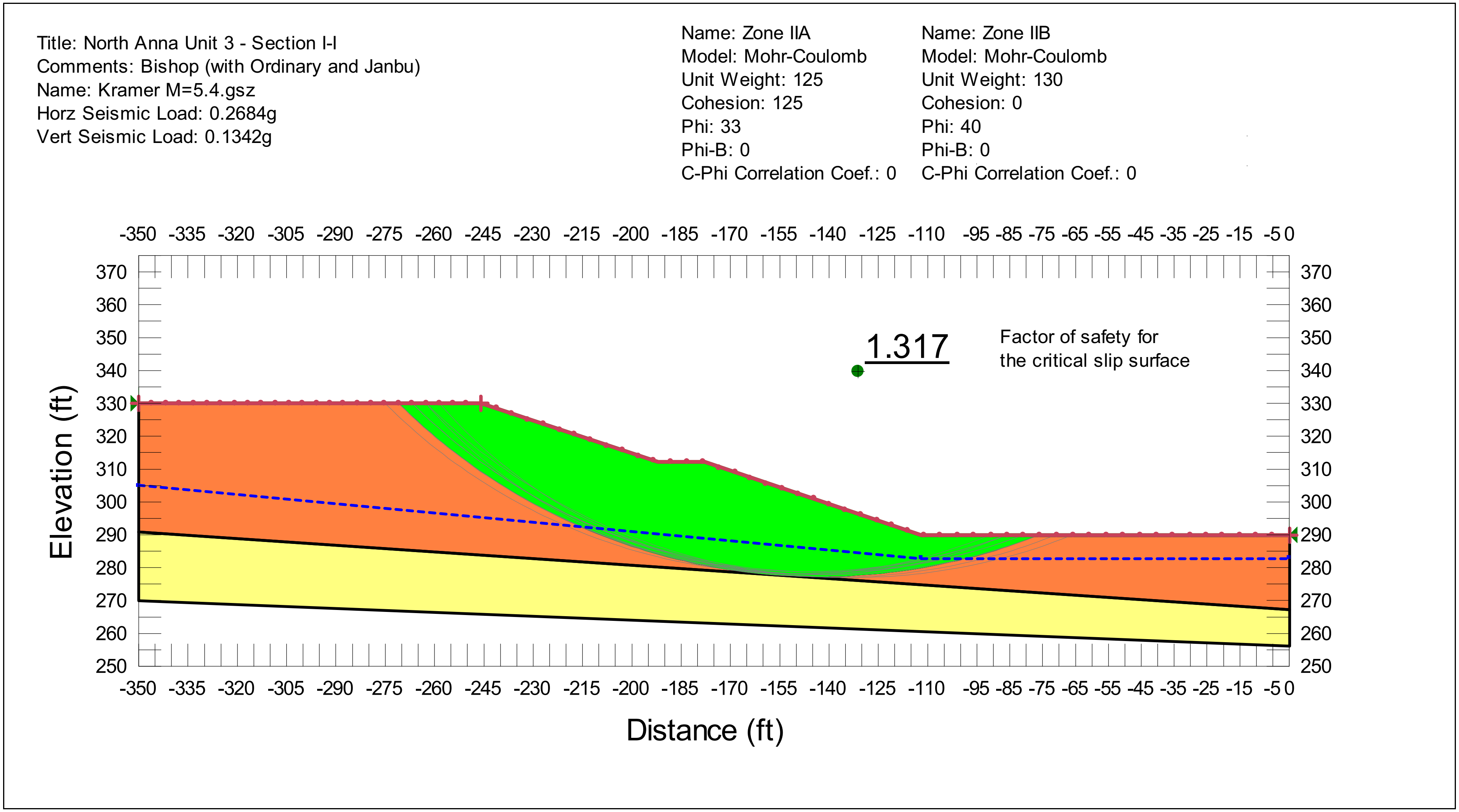
Title: North Anna Unit 3 - Section I-I
Comments: Bishop (with Ordinary and Janbu)
Name: Kramer M=7.2.gsz
Horz Seismic Load: 0.111g
Vert Seismic Load: 0.0555g

Name: Zone IIA	Name: Zone IIB
Model: Mohr-Coulomb	Model: Mohr-Coulomb
Unit Weight: 125	Unit Weight: 130
Cohesion: 125	Cohesion: 0
Phi: 33	Phi: 40
Phi-B: 0	Phi-B: 0
C-Phi Correlation Coef.: 0	C-Phi Correlation Coef.: 0



