Dominion®

North Anna 3 Combined License Application

Part 2: Final Safety Analysis Report

Revision 1
December 2008

REVISION SUMMARY

Revision 0 to 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, 1.1.1.11, 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, 1.1.1.9, 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.
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).
Table 1.9-202	Updated/corrected RGs 1.26 and 1.29.
Tables 1.9-202 & 1.9-203	RAI NA3 12.03-12.04-9, Editorial Corrections
1.3.1	Changed title of 1.3.1.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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
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).

Revision 0 to Revision 1 *(continued)*

Section	Changes
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	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 & 1.9-204	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

Revision 0 to Revision 1 *(continued)*

Section	Changes
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.
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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, 13.6.5, 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.
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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).
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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.
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.

Revision 0 to Revision 1 *(continued)*

Section	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
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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
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

Revision 0 to Revision 1 *(continued)*

Section	Changes
9.2.1.2, 9.2.4.2, 9.2.4.3, 9.2.4.5, Figure 9.2-203, 10.4.5.2.3, Table 11.5-201	RAI NA3 11.05-2, Process and Effluent Monitoring
9.2.1.2; Tables 9.2-201, 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 9.2-201	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.
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
Figure 9.5-203	Added Cooling Tower Maintenance Building, Hybrid Cooling Tower Electrical Building, and Dry Cooling Tower Electrical Building.
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.
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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.
10.4.5.2.1, 10.4.5.2.2	RAI NA3 10.04.05-1: Circulating Water Large Bore Piping Codes and Failures
10.4.5.5	RAI NA3 10.04.05-2: Flooding due to Hybrid Cooling Tower Failure
	Corrected CW minimum inlet temperature.
10.4.5.6	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
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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.
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).

Revision 0 to Revision 1 *(continued)*

Section	Changes
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.
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.

Revision 0 to Revision 1 *(continued)*

Section	Changes
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)

FINAL SAFETY ANALYSIS REPORT
Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Contents

Tables

Tables

Tables

Tables

Figures

Figures

Figures

Figures

Figures

Acronyms/Abbreviations/Initialisms

ADG	ancillary diesel generator
ALARA	as low as reasonably achievable
ALOHA	Areal Locations of Hazardous Atmospheres
AMC	Annual Maintenance Cost
ARD	Automatic Ringdown Circuits
ASCE	American Society of Civil Engineers
BISI	Bypass and Inoperable Status Indicator
BOP	Balance of Plant
bpf	blows per foot
BR	breathing rates
BTP	Branch Technical Position
BWR	Boiling Water Reactor
CB	Control Building
CBR	California Bearing Ratio
CFR	Code of Federal Regulations
CIRC	Circulating Water System
CNO	chief nuclear officer
COL	Combined License
COLA	COL Application
CONAVS	Contaminated Area HVAC Subsystem
COVRERP	Virginia's Radiological Emergency Response Plan
CPT	cone penetrometer tests
CRF	Capital Recovery Factor
CS&TS	Condensate Storage and Transfer System
CSDRS	Certified Seismic Design Response Spectra
CST	Condensate Storage Tank
DBA	design basis accident
DC	Design Certification
DCD	Design Control Document
DCEM	Direct Cost of Equipment and Materials
DLC	Direct Labor Cost
D-RAP	design reliability assurance program
DTPG	defined test plan group
EAB	exclusion area boundary
EC	energy conservation
ECL	effluent concentration limit
EHC	electro-hydraulic control
EIS	Environmental Impact Statement
ENS	Emergency Notification System
EOF	Emergency Operations Facility
EOP	Emergency Operating Procedures
EPC	Engineer, Procure, and Construct
EQD	Equipment Qualification Document

Acronyms/Abbreviations/Initialisms

ERDS	Emergency Response Data Systems
ESP	Early Site Permit
ESPA	ESP Application
ETR	energy transfer ratio
FAC	flow accelerated corrosion
FES	Final Environmental Statements
FFD	Fitness for Duty
FIRS	foundation input response spectra
FMG	failure mode group
FOAK	first of a kind
FPS	Fire Protection System
FS	factor of safety
fps	feet per second
FSRC	Facilities Safety Review Committee
FWSC	Firewater Service Complex
gal	gallon
GE	General Electric
GEH	GE-Hitachi Nuclear Energy Americas, LLC
GIS	Geographic Information System
GMRS	ground motion response spectra
gpd	gallons per day
gpm	gallons per minute
GTG	Generic Technical Guidelines
GW	gigawatts
GWG	generic writer's guide
HCLPF	High Confidence Low Probability of Failure
HFE	Human Factors Engineering
HCLPFs	High Confidence Low Probability of Failure
HP	high-pressure
HPM	Human Performance Monitoring
HSI	Human System Interface
HWCS	Hydrogen Water Chemistry System
I&C	instrumentation and control
IBC	International Building Code
ICF	Indirect Cost Factor
IC/PCC	Isolation Condenser/Passive Containment Cooling
ICRP	International Commission on Radiation Protection
IDLH	immediately dangerous to life or health
IE	Inspection and Enforcement (NRC)
IRB	Independent Review Body
ISFSI	independent spent fuel storage installation
ISI	inservice inspection
IST	inservice testing

Acronyms/Abbreviations/Initialisms

JIT	just in time
JPM	job performance measures
JTG	Joint Test Group
ksf	kips per square foot
ksi	kips per square inch
LCCF	Labor Cost Correction Factor
LCO	limiting conditions for operation
LFL	lower flammability limit
LLD	lower limit of detection
LOPP	Loss of Preferred Power
LP	low-pressure
LWMS	Liquid Waste Management System
M&TE	measuring and test equipment
MCR	main control room
MCVP	main condenser vacuum pump
MEI	maximally exposed individual
min	minute
MOV	motor-operated valve
mph	miles per hour
MR	Maintenance Rule
msl	mean sea level
MWC	maximum water conservation
MWe	megawatts electric
MWS	Makeup Water System
NANIC	North Anna Nuclear Information Center
NAPS	North Anna Power Station
NDE	nondestructive examination
NEI	Nuclear Energy Institute
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NESC	National Electrical Safety Code
NPHS	normal plant heat sink
NRC	United States Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
OATC	Operator-At-The Controls
OBE	Operating Basis Earthquake
ODCM	Offsite Dose Calculation Manual
ODEC	Old Dominion Electric Cooperative
OJT	on-the-job training
OSC	Operational Support Center
P&ID	piping and instrument diagrams
pcf	pounds per cubic foot
PCP	Process Control Program

Acronyms/Abbreviations/Initialisms

PCTMS	Plant Cooling Tower Makeup System
PGP	procedures generation package
PMF	probable maximum flood
PMP	probable maximum precipitation
PP	pocket penetrometer
ppm	parts per million
PSI	preservice inspection
P-STG	plant-specific technical guideline
PST	preservice test
PSWS	Plant Service Water System
PWSS	Pretreated Water Supply System
QA	quality assurance
QC	quality control
QAPD	Quality Assurance Program Description
RB	Reactor Building
RB/FB	Reactor Building/Fuel Building
RCCWS	Reactor Component Cooling Water System
RCS	reactor coolant system
RCTS	resonant column torsional shear
REPAVS	Refueling and Pool Area HVAC Subsystem
RG	Regulatory Guide
RO	reactor operator
RP	radiation protection
RQD	rock quality designation
RPT	radiation protection technician
RT	radiography techniques
RTNSS	Regulatory Treatment of Non-Safety Systems
RTO	Regional Transmission Organization
SACTI	Seasonal/Annual Cooling Tower Impact (computer code)
scfm	standard cubic feet per minute
scfw	standard cubic feet per week
SCG	Startup Controlling Group
SDG	standby diesel generator
SM	silty sand
SRO	senior reactor operator
SRP	Standard Review Plan
SNS	Station Nuclear Safety
SOV	solenoid-operated valve
SPT	standard penetration test
SS	site-specific
SSAR	Site Safety Analysis Report (ESPA Part 2)
SSCs	structures, systems, and components
SSE	Safe Shutdown Earthquake

Acronyms/Abbreviations/Initialisms

STA	Shift Technical Advisor
SUNSI	sensitive unclassified non-safeguards information
SWMB	Storm Water Management Basin
SWR	Service Water Reservoir
SWS	Station Water System
SWST	station water storage tank
TAC	Total Annual Cost
TBE	Turbine Building Air Exhaust Subsystem
TBVS	Turbine Building HVAC System
TCCWS	Turbine Component Cooling Water System
TGS	Turbine Generator Set
UAT	unit auxiliary transformer
UFL	upper flammability limit
UFSAR	Updated Final Safety Analysis Report
USCS	Unified Soil Classification System
UHS	ultimate heat sink
UT	ultrasonic techniques
V&V	verification and validation
VDH	Virginia Department of Health
V_p	compression wave velocity
V_s	shear wave velocity
VHRA	very high radiation area
WHTF	Waste Heat Treatment Facility

FINAL SAFETY ANALYSIS REPORT

Chapter 1 Introduction and General Description of Plant

1.1 Introduction

This section of the ESBWR Design Control Document (DCD), i.e., the referenced DCD, is incorporated by reference with the following departures and/or supplements.

1.1.1 Format and Content

NAPS SUP 1.1-1

1.1.1.1 10 CFR 52 and Regulatory Guide 1.206

This FSAR was developed to comply with the content requirements of 10 CFR 52.79, and to the extent feasible, the content and format requirements contained in Regulatory Guide (RG) 1.206, "Combined License Applications for Nuclear Power Plants (LWR Edition)." See Table 1.9-203, Conformance With the FSAR Content Guidance In RG 1.206. If the information requested by RG 1.206 is not needed (e.g., because it is already provided in the DCD or is located elsewhere in the FSAR), the table specifies the location of the information.

Section C.III.6 of RG 1.206 addresses referencing a design certification (DC) application rather than a certified design. The existing DC rules (10 CFR 52 appendices) require that a Combined Operating License Application (COLA) that references a certified design include a plant-specific DCD containing the same type of information and using the same organization and numbering as the generic DCD for the ESBWR design, as modified and supplemented by the applicant's exemptions and departures. Where necessary to present additional information, new sections were added following the logical structure of the ESBWR generic DCD.

1.1.1.2 Standard Review Plan

As required by 10 CFR 52.79(a)(41), an evaluation of the facility for conformance with the acceptance criteria contained in NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants LWR Edition," in effect six months prior to submittal of the COLA was performed. This evaluation determined that this FSAR contains no unacceptable deviations from the acceptance criteria given in the applicable portions of the SRP. Where necessary, Table 1.9-201, Conformance with Standard Review Plan, provides a summary of any differences from the SRP acceptance criteria, along with a justification for an exception to a criterion or a Branch Technical Position (BTP); or the table identifies the applicable FSAR section(s) that addresses a difference.

1.1.1.3 Tables and Figures

Tabulations of data are designated "tables." Each is identified by the section number followed by a number (for example, Table 1.9-204 would be an FSAR table in Section 1.9.) The use of the "200" series for FSAR table numbers distinguishes FSAR tables from DCD tables. If a table from the DCD is referenced in the FSAR text, it is denoted as such, for example "DCD Table 4.1-1." If a table from the DCD or Early Site Permit Application (ESPA) was revised for use in the FSAR, the original DCD or ESPA table number is appended with an "R;" for example, if "DCD Table 4.2-1" was revised, it would have become "Table 4.2-1R." Tables are located at the end of the section immediately following the text.

Drawings, pictures, sketches, curves, graphs, and engineering diagrams identified as "figures" are numbered using the section number followed by a number (for example, Figure 2.1-201 would be an FSAR figure in Section 2.1). The use of the "200" series for FSAR figure numbers distinguishes FSAR figures from DCD or ESPA figures. If a figure from the DCD or ESPA is referenced in the FSAR text, it is denoted as such; for example "DCD Figure 4.1-1." If a figure from the DCD or ESPA was revised for use in the FSAR, the original DCD or ESPA figure number was appended with an "R;" for example, if "DCD Figure 4.2-1" was revised, it would have become "Figure 4.2-1R." Figures are located at the end of the applicable section following the tables.

1.1.1.4 Numbering of Pages

Text pages are numbered sequentially within each chapter (for example, Page 1-4 is the fourth page of Chapter 1).

1.1.1.5 Proprietary and Security-Related Sensitive Unclassified Non-Safeguards Information (SUNSI)

Proprietary information and SUNSI[1] is withheld from public disclosure and therefore not included in the public version of the FSAR. SUNSI included in the non-public version of the FSAR is appropriately indicated.

1.1.1.6 Acronyms

In addition to the summary list of acronyms in the FSAR frontmatter, acronyms are defined at their first occurrence in FSAR text.

1.1.1.7 Incorporation by Reference

10 CFR 52.79 states in part that, "The final safety analysis report need not contain information or analyses submitted to the Commission in connection with the design certification, provided, however, that the final safety analysis report must either include or incorporate by reference the standard design certification final safety analysis report and must contain, in addition to the information and analyses otherwise required, information sufficient to demonstrate that the site characteristics fall within the site parameters specified in the design certification." Therefore, because this COLA references the ESBWR DC application, this FSAR incorporates the ESBWR DCD by reference, with the departures presented in COLA Part 7, and with supplemental information, as appropriate (see Section 1.1.1.10). References in this FSAR to the DCD should be understood to mean the ESBWR DCD, Tier 2, submitted by GE-Hitachi Nuclear Energy Americas LLC (GEH), as Revision 5.

5020a 9.05.01-17

S128f

1.1.1.8 Departures from the Standard Design Certification (or Application)

A departure is a plant-specific "deviation" from design information in a standard DC rule or, consistent with Section C.III.6 of RG 1.206, from design information in a DC application.

10 CFR 52 clarifies that Tier 2 information in a standard DC rule does not include conceptual design information (CDI) and per Section C.III.6 of RG 1.206, Tier 2 information in a standard DC application does not

1. Any information which, if lost, misused, modified, or accessed without authorization, can reasonably be foreseen as causing harm to the public interest, the commercial or financial interest of the entity or individual to whom the information pertains, the conduct of NRC and Federal programs, or the personal privacy of individuals. SUNSI has been organized into the following seven groups:
   - Allegation information
   - Investigation information
   - Security-related information
   - Proprietary information
   - Privacy Act information
   - Federal, State, Foreign Government, and international agency information
   - Sensitive internal information

S128f

include CDI. Therefore, replacement or revision of CDI does not constitute a departure. Additionally, information addressing combined license (COL) information/holder items and supplemental information (see Section 1.1.1.10) that does not change the intent or meaning of the ESBWR DCD text is not considered a departure from the ESBWR DCD.

NAPS SUP 1.1-2

1.1.1.9 Referencing of ESPA Information

As with the DCD, the FSAR incorporates by reference the North Anna ESPA SSAR, Revision 9, with certain variances and/or supplements (see Section 1.1.1.10). 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. A variance to an ESP is analogous to a departure from a standard DC.

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

1.1.1.10 Supplements

Supplements fall into one of the following categories (see Table 1.1-201 for definitions of categories unless noted otherwise):

- COL Item
- Conceptual Design Information
- ESP COL Action Item
- ESP Permit Condition
- ESPA SSAR Correction
- Supplemental Information (see definition below)

Supplemental information is FSAR information that includes information not related to COL Items, departures, variances, conceptual design, ESPA corrections, or permit conditions (see Table 1.1-201 for definition of terms); or is information to demonstrate that the design of the facility falls within the site characteristics and design parameters specified in the DCD.

1.1.1.11 Left Margin Annotations

FSAR sections are annotated in the left margin with information that identifies: 1) the reason the information is being provided and, as applicable, 2) whether the information is standard (identical) for any ESBWR application, or specific to the COLA for a particular plant.

The annotations and their definitions are listed in Table 1.1-201.

1.1.1.12 Tense

Because this FSAR is a licensing basis document that will control plant design and operations after the COL is issued, the FSAR is generally written in the present tense. Thus, plant design and configuration are described in the present tense although the plant is not yet built. Similarly, programs, procedures, and organizational matters are generally described in the present tense although such descriptions may not yet be implemented. Accordingly, the use of the present tense in this FSAR should be understood as describing the plant, programs and procedures, and organization as they will exist when in place, and not as a representation that they are already in place.

1.1.2 General Description

1.1.2.1 ESBWR Standard Plant Scope

Replace the last sentence with the following.

NAPS CDI The orientation of the principal plant structures for Unit 3 is shown in Figure 2.1-201.

Add the following at the end of this section.

NAPS SUP 1.1-2 The ESBWR standard plant scope is discussed in DCD Section 1.1.2.1. In addition to the buildings and structures within the scope of the ESBWR standard plant, the plant includes an intake structure for plant makeup water, normal power heat sink and auxiliary heat sink cooling towers, a sewage treatment plant, water treatment facilities, storage tanks for water and fuel oil, a switchyard and other site support systems and structures necessary to support the operation and maintenance of the facility. 151284

1.1.2.2 Type of License Request

Add the following at the end of this section.

NAPS SUP 1.1-3 This application by Virginia Electric and Power Company (Dominion) and the Old Dominion Electric Cooperative (ODEC) is for a combined construction permit and operating license, i.e., COL under Section 103 of the Atomic Energy Act, for the third nuclear power plant to be located on the existing North Anna Power Station (NAPS) site in Louisa County, Virginia. This COLA references a DC application for an ESBWR 151284 (consistent with Section C.III.6 of RG 1.206) and the Early Site Permit (ESP) for the NAPS site. The third unit is designated North Anna Unit 3 (Unit 3).

1.1.2.4 Description of Location

Add the following at the end of this section.

NAPS SUP 1.1-4 SSAR Section 2.1.1.1 is incorporated by reference with no departures or supplements. S128b

1.1.2.7 Rated Core Thermal Power

Replace the last three sentences of this section with the following.

NAPS COL 1.1-1-A Unit 3 operates at an estimated gross electrical power output at rated power of approximately 1594 MWe (as shown in DCD Section 10.1). The estimated net electrical power output, which is dependent on site ambient conditions, the normal plant heat sink (NPHS) operation controls, and station electrical loads, is between approximately 1425 MWe and 1510 Mwe. N080

NAPS SUP 1.1-5

1.1.2.8 Schedule

Key milestones associated with the estimated schedule for the completion of construction and the beginning of commercial operation are as follows.

Milestone	Estimated Schedule Date
Potential Safety-Related Construction Start	2012
Commercial Operation	2017

N140

1.1.3 COL Unit-Specific Information

1.1-1-A Establish Rated Electrical Output

NAPS COL 1.1-1-A This COL Item is addressed in Section 1.1.2.7.

NAPS SUP 1.1-1

Table 1.1-201 Left Margin Annotations

|5020b

FSAR Component	Margin Annotation	Definition and Use
Standard Departure	STD DEP X.Y.Z -#	FSAR information that departs from the generic DCD and is common for all parallel applicants; i.e., the departure and discussion of the departure are identical for all applicants of the ESBWR technology. Each Standard Departure is numbered based on the applicable section down to the X.Y.Z level, e.g.: STD DEP 9.2-1, or STD DEP 9.2.1-1.
Plant-Specific Departure	(PLANT) DEP X.Y.Z-#	FSAR information that departs from the generic DCD and is plant-specific; i.e., the departure and discussion of the departure are not identical for all applicants of the ESBWR technology. Each Plant-Specific Departure is numbered based on the applicable section down to the X.Y.Z level, e.g.: NAPS DEP 9.2-1, or NAPS DEP 9.2.1-1.
Standard COL Item	STD COL X.Y-#-A or STD COL X.Y-#-H	FSAR information that addresses a DCD COL Item that is common for all parallel applicants; i.e., the response to and discussion of the DCD COL Item are identical for all applicants of the ESBWR technology. Each Standard COL Item is numbered as identified in ESBWR DCD Table 1.10-1. The –A refers to a COL Applicant item while the –H refers to a COL Holder item.
Plant-Specific COL Item	(PLANT) COL X.Y-#-A or (PLANT) COL X.Y-#-H	FSAR information that addresses a DCD COL Item that is plant-specific; i.e., the response to the COL Item is not a Standard COL Item for parallel applicants. Each Plant-Specific COL Item is numbered as identified in the ESBWR DCD (see STD COL above).

NAPS SUP 1.1-1

Table 1.1-201 Left Margin Annotations

FSAR Component	Margin Annotation	Definition and Use
Standard Conceptual Design Information	STD CDI	A Conceptual Design Information designation is used to identify FSAR information that replaces Conceptual Design Information in the DCD, in whole or in part. Replacement and supplemental Conceptual Design Information is generally plant-specific; however, for conceptual design that is generic for all applications the annotation for standard (STD) is used, STD CDI.
Plant Specific Conceptual Design Information	(PLANT) CDI	A Conceptual Design Information designation is used to identify FSAR information that replaces Conceptual Design Information in the DCD, in whole or in part. Plant specific replacement and supplemental Conceptual Design Information uses the annotation (PLANT) CDI, e.g., NAPS CDI.
Standard Supplemental Information	STD SUP X.Y-#	Supplemental FSAR information that is identical for all parallel applicants; i.e., the supplemental information is identical for all applicants of the ESBWR technology. Each Standard Supplemental Information designation is numbered based on applicable section down to the X.Y level, e.g., STD SUP 10.4-1.
Plant-Specific Supplemental Information	(PLANT) SUP X.Y-#	Supplemental FSAR information that is plant-specific (not standard). Each Plant Specific Supplemental Information designation is numbered based on applicable section down to the X.Y level, e.g., NAPS SUP 10.4-1.
ESP COL Item	(PLANT) 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.

I N025a

NAPS SUP 1.1-1

Table 1.1-201 Left Margin Annotations

FSAR Component	Margin Annotation	Definition and Use
ESP Permit Condition	(PLANT) 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).
ESP Variance	(PLANT) ESP VAR X.Y.Z-#	A request for 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.Z level, e.g., NAPS ESP VAR 2.4-1.
Early Site Permit Safety Analysis Report Corrections	ESP COR	Corrections to the information provided in the ESP safety analysis report in order to ensure that the information is complete and accurate for FSAR.

N025a

S020b

1.2 General Plant Description

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

1.2.2.11.4 Main Turbine

Delete the second sentence of the first paragraph and replace the first sentence of the first paragraph with the following.

STD CDI

The main turbine has one high-pressure (HP) turbine and three low-pressure (LP) turbines.

1.2.2.11.7 Main Condenser

Delete the second sentence of the third paragraph and replace the first sentence of the third paragraph with the following.

STD CDI

The main condenser is a multi-pressure, triple-shell unit.

1.2.2.12.7 Plant Service Water System

N131a

Delete the last sentence of the first paragraph; delete the second and third sentences of the second paragraph; and revise the first sentence of the second paragraph as follows.

N131a

NAPS CDI

The PSWS mechanical draft plume abated cooling towers are used to reject the heat removed from Reactor Component Cooling Water System (RCCWS) and Turbine Component Cooling Water System (TCCWS).

N131a

1.2.2.12.13 Hydrogen Water Chemistry System

Replace this section with the following.

STD CDI

The Hydrogen Water Chemistry System (HWCS) consists of hydrogen and oxygen supply systems to inject hydrogen in the feedwater and oxygen in the offgas, plus monitoring systems to track the effectiveness of the system.

1.2.2.12.15 Zinc Injection System

Replace this section with the following.

STD CDI

The Zinc Injection System is not utilized.

1.2.2.12.16 **Freeze Protection**

Replace this section with the following.

STD CDI

Freeze protection is incorporated at the individual system level using insulation and heat tracing for all external tanks and piping that may freeze during winter weather.

1.2.2.16.10 **Other Building Structures**

Replace the fifth paragraph with the following. S084

NAPS CDI

Other facilities include the Service Building, Water Treatment Building, Administration Building, Training Center, Sewage Treatment Plant, and hot machine shop. These are all of conventional size and design, and in some cases may be shared with other units at the same site. N098

STD SUP 1.2-1

1.2.2.19 **Modular Construction Techniques and Plans**

To the extent practical, modular construction techniques that have been applied during ABWR construction projects will be adapted and/or modified for use during ESBWR construction. Modularization reviews will be performed to develop a plan for bringing the ABWR experience into the ESBWR. Once completed, the results of the modularization reviews will be used as guidance to develop the detailed design of the areas affected by modularization.

1.3 Comparison Tables

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

Add the following at the end of this section.

NAPS COL 1.3-1-A

There are no updates to DCD Table 1.3-1 based on unit-specific information.

1.3.1 **COL Information** S077

1.3-1-A **Update Table 1.3-1**

NAPS COL 1.3-1-A

This COL item is addressed in Section 1.3.