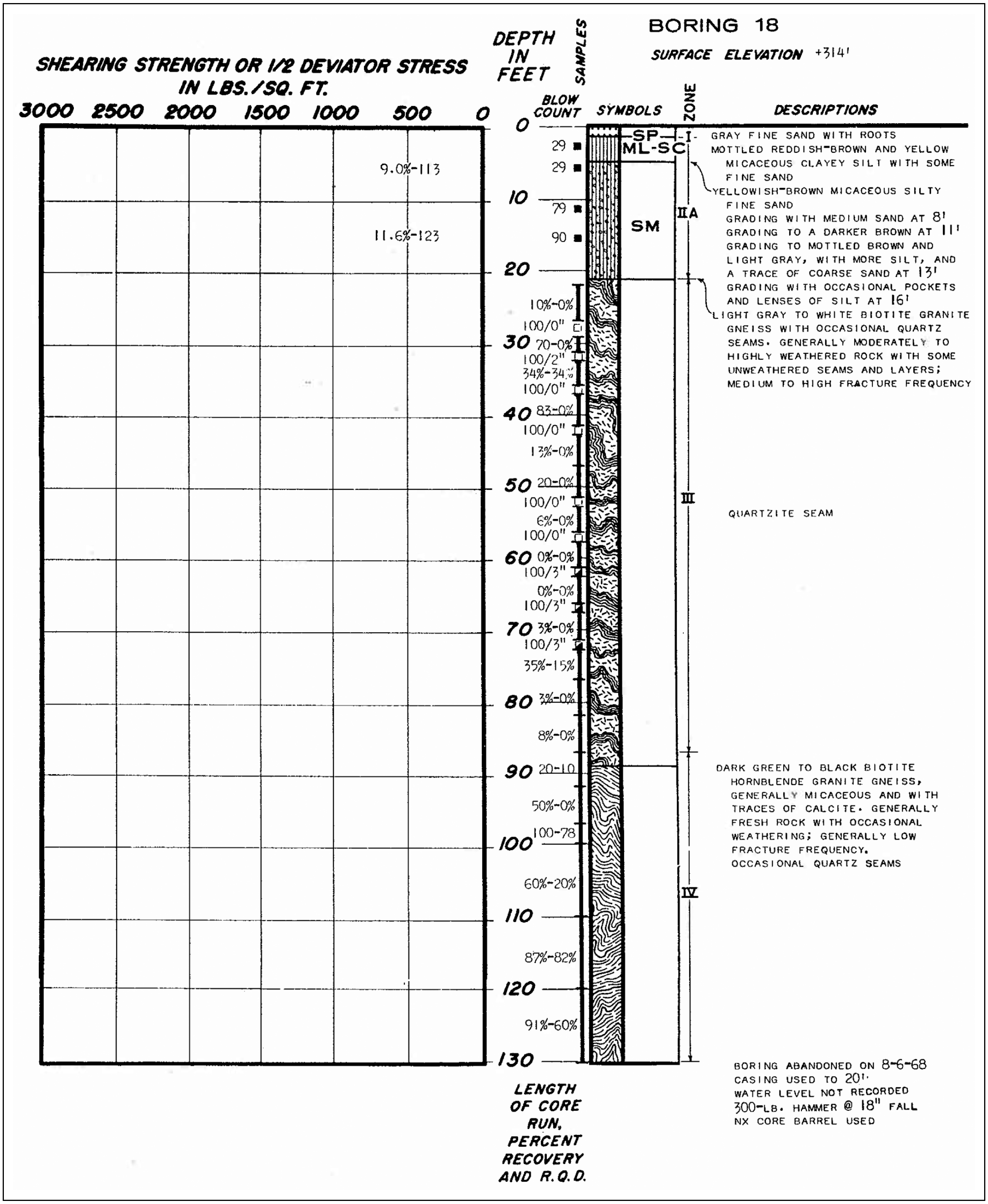
Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

 Figure 2.5-271 Slope Stability Analysis; Slope I-I; Kramer Approach; High Frequency



Note: The conversion from NAVD88 datum elevations to NGVD29 datum elevations is +0.86 ft.