1.4 Identification of Agents and Contractors

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

NAPS SUP 1.4-1

1.4.1 Dominion

Dominion and ODEC are the applicants 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.

Dominion has selected GE-Hitachi Nuclear Energy Americas, LLC (GEH) as its primary contractor for the design of the unit, and Bechtel Power Corporation (Bechtel) as the primary contractor for site engineering. Dominion has responsibility for the operation of the unit. The following sections provide information on the experience and qualifications of the aforementioned agents and contractors as well as the division of responsibility between Dominion and its agents and contractors.

1.4.2 GE-Hitachi Nuclear Energy Americas, LLC (GEH)

GEH is responsible for developing the complete standard plant for the ESBWR necessary to obtain a DC from the NRC, supporting preparation of the COL application, and activities to support deployment of the ESBWR on the North Anna site. GEH, established in June 2007, is a business alliance of GE and Hitachi's respective nuclear businesses, established to serve the global nuclear industry.

DCD Table 1.4-1 lists the commercial nuclear reactors that were completed by GE or are under construction by GEH. For 50 years, GE provided advanced technology for nuclear energy. GE developed breakthrough light water technology in the mid-1950s: the Boiling Water Reactor (BWR). Since then, GE developed nine evolutions of BWR technology, including the first operational advanced light water design in the world, the ABWR, and culminating in its latest generation of design, the ESBWR. All of GE's nuclear technology has been transferred to GEH. There are 67 plants operating worldwide utilizing GEH designs with an operating capacity of over 59 GW, including 36 BWR plants in North America. Various subcontractors are supporting GEH.

1.4.2.1 Construction of the Turbine Island and Nuclear Island

The contractors for the construction of the turbine island and the nuclear island have not yet been selected. The turbine island and the nuclear island together represent the power block. The contractor for the construction of the turbine island will be responsible for the erection and delivery of the turbine building, the electric building, and the contents of each building. The contractor for the construction of the nuclear island will be responsible for the erection and delivery of the reactor and fuel building, the control building, the hot machine shop, the radwaste building, and the contents of each building. Each contractor will be selected based on their historical work in the nuclear industry, ongoing nuclear business, ability to deliver integrated engineering and construction services, and available resources.

1.4.3 Bechtel Power Corporation

Bechtel is responsible for the engineering and licensing support of the COLA, and for site engineering of facilities and utilities outside of the plant power block.

Founded in 1898, Bechtel is one of the world's premier engineering, construction, and project management companies. Privately owned with headquarters in San Francisco, Bechtel has 40 offices around the world and 40,000 employees. Bechtel has a history of supporting the nuclear power industry, beginning with the construction in 1950 of the EBR-1 reactor. Since then, Bechtel has constructed more than 60 GWe of nuclear power capacity worldwide. Various subcontractors are supporting Bechtel.

1.4.4 Other Contractors

In addition to the major contractors listed above, contractual relationships were established with several specialized consultants to assist in developing the COLA. Other subcontractors may be added as the need arises.

1.4.4.1 Tetra Tech NUS, Inc.

Tetra Tech NUS, Inc. conducted new and significant information reviews for the Environmental Report and prepared several sections of the Environmental Report, 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.

1.4.4.2 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, cross-hole seismic tests, and laboratory tests of soil and rock samples; installing ground water observation wells; and preparing a data report.

1.4.4.3 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.

1.5 Requirements for Further Technical Information

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

1.6 Material Incorporated by Reference

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

Add the following paragraph at the end of this section.

NAPS SUP 1.6-1 Table 1.6-201 lists topical reports not included in DCD Section 1.6 that are incorporated in whole or in part by reference in the FSAR.

NAPS SUP 1.6-1

Table 1.6-201 Referenced Topical Reports

Report No.	Title	Section	
NEI 06-13A	Nuclear Energy Institute, "Technical Report on Template for an Industry Training Program Description," NEI 06-13A, Revision 1, March 2008	13BB	13.02.01-1 SO 11
NEI 06-14A	Nuclear Energy Institute, "Quality Assurance Program Description," NEI 06-14A, Revision 4, July 2007	17.5	N075
NEI 07-02A	Nuclear Energy Institute, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," NEI 07-02A, March 2008	17.6	17.06-1 17.06-1
NEI 07-03	Nuclear Energy Institute, "Generic FSAR Template Guidance for Radiation Protection Program Description," NEI 07-03, Revision 3, October 2007	12BB	
NEI 07-08	Nuclear Energy Institute, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)," NEI 07-08, Revision 0, September 2007	12AA	
NEI 07-09	Nuclear Energy Institute, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," NEI 07-09, Revision 0, September 2007	11.5	
NEI 07-10	Nuclear Energy Institute, "Generic FSAR Template Guidance for Process Control Program (PCP)," NEI 07-10, Revision 2, February 2008	11.4	S107

1.7 Drawings and Other Detailed Information

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

1.7.1 Electrical, Instrumentation and Control Drawings

Add the following at the end of this section.

NAPS SUP 1.7-1

Table 1.7-201 supplements DCD Table 1.7-2 for those portions of the electrical system configuration drawings outside the scope of the DCD.

1.7.2 Piping and Instrumentation Diagrams

Add the following at the end of the first paragraph.

NAPS SUP 1.7-1

Table 1.7-202 supplements DCD Table 1.7-3 for those portions of the mechanical system configuration drawings outside the scope of the DCD.

Replace the last paragraph of this section with the following.

STD COL 1.7-1-H

The final P&IDs used for construction will be available upon completion of the final design configuration. Design changes that result in revisions to the simplified diagrams will be incorporated in subsequent updates to this FSAR.

1.7.4 COL information

1.7-1-H Final Design Configuration Confirmation

STD COL 1.7-1-H

This COL item is addressed in Section 1.7.2.

NAPS SUP 1.7-1

Table 1.7-201 Summary of Electrical System Configuration Drawings

Figure 8.2-201, 500/230 kV Switchyard Single-Line Diagram
Figure 8.2-202, 500/230 kV Switchyard Arrangement
Figure 8.2-203, Dominion Transmission Line Map

NAPS SUP 1.7-1

Table 1.7-202 Summary of Mechanical System Configuration Drawings

Figure 9.2-201, Plant Service Water System Simplified Diagram
Figure 9.2-202, Potable Water System Simplified Diagram
Figure 9.2-203, Sanitary Waste Discharge System Simplified Diagram
Figure 9.2-204, Station Water System - Plant Cooling Tower Makeup System (PCTMS)
Figure 9.2-205, Station Water System - Pretreated Water Supply System (PWSS)
Figure 9.5-201, Fire Protection System; Main Yard Loop
Figure 9.5-202, Fire Protection System Secondary Fire Pumps
Figure 9.5-203, Fire Protection System; Cooling Tower Yard Loop
Figure 10.4-201, Circulating Water Pumps
Figure 10.4-202, Dry Cooling Tower Array
Figure 10.4-203, Hybrid Cooling Tower

1.8 Interfaces with Standard Design

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

1.8.2 Identification of Balance of Plant Interfaces

Add the following paragraph after the first paragraph of this section.

STD CDI

The significant interface requirements for those systems that are beyond the scope of the DCD are identified in DCD Tier 1.

Delete the second sentence of the second paragraph of this section.

NAPS SUP 1.8-1

1.8.3 Verification of Site Parameters

Chapter 2 provides information demonstrating that the site characteristics fall within the ESBWR site parameters specified in the referenced certified design.

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 1.8.202). N025a

NAPS SUP 1.8-2

1.8.4 COL Information Items and Permit Conditions

Section 1.10 identifies specific FSAR sections that address the COL information items from the referenced certified design, and COL Action Items and Permit Conditions from the ESP. N025a

NAPS SUP 1.8-3

1.8.5 Generic Changes and Departures from the Referenced Certified Design

There are no generic changes or departures from the referenced certified design. (Reference Table 1.8-201)

NAPS SUP 1.8-4

1.8.6 Variances from the ESP and ESPA SSAR

Requests for variances from the ESP and SSAR comply with the requirements of 10 CFR 52.39 and 10 CFR 52.93. Variances are listed in Table 1.8-202, along with the section of the FSAR in which each is discussed. These variances are described and evaluated in COLA Part 7.

NAPS SUP 1.8-5

1.8.7 Conceptual Design Information

The referenced DCD includes conceptual design information (CDI) for certain systems, or portions of systems, that are outside the scope of the standard plant design. Table 1.8-203 identifies systems for which either the CDI in the DCD is adopted as the actual system design information, or the CDI in the DCD is replaced with site-specific design information, along with cross references to FSAR sections where the CDI is treated. Where there are differences between the conceptual design and the actual design, these differences have been evaluated. The evaluations have concluded that there are no impacts on the safety evaluations provided in the referenced certified design.

NAPS SUP 1.8-6

1.8.8 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 Section 1.8.5, were reviewed with respect to the design certification PRA. The conclusion, which is documented in Section 19.5, is that there is no significant change from the certified design PRA.

1.8 References

1.8.201 [Deleted]

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

N025a

NAPS SUP 1.8-3

Table 1.8-201 Departures from the Referenced Certified Design

Number	Subject	FSAR Section
None		

NAPS SUP 1.8-4

Table 1.8-202 Variances from the ESP and ESPA SSAR

N025a

Number	Subject	FSAR Location
NAPS ESP VAR 2.0-1a-I	Long-Term Dispersion Estimates (χ/Q and D/Q)	Section 2.3.5, Table 2.0-201
NAPS ESP VAR 2.0-2	Hydraulic Conductivity	Section 2.4.12.1.2, Table 2.0-201
NAPS ESP VAR 2.0-3	Hydraulic Gradient	Section 2.4.12.1.2, Table 2.0-201
NAPS ESP VAR 2.0-4	Vibratory Ground Motion	Section 2.5.2.5, Table 2.0-201
NAPS ESP VAR 2.0-5a-h	Distribution Coefficients (K_d)	Table 2.0-201
NAPS ESP VAR 2.0-6	DBA Source Term Parameters and Doses	Table 2.0-201
NAPS ESP VAR 2.0-7a-b	Coordinates and Abandoned Mat Foundations	Table 2.0-201
NAPS ESP VAR 2.4-1	Void Ratio, Porosity, and Seepage Velocity	Section 2.4.12.1.2
NAPS ESP VAR 2.4-2	NAPS Water Supply Well Information	Table 2.4-17R
NAPS ESP VAR 2.5-1	Stability of Slopes	Section 2.5.5
NAPS ESP VAR 2.5-2	Engineered Fill	Section 2.5.1.2.3.k Section 2.5.4.5.3
NAPS ESP VAR 12.2-1	Gaseous Pathway Doses	Section 12.2.2.2.6, Table 12.2-18bR
NAPS ESP VAR 12.2-2	[Deleted]	
NAPS ESP VAR 12.2-3	Annual Liquid Effluent Releases	Section 12.2.2.4.6, Table 12.2-19bR
NAPS ESP VAR 12.2-4	Existing Units' and Site Total Doses	Table 12.2-203

15.06.05-1 N029a

N025e

N025e

12.02-1

12.02-10 15.06.05-1

NAPS SUP 1.8-5

Table 1.8-203 Conceptual Design Information (CDI)

Item in DCD	CDI in DCD adopted as actual design	CDI in DCD replaced with actual design	Evaluation	FSAR Section
1.1.2.1 ESBWR Standard Plant Scope Figure 1.1-1 ESBWR Standard Plant General Site Plan		X	Site-specific plan general site plan provided	1.1.2.1 Figure 2.1-201
1.2.2.11.4 Main Turbine	X		Conceptual turbine type selected as site-specific design	1.2.2.11.4
1.2.2.11.7 Main Condenser	X		Conceptual condenser type selected as site-specific design	1.2.2.11.7
1.2.2.12.7 Plant Service Water System		X	Site-specific design described	1.2.2.12.7
1.2.2.12.13 Hydrogen Water Chemistry Table 3.2-1 P73 Note 9.3.9 Hydrogen Water Chemistry		X	Hydrogen water chemistry option utilized	1.2.2.12.13 Table 3.2-1 9.3.9
1.2.2.12.15 Zinc Injection System Table 3.2-1 P74 Note 9.3.11 Zinc Injection System		X	Zinc Injection system not utilized	1.2.2.12.15 Table 3.2-1 9.3.11
1.2.2.12.16 Freeze Protection		X	Freeze protection incorporated for external tanks and piping that may freeze during winter weather	1.2.2.12.16
1.2.2.16.10 Other Building Structures		X	Site-specific buildings specified	1.2.2.16.10
1.8.2 Identification of BOP Interfaces	X		Not applicable	1.8.2
Appendix 3A Seismic Soil-Structure Interaction Analysis		X	Site-specific geotechnical data described in Chapter 2	Appendix 3A Chapter 2
Appendix 3A.2 ESBWR Standard Site Plan		X	Site-specific general site plan provided	Section 3A.2 Figure 2.1-201

NAPS SUP 1.8-5

Table 1.8-203 Conceptual Design Information (CDI)

Item in DCD	CDI in DCD adopted as actual design	CDI in DCD replaced with actual design	Evaluation	FSAR Section
9.2.1 Plant Service Water Table 9.2-2 Figure 9.2-1		X	Site-specific system description and design characteristics described	9.2.1 Table 9.2-201 Figure 9.2-201
9.2.3 Makeup Water System Table 9.2-9		X	Site-specific system description and design characteristics described	9.2.3 Table 9.2-202
9.2.4 Potable and Sanitary Water Systems		X	Site-specific system description and design characteristics described	9.2.4 Figure 9.2-202 Figure 9.2-203
9.2.10 Station Water System		X	Site-specific system description and design characteristics described	9.2.10 Table 9.2-203 Table 9.2-204 Figure 9.2-204 Figure 9.2-205
9.3.9 Hydrogen Water Chemistry System		X	Site-specific system description and design characteristics described	9.3.9
9.3.11 Zinc Injection System		X	Zinc Injection System not utilized	9.3.11

e0205

NAPS SUP 1.8-5

Table 1.8-203 Conceptual Design Information (CDI)

Item in DCD	CDI in DCD adopted as actual design	CDI in DCD replaced with actual design	Evaluation	FSAR Section
9A Appendix 9A Fire Hazards Analysis		X	Site-specific buildings specified. Site-specific Fire Zone drawings supplied.	9A Contents 9A.1 9A.3.1 9A.4.9 9A.5.9 9A.5.12 Figure 9A.2-33R Figures 9A.2-201 through 9A.2-206
10.4.5 Circulating Water System Table 10.4-3 Figure 10.4-1		X	Site-specific system description and design characteristics described	10.4.5.2.1 Table 10.4-201 Table 10.4-3R Figure 10.4-201 Figure 10.4-202 Figure 10.4-203

1.9 Conformance with Standard Review Plan and Applicability of Codes and Standards

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

1.9.1 Conformance with Standard Review Plan

Add the following paragraph at the end of this section.

NAPS COL 1.9-3-A

Table 1.9-201 evaluates conformance with the SRP sections and BTPs in effect six months prior to the submittal of the COLA. 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 ESBWR 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.

1.9.2 Applicability to Regulatory Criteria

Add the following paragraphs at the end of this section.

NAPS COL 1.9-3-A

Division 1, 4, 5, and 8 Regulatory Guides

Table 1.9-202 evaluates conformance with Division 1, 4, 5, and 8 RGs in effect six months prior to the submittal of the COLA. Each issued Division 1 RG is evaluated. Issued Division 4, 5, and 8 RGs identified in the SRP, RG 1.206, or DCD Table 1.9-21 as COL responsibility are also evaluated. (Conformance with Division 4 RGs is also addressed in COLA Part 3, Section 1.4.) 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 ESBWR or Unit 3.

Regulatory Guide 1.206

Table 1.9-203 evaluates conformance with the FSAR content guidance in RG 1.206. Where necessary, the table identifies the FSAR section where the required information is provided. In the table, the term "Conforms" means that the information called for in RG 1.206 is either: 1) already addressed in the DCD or SSAR; or 2) addressed by adding new information beyond that contained in the DCD or SSAR. The term "Not applicable" means that the information called for in RG 1.206 does not apply to the ESBWR or Unit 3.

Table 1.9-203 evaluates conformance with RG 1.206, Section C.III.2, "Information Needed for a Combined License Application Referencing a Certified Design and an Early Site Permit." Section C.III.1, "Information Needed for a Combined License Application Referencing a Certified Design," and Section C.I, "Standard Format and Content of Combined License Applications for Nuclear Power Plants-Light-Water Reactor Edition," were also evaluated, as applicable, if portions of these sections were referenced or identified in RG 1.206, Section C.III.2, or Section C.III.1, respectively. |S021b

NAPS SUP 1.9-1 **Industrial Codes and Standards** |S021b

Table 1.9-204 identifies the Industrial Codes and Standards that are applicable to those portions of the Unit 3 design that are beyond the scope of the DCD or the SSAR, and to the operational aspects of the facility.

1.9.3 Applicability of Experience Information

Add the following after the first sentence of the section.

NAPS SUP 1.9-2 Table 1.9-205 lists NUREG and NUREG/CR reports cited in the FSAR. |S021a

Add the following paragraph at the end of this section.

Table 1.9-205 addresses operational experience information, as described in applicable NUREG reports, for those portions of the Unit 3 design and operation that are beyond the scope of the DCD. The comment column of Table 1.9-205 includes a reference to the applicable

FSAR section that provides further discussion of the operational experience.

1.9.4 COL Information

1.9-3-A SRP and Regulatory Guide Applicability

NAPS COL 1.9-3-A This COL Item is addressed in Sections 1.9.1 and 1.9.2.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
1	Introduction and Interfaces	Initial Issuance	Mar-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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
2.4.13	Accidental Releases of Radioactive Liquid Effluents in Ground and Surface Waters	Rev. 3	Mar-07	II.1	Conforms. The relatively simple hydrogeologic conditions preclude the need to evaluate alternative conceptual models of the groundwater system. Alternative conceptual models of the more complex surface water system are evaluated to identify the bounding conditions.
				II.2, II.5	Conforms
				II.3	Conforms. Distribution coefficients conservatively assigned from literature values and compared to site-specific distribution coefficients.
				II.4	Conforms. There are no site-proximity hazards, seismic, or non-seismic events that would increase the radionuclide concentrations above the values reported in Section 2.4.13.
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
3.6.3	Leak-Before-Break Evaluation Procedures	Rev. 1	Mar-07	II.1, II.2	Not applicable. ESBWR design does not rely on a Leak Before Break Evaluation.
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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	II.1, II.2, II.3, II.4, II.5, II.6, II.7	Conforms
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
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
3.9.6	Functional Design, Qualification, and Inservice Testing Programs for Pumps, Valves, and Dynamic Restraints	Rev. 3	Mar-07	II.1, II.3, II.4, II.5, II.6	Conforms
				II.2	Not applicable. There are no safety related pumps.
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.
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 3-1	Classification of Main Steam Components Other than the Reactor Coolant Pressure Boundary for BWR Plants	Rev. 2	Mar-07		Conforms
BTP 3-2	Classification of BWR/6 Main Steam and Feedwater Components Other than the Reactor Coolant Pressure Boundary	Rev. 2	Mar-07		Conforms
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.8, II.9, II.10	Conforms
				II.7	Not applicable

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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 to the ESBWR
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.2, II.5, II.6, II.7	Conforms
				II.3, & II.4	Not applicable to the ESBWR
5.2.3	Reactor Coolant Pressure Boundary Materials	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms. Acceptance Criterion II.3 is addressed in DCD Section 3.9.3.9.
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.9, II.10, II.11	Conforms
5.2.5	Reactor Coolant Pressure Boundary Leakage Detection	Rev. 2	Mar-07	II.1, II.2	Conforms

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
5.4	Reactor Coolant System Component and Subsystem Design	Rev. 2	Mar-07		Conforms
5.4.1.1	Pump Flywheel Integrity (PWR)	Rev. 2	Mar-07		Not applicable to the ESBWR
5.4.2.1	Steam Generator Materials	Rev. 3	Mar-07		Not applicable to the ESBWR
5.4.2.2	Steam Generator Program	Rev. 2	Mar-07		Not applicable to the ESBWR
5.4.6	Reactor Core Isolation Cooling System (BWR)	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
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	II.1, II.2, II.3, II.4	Conforms
5.4.11	Pressurizer Relief Tank	Rev. 3	Mar-07		Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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	II.1, II.2, II.3, II.5, II.6, II.7, II.8, II.9, II.10, II.11, II.12	Conforms
				II.4	Conforms with the following exception: The ESBWR is designed to shut down safely without reliance on offsite or diesel-generator-derived AC power, therefore, RG 1.93 is only applicable to onsite safety-related DC power systems.
BTP 5-1	Monitoring of Secondary Side Water Chemistry in PWR Steam Generators	Rev. 3	Mar-07		Not applicable to the ESBWR
BTP 5-2	Overpressurization Protection of Pressurized-Water Reactors While Operating at Low Temperatures	Rev. 3	Mar-07		Not applicable to the ESBWR
BTP 5-3	Fracture Toughness Requirements	Rev. 3	Mar-07		Conforms
BTP 5-4	Design Requirements of the Residual Heat Removal System	Rev. 3	Mar-07		Not applicable to ESBWR
6.1.1	Engineered Safety Features Materials	Rev. 2	Mar-07	II.1, II.2, II.3, II.4	Conforms

SO19

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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		Not applicable to the ESBWR
6.2.1.1.B	Ice Condenser Containments	Draft Rev. 3	Jun-96		Not applicable to the ESBWR
6.2.1.1.C	Pressure-Suppression Type BWR Containments	Rev. 7	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
6.2.1.2	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		Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
6.2.1.5	Minimum Containment Pressure Analysis for Emergency Core Cooling System Performance Capability Studies	Rev. 3	Mar-07		Not applicable to the ESBWR
6.2.2	Containment Heat Removal Systems	Rev. 5	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms
6.2.3	Secondary Containment Functional Design	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms. See DCD Table 1.9-20.
6.2.4	Containment Isolation System	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, II.16, II.17, II.18, II.19, II.20, II.21, II.22	Conforms
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
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.6, II.7, II.8, II.10	Conforms
				II.5, II.9	Not applicable

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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 the ESBWR's two year operating cycle. The frequencies for testing the CR HVAC system are defined by Technical Specifications 3.7.2 and 5.5.12 of the referenced certified design.
				II.7	Exception: SRP states that self-contained breathing apparatus for the control room personnel should be on hand. DCD Section 6.4.1.1 states that CRHA habitability requirements are satisfied without the need for individual breathing apparatus and/or special clothing.
6.5.1	ESF Atmosphere Cleanup Systems	Rev. 3	Mar-07		Conforms. Surveillances, testing, and maintenance guidelines for the CRHAVS are addressed in Technical Specifications 3.7.2, 5.5.12, and 5.5.13, Maintenance Rule requirements in Section 17.6, and procedure requirements in Section 13.5.