NAPS COL 2.5(1) **Figure 2.5-272 Log of Boring B-18**

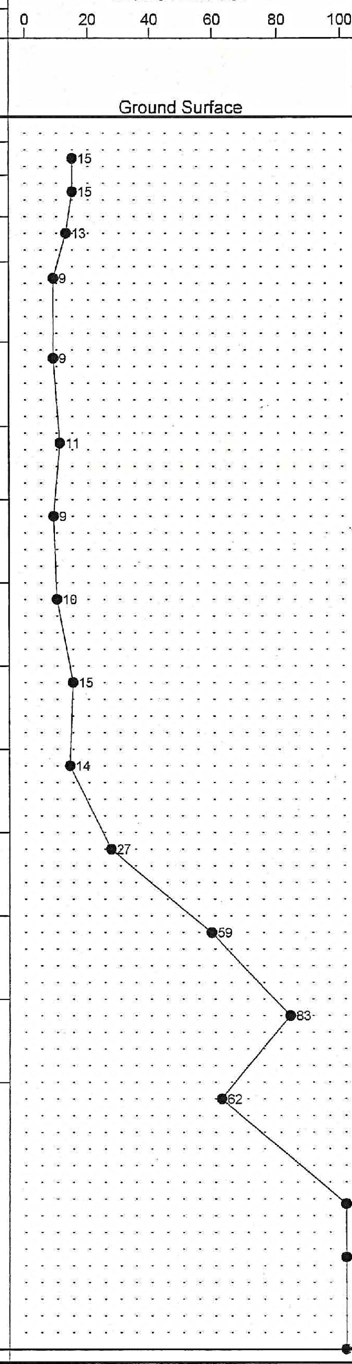


NAPS COL 2.5(1)

Figure 2.5-273a Log of Boring B-929

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST S. Nicely	
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-929	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT/UD	0 HR. 23.5
COLLAR ELEV. 329.0 ft (NAVD88)	NORTHING 3,909,214 US ft (NAD83)	EASTING 11,685,655 US ft (NAD83)	24 HR. 23.9
TOTAL DEPTH 74.0 ft	DRILL MACHINE CME 55 Truck	DRILLER: H. Meyerson	HAMMER TYPE 140 lbs Auto
DATE STARTED 8/8/06	COMPLETED 8/10/06	CORE BARREL TYPE: NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT	SAMP. NO.
329.0					Ground Surface	
327.5	1.5	7	7	8	15	929-1
325.5	3.5	5	6	9	15	929-2
323.0	6.0	4	6	7	13	929-3
320.3	8.7	3	4	5	9	929-4
318.8	10.2					929-UD-1
315.5	13.5	4	4	5	9	929-5
310.4	18.6	5	5	6	11	929-6
306.0	23.0	3	5	4	9	929-7
301.0	28.0	5	5	5	10	929-8
296.0	33.0	6	7	8	15	929-9
291.0	38.0	4	8	6	14	929-10
286.0	43.0	7	13	14	27	929-11
281.0	48.0	19	26	33	59	929-12
276.0	53.0	37	42	41	83	929-13
271.0	58.0	14	19	43	62	929-14
264.0	65.0	50/0.3				929-15
260.7	68.3	50/0.2				929-16
255.7	73.3	41	50/0.2			929-17



SOIL AND ROCK DESCRIPTION

329.0 — 0.0
Clayey SAND (SC) strong brown (7.5YR 5/6), moist, medium dense, trace gravel (Residual Soil)

324.0 — 5.0
Silty, fine to coarse SAND (SM) reddish yellow (7.5YR 6/6&7/6), moist, loose to medium dense, trace clay, relict rock fabric (Residual Soil)

303.0 — 26.0
Silty, fine to coarse SAND (SM) reddish yellow (7.5YR 6/6), moist, medium dense, trace gravel, relict rock fabric (Residual Soil)

283.0 — 46.0
Silty, fine to coarse SAND (SM) light brown (7.5YR 6/4), moist, very dense, trace gravel, relict rock fabric (Residual Soil)

265.0 — 64.0
Weathered Rock: Light brown (7.5YR 6/4), moist, very dense, severely weathered, BIOTITE GNEISS

255.0 — 74.0

Boring terminated at 74.0 ft in Weathered Rock: Very dense, BIOTITE GNEISS

NAPS COL 2.5(1) **Figure 2.5-273b Log of Boring B-947**

MACTEC PROJECT NO.: 6468-06-1472	COUNTY Louisa, VA	GEOLOGIST S.Lehman	
SITE DESCRIPTION NORTH ANNA COL			GROUND WATER (ft)
BORING NO. B-947	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT	0 HR. ND
COLLAR ELEV. 312.5 ft (NAVD88)	NORTHING 3,909,575 US ft (NAD83)	EASTING 11,686,367 US ft (NAD83)	24 HR. 19.5
TOTAL DEPTH 88.8 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White	HAMMER TYPE 140 lbs Auto
DATE STARTED 9/27/06	COMPLETED 9/28/06	CORE BARREL TYPE: NA	

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	BLOW COUNT 0.5ft	BLOW COUNT 0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
312.5					Ground Surface				312.5 — 0.0
311.0	1.5	4	6	9	15	947-1			Elastic SILT (MH) light gray (2.5Y 7/2) and light greenish gray (GLEY1 8/5GY), dry to moist, stiff (Residual Soil)
309.0	3.5	6	5	6	11	947-2			
306.5	6.0	4	3	6	9	947-3			304.5 — 8.0
304.0	8.5	4	4	5	9	947-4			Silty, SAND (SM) strong brown (7.5YR 4/6), moist, loose (Residual Soil)
301.5	11.0	2	4	5	9	947-5			299.5 — 13.0
299.0	13.5	2	3	4	7	947-6			Sandy SILT (ML) light gray (2.5Y 7/2), moist, medium stiff (Residual Soil)
									295.5 — 17.0
293.8	18.7	5	6	6	12	947-7	▼		Silty, fine to medium SAND (SM) reddish yellow (7.5YR 6/6), yellowish brown (2.5 Y 6/4), white (2.5Y 8/1), light yellow (2.5Y 7/3), and light olive brown (2.5Y 5/4&5/3), wet, medium dense to very dense, relict rock fabric (Residual Soil)
288.8	23.7	5	6	10	16	947-8			
283.8	28.7	4	3	10	13	947-9			
278.8	33.7	3	7	12	19	947-10			
273.8	38.7	12	14	16	30	947-11			
268.8	43.7	9	11	17	28	947-12			
263.8	48.7	13	23	24	47	947-13			
258.8	53.7	23	27	28	55	947-14			254.5 — 58.0
253.8	58.7	36	50/0.4			947-15			Weathered Rock: Light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2), moist, very dense, severely weathered, soft, QUARTZ GNEISS
248.8	63.7	50/0.4				947-16			
243.8	68.7	50/0.4				947-17			
238.8	73.7	50/0.3				947-18			

NORTH ANNA COL [illegible]ORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

NAPS COL 2.5(1) **Figure 2.5-273b Log of Boring B-947 *(continued)***

MACTEC PROJECT NO.: 6468-06-1472		COUNTY Louisa, VA		GEOLOGIST S.Lehman		
SITE DESCRIPTION NORTH ANNA COL					GROUND WATER (ft)	
BORING NO. B-947	DRILL METHOD: Mud Rotary	SAMPLE METHODS: SPT			0 HR.	ND
COLLAR ELEV. 312.5 ft (NAVD88)	NORTHING 3,909,575 US ft (NAD83)	EASTING 11,686,367 US ft (NAD83)			24 HR.	19.5
TOTAL DEPTH 88.8 ft	DRILL MACHINE CME 55LC Track	DRILLER: D. White		HAMMER TYPE 140 lbs Auto		
DATE STARTED 9/27/06	COMPLETED 9/28/06	CORE BARREL TYPE: NA				

ELEV. (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT (0 20 40 60 80 100)	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
237.7					Continued from previous page				
									Weathered Rock: Light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2), moist, very dense, severely weathered, soft, QUARTZ GNEISS *(continued)*
233.8	78.7	50/0.2			100+	947-19			
228.8	83.7	50/0.1			100+	947-20			
223.8	88.7	50/0.1			100+	947-21			223.7 — 88.8
									Boring terminated at 88.8 ft in Weathered Rock: Very dense, severely weathered, soft, QUARTZ GNEISS

NORTH ANNA COL CORE NORTH ANNA COL DATA REPORT REV0.GPJ NORTH ANNA COL.GDT 1/19/07

NAPS COL 2.5(1)