S003

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
6.5.2	Containment Spray as a Fission Product Cleanup System	Rev. 4	Mar-07		Not applicable. See DCD Table 1.9-20.
6.5.3	Fission Product Control Systems and Structures	Rev. 3	Mar-07	II.1, II.2 (there is no II.3)	Conforms
				II.4	Not applicable. Drywell spray function is not credited in DCD Chapter 15 dose analysis.
6.5.4	Ice Condenser as a Fission Product Cleanup System	Draft Rev. 4	Jun-96		Not applicable to the ESBWR
6.5.5	Pressure Suppression Pool as a Fission Product Cleanup System	Rev. 1	Mar-07	II.1, II.2	Conforms. Refer to DCD Table 1.9-20.
				II.3	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		Not applicable to the ESBWR
BTP 6-2	Minimum Containment Pressure Model for PWR ECCS Performance Evaluation	Rev. 3	Mar-07		Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 6-3	Determination of Bypass Leakage Paths in Dual Containment Plants	Rev. 3	Mar-07		Conforms. Refer to DCD Table 1.9-20.
BTP 6-4	Containment Purging During Normal Plant Operations	Rev. 3	Mar-07		Conforms. Refer to TS SR 3.6.1.3.
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		Not applicable
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.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
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	Initial Issuance	Mar-07	SRM to SECY 93-087 II.Q	Conforms
7.2	Reactor Trip System	Rev. 5	Mar-07	II.1, II.2, II.3, II.4, SRM to SECY 93-087 II.Q	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
7.3	Engineered Safety Features Systems	Rev. 5	Mar-07	II.1, II.2, II.3, II.4, SRM to SECY 93-087 II.Q	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.
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, SRM to SECY 93-087 II.Q	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, SRM to SECY 93-087 II.Q	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, SRM to SECY 93-087 II.Q	Conforms. Procedures addressed in Section 13.5. Technical Specifications addressed in Chapter 16. ITAAC addressed in COLA Part 10.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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.
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 (formerly Appendix 7-C)	Rev. 5	Mar-07		Conforms
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		Not applicable to the ESBWR
BTP 7-3	Guidance on Protection System Trip Point Changes for Operation with Reactor Coolant Pumps Out of Service	Rev. 5	Mar-07		Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 7-4	Guidance on Design Criteria for Auxiliary Feedwater Systems	Rev. 5	Mar-07		Not applicable to the ESBWR
BTP 7-5	Guidance on Spurious Withdrawals of Single Control Rods in Pressurized Water Reactors	Rev. 5	Mar-07		Not applicable to the ESBWR
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. ESBWR does not use recirculation pumps or active ECCS pumps.
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.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 7-11	Guidance on Application and Qualification of Isolation Devices	Rev. 5	Mar-07		Conforms.
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		Not applicable. RTDs are not used in the ESBWR protection systems.
BTP 7-14	Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems	Rev. 5	Mar-07		Conforms
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		Conforms. Section 13.5 addresses procedures.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

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	Offsite Power System	Rev. 4	Mar-07	II.4, II.5, II.6, II.8	Conforms
				II.1, II.2, II.3, II.7	Not applicable. ESBWR is a passive design and does not rely on offsite power.
8.3.1	A-C Power Systems (Onsite)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4.A through II.4.H, II.4.J, II.5, II.6, II.7, II.10	Conforms
				II.4.I	Not applicable. The ESBWR diesel generators are not safety-related.
				II.8	Not applicable. The ESBWR diesel generators are not safety-related, nor is AC power needed to achieve safe shutdown.
				II.9	Conforms. Addressed in DCD Section 17.4 and in Section 17.6.

8.02-13

8.02-13

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
8.3.2	D-C Power Systems (Onsite)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.7, II.8, II.9, II.10	Conforms
				II.5, II.6	Not applicable. Addressed in DCD Sections 8.3.2.1.1 and 8.3.2.2.2.
				II.11	Not applicable. The ESBWR is designed to shutdown safely without reliance on offsite or diesel-generator-derived AC power for 72 hours, which exceeds station blackout requirements.
				II.12	Conforms. Addressed in Section 17.6.
				II.13	Conforms. Addressed in Section 17.6.
8.4	Station Blackout	Initial Issuance	Mar-07	II.1, II.2	Conforms. Addressed in DCD Section 15.5.5.
				II.3	Not applicable. Onsite Class 1E Emergency AC power sources are not required for ESBWR safe shutdown.
				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.
BTP 8-1	Requirements on Motor-Operated Valves in the ECCS Accumulator Lines	Rev. 3	Mar-07		Not applicable. The ESBWR does not have any safety-related motor-operated valves.

- For Information Only -

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation	
BTP 8-2	Use of Diesel-Generator Sets for Peaking	Rev. 3	Mar-07		Not applicable. The ESBWR can achieve safe shutdown without AC power, and the diesel-generator sets are not safety-related. Therefore, this BTP is not applicable.	5101
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.	8.02-20
BTP 8-4	Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves	Rev. 3	Mar-07		Not applicable. The ESBWR does not use any manually-operated valves to mitigate an accident.	
BTP 8-5	Supplemental Guidance for Bypass and Inoperable Status Indication for Engineered Safety Features Systems	Rev. 3	Mar-07		Not applicable. The ESBWR is designed in accordance with ICSB 21, the predecessor to BTP 8-5, as stated in DCD Table 8.1-1 and DCD Section 8.3.2.2.2. Also, refer to DCD Table 7.1-1 for conformance to RG 1.47 and Bypass and Inoperable Status Indicator (BISI) for all safety-related systems.	50216 8.02-21
BTP 8-6	Adequacy of Station Electric Distribution System Voltages	Rev. 3	Mar-07		Not applicable. The ESBWR is designed in accordance with PSB 1, the predecessor to BTP 8-6, as stated in DCD Table 8.1-1 and DCD Section 8.3.1.1.2.	8.02-22

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
BTP 8-7	Criteria for Alarms and Indications Associated with Diesel-Generator Unit Bypassed and Inoperable Status	Rev. 3	Mar-07		Not applicable. The ESBWR does not use safety-related diesel generators.
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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. Instrument Air is addressed in DCD Section 9.3.6, Service Air is addressed in DCD Section 9.3.7, and High Pressure Nitrogen Supply System is addressed in DCD Section 9.3.8.
9.3.2	Process and Post-accident Sampling Systems	Rev. 3	Mar-07	II.1, II.3, II.4	Conforms
				II.2	Exception. Technical Specifications do not require analyses. Section 9.3.2 addresses actions required to qualify process sampling for taking radioactive samples without having a specific post-accident sampling system. Analyses and frequencies of process systems are addressed in plant operating procedures.
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		Not applicable to the ESBWR
9.3.5	Standby Liquid Control System (BWR)	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.6, II.7, II.8	Conforms

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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. Section 9.4 was evaluated against these criteria.
9.4.2	Spent Fuel Pool Area Ventilation System	Rev. 3	Mar-07	II.1, II.2, II.3, II.4	Conforms
9.4.3	Auxiliary and Radwaste Area Ventilation System	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms. Section 9.4 was evaluated against these criteria.
9.4.4	Turbine Area Ventilation System	Rev. 3	Mar-07	II.1, II.2, II.3	Conforms
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
9.5.1	Fire Protection Program	Rev. 5	Mar-07	II.1, II.2, II.4	Not applicable. See DCD Table 1.9-21.
				II.3, II.5, II.6	Conforms
				II.7	Exception: The elements of the Fire Protection Program 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 Fire Protection Program will be fully operational prior to initial fuel loading. Refer to Section 13.4.
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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		Not applicable to the ESBWR
9.5.5	Emergency Diesel Engine Cooling Water System	Rev. 3	Mar-07		Not applicable to the ESBWR
9.5.6	Emergency Diesel Engine Starting System	Rev. 3	Mar-07		Not applicable to the ESBWR
9.5.7	Emergency Diesel Engine Lubrication System	Rev. 3	Mar-07		Not applicable to the ESBWR
9.5.8	Emergency Diesel Engine Combustion Air Intake and Exhaust System	Rev. 3	Mar-07		Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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. In DCD Section 10.2.2.7, a list of components that may be tested with the unit at load is provided. However, some load reduction may be necessary before testing main stop and control valves, and intermediate stop and intercept valves (see DCD Section 10.2.3.7). 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.

50216

(continued)

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

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 10.2.2.4, ensure that a single failure of any of the above valves important to safety will not disable the function of the overspeed protection system.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

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 10.2.2.7 and 10.2.3.7. The first disassembly and visual inspection of all main stop valves, main control valves, intermediate 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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.2.3	Turbine Rotor Integrity	Rev. 2	Mar-07	II.1, II.2	Conforms
				II.3.A	Exception: DCD Section 10.2.3.5 states that, "Forgings are rough-machined with minimum stock allowance prior to heat treatment." This statement meets the intent of the corresponding SRP Acceptance Criterion. The exception to the Acceptance Criterion is introduced with the reference to welded rotors. The GE N3R-6F52 steam turbine S111 selected for this site utilizes integral forgings in the rotor design and fabrication. Although other manufacturers produce welded rotors, the GE N3R-6F52 rotor is S111 not a welded rotor design and does not utilize welding to construct the base rotor. Flaws in the forging may be repaired by welding and other means, but only after heat treatment. Thus, the intent of this Acceptance Criterion is met.
				II.3.B, II.3.C, II.3.D, II.4, II.5	Conforms
10.3	Main Steam Supply System	Rev. 4	Mar-07	II.1, II.2, II.3, II.5, II.6, II.7, II.8	Conforms
				II.4	Not applicable to the ESBWR
10.3.6	Steam and Feedwater System Materials	Rev. 3	Mar-07	II.1, II.2	Conforms

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.4.1	Main Condensers	Rev. 3	Mar-07	II.1	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, II.3	Conforms
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	Conforms
				II.2	Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.4.7	Condensate and Feedwater System	Rev. 4	Mar-07	II.1, II.2.B, II.3, II.4, II.5, II.6,	Conforms
				II.2.A,	Not applicable to the ESBWR
				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 6.6.7, 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	Conforms. Addressed in DCD Sections 3.9.3, 5.2.4, and 10.4.7, and DCD Tables 1.9-22 and 1.11-1.
10.4.8	Steam Generator Blowdown System (PWR)	Rev. 3	Mar-07		Not applicable to the ESBWR

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
10.4.9	Auxiliary Feedwater System (PWR)	Rev. 3	Mar-07		Not applicable to the ESBWR
BTP 10-1	Design Guidelines for Auxiliary Feedwater System Pump Drive and Power Supply Diversity for Pressurized Water Reactor Plants	Rev. 3	Mar-07		Not applicable to the ESBWR
BTP 10-2	Design Guidelines for Avoiding Water Hammers in Steam Generators	Rev. 4	Mar-07		Not applicable to the ESBWR
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. Addressed in DCD Section 12.2 and in Section 12.2.
				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. Addressed in DCD Sections 11.2 and 12.2, and in Sections 11.2 and 12.2.
				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. Addressed in DCD Sections 11.3 and 12.2, and in Sections 11.2 and 12.2.
				II.8	Not applicable. Applies to ESP applications.

NAPS COL 1.9-3-A

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.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.
				II.10	Not applicable. There is no temporary onsite storage facility.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

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.1, 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 requirements are addressed in Section 17.5.
				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. Quality Assurance Program requirements are addressed in Section 17.5. Conformance with NUREG-0718 is addressed in DCD Table 1.9-8.
				II.6	Conforms

NAPS COL 1.9-3-A

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 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	Rev. 3	Mar-07		Conforms. Addressed in DCD Section 15.3.16 and in Section 2.4.13.
12.1	Assuring that Occupational Radiation Exposures Are As Low As Is Reasonably Achievable	Rev. 3	Mar-07	II.1, II.2. II.3, II.4	Conforms. Addressed in Section 13.2, and Appendices 12AA and 12BB.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
12.2	Radiation Sources	Rev. 3	Mar-07	II.1	Not applicable. Acceptance criterion cites RG 1.3. SRP states RG 1.3 is applicable to license holders issued prior to January 10, 1997. COL applicant is not a license holder.
				II.2	Not applicable to the ESBWR
				II.3	Conforms. Addressed in DCD Sections 12.3 and 15.4 and in Section 6.4.
				II.4	Conforms. Addressed in DCD Section 12.3.
				II.5	Conforms
				II.6	Conforms. Addresses in DCD Sections 1A and 12.2.
				II.7	Conforms. Addressed in DCD Section 12.2.
12.3–12.4	Radiation Protection Design Features	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5	Conforms

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
12.5	Operational Radiation Protection Program	Rev. 3	Mar-07	II.1	Conforms with the following exceptions: 1) NUREG-0731 is not active, and is not utilized; 2) RG 8.8 specifies the use of RG 1.16. Reporting per C.1.b(2) and C.1.b(3) of RG 1.16 is no longer required.
				II.2.A, II.2.B, II.2.C, II.2.D, II.2.E.i, II.2.E.ii, II.2.E.iii, II.2.E.iv, II.2.F, II.2.G, II.2.H, II.4	Conforms
				II.2.E.v	Conforms with the following exception: NUREG-1736 states that RGs 8.20, 8.26, and 8.32 are outdated and recommends use of the methods in RG 8.9, Rev. 1. Therefore, the methods identified in RG 8.9, Rev. 1 will be used in place of those in RGs 8.20, 8.26, and 8.32.
				II.3	Conforms with the following exceptions: 1) RG 8.25 is not applicable to power stations; 2) NUREG-1736 states that RGs 8.20, 8.26, and 8.32 are outdated and recommends use of the methods in RG 8.9, Rev. 1; and 3) RP program and procedures are established, implemented, maintained, and reviewed under the QA Program described in Section 17.5.

NAPS COL 1.9-3-A

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.
				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.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.1.2–13.1.3 *(continued)*	Operating Organization	Rev. 6	Mar-07	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	Conforms with the following exception: Section 17.5 states, "The operational phase quality assurance program requirements will be established through the Company's commitment to ANSI/ASME NQA-1-1994 as described within this QAPD. This edition of NQA-1 contains overall quality assurance requirements equivalent to those of ANSI N18.7-1976, and the Company has included within this QAPD the required administrative controls from ANSI N18.7-1976. Therefore, the Company does not commit to compliance with the requirements of ANSI N18.7-1976/ANS-3.2."
				II.1.A.i through II.1.A.v, II.1.C, II.1.E, II.1.F, II.1.G	Conforms
				II.1.D	Not applicable
				II.1.H	Conforms. Addressed in Section 13.2.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.2.1	Reactor Operator Requalification Program: Reactor Operator Training	Rev. 3	Mar-07	II.1.A.i	Conforms. Addressed in Section 13.1.
				II.1.A.ii, II.1.A.iii, II.1.A.v, II.1.B, II.1.D, II.1.E	Conforms
				II.1.A.iv	Conforms. Addressed in Sections 13.1, 13.2, and 17.5.
				II.1.A.vi	Conforms. Addressed in DCD Chapter 18.
				II.1.A.vii	Exception: The COLA incorporates by reference approved industry template NEI 06-13, which does not address compliance with NUREG-1021.
				II.1.C	Exception: This item states that "formal segments of the initial licensed operator training program should be substantially complete when the pre-operational program test begins." Appendix 13BB commits to a similar state of readiness: "Before initial fuel loading, the number of persons trained in preparation for RO and SRO licensing examinations will be sufficient to meet regulatory requirements, with allowances for examination contingencies and without the need for planned overtime."

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
13.2.2	Non-Licensed Plant Staff Training	Rev. 3	Mar-07	II.1, II.2, II.3, II.4, II.5, II.7, II.8, II.9	Conforms.
				II.6	Exception: This item states that “formal segments of the initial training program should be substantially complete when the pre-operational test program begins.” Appendix 13BB commits to a similar state of readiness: “Before initial fuel loading, sufficient plant staff will be trained to provide for safe plant operations.”
				II.10	Conforms. Addressed in DCD Section 9.5.1.
				II.11	Conforms. Addressed in Sections 13.2 and 13.4.

NAPS COL 1.9-3-A

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.27, II.28, II.29, 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	Conforms. Addressed in DCD Section 13.3 and COLA Part 5. The NAPS Units 1 and 2 EOF will be used for Unit 3.
				II.26	Conforms. Reviewed under SRPs 7.5 and 18.2.
				II.31	Conforms. Addressed in Section 13.4.
13.4	Operational Programs	Rev. 3	Mar-07		Conforms

NAPS COL 1.9-3-A

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	Conforms
				II.8	Section 13.5 and DCD Section 18.9 discuss conformance with NUREG- 0711
				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	Conforms
				II.2.A, II.2.B	Conforms
				II.2.C	Section 13.5 and DCD Section 18.9 discuss conformance with NUREG- 0711
				II.2.D, II.2.E, II.2.F, II.2.G, II.2.H, II.2.I	Conforms
13.6	Physical Security	Rev. 3	Mar-07		Addressed in COLA Part 8.
13.6.1	Physical Security - Combined License Review Responsibilities	Initial Issuance	Mar-07		Addressed in COLA Part 8.
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.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
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

14.02-5 14.02-6

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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	V	Conforms
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
15.0.3	Design Basis Accident Radiological Consequences of Analyses for Advanced Light Water Reactors	Initial Issuance	Mar-07		Not applicable to the ESBWR
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

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.1.5	Steam System Piping Failures Inside and Outside of Containment (PWR)	Rev. 3	Mar-07		Not applicable to the ESBWR
15.1.5.A	Radiological Consequences of Main Steam Line Failures Outside Containment of a PWR				Not applicable to the ESBWR
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	1A, 1B, 1C, 1D, 2A, 2B, 2D, 2E, 2F, 3A, 3B, 3C, 3D	Conforms
				2C	Not applicable. This is not an event of moderate frequency.
15.2.6	Loss of Nonemergency AC Power to the Station Auxiliaries	Rev. 2	Mar-07	II.1, II.2, II.4, II.5, II.5B, II.5C, II.5D	Conforms
				II.3	Not applicable. This is not an event of moderate frequency.
				II.5A	Not applicable. There are no RCS loops in the ESBWR.
15.2.7	Loss of Normal Feedwater Flow	Rev. 2	Mar-07	1A, 1B, 1C, 1D, 2A, 2B, 2D, 2E, 2F, 3A, 3B, 3C, 3D	Conforms
				2C	Not applicable. This is not an event of moderate frequency.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.2.8	Feedwater System Pipe Breaks Inside and Outside Containment (PWR)	Rev. 2	Mar-07		Not applicable to the ESBWR
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		Not applicable to the ESBWR
15.3.3–15.3.4	Reactor Coolant Pump Rotor Seizure and Reactor Coolant Pump Shaft Break	Rev. 3	Mar-07		Not applicable to the ESBWR
15.4.1	Uncontrolled Control Rod Assembly Withdrawal from a Subcritical or Low Power Startup Condition	Rev. 3	Mar-07	1A, 1C	Conforms
				1B	Not applicable to the ESBWR
15.4.2	Uncontrolled Control Rod Assembly Withdrawal at Power	Rev. 3	Mar-07	1A, 1C	Conforms
				1B	Not applicable to the ESBWR
15.4.3	Control Rod Misoperation (System Malfunction or Operator Error)	Rev. 3	Mar-07	1, 2, 3	Conforms

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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	1A, 1B, 1D, 1E, 1F, 1, 2, 3, 4	Conforms
				1C	Not applicable. This is not an event of moderate frequency.
15.4.6	Inadvertent Decrease in Boron Concentration in the Reactor Coolant System (PWR)	Rev. 2	Mar-07		Not applicable to the ESBWR
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		Not applicable to the ESBWR
15.4.8.A	Radiological Consequences of a Control Rod Ejection Accident (PWR)				Not applicable to the ESBWR
15.4.9	Spectrum of Rod Drop Accidents (BWR)	Rev. 3	Mar-07	1, 2, 3	Conforms. Postulated events are not applicable to the ESBWR.
15.4.9.A	Radiological Consequences of Control Rod Drop Accident (BWR)	Rev 2	July 81		Conforms. Postulated control rod drop events are not applicable to the ESBWR.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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				Not applicable to the ESBWR
15.6.4	Radiological Consequences of Main Steam Line Failure Outside Containment (BWR)	Rev. 2	Jul-81	II.1, II.2, II.3	Conforms
				II.4	Conforms. Addressed in TS 3.4.3.

NAPS COL 1.9-3-A

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	July 81		Not Applicable. Reference DCD Table 1.9-20.
15.6.5.B	Radiological Consequences of a Design Basis Loss-of-Coolant Accident: Leakage From Engineered Safety Feature Components Outside Containment	Rev 1	July 81		Not Applicable. Reference DCD Table 1.9-20.
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	July 81		Not Applicable. Reference DCD Table 1.9-20.

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
15.7.3	Postulated Radioactive Releases Due to Liquid-Containing Tank Failures			1, 2	Conforms
15.7.4	Radiological Consequences of Fuel Handling Accidents	Rev. 2	Jul-81	II.1, II.2, II.3, II.4, II.5	Conforms. Radiological assumptions superseded by SRP 15.0.1.
15.7.5	Spent Fuel Cask Drop Accidents	Rev. 2	July 81	II.1, II.2, II.3, II.4, II.5	Conforms. Because a spent fuel cask drop exceeding 9.2 m (30 ft) is not postulated (DCD Section 15.4.10.1), per SRP 15.7.5 a design basis radiological analysis is not required. Therefore, the acceptance criteria do not apply even though the SRP does.
15.8	Anticipated Transients Without Scram	Rev. 2	Mar-07	1A	Not applicable. ESBWR does not have recirculation pumps.
				1B, 1C, 1D, 1E	Conforms
				1F	Conforms
15.9	Boiling Water Reactor Stability	Initial Issuance	Mar-07	1, 2, 3, 4A, 4B, 5, 6, 7, 9A, 9B, 9C, 10, 11	Conforms
				8, 9D	Conforms
16	Technical Specifications	Rev. 2	Mar-07		Conforms
16.1	Risk-informed Decision Making: Technical Specifications	Rev. 1	Mar-07		Not applicable

- For Information Only -

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

SRP Section	Title	Rev	Date	Specific Acceptance Criteria	Evaluation
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.
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 DCD Section 17.4 and in Section 17.6. N115b

NAPS COL 1.9-3-A

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
				II.B.8	DOM-QA-1: Alternative language addresses the grace period (previously approved by NRC).
				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.
				II.U.1.e	DOM-QA-1: Not a commitment in DOM-QA-1. Included in implementing procedure.
				II.U.2.k	DOM-QA-1: Not applicable. On-line records not used.

(1) (1) (1) (1) (1) (1)

NAPS COL 1.9-3-A

Table 1.9-201 Conformance with Standard Review Plan

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.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 1	Dominion QAPD (Appendix 17AA): Conforms ① ②
				II.W Option II	Dominion QAPD: Not applicable for North Anna. Option I chosen ①
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.
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.

① 17.05-1
② N121a

NAPS COL 1.9-3-A

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. RG 1.183 is used.
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
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. RG 1.183 is used.
1.6	Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems	Rev. 0	Mar-71	General	Not applicable
1.7	Control of Combustible Gas Concentrations in Containment	Rev. 3	Mar-07	General	Conforms

15021b

NAPS COL 1.9-3-A

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	Conforms, with the following exceptions: (1) instead of NQA-1-1983 or NQA-1-1989, NQA-1-1994 is utilized as specified in the QAPD; (2) experience requirements cannot be met prior to operations as described in Appendix 13BB.
1.9	Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants	Rev. 4	Mar-07	General	Not applicable
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

S094a

S094b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation	
1.14	Reactor Coolant Pump Flywheel Integrity	Rev. 1	Aug-75	General	Not applicable	
1.16	Reporting of Operating Information–Appendix A Technical Specifications	Rev. 4	Aug-75	General	Conforms with the following exceptions: Reporting per C.1.b(2) and C.1.b(3) is no longer required	12.03-12.04-9
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	3.09.02-2
				C.3	Conforms	S021b 3.09.02-2
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 11.4.2.3 (NEI 07-10) and 11.5.4.5 (NEI 07-09) provide descriptions of the PCP and ODCM, respectively. Implementation milestones are provided in Section 13.4.	S021b
1.22	Periodic Testing of Protection System Actuation Functions	Rev. 0	Feb-72	General	Conforms. Operational program implementation is described in Section 13.4.	
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.	S021b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation	
1.24	Assumptions Used for Evaluating the Potential Radiological Consequences of a Pressurized Water Reactor Radioactive Gas Storage Tank Failure	Rev. 0	Mar-72	All	Not applicable	
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	All	Exception: The requirements for quality group classifications and standards are defined by the DCD which implements Rev. 3. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b.	S1289
		Rev. 3	Feb-76	All	Conforms. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b.	3.02.02-1
1.27	Ultimate Heat Sink for Nuclear Power Plants	Rev. 2	Jan-76	General	The UHS is within the scope of the referenced certified design and is addressed in DCD Section 9.2.5.	

NAPS COL 1.9-3-A

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	Exception: The requirements for seismic design classification are defined by the DCD which implements Rev. 3. Refer to DCD Tables 1.9-21, 1.9-21a, 1.9-21b.	S1289
		Rev. 3	Sep-78	All	Conforms. Refer to in DCD Tables 1.9-21, 1.9-21a, 1.9-21b.	S046 3.02.01-3
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. Operational program implementation is described in Section 13.4.	
1.32	Criteria for Power Systems for Nuclear Power Plants	Rev. 3	Mar-04	General	Conforms.	

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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	Conforms. Operational program implementation is described in Section 13.4.
1.35	Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments	Rev. 3	Jul-90	General	Not applicable
1.35.1	Determining Prestressing for Inspection of Prestressed Concrete Containments	Rev. 0	Jul-90	General	Not applicable
1.36	Nonmetalic Thermal Insulation for Austenitic Stainless Steel	Rev. 0	Feb-73	General	Conforms. Operational program implementation is described in Section 13.4.
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

150216

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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	Exception. Section 17.5 identifies equivalent quality assurance standards.
1.39	Housekeeping Requirements for Water-Cooled Nuclear Power Plants	Rev. 2	Sep-77	General	Exception. Section 17.5 identifies equivalent quality assurance standards.
1.40	Qualification Tests of Continuous-Duty Motors Installed Inside the Containment of Water-Cooled Nuclear Power Plants	Rev. 0	Mar-73	General	Conforms
1.41	Preoperational Testing of Redundant On-Site Electric Power Systems to Verify Proper Load Group Assignments	Rev. 0	Mar-73	General	Conforms with the following exception: There are no safety-related DGs for ESBWR.
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. Operational program implementation is described in Section 13.4.
1.45	Reactor Coolant Pressure Boundary Leakage Detection Systems	Rev. 0	May-73	General	Conforms. Operational program implementation is described in Section 13.4.

S074

S021b
8.03.02
2

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.47	Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems	Rev. 0	May-73	General	Conforms. Operational program implementation is described in Section 13.4.
1.50	Control of Preheat Temperature for Welding of Low-Alloy Steel	Rev. 0	May-73	General	Conforms. Operational program implementation is described in Section 13.4.
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
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	Conforms
1.56	Maintenance of Water Purity in Boiling Water Reactors	Rev. 1	Jul-78	General	Conforms.
1.57	Design Limits and Loading Combinations for Metal Primary Reactor Containment System Components	Rev. 1	Mar-07	General	Conforms

S021b

S021b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation	
1.59	Design Basis Floods for Nuclear Power Plants (Errata Published 7/30/80)	Rev. 2	Aug-77	General	Conforms	S021b
1.60	Design Response Spectra for Seismic Design of Nuclear Power Plants	Rev. 1	Dec-73	General	Conforms	S021b
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	
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. 2	Aug-78	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.	14.02-5 14.02-6
1.68.1	Preoperational and Initial Startup Testing of Feedwater and Condensate Systems for Boiling Water Reactor Power Plants	Rev. 1	Jan-77	General	Conforms	

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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 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. Table 1.9-203.
1.71	Welder Qualification for Areas of Limited Accessibility	Rev. 1	Mar-07	General	Conforms. Operational program implementation is described in Section 13.4.
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

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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	Not applicable
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	Not applicable
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

S021b

S021b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.83	Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes	Rev. 1	Jul-75	General	Not applicable
1.84	Design, Fabrication, and Materials Code Case Acceptability, ASME Section III	Rev. 33	Aug-05	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.
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

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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 with the following exception: The ESBWR is designed to shut down safely without reliance on offsite or diesel-generator-derived AC power, therefore, the regulatory guide is only applicable to onsite safety-related DC power systems.
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	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

S079

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.97	Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants	Rev. 4	Jun-06	General	Conforms. Operational program implementation is described in Section 13.4.
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. Superseded by BTP 11-5.
1.99	Radiation Embrittlement of Reactor Vessel Materials	Rev. 2	May-88	General	Conforms. Operational program implementation is described in Section 13.4.
1.100	Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants	Rev. 2	Jun-88	General	Conforms
1.101	Emergency Response Planning and Preparedness for Nuclear Power Reactors	Rev. 5	Jun-05	General	Not applicable
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. Operational program implementation is described in Section 13.4.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.106	Thermal Overload Protection for Electric Motors on Motor-Operated Valves	Rev. 1	Feb-77	General	Not applicable
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

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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 except the suggested breakdown identified in Appendix A to the RG is not used because it is not consistent with the DCD presentation of information.
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. 2	May-89	General	Conforms
1.115	Protection Against Low-Trajectory Turbine Missiles	Rev. 1	Jul-77	General	Conforms
1.116	Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems	Rev. 0	May-77	General	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. Operational program implementation is described in Section 13.4.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.121	Bases for Plugging Degraded PWR Steam Generator Tubes	Rev. 0	Aug-76	General	Not applicable
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. 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	Not Applicable. IEEE 484 does not apply to ESBWR VRLA batteries, therefore, RG 1.128 is not applicable. IEEE 1187 applies to VRLA batteries.

S021b

S021b
8.03.02-2

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation	
1.129	Maintenance, Testing, and Replacement of Vented Lead-Acid Storage Batteries for Nuclear Power Plants	Rev. 2	Feb-07	General	Not Applicable. IEEE 450 does not apply to ESBWR VRLA batteries, therefore, RG 1.129 is not applicable. IEEE 1188 applies to VRLA batteries.	50216 8.03.02-2
1.130	Service Limits and Loading Combinations for Class 1 Plate-and-Shell-Type Supports	Rev. 2	Mar-07	General	Conforms	50216
1.131	Qualification Tests of Electric Cables, Field Splices, and Connections for Light-Water-Cooled Nuclear Power Plants	Rev. 0	Aug-77	General	Conforms	

NAPS COL 1.9-3-A

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)

IS021b

NAPS COL 1.9-3-A

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 three 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	Not applicable

NAPS COL 1.9-3-A

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	Rev. 0	Sep-77	General	Not applicable. Water levels and discharges in Lake Anna were evaluated in the SSAR and ESP-ER.
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	Not applicable
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	Rev. 0	May-78	General	Conforms

S074

S0216

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

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. Operational program implementation is described in Section 13.4.
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. 14	Aug-05	General	Conforms. Operational program implementation is described in Section 13.4.

S021b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

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	Rev. 0	Mar-81	General	Conforms
1.149	Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations	Rev. 3	Oct-01	General	Conforms
1.150	Ultrasonic Testing of Reactor Vessel Welds During Preservice and Inservice Examinations	Rev. 1	Feb-83	General	Conforms. Operational program implementation is described in Section 13.4.
1.151	Instrument Sensing Lines	Rev. 0	Jul-83	General	Conforms. Operational program implementation is described in Section 13.4.
1.152	Criteria for Use of Computers in Safety Systems of Nuclear Power Plants	Rev. 2	Jan-06	General	Conforms. Operational program implementation is described in Section 13.4.
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

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.155	Station Blackout	Rev. 0	Aug-88	General	Conforms, except no emergency AC power is required for the ESBWR. Only the coping analysis is applicable. Operational program implementation is described in Section 13.4.
1.156	Environmental Qualification of Connection Assemblies for Nuclear Power Plants	Rev. 0	Nov-87	General	Conforms
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.

15021b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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
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.
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	Not applicable.
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.
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.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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	Not applicable. The approach described in this RG is not being used.
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.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.176	An Approach for Plant-Specific, Risk-Informed Decisionmaking: Graded Quality Assurance	Rev. 0	Aug-98	General	Not applicable. A risk-based graded QA program is not being used.
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 Inservice Inspection of Piping	Rev. 0	Sep-98	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. Operational program implementation is described in Section 13.4.
1.181	Content of the Updated Final Safety Analysis Report in Accordance with 10 CFR 50.71(e)	Rev. 0	Sep-99	General	Conforms
1.182	Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants	Rev. 0	May-00	General	Conforms

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.189	Fire Protection for Nuclear Power Plants	Rev. 1	Mar-07	General	Conforms with the following exception. Section C.1.1.c of the RG states that during construction, on sites with an operating unit, the superintendent of the operating plant should have overall responsibility for fire protection. However, due to physical and administrative separation of Unit 3 from the operating units, the on-site executive in charge of construction will have overall responsibility for Unit 3 fire protection during construction.
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 5.3.1.8. 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.

13.01.02-13.01.03-1

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.193	ASME Code Cases Not Approved for Use	Rev. 1	Aug-05	General	Conforms
1.194	Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants	Rev. 0	Jun-03	General	Conforms
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

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.200	An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities	Rev. 1	Jan-07	General	Not applicable
1.201	Guidelines for Categorizing Structures, Systems, and Components in Nuclear Power Plants According to Their Safety Significance	Rev. 1	May-06	General	Not applicable
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	Conforms
1.204	Guidelines for Lightning Protection of Nuclear Power Plants	Rev. 0	Nov-05	General	Conforms. Operational program implementation is described in Section 13.4.
1.205	Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants	Rev. 0	May-06	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	See Table 1.9-203.

NAPS COL 1.9-3-A

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	All	Not applicable. The RG 1.208 performance-based approach to define the SSE ground motion is not used. See Section 2.5.2 and SSAR Section 2.5.2.
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.
4.7	General Site Suitability Criteria for Nuclear Power Stations	Rev. 2	Apr-98	General	Conforms. See SSAR Section 1.8.2.

NAPS COL 1.9-3-A

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. 1	Feb-79	General	Conforms. Section 11.5.4.5 (NEI 07-09) provides a description of the ODCM. The implementation milestone is provided in Section 13.4. (IS046) 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 quality assurance of radiological effluent and environmental monitoring, that is based on Regulatory Guide 4.15, Revision 1, to apply to North Anna Unit 3. Regulatory Guide 4.15, Revision 1 is a proven methodology for quality assurance of radiological effluent and environmental monitoring programs that is acceptable to the NRC staff as a method for demonstrating compliance with applicable requirements of 10 CFR Parts 20, 50, 52, 61, and 72. Use of Revision 2 of Regulatory (continued) (S046)

NAPS COL 1.9-3-A

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	Rev. 1	Feb-79	General	Guide 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.

S046

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
5.44	Perimeter Intrusion Alarm Systems	Rev. 3	Oct-97	C.1.1(2), C.1.1(3), C.1.1.1 – C.1.1.5, C.1.2 – C.1.7.1, C.1.8, C.2.1, C.2.2, C.2.4, C.2.8, C.3.1	Conforms
				C.1.1(1)	Exception. The RG states that one individual should be able to assess a zone of 100 m or 328 ft from the end of that zone. There is one zone that is longer than the recommended 100 m; however, this zone has two individuals tasked with the coverage over this zone and there is CCTV coverage over a portion of that zone as an added enhancement.

I50216

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
5.44 *(cont'd)*	Perimeter Intrusion Alarm Systems	Rev. 3	Oct-97	C.1.7.2	Exception. North Anna's BREs are positioned so that the officers can observe multiple zones in two directions in what could be considered a "V" shape. This is not consistent with the RG guidance "the guard observing in one direction," but it is evaluated as being effective considering the detection systems and BRE configuration in relationship to the isolation zones.
				C.2.3, C.2.5 – C.2.7	Not applicable. These types of detection equipment are not used.
				C.3.2	Not applicable. This testing option is not used.
5.62	Reporting of Safeguards Events	Rev. 1	Nov-87	General	Conforms
5.66	Access Authorization Program for Nuclear Power Plants	Rev. 0	Jun-91	General	Not applicable. NEI 03-01, Revision 1, April 2004 is used.
8.1	Radiation Symbol	Rev. 0	Feb-73	General	Conforms. The facility utilizes standard radiation symbols.
8.2	Guide for Administrative Practices in Radiation Monitoring	Rev. 0	Feb-73	General	Conforms. Operational program implementation is described in Section 13.4.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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	Rev. 1	Mar-81	General	Conforms. Operational program implementation is described in Section 13.4.
8.6	Standard Test Procedure for Geiger-Muller Counters	Rev. 0	May-73	General	Conforms. Operational program implementation is described in Section 13.4.
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.

1S021b

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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.
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	Exception. Per NUREG-1736, RG 8.20 is outdated. RG 8.9 is used. Operational program implementation is described in Section 13.4.
8.25	Air Sampling in the Workplace	Rev. 1	Jun-92	General	Not applicable

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
8.26	Applications of Bioassay for Fission and Activation Products	Rev. 0	Sep-80	General	Exception. Per NUREG-1736, RG 8.26 is outdated. RG 8.9 is used. Operational program implementation is described in Section 13.4. 12.03-12.04-9
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	Exception. Per NUREG-1736, RG 8.32 is outdated. RG 8.9 is used. Operational program implementation is described in Section 13.4. 12.03-12.04-9
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.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
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.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.2 1	Introduction and General Description of the Plant	Conforms
C.III.2 1.1	Introduction	Conforms
C.III.2 1.2	General Plant Description	Conforms. Addressed in Sections 1.2.2.19 and 2.0, Figure 2.1-201, and DCD Figures 1.2-1 through 1.2-33.
C.III.2 1.3	Comparisons with Other Facilities	Conforms
C.III.2 1.4	Identification of Agents and Contractors	Conforms
C.III.2 1.5	Requirements for Further Technical Information	Conforms
C.III.2 1.6	Material Referenced	Conforms
C.III.2 1.7	Drawings and Other Detailed Information	Conforms
C.III.2 1.8	Site and Plant Design Interfaces and Conceptual Design Information	Conforms. There are no generic changes or departures from the DCD.
C. III.2 1.9	Conformance with Regulatory Criteria	Conforms
C.III.2 2.1.1	Site Location and Description	Conforms
C.III.2 2.1.2.1	Authority	Conforms
C.III.2 2.1.2.2	Control of Activities Unrelated to Plant Operation	Conforms. There are no known significant changes regarding activities unrelated to plant operation within the exclusion area.
C.III.2 2.1.2.3	Arrangements for Traffic Control	Conforms. There are no known significant changes regarding highways, railroads, or waterways that traverse the exclusion area.
C.III.2 2.1.2.4	Abandonment or Relocation of Roads	Conforms. There are no known significant changes regarding any public roads traversing the exclusion area.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.2 2.1.3	Population Distribution	Conforms
C.III.2 2.2	Nearby Industrial, Transportation, and Military Facilities	Conforms
C.III.2 2.3.1	Regional Climatology	Conforms
C.III.2 2.3.2	Local Meteorology	Conforms
C.III.2 2.3.3	Onsite Meteorological Measurements Program	Conforms. Addressed in SSAR Sections 2.3.3 and 1.8.2 (which commit to RG 1.23, Proposed Revision 1).
C.III.2 2.3.4	Short-Term Atmospheric Dispersion Estimates for Accident Releases	Conforms
C.III.2 2.3.5	Long-Term Atmospheric Dispersion Estimates for Routine Releases	Conforms
C.III.2 2.4.1	Hydrologic Description	Conforms
C.III.2 2.4.2	Floods	Conforms
C.III.2 2.4.3	Probable Maximum Flood (PMF) on Streams and Rivers	Conforms
C.III.2 2.4.4	Potential Dam Failures	Conforms
C.III.2 2.4.5	Probable Maximum Surge and Seiche Flooding	Conforms
C.III.2 2.4.6	Probable Maximum Tsunami Hazards	Conforms
C.III.2 2.4.7	Ice Effects	Conforms. Addressed in DCD Appendix 3G.
C.III.2 2.4.8	Cooling Water Canals and Reservoirs	Conforms
C.III.2 2.4.9	Channel Diversions	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.2 2.4.10	Flooding Protection Requirements	Conforms. There are no safety-related SSCs that are not part of the DC facility.
C.III.2 2.4.11	Low Water Considerations	Conforms
C.III.2 2.4.12	Groundwater	Not applicable. A permanent dewatering system is not required.
C.III.2 2.4.13	Accidental Release of Radioactive Liquid Effluent in Ground and Surface Waters	Conforms
C.III.2 2.4.14	Technical Specifications and Emergency Operation Requirements	Conforms
C.III.2 2.5.1	Basic Geologic and Seismic Information	Conforms
C.III.2 2.5.2	Vibratory Ground Motion	Conforms
C.III.2 2.5.3	Surface Faulting	Conforms
C.III.2 2.5.4	Stability of Subsurface Materials and Foundations	Conforms
C.I 2.5.4.1	Geologic Features	Conforms
C.I 2.5.4.2	Properties of Subsurface Materials	Conforms
C.I 2.5.4.3	Foundation Interfaces	Conforms
C.I 2.5.4.4	Geophysical Surveys	Conforms
C.I 2.5.4.5	Excavations and Backfill	Conforms. Addressed in Sections 2.5.4.5 and 17.5.
C.I 2.5.4.6	Ground Water Conditions	Conforms
C.I 2.5.4.7	Response of Soil and Rock to Dynamic Loading	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.I 2.5.4.8	Liquefaction Potential	Conforms
C.I 2.5.4.9	Earthquake Site Characteristics	Conforms
C.I 2.5.4.10	Static Stability	Conforms
C.I 2.5.4.11	Design Criteria	Conforms
C.I 2.5.4.12	Techniques to Improve Subsurface Conditions	Conforms
C.III.2 2.5.5	Stability of slopes	Conforms
C.III.1 3.1	Conformance with NRC General Design Criteria	Conforms. Conformance with the NRC's criteria in 10 CFR 50, Appendix A, is described in DCD Section 3.1 and the applicable DCD system sections.
C.III.1 3.2.1	Seismic Classification	Conforms. There are no additional safety-related or RTNSS SSCs subject to seismic classification beyond those addressed in the DCD. There are no SSCs outside the referenced certified design that are required to be designed for an OBE.
C.III.1 3.2.2	System Quality Group Classification	Conforms. There are no additional safety-related or RTNSS SSCs subject to system quality group classification beyond those addressed in the DCD.
C.III.1 3.3.1 (1)	Wind Loadings	Conforms. There are no safety-related SSCs outside the scope of the certified design. Nonsafety-related facility SSCs that are not included in the referenced certified design meet the requirements of DCD Sections 3.3.1.3 and 3.3.2.3.
C.III.1 3.3.1 (2)	Wind Loadings	Conforms
C.III.1 3.3.2	Tornado Loadings	Conforms