Figure 2.5-274 Log of CPT C-915

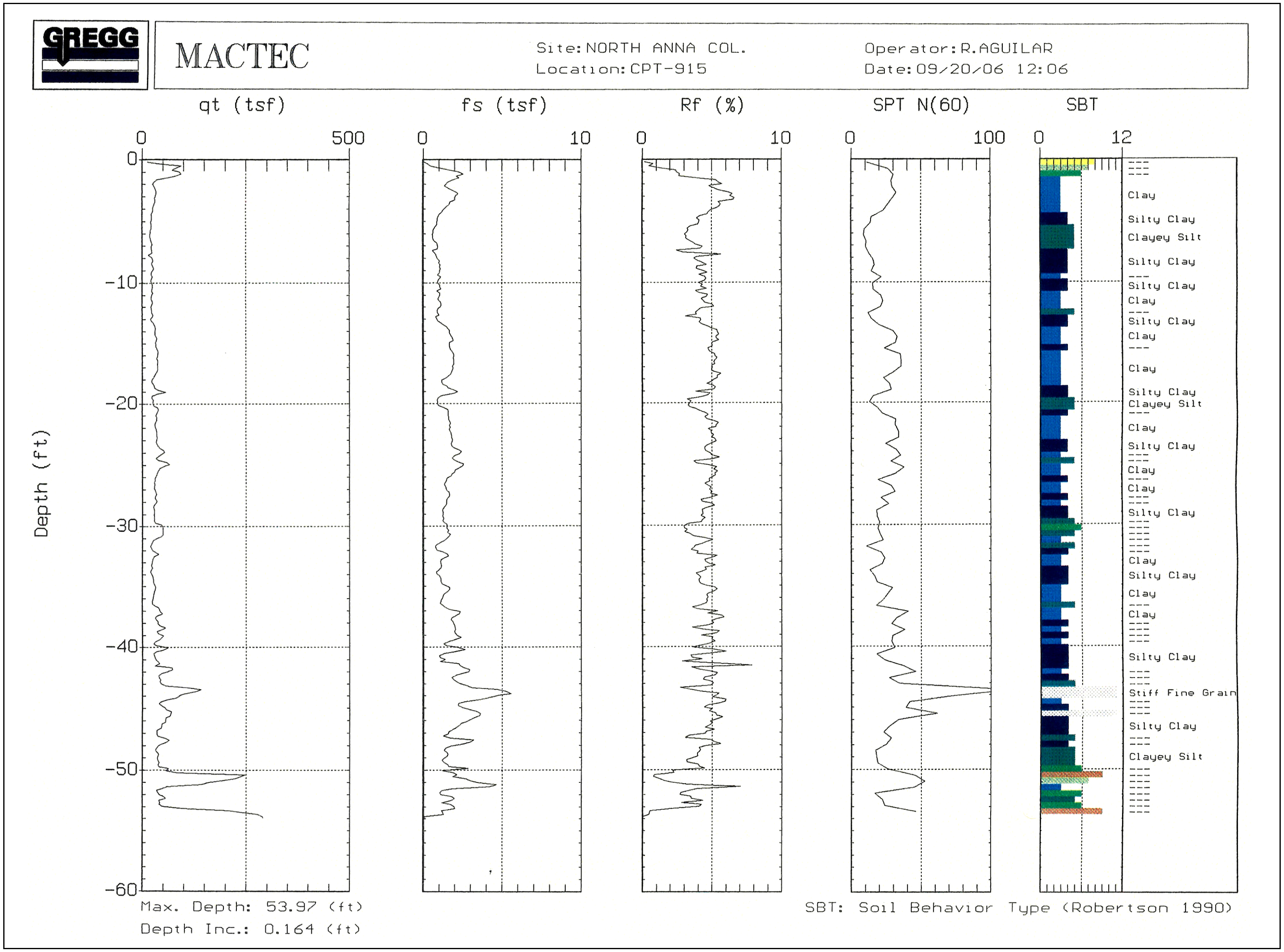