15021b

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.4	Internal Flood Protection	Conforms. There are no SSCs outside the scope of the referenced certified design that require internal flood protection whose failure could prevent a safe shutdown of the plant or result in the uncontrolled release of significant radioactivity.
C.III.1 3.4.2	Analysis Procedures	Conforms. There are no Seismic Category I structures outside the scope of the referenced certified design.
C.III.1 3.5.1.1	Internally Generated Missiles (Outside Containment)	Conforms. There are no SSCs outside the scope of the referenced certified design that are required to be protected against damage from internally generated missiles.
C.III.1 3.5.1.2	Internally Generated Missiles (Inside Containment)	Conforms
C.III.1 3.5.1.3	Turbine Missiles	Conforms. Addressed in DCD Section 10.2.3.8.
C.III.1 3.5.1.4	Missiles Generated by Tornadoes and Extreme Winds	Conforms. Table 2.0-201 demonstrates that the site-specific tornado characteristics are bounded by the parameters assumed in the DCD. DCD Section 3.5.1.4 indicates that resistance to missiles is independent of site topography.
C.III.1 3.5.1.5	Site Proximity Missiles (Except Aircraft)	Conforms
C.III.2 3.5.1.6	Aircraft Hazards	Conforms
C.III.1 3.5.2	Structures, Systems, and Components To Be Protected from Externally Generated Missiles	Conforms. There are no SSCs outside the scope of the referenced certified design that are required to be protected from externally generated missiles.
C.III.1 3.5.3	Barrier Design Procedures	Conforms. There are no SSCs that require reanalysis for tornado, extreme wind, or site proximity missile impact or for aircraft impact.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.6	Protection against Dynamic Effects Associated with the Postulated Rupture of Piping	Conforms
C.III.1 3.6.1	Plant Design for Protection against Postulated Piping Failures in Fluid systems Outside of Containment	Conforms
C.III.1 3.6.2	Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping	Conforms
C.III.1 3.6.3	Leak-Before-Break Evaluation Procedures	Not Applicable. ESBWR design does not rely on a Leak Before Break Evaluation.
C.III.1 3.7.1	Seismic Design Parameters	Conforms. Addressed in DCD Sections 3.7 and 3.7.1.
C.III.1 3.7.1.1	Design Ground Motion	Conforms
C.III.1 3.7.1.2	Percentage of Critical Damping Values	Conforms
C.III.1 3.7.1.3	Supporting Media for Seismic Category I Structures	Conforms
C.III.1 3.7.2	Seismic System Analysis	Conforms. Addressed in DCD Section 3.7.2.
C.III.1 3.7.2.1	Seismic Analysis Methods	Conforms
C.III.1 3.7.2.2	Natural Frequencies and Responses	Conforms. Addressed in DCD Section 3.7.2.2.
C.III.1 3.7.2.3	Procedures Used for Analytical Modeling	Conforms
C.III.1 3.7.2.4	Soil/Structure Interaction	Conforms
C.III.1 3.7.2.5	Development of Floor Response Spectra	Conforms. Addressed in DCD Section 3.7.2.5.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.7.2.6	Three Components of Earthquake Motion	Conforms
C.III.1 3.7.2.7	Combination of Modal Responses	Conforms
C.III.1 3.7.2.8	Interaction of Nonseismic Category I Structures with Seismic Category I Structures	Conforms. There are no Seismic Category I structures outside the scope of the referenced certified design. In lieu of providing the plant-specific distances between structures and the heights of structures, the distance and height requirements for Non-Seismic Category I structures are addressed in DCD Section 3.7.2.8.
C.III.1 3.7.2.9	Effects of Parameter Variations on Floor Response Spectra	Conforms. Addressed in DCD Section 3.7.2.9.
C.III.1 3.7.2.10	Use of Constant Vertical Static Factors	Conforms
C.III.1 3.7.2.11	Method Used to Account for Torsional Effects	Conforms
C.III.1 3.7.2.12	Comparison of Responses	Conforms. Addressed in DCD Section 3.7.2.12.
C.III.1 3.7.2.13	Methods for Seismic Analysis of Dams	Not applicable. There are no Seismic Category I dams in the ESBWR design per DCD Section 3.7.3.14.
C.III.1 3.7.2.14	Determination of Dynamic Stability of Seismic Category I Structures	Conforms. Addressed in DCD Sections 3.7.2.14 and 3.8.5.5.
C.III.1 3.7.2.15	Analysis Procedure for Damping	Conforms
C.III.1 3.7.3.1	Seismic Analysis Methods	Conforms
C.III.1 3.7.3.2	Procedures Used for Analytical Modeling	Conforms
C.III.1 3.7.3.3	Analysis Procedure for Damping	Conforms
C.III.1 3.7.3.4	Three Components of Earthquake Motion	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.7.3.5	Combination of Modal Responses	Conforms. Addressed in DCD Section 3.7.3.7.
C.III.1 3.7.3.6	Use of Constant Vertical Static Factors	Conforms
C.III.1 3.7.3.7	Buried Seismic Category I Piping, Conduits, and Tunnels	Conforms. Addressed in DCD Section 3.7.3.13.
C.III.1 3.7.3.8	Methods for Seismic Analysis of Seismic Category I Concrete Dams	Not applicable. There are no Seismic Category I dams for Unit 3.
C.III.1 3.7.3.9	Methods for Seismic Analysis of Above-Ground Tanks	Conforms. Addressed in DCD Section 3.7.3.15.
C.III.1 3.7.4	Seismic Instrumentation	Conforms
C.III.1 3.8.1	Concrete Containment	Conforms
C.III.1 3.8.2	Steel Containment	Conforms
C.III.1 3.8.3	Concrete and Steel Internal Structures of Steel or Concrete Containments	Conforms
C.III.1 3.8.4	Other Seismic Category I Structures	Conforms. There are no Seismic Category I structures that are outside the scope of the DCD.
C.III.1 3.8.5	Foundations	Conforms
C.III.1 3.9.1	Special Topics for Mechanical Components	Conforms. There are no Seismic Category I components or supports beyond those evaluated in the reference certified design.
C.III.1 3.9.1.1	Design Transients	Conforms. There are no Seismic Category I components or supports beyond those evaluated in the reference certified design.
C.III.1 3.9.1.2	Computer Programs Used in Analysis	Conforms. There are no Seismic Category I components or supports beyond those evaluated in the reference certified design.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.9.1.3	Experimental Stress Analysis	Conforms. There are no Seismic Category I components or supports beyond those evaluated in the reference certified design.
C.III.1 3.9.1.4	Considerations for the Evaluation of the Faulted Condition	Conforms. There are no Seismic Category I components or supports beyond those evaluated in the reference certified design.
C.III.1 3.9.2	Dynamic Testing and Analysis of Systems, Components, and Equipment	Conforms. There are no systems outside the scope of the referenced certified design that require dynamic testing and analysis.
C.III.1 3.9.2.1	Piping Vibration, Thermal Expansion, and Dynamic Effects	Conforms. There are no ASME Code Class 1, 2, and 3 systems; other high-energy piping systems inside seismic Category I structures; high-energy portions of systems for which failure could reduce the functioning of any seismic Category I plant feature to an unacceptable level; or seismic Category I portions of moderate-energy piping systems located outside containment outside the scope of the referenced certified design.
C.III.1 3.9.2.2	Seismic Analysis and Qualification of Seismic Category I Mechanical Equipment	Conforms
C.III.1 3.9.2.3	Dynamic Response Analysis of Reactor Internals Under Operational Flow Transients and Steady-State Conditions	Conforms. There are no ESBWR pressure vessel internals that the referenced certified design does not cover.
C.III.1 3.9.2.4	Pre-Operational Flow-Induced Vibration Testing of Reactor Internals	Conforms. There are no BWR pressure vessel internals that the referenced certified design does not cover. DCD Sections 3.9.2.3 and 3.9.2.4 adequately cover the analysis of potential adverse flow effects that could impact BWR vessel internals.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.9.2.5	Dynamic System Analysis of the Reactor Internals Under Faulted Condition	Conforms. Addressed in DCD Section 3.9.3.1 and DCD Table 3.9-2.
C.III.1 3.9.2.6	Correlations of Reactor Internals Vibration Tests with the Analytical Results	Conforms. Addressed in DCD Section 3.9.2.6.
C.III.1 3.9.3	ASME Code Class 1, 2, and 3 Components and Component Supports, and Core Support Structures	Conforms. There are no pressure-retaining components or component supports designed or constructed in accordance with ASME Code Class 1, 2, or 3, or GDC 1, 2, 4, 14, or 15, beyond those evaluated in the referenced certified design.
C.III.1 3.9.4	Control Rod Drive Systems	Conforms
C.III.1 3.9.5.1	Design Arrangements	Conforms
C.III.1 3.9.5.2	Loading Conditions	Conforms
C.III.1 3.9.5.3	Design Bases	Conforms
C.III.1 3.9.5.4	BWR Reactor Pressure Vessel Internals Including Steam Dryer	Conforms. There are no reactor pressure vessel internals (including the steam dryer) or other main steam system components that are not covered by the referenced certified design. The reactor is classified as non-prototype.
C.III.1 3.9.6.1	Functional Design and Qualification of Pumps, Valves, and Dynamic Restraints	Conforms. There is no safety-related equipment beyond the scope of the referenced certified design.
C.III.1 3.9.6.2	Inservice Testing Program for Pumps	Not applicable. There are no safety-related pumps.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.9.6.3	Inservice Testing Program for Valves	Conforms. Addressed in DCD Section 3.9.6; the list of valves included in the IST program is provided in DCD Table 3.9-8. IST Program test procedures and schedules are addressed in TS Section 5.5.5. Justification for cold shutdown and refueling outage test schedules is addressed in DCD Section 3.9.6 and DCD Table 3.9-8. The implementation milestones for the IST and MOV Programs are addressed in Section 13.4.
C.III.1 3.9.6.3.1	Inservice Testing Program for Motor-Operated Valves (MOVs)	Conforms. Addressed in DCD Section 3.9.6.
C.III.1 3.9.6.3.2	Inservice Testing Program for Power-Operated Valves (POVs) Other Than MOVs	Conforms. Addressed in DCD Section 3.9.6.
C.III.1 3.9.6.3.3	Inservice Testing Program for Check Valves	Conforms. Addressed in DCD Section 3.9.6.
C.III.1 3.9.6.3.4	Pressure Isolation Valve (PIV) Leak Testing	Not applicable. The ESBWR plant does not have any PIVs.
C.III.1 3.9.6.3.5	Containment Isolation Valve (CIV) Leak Testing	Conforms
C.III.1 3.9.6.3.6	Inservice Testing Program for Safety and Relief Valves	Conforms. Addressed in DCD Table 3.9-8.
C.III.1 3.9.6.3.7	Inservice Testing Program for Manually Operated Valves	Conforms. Addressed in DCD Table 3.9-8.
C.III.1 3.9.6.3.8	Inservice Testing Program for Explosively Activated Valves	Conforms. Addressed in DCD Table 3.9-8.
C.III.1 3.9.6.4	Inservice Testing Program for Dynamic Restraints	Conforms with the following exception: A plant specific snubber table will be prepared in conjunction with closure of ITAAC Table 3.1-1.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.9.6.5	Relief Requests and Alternative Authorizations to ASME OM Code	Conforms
C.III.1 3.10.1	Seismic Qualification Criteria	Conforms. There is no seismic or dynamic qualification required for equipment that is outside the scope of the referenced certified design.
C.III.1 3.10.2	Methods and Procedures for Qualifying Mechanical and Electrical Equipment and Instrumentation	Conforms
C.III.1 3.10.3	Methods and Procedures of Analysis or Testing of Supports of Mechanical and Electrical Equipment and Instrumentation	Conforms
C.III.1 3.10.4	Test and Analyses Results and Experience Database	Conforms
C.III.1 3.11	Environmental Qualification of Mechanical and Electrical Equipment	Conforms. There is no other equipment beyond that which has been evaluated in the referenced certified design.
C.III.1 3.11.1	Equipment Location and Environmental Conditions	Conforms
C.III.1 3.11.2	Qualification Tests and Analysis	Conforms
C.III.1 3.11.3	Qualification Test Results	Conforms
C.III.1 3.11.4	Loss of Ventilation	Conforms
C.III.1 3.11.5	Estimated Chemical and Radiation Environment	Conforms
C.III.1 3.11.6	Qualification of Mechanical Equipment	Conforms
C.III.1 3.12.1	Introduction	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.12.2	Codes and Standards	Conforms. Addressed in DCD Sections 3.2, 3.6, 3.7, and in Chapters 5 and 14.
C.III.1 3.12.3	Piping Analysis Methods	Conforms. Addressed in DCD Sections 3.7.2.2 and 3.7.3.9.
C.III.1 3.12.3.1	Experimental Stress Analyses	Conforms. Addressed in DCD Section 3.9.1.3.
C.III.1 3.12.3.2	Modal Response Spectrum Method	Conforms. Addressed in DCD Section 3.7.2.1.
C.III.1 3.12.3.3	Response Spectra Method (or Independent Support Motion Method)	Conforms. Addressed in DCD Section 3.7.2.1.2.
C.III.1 3.12.3.4	Time History Method	Conforms. Addressed in DCD Section 3.7.2.1.1.
C.III.1 3.12.3.5	Inelastic Analyses Method	Not Applicable. Per DCD Section 3.9.1.4 (Inelastic Analyses Methods), except for pipe whip restraints, inelastic analyses methods are not used in the ESBWR piping design and analysis.
C.III.1 3.12.3.6	Small-Bore Piping Method	Conforms. Addressed in DCD Section 3.7.3.16.
C.III.1 3.12.3.7	Nonseismic/Seismic Interaction (II/I)	Conforms with the following exception: The location and distance between piping systems will be established as part of the completion of ITAAC Table 3.1-1.
C.III.1 3.12.3.8	Seismic Category I Buried Piping	Not Applicable. Per DCD Section 3.7.3.13, there is no buried Seismic Category I piping.
C.III.1 3.12.4	Piping Modeling Technique	Conforms. Addressed in DCD Section 3.7.3.3.1 and Appendix 3D for the PISYS computer code.
C.III.1 3.12.4.1	Computer Codes	Conforms. Addressed in DCD Appendix 3D.
C.III.1 3.12.4.2	Dynamic Piping Model	Conforms. Addressed in DCD Section 3.7.3.3.1.
C.III.1 3.12.4.3	Piping Benchmark Program	Conforms. Addressed in DCD Appendix 3D.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.12.4.4	Decoupling Criteria	Conforms. Addressed in DCD Sections 3.7.2.3 and 3.7.3.16.
C.III.1 3.12.5.1	Seismic Input Envelope vs. Site-Specific Spectra	Conforms. Addressed in DCD Section 3.7.1.
C.III.1 3.12.5.2	Design Transients	Conforms. Addressed in DCD Section 3.9.1.1 and DCD Table 3.9-1.
C.III.1 3.12.5.3	Loadings and Load Combination	Conforms. Addressed in DCD Section 3.9.1.1 and DCD Table 3.9-8.
C.III.1 3.12.5.4	Damping Values	Conforms. Addressed in DCD Section 3.7.1.2 and DCD Table 3.7-1.
C.III.1 3.12.5.5	Combination of Modal Responses	Conforms. Addressed in DCD Section 3.7.3.7.
C.III.1 3.12.5.6	High-Frequency Modes	Conforms. Addressed in DCD Sections 3.7.1.1 and 3.7.1.2.
C.III.1 3.12.5.7	Fatigue Evaluation of ASME Code Class 1 Piping	Conforms. Addressed in DCD Section 3.9.3.4 and DCD Table 3.9-8.
C.III.1 3.12.5.8	Fatigue Evaluation of ASME Code Class 2 and 3 Piping	Conforms. Addressed in DCD Section 3.9.
C.III.1 3.12.5.9	Thermal Oscillations in Piping Connected to the Reactor Coolant System	Conforms
C.III.1 3.12.5.10	Thermal Stratification	Conforms. Addressed in DCD Section 3.9.2.1.2.
C.III.1 3.12.5.11	Safety Relief Valve Design, Installation, and Testing	Conforms. Addressed in DCD Figures 5.2-3 and 5.4-3, and DCD Table 3.9-8.
C.III.1 3.12.5.12	Functional Capability	Conforms. Addressed in DCD Table 3.9-2, Note 13, and DCD Chapters 5 and 6.
C.III.1 3.12.5.13	Combination of Inertial and Seismic Anchor Motion Effects	Conforms. Addressed in DCD Section 3.7.3.9.
C.III.1 3.12.5.14	Operating-Basis Earthquake as a Design Load	Not applicable. The SSE establishes the design load for the ESBWR.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.12.5.15	Welded Attachments	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.5.16	Modal Damping for Composite Structures	Conforms. Addressed in DCD Section 3.7.2.13.
C.III.1 3.12.5.17	Minimum Temperature for Thermal Analyses	Conforms. Addressed in DCD Sections 3.9.1.1 and 3.9.3.1.
C.III.1 3.12.5.18	Intersystem Loss-of-Coolant Accident	Conforms. Addressed in DCD Appendix 3K.
C.III.1 3.12.5.19	Effects of Environment on Fatigue Design	Conforms. Addressed in DCD Section 3.9.3.4. The reference in RG 1.206 to 1.76 appears to be in error, and should have referenced 1.207.
C.III.1 3.12.6.1	Applicable Codes	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.6.2	Jurisdictional Boundaries	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.6.3	Loads and Load Combinations	Conforms. Addressed in DCD Section 3.9 and DCD Appendix 3B.
C.III.1 3.12.6.4	Pipe Support Baseplate and Anchor Bolt Design	Conforms. Addressed in DCD Section 3.9.3.7.
C.III.1 3.12.6.5	Use of Energy Absorbers and Limit Stops	Conforms. Addressed in DCD Section 3.9.3.7.
C.III.1 3.12.6.6	Use of Snubbers	Conforms. Addressed in DCD Section 3.9.3.7.1(3).
C.III.1 3.12.6.7	Pipe Support Stiffnesses	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.6.8	Seismic Self-Weight Excitation	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.6.9	Design of Supplementary Steel	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.6.10	Consideration of Friction Forces	Conforms. Addressed in DCD Section 3.9.3.7.1(5).
C.III.1 3.12.6.11	Pipe Support Gaps and Clearances	Conforms. Addressed in DCD Section 3.9.3.7.1.
C.III.1 3.12.6.12	Instrumentation Line Support Criteria	Conforms. Addressed in DCD Section 3.9.3.7.1.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 3.12.6.13	Pipe Deflection Limits	Conforms. Addressed in DCD Section 3.9.2.1.1 and Chapter 14.
C.III.1 3.13	Threaded Fasteners – ASME code Class 1, 2, and 3	Conforms
C.III.1 3.13.1.1	Materials Selection	Conforms
C.III.1 3.13.1.2	Special Materials Fabrication Processes and Special Controls	Conforms
C.III.1 3.13.1.3	Fracture Toughness Requirements for Threaded Fasteners Made of Ferritic Materials	Conforms
C.III.1 3.13.1.5	Certified Material Test Reports	Conforms
C.III.1 3.13.2	Inservice Inspection Requirements	Conforms
C.III.1 4.1	Reactor: Summary Description	Conforms
C.III.1 4.2	Fuel System Design	Conforms
C.III.1 4.3	Nuclear Design	Conforms
C.III.1 4.4	Thermal and Hydraulic Design	Conforms
C.III.1 4.5.1	Control Rod Drive Structural Materials	Conforms
C.III.1 4.5.2	Reactor Internal and Core Support Materials	Conforms
C.III.1 4.6	Functional Design of Reactivity Control System	Conforms
C.III.1 5.1	Reactor Coolant and Connecting Systems: Summary Description	Conforms
C.III.1 5.2.1	Compliance with ASME Codes and Code Cases	Conforms

| 50216

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 5.2.2.1	Design Bases	Conforms
C.III.1 5.2.2.2	Design Evaluation	Conforms
C.III.1 5.2.2.3	Piping and Instrumentation Diagrams	Conforms
C.III.1 5.2.2.4	Equipment and Component Description	Conforms
C.III.1 5.2.2.5	Mounting of Pressure-Relief Devices	Conforms
C.III.1 5.2.2.6	Applicable Codes and Classification	Conforms
C.III.1 5.2.2.7	Material Specification	Conforms
C.III.1 5.2.2.8	Process Instrumentation	Conforms
C.III.1 5.2.2.9	System Reliability	Conforms
C.III.1 5.2.2.10	Testing and Inspection	Conforms. Addressed in DCD Section 5.2.2.4, and in Section 3.9 and Chapter 14.
C.III.1 5.2.3.1	Material Specifications	Conforms
C.III.1 5.2.3.2	Compatibility with Reactor Coolant	Conforms. Addressed in DCD Section 5.2.3.
C.III.1 5.2.3.3	Fabrication and Processing of Ferritic Materials	Conforms
C.III.1 5.2.3.4	Fabrication and Processing of Austenitic Stainless Steels	Conforms
C.III.1 5.2.3.5	Prevention of Primary Water Stress-Corrosion Cracking for Nickel-Based Alloys (PWRs only)	Not applicable. Applies only to PWRs.
C.III.1 5.2.3.6	Threaded Fasteners	Conforms. Addressed in DCD Section 3.9.3.9.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 5.2.4.1	Inservice Inspection and Testing Program	Conforms. Addressed in DCD Section 5.2.4 and in Section 5.2.4.
C.III.1 5.2.4.2	Preservice Inspection and Testing Program	Conforms. Addressed in DCD Section 5.2.4.
C.III.1 5.2.5	Reactor Coolant Pressure Boundary Leakage Detection	Conforms
C.III.1 5.3.1.1	Material Specifications	Conforms
C.III.1 5.3.1.2	Special Processes Used for Manufacturing and Fabrication	Conforms
C.III.1 5.3.1.3	Special Methods for Nondestructive Examination	Conforms
C.III.1 5.3.1.4	Special Controls for Ferritic and Austenitic Stainless Steels	Conforms
C.III.1 5.3.1.5	Fracture Toughness	Conforms
C.III.1 5.3.1.6	Material Surveillance	Conforms. Addressed in DCD Section 5.3.1.6 and Section 5.3.1.8.
C.III.1 5.3.1.7	Reactor Vessel Fasteners	RG does not contain any guidance in this section.
C.III.1 5.3.2.1	Limit Curves	Conforms
C.III.1 5.3.2.2	Operating Procedures	Conforms. Addressed in DCD Sections 5.3.2.1, 5.3.2.2, and 5.3.3.6, and in Section 5.3.3.6.
C.III.1 5.3.2.3	Pressurized Thermal Shock (PWRs only)	Not applicable. Applies only to PWRs.
C.III.1 5.3.2.4	Upper-Shelf Energy	Conforms
C.III.1 5.3.3	Reactor Vessel Integrity	Conforms. Identification of a specific manufacturer is not required.
C.III.1 5.3.3.1	Design	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 5.3.3.2	Materials of Construction	Conforms
C.III.1 5.3.3.3	Fabrication Methods	Conforms
C.III.1 5.3.3.4	Inspection Requirements	Conforms. Addressed in DCD Section 5.3.3.4.
C.III.1 5.3.3.5	Shipment and Installation	Conforms. Addressed in DCD Section 5.3.3.5.
C.III.1 5.3.3.6	Operating Conditions	Conforms. Addressed in DCD Section 5.3.3.6.
C.III.1 5.3.3.7	Inservice Surveillance	Conforms. Addressed in DCD Section 5.3.3.7.
C.III.1 5.3.3.8	Threaded Fasteners	Conforms. Addressed in DCD Section 3.9.3.9.
C.III.1 5.4.1	Reactor Coolant Pumps or Circulation Pumps (BWR)	Conforms
C.III.1 5.4.1.1	Pump Flywheel Integrity (PWR)	Not applicable. Applies only to PWRs.
C.III.1 5.4.2	Steam Generators (PWR)	Not applicable. Applies only to PWRs.
C.III.1 5.4.3	Reactor Coolant System Piping and Valves	Conforms S069
C.III.1 5.4.4	Main Steamline Flow Restrictions	Conforms S069
C.III.1 5.4.5	Pressurizer	Not applicable. Applies only to PWRs. S069
C.III.1 5.4.6	Reactor Core Isolation Cooling System (BWRs/Isolation Condenser System (Economic Simplified BWR)	Conforms S069

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation	
C.III.1 5.4.7	Residual Heat Removal System/Passive Residual Heat Removal System (Advanced Light-Water Reactor) Shutdown Cooling Mode of the Reactor Water Cleanup System (Economic Simplified BWR)	Conforms	S069
C.III.1 5.4.8	Reactor Water Cleanup System (BWR) Reactor Water Cleanup/Shutdown Cooling System (Economic Simplified BWR)	Conforms	S069
C.III.1 5.4.9	Reactor Coolant System Pressure Relief Devices/Reactor Coolant Depressurization Systems	Conforms	S069
C.III.1 5.4.10	Reactor Coolant System Component Supports	Conforms	S069
C.III.1 5.4.11	Pressurizer Relief Discharge System (PWRs only)	Not applicable. Applies only to PWRs.	S069
C.III.1 5.4.12	Reactor Coolant System High-Point Vents	Conforms	S069
C.III.1 5.4.13	Main Steamline, Feedwater, and Auxiliary Feedwater Piping	Conforms	S069
C.III.1 6.1	Engineered Safety Features: Engineered Safety Feature Materials	Conforms. Addressed in DCD Section 6.1.	
C.III.1 6.1.1.1	Materials Selection and Fabrication	Conforms	
C.III.1 6.1.1.2	Composition and Compatibility of Core Cooling Coolants and Containment Sprays	Conforms. Addressed in DCD Sections 5.2.3.2, 5.2.3.4.1, 5.4.8, 6.1.1.3.4, 6.1.1.4, 6.1.2, 9.1.3, and 9.3.10.	
C.III.1 6.1.2	Organic Materials	Conforms	N115a

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 6.2	Containment Systems	Conforms
C.III.1 6.2.1	Containment Functional Design	Conforms
C.III.1 6.2.2	Containment Heat Removal Systems	Conforms
C.III.1 6.2.3	Secondary Containment Functional Design	Not Applicable. The ESBWR plant does not have a secondary containment.
C.III.1 6.2.4	Containment Isolation System	Conforms.
C.III.1 6.2.5	Combustible Gas Control in Containment	Conforms.
C.III.1 6.2.6	Containment Leakage Testing	Conforms. Addressed in DCD Sections 6.2.6.1 through 6.2.6.4, and in Section 13.4. Special testing requirements in RG 1.206, Section C.III.1, Section 6.2.6.5 are not applicable to the ESBWR.
C.III.1 6.2.7	Fracture Prevention of Containment Pressure Vessel	Conforms
C.III 6.3	Emergency Core Cooling System	Conforms. There are no aspects of the site-specific design that affect the LOCA analyses in the DCD.
C.III.1 6.4	Habitability Systems	Conforms
C.III.2 6.5	Fission Product Removal and Control Systems	Conforms
C.III.1 6.6	Inservice Inspection of Class 2 and 3 Components	Conforms. Addressed in DCD Section 6.6 and in Section 6.6.10.3.
C.III.1 6.6.1	Components Subject to Examination	Conforms
C.III.1 6.6.2	Accessibility	Conforms
C.III.1 6.6.3	Examination Techniques and Procedures	Conforms. Addressed in DCD Section 6.6.3.2. There are no special examination techniques required to meet the ASME Code.

| N115a

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 6.6.4	Inspection Intervals	Conforms. Addressed in DCD Section 6.6.4.
C.III.1 6.6.5	Examination Categories and Requirements	Conforms. Addressed in DCD Section 6.6.3.1.
C.III.1 6.6.6	Evaluation of Examination Results	Conforms (addressed in DCD Section 6.6.5), except that RG 1.206 references ASME Code Sections IWC-4000 and IWD-4000 for Class 2 and Class 3, respectively, whereas DCD Section 6.6.5 references IWA-4000. Later editions of ASME Code Section XI do not contain Sections IWC-4000 and IWD-4000, only IWA-4000. Therefore, the intent of the RG is met.
C.III.1 6.6.7	System Pressure Tests	Conforms. Addressed in DCD Section 6.6.6.
C.III.1 6.6.8	Augmented Inservice Inspection to Protect against Postulated Piping Failures	Conforms. Addressed in DCD Section 6.6.7.
C.III.1 6.7	Main Steamline Isolation Valve Leakage Control Steam (BWRs)	Not applicable to the ESBWR.
C.III.1 7	Instrumentation and Controls	Conforms. Addressed in DCD Chapter 7, Tier 1, and design-related ITAAC (DAC). There are no departures from the referenced certified design.
C.III.1 7.1	Introduction	Conforms. There is no safety-related instrumentation, control, or supporting system that has not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.2	Reactor Trip System	Conforms. There is no reactor trip system instrumentation, control, or supporting system that has not been addressed in the referenced certified design or other parts of the COL application.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 7.3	Engineered Safety Features Systems	Conforms. There are no ESF systems I&C or supporting systems that have not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.4	Systems Required for safe Shutdown	Conforms. There are no safe-shutdown systems I&C or supporting systems that have not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.5	Information Systems Important to Safety	Conforms. There are no information systems important to safety that have not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.6	Interlock Systems Important to Safety	Conforms. There are no interlock systems important to safety that have not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.7	Control Systems Not Required for Safety	Conforms. There is no control system instrumentation or supporting system that has not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.8	Diverse Instrumentation and Control Systems	Conforms. There is no diverse I&C system that has not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 7.9	Data Communication Systems	Conforms. There are no data communication systems that have not been addressed in the referenced certified design or other parts of the COL application.
C.III.1 8	Electrical Power	Conforms
C.III.1 8.1	Introduction	Conforms. There are no safety-related or RTNSS onsite AC or DC loads that are added to the referenced certified design. There are no safety-related or RTNSS electrical systems that are beyond the scope of the referenced certified design.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 8.2.1	Description	Conforms. Addressed in Section 8.2.
C.III.1 8.2.2	Analysis	Conforms. Addressed in Section 8.2.
C.III.1 8.3.1.1	AC Power Systems: Description	Conforms. Addressed in DCD Section 8.3.1 and in Section 8.3.1.1.
C.III.1 8.3.1.2	Analysis	Not applicable. Does not request information for passive designs.
C.III.1 8.3.1.3	Electrical Power System Calculations and Distribution System Studies for AC Systems	Conforms
C.III.1 8.3.2.1	DC Power Systems: Description	Not applicable. Does not request information for passive designs.
C.III.1 8.3.2.2	Analysis	Not applicable. Does not request information for passive designs.
C.III.1 8.3.2.3	Electrical Power System Calculations and Distribution System Studies for DC Systems	Conforms
C.III.1 8.4.1(1)	Station Blackout: Description	Not applicable. Does not request information for passive designs.
C.III.1 8.4.1(2)		Not applicable. Does not request information for passive designs.
C.III.1 8.4.1(3)		Conforms. Addressed in Section 8.3.2.1.1.
C.III.1 8.4.1(4)		Conforms. Addressed in Section 8.3.2.1.1.
C.III.1 8.4.2	Analysis	Not applicable. Does not request information for passive designs.
C.III 9.1.1	Fuel Storage and Handling: Criticality Safety of Fresh and Spent Fuel Storage and Handling	Conforms. Addressed in DCD Sections 9.1.1 and 9.1.2.
C.III 9.1.2	New and Spent Fuel Storage	Conforms. Addressed in DCD Section 9.1.2.
C.III 9.1.3	Spent Fuel Pool Cooling and Cleanup System	Conforms. Addressed in DCD Section 9.1.3.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III 9.1.4	Light Load Handling System (Related to Refueling)	Conforms
C.III.1 9.1.5	Overhead Heavy Load Handling System	Conforms. Addressed in DCD Section 9.1.5.5 and in Sections 9.1.4 and 9.1.5.
C.III.1 9.2.1.1	Station Service Water System (Open, Raw Water Cooling Systems): Design Bases	Conforms. Addressed in DCD Section 9.2.1.1.
C.III.1 9.2.1.2	System Description	Conforms. Addressed in DCD Section 9.2.1.2 and in Section 9.2.1.2.
C.III.1 9.2.1.3	Safety Evaluation	Conforms. Addressed in DCD Section 9.2.1.3 and in Section 9.2.1.2 (for long-term corrosion and fouling).
C.III.1 9.2.1.4	Inspection and Testing Requirements	Conforms. Addressed in DCD Section 9.2.1.4.
C.III.1 9.2.1.5	Instrumentation Requirements	Conforms. Addressed in DCD Section 9.2.1.5.
C.III 9.2.2	Cooling System for Reactor Auxiliaries (Closed Cooling Water Systems)	Conforms
C.III.1 9.2 (for DCD Section 9.2.3)	Makeup Water System Design Bases	Conforms. Design Bases, Safety Evaluation, Inspection and Testing Requirements, and Instrumentation are addressed in DCD Section 9.2.3. System Description is addressed in Section 9.2.3.
C.III.1 9.2.4	Potable and Sanitary Water Systems Design Bases	Conforms
C.III.1 9.2.5	Ultimate Heat Sink	The design of the UHS is within the scope of the referenced certified design, and inspection and testing requirements are addressed in DCD Section 9.2.5.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 9.2.6	Condensate Storage Facilities	Conforms. There are no safety-related or RTNSS condensate storage facilities outside the scope of the referenced certified design that are sources of water for residual heat removal or sources of coolant inventory makeup for safety-related systems.
C.III.1 9.2 (for DCD Section 9.2.7)	Chilled Water System	Conforms. Addressed in DCD Section 9.2.7.
C.III.1 9.2 (for DCD Section 9.2.8)	Turbine Component Cooling Water System	Conforms. Addressed in DCD Section 9.2.8.
C.III.1 9.2 (for DCD Section 9.2.10)	Station Water System	Conforms. Design Bases, Safety Evaluation, Inspection and Testing Requirements, and Instrumentation are addressed in DCD Section 9.2.10. System Description is addressed in Section 9.2.10.
C.III.1 9.3	Process Auxiliaries	Conforms. Hydrogen Water Chemistry is addressed in Section 9.3.9, Oxygen Injection System is addressed in Section 9.3.10, Zinc Injection System is addressed in Section 9.3.11, and Auxiliary Boiler System is addressed in DCD Section 9.3.12.
C.III.1 9.3 1	Compressed Air Systems	Conforms. Instrument Air is addressed in DCD Section 9.3.6, Service Air is addressed in DCD Section 9.3.7, and High Pressure Nitrogen Supply System is addressed in DCD Section 9.3.8.
C.III.1 9.3.2	Process and Postaccident Sampling Systems	Conforms
C.III.1 9.3.3	Equipment and Floor Drain System	Conforms. Addressed in DCD Section 9.3.3.
C.III.1 9.3.4	Chemical and Volume Control System (PWRs) (Including Boron Recovery System)	Not applicable. Applies only to PWRs.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 9.3.5	Standby Liquid Control System	Conforms
C.III.1 9.4	Air Conditioning, Heating, Cooling, and Ventilation Systems	Conforms. Reactor Building HVAC System is addressed in DCD Section 9.4.6, Electric Building Heating, Ventilation, and Air Conditioning System is addressed in DCD Section 9.4.7, and Drywell Cooling System is addressed in DCD Section 9.4.8.
C.III.1 9.4.1	Control Room Area Ventilation System	Conforms
C.III.1 9.4.2	Spent Fuel Pool Area Ventilation Systems	Conforms
C.III.1 9.4.3	Auxiliary and Radwaste Area Ventilation System	Conforms
C.III.1 9.4.4	Turbine Building Area Ventilation System	Conforms
C.III.1 9.4.5	Engineered Safety Feature Ventilation System	Conforms
C.III.I 9.5.1	Fire Protection Program	Conforms
C.III.1 9.5.1.1(1)		Conforms
C.III.1 9.5.1.1(2)		Conforms
C.III.1 9.5.1.1(3)		Conforms. Addressed in DCD Section 1.7.
C.III.1 9.5.1.1(4)		Conforms. Will be completed in accordance with the milestones in Section 13.4.
C.III.1 9.5.1.1(5)		Conforms. Will be completed in accordance with the milestones in Section 13.4.
C.III.1 9.5.1.1(6)		Conforms
C.III.1 9.5.1.1(7)		Conforms. Will be completed in accordance with the milestones in Section 13.4.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 9.5.1.1(8)		Conforms
C.III.1 9.5.1.1(9)		Conforms. Addressed in DCD Sections 9.5.1.15 and 14.3, and in Section 13.4.
C.III.1 9.5.2	Communication System	Conforms. Addressed in DCD Section 9.5.2 and in Section 9.5.2.
C.III.1 9.5.3	Lighting System	Conforms. Addressed in DCD Section 9.5.3.
C.III.1 9.5.4	Diesel Generator Fuel Oil Storage and Transfer Systems	Conforms. Addressed in DCD Section 9.5.4 and in Section 9.5.4.
C.III.1 9.5.4.1	Design Basis	Conforms. Addressed in DCD Section 9.5.4.
C.III.1 9.5.4.2	System Description	Conforms
C.III.1 9.5.4.3	Safety Evaluation	Conforms
C.III.1 9.5.5	Diesel Generator Cooling Water Systems	Conforms. Addressed in DCD Section 9.5.5.
C.III.1 9.5.6	Diesel Generator Starting Systems	Conforms. Addressed in DCD Section 9.5.6.
C.III.1 9.5.7	Diesel Generator Lubrication Systems	Conforms. Addressed in DCD Section 9.5.7.
C.III.1 9.5.8	Diesel Generator Combustion Air Intake and Exhaust System	Conforms. Addressed in DCD Section 9.5.8.
C.III.1 10.1	Steam and Power Conversion: Introduction	Conforms. There are no principal design features of the steam and power conversion system that are outside the scope of the referenced certified design.
C.III.1 10.2.1 (1)	Design Bases	Conforms. Addressed in DCD Section 10.2.1.
C.III.1 10.2.1 (2)	Design Bases	Conforms. Addressed in DCD Section 10.2.2.
C.III.1 10.2.1 (3)	Design Bases	Conforms. Addressed in DCD Sections 3.5.1, 3.5.3, 3.6, and 10.2.4, and DCD Figure 3.5-2.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 10.2.2 (1)	Description	Conforms. Addressed in DCD Sections 10.2.2, 10.2.3, and DCD Figures 1.2-12 to 1.2-20, 3.5-2, and 10.1-1.
C.III.1 10.2.2 (2)	Description	Conforms. Addressed in DCD Sections 10.2.2 and 10.2.3.
C.III.1 10.2.2 (3)	Description	Conforms. Addressed in DCD Section 10.2.2 and DCD Figures 10.2-1, 10.2-2, and 10.2-3.
C.III.1 10.2.2 (4)	Description	Conforms. Addressed in DCD Sections 10.2.3 and 14.2.8.
C.III.1 10.2.2 (5)	Description	Conforms. Addressed in DCD Sections 12.2.1, 12.2.3, 12.4.4, DCD Table 12.2-23, and DCD Figures 12.3-12 to 12.3-18 and 12.3-32 to 12.3-38.
C.III.1 10.2.2 (6)	Description	Conforms. Addressed in DCD Sections 3.6, 10.2.2, and 10.2.4.
C.III.1 10.2.3 (1)	Turbine Rotor Integrity	Conforms. Addressed in DCD Section 10.2.3 and Section 10.2.3.8.
C.III.1 10.2.3 (2)	Turbine Rotor Integrity	Conforms. Addressed in DCD Section 10.2.3 and Section 10.2.3.8.
C.III.1 10.2.3 (3)	Turbine Rotor Integrity	Conforms. Addressed in DCD Section 10.2.3 and Section 10.2.3.8.
C.III.1 10.2.3 (4)	Turbine Rotor Integrity	Conforms. Addressed in DCD Section 10.2.3 and Section 10.2.3.8.
C.III.1 10.2.3 (5)	Turbine Rotor Integrity	Conforms. Addressed in DCD Sections 10.2.2 and 10.2.3, and Section 10.2.3.8.
C.III.1 10.3	Main Steam Supply System	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.1 (1)	Design Bases	Conforms. Addressed in DCD Section 10.3.1.
C.III.1 10.3.1 (2)	Design Bases	Conforms. Addressed in DCD Section 10.3.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 10.3.1 (3)	Design Bases	Conforms. Addressed in DCD Sections 10.3.2 and 10.3.3.
C.III.1 10.3.1 (4)	Design Bases	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.1 (5)	Design Bases	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.1 (6)	Design Bases	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.2	Description	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.3	Evaluation	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.4	Inspection and Testing Requirements	Conforms. Addressed in DCD Section 10.3.4.
C.III.1 10.3.5	Water Chemistry (PWR Only)	Not applicable. Only applies to PWRs.
C.III.1 10.3.6 (1)	Steam and Feedwater System Materials	Conforms. Addressed in DCD Section 10.3.6.
C.III.1 10.3.6 (2)	Steam and Feedwater System Materials	Conforms. Addressed in DCD Sections 6.6 and 10.3.4.
C.III.1 10.3.6 (3)	Steam and Feedwater System Materials	Not applicable. DCD Section 10.3.6 states that there are no austenitic stainless steels in the steam and feedwater system piping.
C.III.1 10.3.6 (4)	Steam and Feedwater System Materials	Not Applicable. DCD Section 10.3.6 states that there are no austenitic stainless steels in the ASME Code Section III Class 1 and 2 portions of steam and feedwater piping.
C.III.1 10.3.6 (5)	Steam and Feedwater System Materials	Conforms. Addressed in DCD Section 10.3.
C.III.1 10.3.6 (6)	Steam and Feedwater System Materials	Not applicable
C.III.1 10.4 (1)	Other Features of the Steam and Power Conversion System	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 10.4.1	Main Condensers	Conforms. Sampling points for detection are discussed in DCD Section 10.4.1.5.4. Although sodium content and sampling for sodium content is not specifically mentioned in DCD Section 10.4.1, monitoring condensate for an increase in conductivity is considered an acceptable means to detect condenser tube leakage. A table of key parameters and associated action levels is provided as Table 10.4-201. Alarm setpoints are established to provide an indication of abnormal chemistry conditions prior to reaching a recommended action level.
C.III.1 10.4.2	Main Condenser Evacuation System	Conforms. There are no design features of the main condenser evacuation system that are outside the scope of the referenced certified design.
C.III.1 10.4.3 (1)	Turbine Gland Sealing System	Conforms. Addressed in DCD Section 10.4.3.
C.III.1 10.4.3 (2)		Conforms with the following exception: For the operational phase, the QA Program is described in Chapter 17, and is based on NQA-1, rather than RG 1.33.
C.III.1 10.4.4 (1)	Turbine Bypass System	Conforms. The Turbine Bypass System is consistent with the referenced certified design.
C.III.1 10.4.5 (1)	Circulating Water System	Conforms
C.III.1 10.4.5 (2)		Not applicable. The circulating water system does not interface with the UHS.
C.III.1 10.4.6 (1)	Condensate Cleanup System	Conforms
C.III.1 10.4.6 (2)		Conforms. Addressed in DCD Sections 10.4.1, 10.4.6, and 5.2.3, DCD Table 5.2-5, and in Table 10.4-201.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 10.4.6 (3)		Conforms
C.III.1 10.4.6 (4)		Not applicable. Only applies to PWRs.
C.III.1 10.4.7 (1)	Condensate and Feedwater Systems	Not applicable. Only applies to PWRs.
C.III.1 10.4.7 (2)		Conforms. Addressed in DCD Sections 1.2.2 and 5.2.4, and DCD Tables 1.9-22 and 1.11-1.
C.III.1 10.4.7 (3)		Not applicable. The condensate and feedwater systems are consistent with the referenced certified design.
C.III.1 10.4.8	Steam Generator Blowdown System (PWR)	Not applicable. Only applies to PWRs.
C.III.1 10.4.9	Auxiliary Feedwater System (PWR)	Not applicable. Only applies to PWRs.
C,III.1 11.1	Source Terms	Conforms
C.III.1 11.2.1(1)	Liquid Waste Management Systems: Design Bases	Conforms. Addressed in DCD Section 11.2 and in Section 11.2.
C.III.1 11.2.1(2)	Design Bases	Conforms. Addressed in DCD Section 11.2.
C.III.1 11.2.1(3)	Design Bases	Conforms. Addressed in DCD Section 11.2.1 and DCD Table 11.2-3. Conformance with RG 1.140 is addressed in DCD Section 9.4.3.
C.III.1 11.2.1(4)	Design Bases	Conforms. Addressed in DCD Section 9.4.3.
C.III.1 11.2.1(5)	Design Bases	Conforms. Addressed in DCD Sections 11.2.3 and 15.3.16 and in Section 2.4.13.
C.III.1 11.2.1(6)	Design Bases	Conforms. Quality Assurance Program requirements are addressed in Chapter 17.
C.III.1 11.2.1(7)	Design Bases	Conforms. Addressed in DCD Section 11.2.4.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 11.2.1(8)	Design Bases	Conforms
C.III.1 11.2.1(9)	Design Bases	Conforms. Addressed in DCD Section 11.2.2 and in Section 11.2.
C.III.1 11.2.2(1)	System Description	Conforms. Addressed in DCD Section 11.2.2.
C.III.1 11.2.2(2)	System Description	Conforms. Addressed in DCD Section 11.2.2.
C.III.1 11.2.2(3)	System Description	Conforms. Addressed in DCD Section 11.2.2.
C.III.1 11.2.2(4)	System Description	Conforms. Addressed in DCD Section 11.2.2.
C.III.1 11.2.3(1)	Radioactive Effluent Releases	Conforms. Addressed in DCD Sections 11.2 and 12.2, and in Section 12.2.
C.III.1 11.2.3(2)	Radioactive Effluent Releases	Conforms. Addressed in DCD Sections 11.2 and 12.2, and in Section 12.2.
C.III.1 11.3.1(1)	Gaseous Waste Management Systems: Design Bases	Addressed in DCD Section 11.3. Conforms with the following exception: No discussion is provided regarding the capability of and requirements for using portable processing equipment for refueling outages.
C.III.1 11.3.1(2)	Design Bases	Conforms. Addressed in DCD Section 11.3.
C.III.1 11.3.1(3)	Design Bases	Conforms. Addressed in DCD Section 11.3.
C.III.1 11.3.1(4)	Design Bases	Conforms. Quality Assurance Program requirements are addressed in Chapter 17.
C.III.1 11.3.1(5)	Design Bases	Conforms. Addressed in DCD Section 11.3.5.
C.III.1 11.3.1(6)	Design Bases	Conforms. Addressed in DCD Section 12.6 and in Section 12.6.
C.III.1 11.3.1(7)	Design Bases	Conforms. Addressed in DCD Section 11.3.
C.III.1 11.3.2(1)	System Description	Conforms. Addressed in DCD Section 11.3.2.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 11.3.2(2)	System Description	Conforms. Addressed in DCD Section 11.3.2.
C.III.1 11.3.2(3)	System Description	Conforms. Addressed in DCD Section 11.3.2.
C.III.1 11.3.2(4)	System Description	Conforms. Addressed in DCD Sections 11.3.2, 11.3.3, and 9.4.
C.III.1 11.3.3	Radioactive Effluent Releases	Conforms. Addressed in DCD Sections 11.3 and 12.2, and in Section 12.2.
C.III.1 11.4.1(1)	Solid Waste Management System: Design Bases	Conforms. Addressed in DCD Section 11.4 and in Section 11.4.
C.III.1 11.4.1(2)	Design Bases	Conforms. Addressed in DCD Section 11.4 and in Section 11.4.
C.III.1 11.4.1(3)	Design Bases	Conforms. Addressed in DCD Section 11.4 and in Section 11.4.
C.III.1 11.4.1(4)	Design Bases	Conforms. Addressed in DCD Section 11.4 and in Sections 11.4, 13.5, and 17.5.
C.III.1 11.4.1(5)	Design Bases	Conforms. Addressed in DCD Section 11.4 and in Section 11.4.
C.III.1 11.4.1(6)	Design Bases	Conforms.
C.III.1 11.4.1(7)	Design Bases	Conforms. Addressed in DCD Section 11.4.
C.III.1 11.4.2(1)	System Description	Addressed in DCD Section 11.4 and in Section 11.4. Conforms with the following exception: The FSAR provides a description of the PCP. Detailed waste packaging methodologies will be provided in the PCP. The implementation milestone is provided in Section 13.4.
C.III.1 11.4.2(2)	System Description	Addressed in DCD Section 11.4 and in Section 11.4. Conforms with the following exception: The FSAR provides a description of the PCP. Detailed waste packaging methodologies will be provided in the PCP. The implementation milestone is provided in Section 13.4.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 11.4.2(3)	System Description	Addressed in DCD Section 11.4 and in Section 11.4. Conforms with the following exception: The FSAR provides a description of the PCP. Detailed waste packaging methodologies will be provided in the PCP. The implementation milestone is provided in Section 13.4. There are no temporary onsite storage facilities.
C.III.1 11.4.2 (4)	System Description	Conforms. Addressed in DCD Section 11.4.
C.III.1 11.4.3 (1)	Radioactive Effluent Releases	Addressed in DCD Section 11.4 and in Section 11.4. Conforms with the following exception: The FSAR provides a description of the PCP. Detailed waste packaging methodologies will be provided in the PCP. The implementation milestone is provided in Section 13.4.
C.III.1 11.4.3 (2)	Radioactive Effluent Releases	Conforms. Addressed in DCD Sections 3.1 and 11.4.
C.III.1 11.4.3 (3)	Radioactive Effluent Releases	Conforms. Addressed in DCD Section 12.2.
C.III.1 11.5.1	Process and Effluent Radiological Monitoring and Sampling Systems: Design Bases	Conforms
C.III.1 11.5.2(1)	System Description	Conforms. Addressed in DCD Section 11.5.
C.III.1 11.5.2 (2)	System Description	Conforms with the following exception: Section 11.5 provides a description of the ODCM. The implementation milestone is provided in Section 13.4.
C.III.1 11.5.2 (3)	System Description	Conforms with the following exception: Section 11.5 and TS Section 5 provide a description of radiological effluent controls. The implementation milestone is provided in Section 13.4. N115c
C.III.1 11.5.2 (4)	System Description	Conforms with the following exception: Section 11.5 and TS Section 5 provide a description of the REMP. The implementation milestone is provided in Section 13.4. N115c

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation	
C.III.1 11.5.2 (5)	System Description	Conforms. Addressed in DCD Sections 3.1 and 11.5.	
C.III.1 11.5.2 (6)	System Description	Conforms	
C.III.1 11.5.2 (7)	System Description	Conforms	
C.III.1 11.5.3	Effluent Monitoring and Sampling	Conforms	
C.III.1 11.5.4	Process Monitoring and Sampling	Conforms	
C.III.1 12.1.1	Policy Considerations	Conforms. Addressed in Sections 12.1 and 12.5.	
C.III.1 12.1.2	Design Considerations	Conforms. Addressed in Section 12.5.	
C.III.1 12.1.3	Operational Considerations	Conforms. Addressed in Sections 12.1 and 12.5.	
C.III.1 12.2.1	Contained Sources	Conforms. Addressed in DCD Section 12.2.1.	12.03-12.04-9
C.III.1 12.2.2	Airborne Radioactive Material Sources	Conforms	
C.III.1 12.3.1	Facility Design Features	Conforms	
C.III.1 12.3.2	Shielding	Conforms	
C.III.1 12.3.3	Ventilation	Conforms. Addressed in DCD Sections 9.4.1 and 12.3.	
C.III.1 12.3.4	Area Radiation and Airborne Radioactivity Monitoring Instrumentation	Conforms. Addressed in Sections 12.3 and 12.5.	12.03-12.04-9
C.III.1 12.3.5	Dose Assessment	Conforms. Addressed in DCD Section 12.4 and in Section 12.4.	
C.III.1 12.4	Dose Assessment	Conforms	
C.III.1 12.5 (1) (a)	Operational Radiation Protection Program: Organization	Conforms. Addressed in Sections 12.5 and 13.1.	
C.III.1 12.5 (1) (b)	Facilities	Conforms	

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 12.5 (1) (c)	Instrumentation and Equipment	Conforms
C.III.1 12.5 (1) (d)	Procedures	Conforms
C.III.1 12.5 (1) (e)	Training	Conforms. Addressed in Sections 12.5 and 13.2.
C.III.1 12.5 (2)		Conforms. Addressed in DCD Section 12.3.
C.III.1 12.5 (3)		Conforms. Addressed in Sections 12.5, 13.1, and 13.4.
C.III.1 12.5 (4)		Conforms. Addressed in Section 13.4.
C.III.1 12.5, last paragraph		Conforms. Addressed in Sections 12.5, 13.1, 13.2, and 13.5.
C.III.1 12.5.1	Organization	Conforms. Addressed in Sections 12.5 and 13.1.
C.III.1 12.5.2	Equipment, Instrumentation, and Facilities	Conforms
C.III.1 12.5.3	Procedures	Addressed in Sections 12.5, 13.2, 13.5, and 17.5. Conforms with one exception: With respect to RG 1.33, Dominion's QA procedures follow NQA-1 rather than the older standards referenced in RG 1.33. The QA requirements are described in Section 17.5.
C.III.1 13.1.1(1)	Organizational Structure of Applicant: Management and Technical Support Organization	Conforms. Addressed in Sections 13.1 and 14.2.
C.III.1 13.1.1(2)		Conforms
C.III.1 13.1.1(3)		Conforms
C.III.1 13.1.1(4)		Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.1.1(5)		Conforms
C.III.1 13.1.1(6)		Conforms
C.III.1 13.1.1(7)		Conforms. Addressed in Sections 13.1 and 14.2.
C.III.1 13.1.1.1	Design, Construction, and Operating Responsibilities	Conforms
C.III.1 13.1.1.2	Organizational Arrangement	Conforms. Addressed in Sections 13.1 and 17.5. Unit 3 is not a new, multi-unit plant site.
C.III.1 13.1.1.3	Qualifications	Conforms. Addressed in Sections 13.1 and 17.5.
C.III.1 13.1.2(1)		Exception. The guidelines of RG 1.33 are met through equivalent administrative controls described in Chapter 17.
C.III.1 13.1.2(2)		Exception. The guidelines of RG 1.33 are met through equivalent administrative controls described in Chapter 17.
C.III.1 13.1.2(3)		Conforms. Addressed in Sections 9.5.1 and 13.1.
C.III.1 13.1.2(4)		Conforms
C.III.1 13.1.2(5)		Conforms
C.III.1 13.1.2(6)		Conforms
C.III.1 13.1.2(7)		Conforms
C.III.1 13.1.2(8)		Conforms. Addressed in Appendix 13AA.
C.III.1 13.1.2.1	Plant Organization	Conforms. Addressed in Sections 13.1 and 17.5.
C.III.1 13.1.2.2(1)	Plant Personnel Responsibilities and Authorities	Conforms. Addressed in Sections 13.1 and 17.5.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.1.2.2(2)		Conforms
C.III.1 13.1.2.2(3)		Conforms
C.III.1 13.1.2.3	Operating Shift Crews	Conforms
C.III.1 13.1.3.1	Qualification Requirements	Conforms. Addressed in Sections 13.1 and 17.5.
C.III.1 13.1.3.2	Qualifications of Plant Personnel	Exception. Resumes will not be included in the application, but will be available for inspection at corporate headquarters upon request.
C.III.1 13.2.1	Plant Staff Training Program	Conforms
C.III.1 13.2.1.1 Licensed Staff (1)		Conforms with the following exceptions: 1) this item discusses inclusion of details of the licensed training program. As noted in Appendix 13BB, the systematic approach to training (SAT) process is used to establish and maintain training programs. Course duration and content are determined by the SAT process and by administrative procedure and are not included in the FSAR section; 2) the requirement for a "contingency plan…in the event fuel loading is subsequently delayed"' is met by the operator re-qualification program; and 3) the industry standard content for this section does not include a discussion of proposed schedule for licensed personnel.
C.III.1 13.2.1.1 Licensed Staff (2)		Conforms
C.III.1 13.2.1.1 Licensed Staff (3)		Conforms

| S011

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.2.1.1 Licensed Staff (4)		Conforms
C.III.1 13.2.1.1 Licensed Staff (5)		Conforms
C.III.1 13.2.1.1 Licensed Staff (6)		Conforms
C.III.1 13.2.1.1 Non-licensed Staff (1)		Conforms
C.III.1 13.2.1.1 Non-licensed Staff (2)		Conforms
C.III.1 13.2.1.1 Non-licensed Staff (3)		Exception – This item discusses programs not covered under 10 CFR 50.120. As noted in Appendix 13BB, the systematic approach to training (SAT) process is used to establish and maintain training programs. Course duration and content are determined by the SAT process and by administrative procedure and are not included in the FSAR section.
C.III.1 13.2.1.1 Non-licensed Staff (4)		Conforms. Addressed in Section 9.5.1.
C.III.1 13.2.1.1 Non-licensed Staff (5)		Conforms