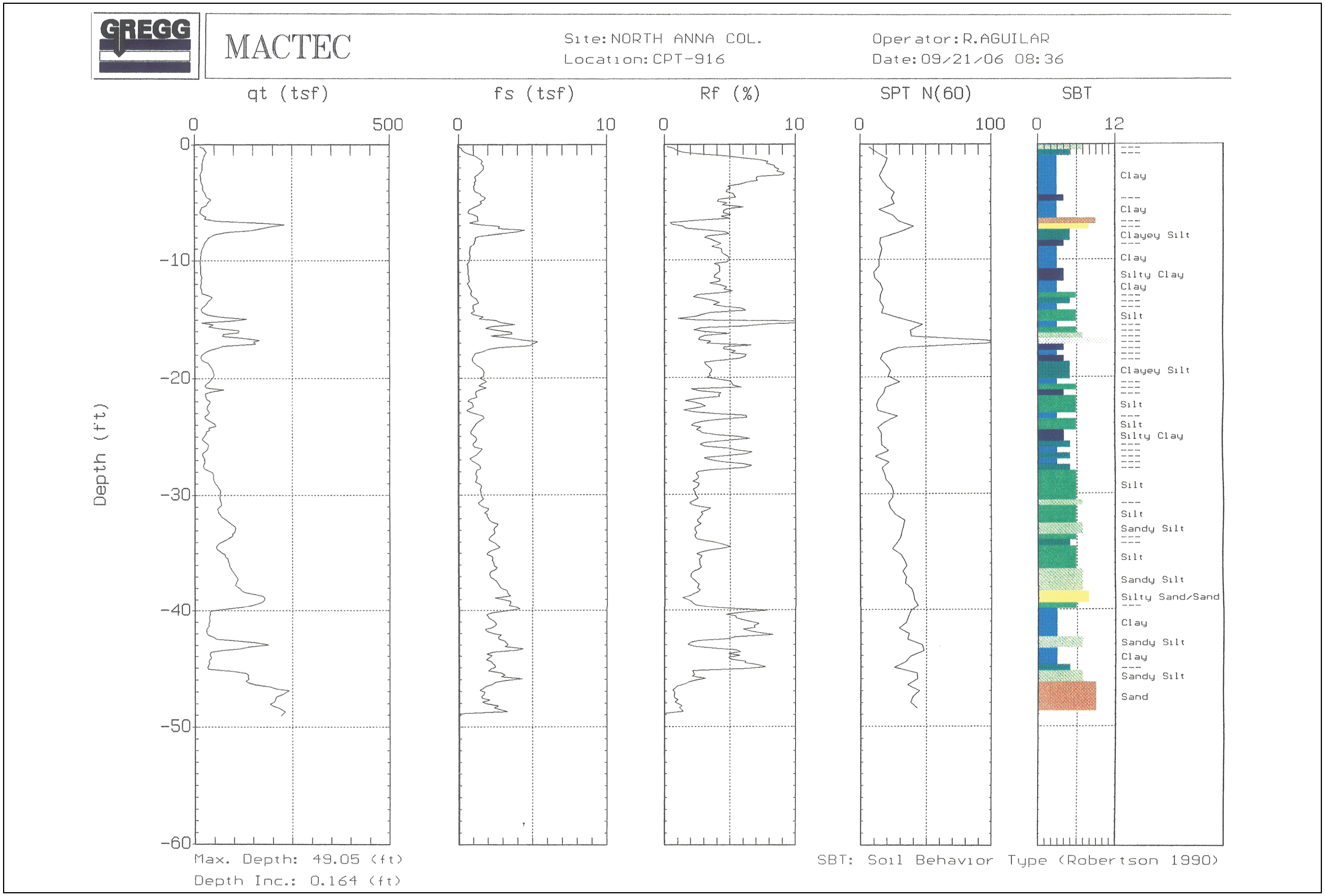