I 5011

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.2.1.1 Non-licensed Staff (6)		Conforms with the following exception: The first part of this item discusses detailed course descriptions. As noted in Appendix 13BB, the systematic approach to training (SAT) process is used to establish and maintain training programs. Course duration and content are determined by the SAT process and by administrative procedure and are not included in the FSAR section. The implementation milestone is addressed in Section 13.4.
C.III.1 13.2.1.1 Non-licensed Staff (7)		Conforms
C.III.1 13.2.1.2	Coordination with Preoperational Tests and Fuel Loading	Conforms with the following exception – Rather than providing contingency plans for training in the event of significantly delayed fuel loading the retraining programs are utilized, as described in Appendix 13BB. Figure 13.1-202 shows the training schedule relative to fuel loading.
C.III.1 13.2.2(1)	Applicable NRC Documents: 10 CFR 19	Conforms
C.III.1 13.2.2(2)	10 CFR 26	Conforms
C.III.1 13.2.2(3)	10 CFR 50	Conforms
C.III.1 13.2.2(4)	10 CFR 50 Appendix E	Conforms
C.III.1 13.2.2(5)	10 CFR 52	Conforms
C.III.1 13.2.2(6)	10 CFR 55	Conforms
C.III.1 13.2.2(7)	RG 1.8	Addressed in Table 1.9-202.
C.III.1 13.2.2(8)	RG 1.149	Addressed in Table 1.9-202.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.2.2(9)	NUREG-0711	Conforms. HFE addressed in DCD Chapter 18.
C.III.1 13.2.2(10)	NUREG-1021	Exception: Industry standard content for this section does not explicitly include discussion of compliance with NUREG-1021, Operator Licensing Examination Standards for Power Reactors.
C.III.1 13.2.2(11)	NUREG-1220	Not applicable. NUREG provides instructions for NRC inspectors.
C.III.1 13.2.2(12)	GL 86-04	Conforms
C.III.1 13.2.2(13)	RG 1.134	Conforms. Industry standard content for this section does not explicitly include a discussion of compliance with RG 1.134, Medical Evaluations.
C.III.1 13.3(1)	Emergency Planning	Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3(2)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3(3)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3(4)		Conforms. Addressed in Chapter 2, and the Emergency Plan and Evacuation Time Estimate in COLA Part 5.
C.III.1 13.3(5)		Conforms. Addressed in COLA Part 5.
C.III.1 13.3(6)		Not applicable. Applies when state and/or local governments decline to participate in emergency planning and preparedness.
C.III.1 13.3(7)		Conforms
C.III.1 13.3.1 (1)	Combined License Application and Emergency Plan Content	Conforms. Addressed in COLA Part 5.
C.III.1 13.3.1 (2)		Conforms. Addressed in COLA Part 5 and 10.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.3.1 (3)		Conforms. Addressed in Chapter 1 and the Emergency Plan in COLA Part 5.
C.III.1 13.3.1 (4)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3.1 (5)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3.1 (6)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3.1 (7)		Conforms. Addressed in Chapter 1.
C.III.1 13.3.1 (8)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3.1 (9)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3.2 (1)	Emergency Plan Considerations for Multiunit Sites	Conforms. The Unit 3 EP is a stand-alone plan and does not rely upon the EP for Units 1 and 2.
C.III.1 13.3.2 (2)		Not applicable. The Unit 3 EP is a stand-alone plan and does not rely upon the EP for Units 1 and 2.
C.III.1 13.3.2 (3)		Conforms. Addressed in the Emergency Plan in COLA Part 5 and 10.
C.III.1 13.3.2 (4)		Conforms. Addressed in COLA Part 5.
C.III.1 13.3.2 (5)		Conforms. Addressed in the Emergency Plan in COLA Part 5.
C.III.1 13.3.2 (6)		Conforms. Addressed in the Emergency Plan and the Evacuation Time Estimate in COLA Part 5.
C.III.1 13.3.2 (7)		Not applicable. Provisions for co-located licensees do not apply.
C.III.1 13.3.2 (8)		Conforms. Addressed in COLA Part 10.
C.III.1 13.3.2 (9)		Not applicable. There are no adjacent sites.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 13.3.3	Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria	Conforms with the following exceptions: 1. Did not include ITAAC in COLA Part 10 to address the non-bolded items in RG 1.206, Table II.C.1-B1. 2. Did not include ITAAC in COLA Part 10 to address RG 1.206, Table II.C.1-B1 ITAAC 17.0.
C.III.1 13.4	Operational Program Implementation	Conforms
C.III.1 13.5.1	Administrative Procedures	Conforms. Addressed in Sections 13.5 and 17.5.
C.III.1 13.5.2.1	Operating and Emergency Operating Procedures	Conforms with the following exception: Section 13.5.1 identifies classes of procedures by topic or type in lieu of the specific title. Operating procedures will be developed after activities such as job and task analyses have been completed.
C.III.1 13.5.2.2	Maintenance and Other Operating Procedures	Conforms
C.III.1 13.6	Security	Conforms. Addressed in Sections 13.4 and 13.6, and COLA Part 8.
C.I 13.7	FFD	Conforms
C.III.1 14.1	Verification Program: Specific Information to be Addressed for the Initial Plant Test Program	Conforms. Addressed in Sections 14.2 and 14.3.
C.III.1 14.2	Initial Plant Test Program	Conforms
C.III.1 14.2.1	Summary of Test Program and Objectives	Conforms
C.III.1 14.2.2	Organization and Staffing	Conforms. Addressed in DCD Section 14.2 and in Sections 13.1, 14.2, and 17.5.
C.III.1 14.2.3	Test Procedures	Conforms. Addressed in DCD Section 14.2.
C.III.1 14.2.4	Conduct of Test Program	Conforms. Addressed in DCD Section 14.2.

14.03.10-1.7

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 14.2.5	Review, Evaluation, and Approval of Test Results	Conforms. Addressed in DCD Section 14.2.
C.III.1 14.2.6	Test Records	Conforms
C.III.1 14.2.7	Conformance of Tests Programs with Regulatory Guides	Conforms. Addressed in DCD Section 14.2.3.
C.III.1 14.2.8	Utilization of Reactor Operating and Testing Experiences in Development of Test Program	Conforms. Addressed in DCD Section 14.2 and in Section 14.2.
C.III.1 14.2.9	Trial Use of Plant Operating and Emergency Procedures	Conforms. Addressed in DCD Section 14.2.5 and in Section 13.2.
C.III.1 14.2.10	Initial Fuel Loading and Initial Criticality	Conforms. Addressed in DCD Section 14.2.6.
C.III.1 14.2.11	Test Program Schedule	Conforms. Addressed in DCD Section 14.2.7 and in Section 14.2.7.
C.III.1 14.2.12	Individual Test Descriptions	Conforms. Addressed in DCD Section 14.2.8 and in Section 14.2.9.
C.III.1 14.3	Inspections, Tests, Analyses, and Acceptance Criteria	Conforms. Addressed in COLA Part 10.
C.III.1 15.1	Transient and Accident Analyses: Transient and Accident Classification	Conforms. There are no aspects of the site-specific design that affect the transient and accident analyses in the DCD.
C.III.1 15.2	Frequency of Occurrence	Conforms
C.III.1 15.3	Plant Characteristics Considered in the Safety Evaluation	Conforms
C.III.1 15.4	Assumed Protection System Actions	Conforms
C.III.1 15.5	Evaluation of Individual Initiating Events	Conforms.
C.III.1 15.6	Event Evaluation	See below

S021b

S021b

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 15.6.1	Identification of Causes and Frequency Classification	Conforms
C.III.1 15.6.2	Sequence of Events and Systems Operation	Conforms
C.III.1 15.6.3	Core and System Performance	Conforms
C.III.1 15.6.4	Barrier Performance	Conforms
C.III.1 15.6.5	Radiological Consequences	Conforms. Table 2.0-201 compares the site-specific short-term χ/Qs for the EAB, LPZ, and control room to the χ/Qs assumed in the DCD.
C.III.1 16.1	Technical Specifications and Bases	Conforms. Addressed in COLA Part 4. There are no deviations from the generic TS bases.
C.III.1 16.2	Content and Format of Technical Specifications and Bases	Conforms. Addressed in COLA Part 4. No plant-specific deviations from the referenced certified generic Technical Specifications or Bases are required and none are being requested (e.g., incorporation of TSTF travelers).
C.III.1 17.1	Quality Assurance and Reliability Assurance: Quality Assurance During the Design and Construction Phase	Conforms
C.III.1 17.2	Quality Assurance During the Operations Phase	Conforms
C.III.1 17.3	Quality Assurance Program Description	Conforms
C.III.1 17.4.1	New Section 17.4 in the Standard Review Plan	Conforms
C.III.1 17.4.2	Reliability Assurance Program Scope, Stages, and Goals	Not applicable
C.III.1 17.4.3	Reliability Assurance Program Implementation	Conforms. Addressed in Sections 17.4 and 17.6.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 17.4.4	Reliability Assurance Program Information Needed in a COL Application	Conforms. Addressed in DCD Section 17.4 and in Sections 17.4, 17.5, and 17.6.
C.III.1 17.5	Quality Assurance Program Guidance	See below
C.III.1 17.5.1	COL Applicant QA Program Responsibilities	Conforms
C.III.1 17.5.2	Updated SRP Section 17.5 and the QA Program Description	Conforms. QA applied to safety-related activities performed prior to the start of construction (e.g., site investigation, design and safety analysis, early procurements) is described in the Dominion Nuclear Facility QAPD topical report, DOM-QA-1. QA applied during activities to adapt the design to specific plant implementation, construction, and operations is addressed in Section 17.5.
C.III.1 17.5.3	Evaluation of the QAPD Against the SRP and QAPD Submittal Guidance	Conforms
C.III.1 17.6	Description of the Applicant's Program for Implementation of 10 CFR 50.65, the Maintenance Rule	Conforms
C.III.1 17.6.1	Scoping per 10 CFR 50.65(b)	Conforms
C.III.1 17.6.2	Monitoring per 10 CFR 50.65(a)	Conforms
C.III.1 17.6.3	Periodic Evaluation per 10 CFR 50.65(a)(3)	Conforms
C.III.1 17.6.4	Risk Assessment and Management per 10 CFR 50.65(a)(4)	Conforms
C.III.1 17.6.5	Maintenance Rule Training and Qualification	Conforms

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 17.6.6	Maintenance Rule Program Role in Implementation of Reliability Assurance Program (RAP) in the Operations Phase	Conforms
C.III.1 17.6.7	Maintenance Rule Program Implementation	Conforms
C.III.1 Chapter 18	Human Factors Engineering	Conforms
	HFE principles incorporated into:	
	(1) Planning and management	Conforms. Addressed in DCD Section 18.2.
	(2) Plant design processes not closed with design certification	Conforms. Addressed in DCD Tier 1, ITAAC Table 3.3-1.
	(3) HSI, procedures, and training	Conforms. Addressed in DCD Tier 1, ITAAC Table 3.3-1, Items 6, 7, and 8.
	(4) implementation of the design	Conforms. Addressed in DCD Tier 1, ITAAC Table 3.3-1, Item 10.
	(5) monitoring of performance at the site	Conforms. Addressed in DCD Tier 1, ITAAC Table 3.3-1, Item 11.
	Applicant program addresses normal and emergency, maintenance, test, inspection and surveillance activities	Conforms. Addressed in DCD Section 18.1.
	FSAR/DCD describe objectives and scope of the applicant's activities related to element, methodology, and results for (12 HFE elements)	Conforms. Addressed in DCD Sections 18.3 through 18.13.
	Applicant should reference detailed implementation plan reviewed and approved as part of design certification	Conforms. Addressed in DCD Section 18.2.1.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.I 18.1	HFE Program Management	Conforms. Addressed in DCD Sections 18.2.2 and 18.2.3.
C.I 18.1.1	General HFE Program and Scope	Conforms. Addressed in DCD Sections 18.2.1 and 18.2.2.
C.I 18.1.2	HFE Team and Organization	Conforms. Addressed in DCD Section 18.2.3.
C.I 18.1.3	HFE Process and Procedures	Conforms. Addressed in DCD Sections 18.2.1 and 18.2.2.
C.I 18.1.4	HFE Issues Tracking	Conforms. Addressed in DCD Section 18.2.2.
C.I 18.1.5	HFE Technical Program	Conforms. Addressed in DCD Sections 18.3 through 18.13.
C.I 18.2.1	Objectives and scope	Conforms. Addressed in DCD Section 18.3.1.
C.I 18.2.2.1	OER Process	Conforms. Addressed in DCD Section 18.3.2.
C.I 18.2.2.2	Predecessor plants and systems	Conforms. Addressed in DCD Section 18.3.2.1.
C.I 18.2.2.3	Risk-important human actions	Conforms. Addressed in DCD Section 18.3.2.2.
C.I 18.2.2.4	HFE technology	Conforms. Addressed in DCD Section 18.3.2.3.
C.I 18.2.2.5	Recognized industry issues	Conforms. Addressed in DCD Section 18.3.2.4.
C.I 18.2.2.6	Issued Identified by plant personnel	Conforms. Addressed in DCD Section 18.3.2.5.
C.I 18.2.2.7	Issue Analysis, Tracking, and Review	Conforms. Addressed in DCD Section 18.3.2.6.
C.I 18.2.3	Results	Conforms. Addressed in DCD Section 18.3.3.
C.I 18.3.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.4.2.
C.I 18.3.1.1	Functional Requirements Analysis	Conforms. Addressed in DCD Section 18.4.1.
C.I 18.3.1.2	Function Allocation Analysis	Conforms. Addressed in DCD Section 18.4.2.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.I 18.3.2.1	Methodology for Functional Requirements Analysis	Conforms. Addressed in DCD Section 18.4.1.
C.I 18.3.2.2	Methodology for Function Allocation Analysis	Conforms. Addressed in DCD Section 18.4.2.
C.I 18.3.3	Results	Conforms. Addressed in DCD Sections 18.4.1 and 18.4.2.
C.I 18.4.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.5.1.
C.I 18.4.2	Methodology	Conforms. Addressed in DCD Section 18.5.1.
C.I 18.4.3	Results	Conforms. Addressed in DCD Section 18.5.1.
C.I 18.5.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.6.2.
C.I 18.5.2	Methodology	Conforms. Addressed in DCD Sections 18.6.4 and 18.6.5.
C.I 18.5.3	Results	Conforms. Addressed in DCD Section 18.6.6.
C.I 18.6.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.7.1.
C.I 18.6.2	Methodology	Conforms. Addressed in DCD Section 18.7.2.
C.I 18.6.3	Results	Conforms. Addressed in DCD Section 18.7.3.
C.I 6.3.2.8	Manual Actions	Conforms. Addressed in DCD Section 18.7.2.
C.I 18.7.1	Objectives and scope	Conforms. Addressed in DCD Section 18.8.1.
C.I 18.7.2.1	HSI Design Inputs	Conforms. Addressed in DCD Section 18.8.1.
C.I 18.7.2.2	Concept of operations	Conforms. Addressed in DCD Section 18.8.1.
C.I 18.7.2.3	Functional Requirements Specification	Conforms. Addressed in DCD Section 18.8.1.
C.I 18.7.2.4	HSI Concept Design	Conforms. Addressed in DCD Section 18.8.1.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.I 18.7.2.5	HSI Detailed Design and Integration	Conforms. Addressed in DCD Section 18.8.1.
C.I 18.7.2.6	HSI Tests and Evaluations	Conforms. Addressed in DCD Section 18.8.1.
C.I 18.7.3.1	Overview of HSI Design and Its Key Features	Conforms. Addressed in DCD Section 18.8.1(3).
C.I 18.7.3.2	Safety Aspects of the HSI	Conforms. Addressed in DCD Section 18.8.1(3).
C.I 18.7.3.3	HSI Change Process	Conforms. Addressed in DCD Section 18.13.3. N115a
C.I 18.8.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.9.1.
C.I 18.8.2	Methodology	Conforms. Addressed in DCD Section 18.9.2.
C.I 18.8.3	Results	Conforms. Addressed in DCD Section 18.9.3.
C.I 18.9.1	Objectives and Scope	Conforms. Addressed in DCD Sections 18.10.1 and 18.10.2.
C.I 18.9.2	Methodology	Conforms. Addressed in DCD Sections 18.10.3 and 18.10.4.
C.I 18.9.3	Results	Conforms. Addressed in DCD Section 18.10.5.
C.I 18.10.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.11 and 18.11.1.
C.I 18.10.2	Methodology	Conforms. Addressed in DCD Section 18.11.
C.I 18.10.2.1	Operational Conditions Sampling	Conforms. Addressed in DCD Section 18.11.
C.I 18.10.2.2	Design Verification	Conforms. Addressed in DCD Section 18.11.
C.I 18.10.2.3	Integrated System Validation	Conforms. Addressed in DCD Section 18.11. S021b
C.I 18.10.2.4	Human Engineering Discrepancy Resolution	Conforms. Addressed in DCD Section 18.11. S021b
C.I 18.10.3	Results	Conforms. Addressed in DCD Section 18.11.2.
C.I 18.11.1	Objectives and Scope	Conforms. Addressed in DCD Section 18.12.1.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.I 18.11.2	Methodology	Conforms. Addressed in DCD Section 18.12.2.
C.I 18.11.3	Results	Conforms. Addressed in DCD Section 18.12.3.
C.I 18.12.1	Objectives and Scope	Conforms. Addressed in DCD Sections 18.13.1 and 18.13.2.
C.I 18.12.2	Methodology	Conforms. Addressed in DCD Sections 18.13.2 and 18.13.3.
C.I 18.12.3	Results	Conforms. Addressed in DCD Section 18.13.4.
C.III.1 Chapter 19	Probabilistic Risk Assessment and Severe Accident Evaluation	Conforms. As discussed in RG 1.206, Section C.III.1.10, the FSAR follows the organization and numbering of the referenced certified design.

NAPS SUP 1.9-1

Table 1.9-204 Industrial Codes and Standards | ①

Code or Standard Number	Year	Title	
American National Standards Institute			①
N323D	2002	Installed Radiation Protection Instrumentation	①
American Society of Civil Engineers (ASCE)			① ②
ASCE 7-02	2002	Minimum Design Loads for Buildings and Other Structures	① ②
American Society of Mechanical Engineers (ASME)			
A17.1	2007	Safety Code for Elevators and Escalators	
B31.1	2007	Power Piping	
NQA-1	1994	Quality Assurance Requirements for Nuclear Facility Applications	S094a
Boiler and Pressure Vessel Code, Section IX	2007	Qualification Standard for Welding and Brazing Procedures, Welder, Brazers and Welding and Brazing Operators	
ASTM International			S021b
ASTM E84-07	2007	Standard Test Method for Surface Burning Characteristics of Building Materials	S021b
ASTM E119-07a	2007	Standard Test Methods for Fire Tests of Building Construction and Materials	S021b
ASTM E814-06	2006	Standard Test Method for Fire Tests of Through-Penetration Fire Stops	S021b
Applicable Building Codes			
International Building Code	As defined in the Virginia Uniform Statewide Building Code edition of record	International Building Code	
Applicable Building Codes (continued)			
International Fire Code	As defined in the Virginia Uniform Statewide Building Code edition of record	International Fire Code	

① 14.02-5
② 2.03.01-1

NAPS SUP 1.9-1

Table 1.9-204 Industrial Codes and Standards

Code or Standard Number	Year	Title
28 CFR 36		Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities (Americans With Disabilities Act (ADA) Accessibility Guidelines) S021b
	2003	Virginia Uniform Statewide Building Code, Part I (Virginia Construction Code)
Factory Mutual		
Data Sheet 7-42	2006	Guidelines for Evaluating the Effects of Vapor Cloud Explosions Using a TNT Equivalency Method
	2007	Approval Guide
Institute of Electrical and Electronics Engineers (IEEE)		
C2	2007	National Electric Safety Code
C57.19.100-1995 (R2003)	2004	IEEE Guide for Application of Power Apparatus Bushings 2.03.02-1
National Fire Protection Association (NFPA)		
NFPA 10	2007	Standard for Portable Fire Extinguishers
NFPA 11	2005	Standard for Low-, Medium-, and High-Expansion Foam S021b
NFPA 13	2007	Standard for the Installation of Sprinkler Systems
NFPA 14	2007	Standard for the Installation of Sandpipe and Hose Systems
NFPA 15	2007	Standard for Water Spray Fixed Systems for Fire Protection
NFPA (continued)		
NFPA 16	2007	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 20	2007	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 24	2007	Standard for the Installation of Private Fire Service Mains and their Appurtenances

NAPS SUP 1.9-1

Table 1.9-204 Industrial Codes and Standards

Code or Standard Number	Year	Title	
NFPA 25	2008	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	S021b
NFPA 30	2008	Flammable and Combustible Liquids Code	
NFPA 37	2006	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	
NFPA 55	2005	Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks	9.05.01-9
NFPA 70	2008	National Electric Code	
NFPA 72	2007	National Fire Alarm Code	
NFPA 80	2007	Standard for Fire Doors and Other Opening Protectives	S021b
NFPA 80A	2007	Recommended Practice for Protection of Buildings from Exterior Fire Exposures	
NFPA 101	2006	Life Safety Code	
NFPA 204	2007	Standard for Smoke and Heat Venting	
NFPA 214	2005	Standard on Water-Cooling Towers	
NFPA 241	2004	Standard for Safeguarding Construction, Alteration, and Demolition Operations	
NFPA 252	2008	Standard Methods of Fire Tests of Door Assemblies	
		NFPA (continued)	
NFPA 255	2006	Standard Method of Test of Surface Burning Characteristics of Building Materials	
NFPA 780	2008	Standard for the Installation of Lightning Protection Systems	
		North American Electric Reliability Corporation (NERC)	N127
PRC-005-1	2006	Transmission and Generation Protection System Maintenance and Testing	N127

NAPS SUP 1.9-1

Table 1.9-204 Industrial Codes and Standards

Code or Standard Number	Year	Title
PRC-008-0	2005	Underfrequency Load Shedding Equipment Maintenance Program
PRC-017-0	2005	Special Protection System Maintenance and Testing
Occupational Safety and Health Act (OSHA)		
29 CFR 1910	2006	Occupational Safety and Health Standards
29 CFR 1926	2006	Safety and Health Regulations for Construction
Underwriters Laboratories (UL)		
	2007	Fire Protection Equipment Directory
Environmental Protection Agency (EPA)		
40 CFR 60	2006	EPA Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

N127

N127

NAPS SUP 1.9-2

Table 1.9-205 NUREG Reports Cited

ISO21a

NUREG No.	Issue Date	Title	Comment/ Section Where Discussed
0016, Rev. 1	01/1979	Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Boiling Water Reactors (BWRs)	12.2
0570	06/1979	Toxic Vapor Concentrations in the Control Room Following a Postulated Accidental Release	6.4
0612	07/1980	Control of Heavy Loads at Nuclear Power Plants	13.5
0737	11/1980	Clarification of TMI Action Plan Requirements	13.1
0800	03/2007	Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants	1.1 2.0 2.2 2.5 9.3 11.5
0868	06/1982	A Collection of Mathematical Models for Dispersion in Surface Water and Groundwater	2.4
1437	05/1996	Generic Environmental Impact Statement for License Renewal of Nuclear Plants	12.2
1736	10/2001	Consolidated Guidance: 10 CFR Part 20 – Standards for Protection Against Radiation	1.9
1805	12/2004	Fire Dynamics Tools (FDT[s]) Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program	2.2
1811, Vol. 1	12/2006	Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site, Volume 1	2.4
1835	09/2005	Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site	2.0

ISO21b

ISO21b
NO25a

NAPS SUP 1.9-2

Table 1.9-205 NUREG Reports Cited

NUREG No.	Issue Date	Title	Comment/ Section Where Discussed
CR-4013	04/1986	LADTAP II Technical Reference and User Guide	12.2
CR-4653	03/1987	GASPAR II Technical Reference and User Guide	12.2
CR-5512, Vol. 1	10/1992	Residual Radioactive Contamination from Decommissioning, Vol. 1	2.4
CR-6624	11/1999	Recommendations for Revision of Regulatory Guide 1.78	2.2
CR-6697	11/2000	Development of Probabilistic RESRAD 6.0 and RESRAD-BUILD 3.0 Computer Codes	2.4
CR-6728	10/2001	Technical Basis for Revision of Regulatory Guidance on Design Ground Motions: Hazard- and Risk-consistent Ground Motion Spectra Guidelines	2.5

N025a

02.02.03-1

1.10 Summary of COL Items

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

Add the following at the end of this section.