Figure 2.5-275 Log of CPT C-916

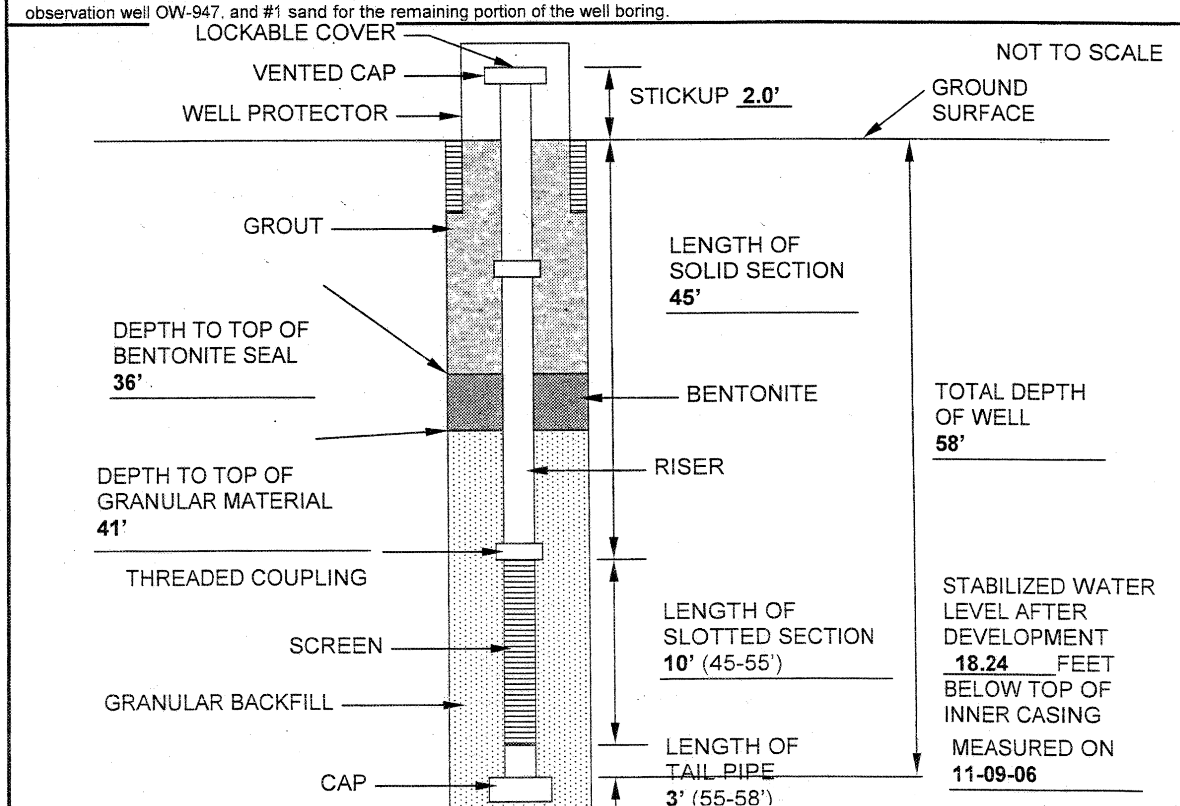


NAPS COL 2.5(1) **Figure 2.5-276 Log of Well OW-947**

OBSERVATION WELL INSTALLATION RECORD

JOB NAME	**NORTH ANNA COL**	JOB NUMBER	**6468-06-1472**
WELL NUMBER	**OW-947**	INSTALLATION DATE	**11-06-06**
LOCATION (NAD83)	**N = 3,909,579.58 E = 11,686,371.84**		
GROUND SURFACE ELEVATION* (NAVD88)	**313.30**	REFERENCE POINT ELEVATION** (NAVD88)	**315.08**
GRANULAR BACKFILL MATERIAL	**Southern Silica #1 & #3 Sand***	SLOT SIZE	**.010**
SCREEN MATERIAL	**PVC Schd. 40-Standard**	SCREEN DIAMETER	**2 in.**
RISER MATERIAL	**PVC Schd. 40-Standard**	RISER DIAMETER	**2 in.**
DRILLING TECHNIQUE	**Hollow-stem auger 4.25" I.D.**	DRILLING CONTRACTOR	**MACTEC**
BOREHOLE DIAMETER	**Approximately 8"**	MACTEC FIELD REPRESENTATIVE	**Kim Charles-Smith**
LOCK BRAND	**Master**	SIZE/MODEL	**N/A**
KEY CODE/COMBINATION	**#3206**		

* Both #1 and #3 sand met the technical specifications for use as granular backfill material. MACTEC used #3 sand to backfill the sump portion of observation well OW-947, and #1 sand for the remaining portion of the well boring.



* Reference point is a marked location on the concrete well pad
** Reference point is the top of PVC casing

NORTH ANNA POWER STATION MINERAL, VIRGINA COL PROJECT Dominion Purchase Order 7015798	MACTEC MACTEC Engineering and Consulting, Inc. 3301 Atlantic Avenue Raleigh, North Carolina 27604	OBSERVATION WELL INSTALLATION RECORD [illegible]