NAPS SUP 1.10-1

Table 1.10-201 lists the FSAR location(s) where the individual COL items from the DCD are addressed. Table 1.10-202 lists the FSAR location(s) where the individual COL Action Items and Permit Conditions from the ESP (Reference 1.10-202) are addressed. N025a

1.10 References

1.10-201 [Deleted]

1.10-202 Early Site Permit (ESP) for the North Anna ESP Site, No. ESP-003, U.S. Nuclear Regulatory Commission, November 2007. N025a

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section
1.1-1-A	Establish Rated Electrical Output	1.1.2.7
1.3-1-A	Update Table 1.3-1	1.3.1
1.7-1-H	Final Design Configuration Confirmation	1.7
1.9-3-A	SRP and Regulatory Guide Applicability	SRP: Table 1.9-201 RGs: 1.9.1 and 1.9.2 RG 1.206: Table 1.9-203
1.11-1-A	Address Table 1.11-1 Items that refer to Notes (2) and (7)	1.11.1 and Table 1.11-201
1C.1-1-A	Handling of Safeguards Information	1C.1, Table 1C-201
1C.1-2-A	Emergency Preparedness and Response Actions	1C.1, Table 1C-202
2.0-1-A	Site Characteristics Demonstration	2.0
2.0-2-A	Site Location and Description Information in Accordance with SRP 2.1.1	2.0 and 2.1.1
2.0-3-A	Site-Specific Exclusion Area Authority and Control Information in Accordance with SRP 2.1.2.	2.0 and 2.1.2
2.0-4-A	Describe the Population Distribution in Accordance with SRP 2.1.3	2.0 and 2.1.3
2.0-5-A	Identify Potential Hazards in the Site Vicinity, in Accordance with SRP 2.2.1 - 2.2.2	2.0 and 2.2
2.0-6-A	Evaluation of Potential Accidents in Accordance with SRP 2.2.3	2.0 and 2.2.3
2.0-7-A	Regional Climatology in Accordance with SRP 2.3.1	2.0 and 2.3.1
2.0-8-A	Local Meteorology in Accordance with SRP 2.3.2	2.0 and 2.3.2
2.0-9-A	Onsite Meteorological Measurement Programs in Accordance with SRP 2.3.3	2.0 and 2.3.3
2.0-10-A	Short-Term Diffusion Estimates for Accidental Atmospheric Releases in Accordance with SRP 2.3.4	2.0 and 2.3.4

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section
2.0-11-A	Long-Term Diffusion Estimates in Accordance with SRP 2.3.5	2.0 and 2.3.5
2.0-12-A	Hydraulic Description Maximum Ground Water Level in Accordance with SRP 2.4.1	2.0 and 2.4.1
2.0-13-A	Protection of Below-Grade Penetrations and Access Openings from Floods in Accordance with SRP 2.4.2	2.0 and 2.4.2
2.0-14-A	Probable Maximum Flood on Streams and Rivers in Accordance with SRP 2.4.3	2.0 and 2.4.3
2.0-15-A	Potential Dam Failures Seismically Induced in Accordance with SRP 2.4.4	2.0 and 2.4.4
2.0-16-A	Probable Maximum Surge and Seiche Flooding in Accordance with SRP 2.4.5	2.0 and 2.4.5
2.0-17-A	Probable Maximum Tsunami in Accordance with SRP 2.4.6	2.0 and 2.4.6
2.0-18-A	Ice Effects in Accordance with SRP 2.4.7	2.0 and 2.4.7
2.0-19-A	Cooling Water Canals and Reservoirs in Accordance with SRP 2.4.8	2.0 and 2.4.8
2.0-20-A	Channel Diversion in Accordance with SRP 2.4.9	2.0 and 2.4.9
2.0-21-A	Flooding Protection Requirements in Accordance with SRP 2.4.10	2.0 and 2.4.10
2.0-22-A	Cooling Water Supply in Accordance with SRP 2.4.11	2.0 and 2.4.11
2.0-23-A	Groundwater in Accordance with SRP 2.4.12	2.0 and 2.4.12
2.0-24-A	Accidental Releases of Liquid Effluents in Ground and Surface Waters in Accordance with SRP 2.4.13	2.0 and 2.4.13
2.0-25-A	Technical Specifications and Emergency Operation Requirements in Accordance with SRP 2.4.14	2.0 and 2.4.14
2.0-26-A	Basic Geologic and Seismic Information in Accordance with SRP 2.5.1	2.0 and 2.5.1
2.0-27-A	Vibratory Ground Motion in Accordance with SRP 2.5.2	2.0 and 2.5.2

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section	
2.0-28-A	Surface Faulting in Accordance with SRP 2.5.3	2.0 and 2.5.3	
2.0-29-A	Stability of Subsurface Materials and Foundations in Accordance with SRP 2.5.4	2.0 and 2.5.4	
2.0-30-A	Stability of Slopes in Accordance with SRP 2.5.5	2.0 and 2.5.5	
2A.2-1-A	Confirmation of the ESBWR χ/Q Values	2.3.4.3 and 2A.2.4	N029b
2A.2-2-A	Confirmation of the Reactor Building χ/Q Values	2A.2.5	N029b
3.9.9-1-H	Reactor Internals Vibration Analysis, Measurement and Inspection Program	3.9.2.4	
3.9.9-2-H	ASME Class 2 or 3 or Quality Group D Components with 60 Year Design Life	3.9.3.1	
3.9.9-3-A	Inservice Testing Programs	3.9.6	
3.9.9-4-A	Snubber Inspection and Test Program	3.9.3.7.1(3)e	
3.10.4-1-A	Dynamic Qualification Report	3.10.1.4	
3.11-1-A	Environmental Qualification Document (EQD)	3.11.4.4	S013
4.3-1-A	Variances from Certified Design	4.3.3.1	S070d
4A-1-A	Variances from Certified Design	4A.1	S070d
5.2-1-A	Preservice and Inservice Inspection Program Description	5.2.4, 5.2.4.3.4, 5.2.4.6, 5.2.4.11, and 6.6	S091 S063
5.2-2-H	Leak Detection Monitoring	5.2.5 and 5.2.5.9	S063
5.2-3-A	Preservice and Inservice Inspection NDE Accessibility Plan Description	5.2.4 and 5.2.4.2	S063
5.3-2-A	Materials and Surveillance Capsule	5.3.1.8	
6.2-1-H	Pipe Length from Containment to Inboard/Outboard Isolation Valve	6.2.4.2	S004
6.4-1-A	CRHA Procedures and Training	6.4.4	N115c
6.4-2-A	Toxic Gas Analysis	6.4.5	
6.6-1-A	PSI/ISI Program Description	6.6	N115c
6.6-2-A	PSI/ISI NDE Accessibility Plan Description	6.6.2	

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section	
8.2.4-1-A	Transmission System Description	8.2.1.1	
8.2.4-2-A	Switchyard Description	8.2.1.2.1	
8.2.4-3-A	Normal Preferred Power	8.2.1.2	
8.2.4-4-A	Alternate Preferred Power	8.2.1.2	
8.2.4-5-A	Protective Relaying	8.2.1.2.2	IN081
8.2.4-6-A	Switchyard DC Power	8.2.1.2.1	
8.2.4-7-A	Switchyard AC Power	8.2.1.2.1	
8.2.4-8-A	Switchyard Transformer Protection	8.2.1.2.1	
8.2.4-9-A	Stability and Reliability of the Offsite Transmission Power Systems	8.2.2.1	
8.2.4-10-A	Interface Requirements	8.2.2.1	
8A.2.3-1-A	Cathodic Protection System	8A.2.1	
9.1-4-A	Fuel Handling Operations	9.1.4.13 and 9.1.4.19	IS040
9.1-5-A	Handling of Heavy Loads	9.1.5.6, 9.1.5.8, and 9.1.5.9	IS040
9.2.1-1-A	Material Selection	9.2.1.2	
9.2.5-1-H	Post 7-Day Makeup to Ultimate Heat Sink (UHS)	9.2.5	IS041
9.3.2-1-A	Post-Accident Sampling Program	9.3.2.2	
9.3.9-1-A	Implementation of Hydrogen Water Chemistry	9.3.9	
9.3.9-2-A	Hydrogen and Oxygen Storage and Supply	9.3.9.2	
9.3.10-1-A	Oxygen Storage Facility	9.3.10.2	
9.3.11-1-A	Determine Need for Zinc Injection System	9.3.11.2	
9.3.11-2-A	Provide System Description for Zinc Injection System	9.3.11.4	
9.5.1-1-A	Secondary Firewater Storage Source	9.5.1.4	
9.5.1-2-A	Secondary Firewater Capacity	9.5.1.4	
9.5.1-4-A	Piping and Instrument Diagrams	9.5.1.2, 9.5.1.4, 9.5.1.5, and Figures 9.5-201, 9.5-202, and 9.5-203	

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section	
9.5.1-5-A	Fire Barriers	9.5.1.10	
9.5.1-6-H	Smoke Control	9.5.1.11	
9.5.1-7-H	Fire Hazards Analysis (FHA) Compliance Review	9.5.1.12	
9.5.1-8-A	Fire Protection (FP) Program Description	9.5.1.15	
9.5.1-10-H	Fire Brigade	9.5.1.15.4, 13.1.2.1.5	
9.5.1-11-A	Quality Assurance	9.5.1.15.9	
9.5.2.5-1-A	Emergency Notification System	9.5.2.2	S033
9.5.2.5-2-A	Grid Transmission Operator	9.5.2.2	
9.5.2.5-3-A	Offsite Interfaces (1)	9.5.2.2	S033
9.5.2.5-4-A	Offsite Interfaces (2)	9.5.2.2	S033
9.5.2.5-5-A	Fire Brigade Radio System	9.5.2.2	S033
9.5.4-1-A	Fuel Oil Capacity	9.5.4.2	
9.5.4-2-A	Protection of Underground Piping	9.5.4.2	
9A.7-1-A	Yard Fire Zone Drawings	9A.4.7	
9A.7-2-A	Fire Hazards Analysis for Site Specific Areas	9A.4.7, 9A.5.7, 9A.5.8, 9A.5.9, and 9A.5.12	
10.2-1-A	Turbine Maintenance and Inspection Program	10.2.3.6	S039
10.2-2-A	Turbine Missile Probability Analysis	10.2.3.8	S039
10.4-1-A	Leakage (of Circulating Water Into the Condenser)	10.4.6.3	No change
11.2-1-A	Implementation of IE Bulletin 80-10	11.2.2.3	
11.2-2-A	Implementation of Part 20.1406	11.2.2.3	
11.4-1-A	SWMS Processing Subsystem Regulatory Guide Compliance	11.4.2.3.5	S120
11.4-2-A	Compliance with IE Bulletin 80-10	11.4.2.3.5	S120
11.4-3-A	Process Control Program	11.4.2.3.5	S120
11.4-4-A	Temporary Storage Facility	11.4.1	
11.4-5-A	Compliance with Part 20.1406	11.4.1	

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section	
11.5-1-A	Sensitivity or Subsystem Lower Limit of Detection	11.5.4.7	
11.5-2-A	Offsite Dose Calculation Manual	11.5.4.4, 11.5.4.5, and 11.5.5.8	S025
11.5-3-A	Process and Effluent Monitoring Program	11.5, 11.5.4.6, and Table 11.5-201	S057
11.5-4-A	Site Specific Offsite Dose Calculation	11.5.4.8	
11.5-5-A	Instrument Sensitivities	11.5.4.9	
12.1-1-A	Regulatory Guide 8.10	12BB	
12.1-2-A	Regulatory Guide 1.8	12BB	
12.1-3-A	Operational Considerations	12BB	
12.1-4-A	Regulatory Guide 8.8	12BB	
12.2-2-A	Airborne Effluents and Doses	12.2.2.1, 12.2.2.2, and Table 2.0-201	
12.2-3-A	Liquid Effluents and Doses	12.2.2.4	
12.2-4-A	Other Contained Sources	12.2.1.5	12.02-4 S099
12.3-2-A	Operational Considerations	12.3.4	
12.3-3-H	Controlled Access	12.3.1.3	S098
12.5-1-A	Equipment, Instrumentation, and Facilities	12BB	
12.5-2-A	Compliance with 10 CFR Part 50.34(f)(2)(xxvii) and NUREG-0737 Item III.D.3.3	12BB	
12.5-3-A	Radiation Protection Program	12BB	
13.1-1-A	Organizational Structure	9.5.1.15.3, 13.1.1 through 13.1.3, and Appendix 13AA	S035
13.2-1-A	Reactor Operator Training	13.2.1 and 13BB	
13.2-2-A	Training for Non-Licensed Plant Staff	13.2.2 and 13BB	
13.3-1-A	Identification of OSC and Communication Interfaces with Control Room and TSC	13.3 and COLA Part 5, Sections II.F and II.H	
13.3-2-A	Identification of EOF and Communication Interfaces with Control Room and TSC	13.3 and COLA Part 5, Sections II.F and II.H	

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section	
13.3-3-A	Decontamination Facilities	13.3 and COLA Part 5, Section II.J	
13.4-1-A	Operation Programs	13.4	
13.4-2-A	Implementation Milestones	13.4	
13.5-1-A	Administrative Procedures Development Plan	13.5.1	
13.5-2-A	Plant Operating Procedures Development Plan	13.5.2	
13.5-3-A	Emergency Procedures Development	13.5.2	
13.5-5-A	Procedures Included in Scope of Plan	13.5, 13.5.2	
13.5-5-A	Procedures Included in Scope of Plan	13.5.2	
13.5-6-H	Procedures for Calibration, Inspection, and Testing	13.5.2	
13.6-6-A	Key Control	13.6.1.1.5	S078
13.6-7-A	Secondary Alarm Station Design	Physical Security Plan	S078
13.6-8-H	CAS and SAS Redundancy	13.6.1.1.8	S078
13.6-9-A	Operational Alarm Response Procedures	13.6.1.1.3	S078
13.6-10-A	Operational Surveillance Test Procedures	13.6.1.1.8	S078
13.6-11-A	Maintenance Test Procedures	13.6.1.1.8	S078
13.6-12-A	Operational Response Procedures to Security Events	13.6.2	S078
13.6-13-A	Operational Alarm Response Procedures	13.6.1.1.3	S078
13.6-14-A	Administrative Controls to Sensitive Cabinets	13.6.1.1.5	S078
13.6-15-A	Administrative Controls to Sensitive Equipment	13.6.1.1.5	S078
14.2-1-A	Description - Initial Test Program Administration	14.2.2.1, Appendix 14AA	
14.2-2-H	Startup Administrative Manual	14.2.2.1	S044a
14.2-3-H	Test Procedures	14.2.2.2	S044a
14.2-4-H	Test Program Schedule and Sequence	14.2.7	
14.2-5-A	Site Specific Tests	14.2.9	

NAPS SUP 1.10-1

Table 1.10-201 Summary of FSAR Sections Where DCD COL Items Are Addressed

Item No.	Subject/Description of Item	FSAR Section	
14.2-6-H	Site Specific Test Procedures	14.2.9	
14.3-1-A	Emergency Planning ITAAC	14.3.8	
14.3-2-A	Site-Specific ITAAC	14.3.9	
14.3A-1-1	Establish a Schedule for Design Acceptance Criteria ITAAC Closure	14.3A.1	S065
16.0-1-A	COL Applicant Bracketed Items	COLA Part 4	S115a
16.0-2-H	COL Holder Bracketed Items	5.3.1.5, COLA Part 4	S115a
17.2-1-A	QA Program for the Construction and Operations Phases	17.2	
17.2-2-A	QA Program for Design Activities	17.2	
17.3-1-A	Quality Assurance Program Document	17.3	
17.4-1-H	Operation Reliability Assurance Activities	17.4.1, 17.4.6, 17.4.9, 17.4.10, and 17.6	
18.13-1-H	Milestone for HPM Implementation	18.13.3	S083
19.2.6-1-H	Seismic High Confidence Low Probability of Failure Margins	19.2.3.2.4	

NAPS SUP 1.10-1

Table 1.10-202 Summary of FSAR Sections Where ESP COL Action Items and Permit Conditions Are Addressed

15021b

Item No.	Subject/Description of Item	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)	1.12
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
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
ESP 2.5-6	Safety-Related Facilities Stability Analysis	2.5.4

NAPS SUP 1.10-1

Table 1.10-202 Summary of FSAR Sections Where ESP COL Action Items and Permit Conditions Are Addressed

Item No.	Subject/Description of Item	Section	
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	11.3.1	
ESP 13.6-1	Design of Protected Area Barriers	13.6	
Permit Condition 3.E(1)	Exclusion Area Control	2.1.2	N025c
Permit Condition 3.E(2)	Cooling for a Second New Unit	Not applicable to Unit 3	N025c
Permit Condition 3.E(3)	Accidental Releases	2.4.13	N025c
Permit Condition 3.E(4)	Weathered or Fractured Rock	2.5.1	N025c
Permit Condition 3.E(5)	Engineered Fill	2.5.1	N025c
Permit Condition 3.E(6)	NRC Notification	2.5.1 and 2.5.4	N025c
Permit Condition 3.E(7)	Improved Soils	2.5.4	N025c

1.11 Technical Resolutions of Task Action Plan Items, New Generic Issues, New Generic Safety Issues and Chernobyl Issues

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

1.11.1 Approach

Add the following at the end of this section.

NAPS COL 1.11-1-A Table 1.11-201 supplements DCD Table 1.11-1 to address the site-specific aspects of items that refer to Notes (2) and (7).

NAPS SUP 1.11-1 Table 1.11-202 supplements DCD Table 1.11-1 to provide references to FSAR locations that provide additional information on specific issues. 150216

1.11.2 COL Information

1.11-1-A Address Table 1.11-1 Items that refer to Notes (2) and (7)

NAPS COL 1.11-1-A This COL item is addressed in Section 1.11 and Table 1.11-201.

NAPS COL 1.11-1-A

Table 1.11-201 COL Item Resolutions Related to NUREG-0933 Table II Task Action Plan Items and New Generic Issues

Action Plan Item/ Issue Number	Description	Associated Location(s) Where Discussed and/or Technical Resolution
	Task Action Plan Items	
A-33	NEPA Review of Accident Risks	This environmental issue involves consideration of accidents on a risk specific basis. This subject is addressed in ESP-ER Chapter 7 and COLA Part 3, Chapter 7.
B-1	Environmental Technical Specifications	Issue is addressed in COLA Part 4, Sections 5.5.1 and 5.5.3, which address the Offsite Dose Calculation Manual and Radioactive Effluent Controls Program. See also Sections 11.5.4.5 and 11.5.4.6.
B-28	Radionuclide/Sediment Transport Program	Issue is addressed in COLA Part 4, Sections 5.5.1 and 5.5.3, which address the Offsite Dose Calculation Manual and Radioactive Effluent Controls Program. See also Sections 11.5.4.5 and 11.5.4.6.
B-37	Chemical Discharges to Receiving Waters	Issue is addressed in ESP-ER Section 5.3 and COLA Part 3, Sections 3.3, 3.6, and 5.2.
B-38	Reconnaissance Level Investigations	Issue is addressed in ESP-ER Chapter 2 and SSAR Chapter 2.
B-39	Transmission Lines	Issue is addressed in COLA Part 3, Sections 3.7, 4.3, and 5.6.
B-40	Effects of Power Plant Entrainment on Plankton	Issue is addressed in ESP-ER Section 5.3.1.2.
B-41	Impacts on Fisheries	Impact of power plant operation on fishery resources is addressed in ESP-ER Sections 5.3.1.2.4 and 5.3.2.2.2.
B-42	Socioeconomic Environmental Impacts	Issue is addressed in ESP-ER Sections 2.5, 4.4, and 5.8. COLA Part 3, Section 5.8 provides supplementary information on this issue.

NAPS COL 1.11-1-A

Table 1.11-201 COL Item Resolutions Related to NUREG-0933 Table II Task Action Plan Items and New Generic Issues

Action Plan Item/ Issue Number	Description	Associated Location(s) Where Discussed and/or Technical Resolution
B-43	Value of Aerial Photographs for Site Evaluation	Work completed to date on this issue is published in NUREG/CR-2861. The use of aerial photography is discussed in SSAR Sections 2.4.9, 2.5.1 and 2.5.3. Results of a visual impact study are presented in COLA Part 3, Section 5.8.
C-16	Assessment of Agricultural Land in Relation to Power Plant Siting and Cooling System Selection	(3) The impact of construction and power plant operation on agricultural land use is addressed in ESP-ER Sections 4.1 and 5.1. Water use for agricultural lands is addressed in ESP-ER Sections 2.3.2 and 2.3.3. COLA Part 3 contains no additional information on this topic.
	New Generic Issues	
184	Endangered Species	Issue is addressed in ESP-ER Sections 2.4.1.6, 2.4.2.2.5, 4.3.1.2, 4.3.2, 5.3.1.2.3, 5.3.3.2, and 5.4.4. COLA Part 3 contains no additional information on this topic.

NAPS SUP 1.11-2

Table 1.11-202 Supplementary Resolutions Related to NUREG-0933 Table II TMI Action Plan Items and Human Factors Issues

Action Plan Item/ Issue Number	Description	Associated Location(s) Where Discussed and/or Technical Resolution
TMI Action Plan Items		
1.A.1.1	Shift Technical Advisor	Sections 13.1.2.1.2.9 and DCD Section 18.6
1.A.1.2	Shift Supervisor Administrative Duties	Sections 13.1.2.1.2.5 and 13.1.2.1.2.6
1.A.1.3	Shift Manning	Section 13.1.2.1.4, Table 13.1-202, Figure 13.1-203, and DCD Section 18.6
1.A.2.1(1)	Qualifications – Experience	Section 13.1.3.1, Table 13.1-201, Section 17.5, and DCD Section 18.6
1.C.3	Shift Supervisor Responsibilities	Sections 13.1.2.1.2.5 and 13.1.2.1.2.6
1.F.2(6)	Increase the Size of Licensees' QA Staff	Table 13.1-201 and Section 17.5
1.F.2(9)	Clarify Organizational Reporting Levels for the QA Organization	Section 13.1.1.2.7, Table 13.1-201, and Section 17.5
II.B.3	Post Accident Sampling	Appendix 12BB
III.D.3.3	In-Plant Radiation Monitoring	Appendix 12BB
Human Factors Issues		
HF1.1	Shift Staffing	Table 13.1-202 and Section 13.1.2.1.4

NAPS SUP 1.12-1

1.12 Impact of Construction Activities on Units 1 and 2

1.12.1 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

1.12.2 Potential Construction Activity Hazards

Unit 3 is located on the existing 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 ESBWR standard plant structures such as the Reactor Building, Control Building, Fuel Building, Turbine Building, Radioactive Waste Building and Electrical Building; 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 1.12-201.

1.12.3 **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 1.12-201); additionally, information in Chapters 4, 5, 6, 7, 8 and 9 of the NAPS UFSAR was utilized.

1.12.4 **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.
- 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 1.12-202).

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

The information described in Sections 1.12.2–1.12.4 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 1.12-201, Table 1.12-202 presents the potential consequences to the SSCs of the existing units that were identified in the above process.

1.12.6 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 1.12-203.

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 Circulating Water System (CIRC) 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.

1.12.7 References

1.12-201 North Anna Power Station, Units 1 and 2, Updated Final Safety Analysis Report, Revision 38.

1.12-202 North Anna Power Station, Units 1 and 2, Technical Specifications, Amendments 231/212.

NAPS SUP 1.12-1

Table 1.12-201 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

NAPS SUP 1.12-1

Table 1.12-201 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 1.12-1

Table 1.12-202 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

NAPS SUP 1.12-1

Table 1.12-202 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

NAPS SUP 1.12-1

Table 1.12-203 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

NAPS SUP 1.12-1

Table 1.12-203 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

Appendix 1A Response to TMI Related Matters

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

Table 1A-1, 10 CFR 50.34(f)(3)(i), TMI Item I.C.5

Add the following to the end of the ESBWR Resolution statement:

STD SUP 1A.1-1

ESBWR construction and operations engineers are also continually involved in reviewing industry experience from these same sources in accordance with the administrative procedures described in DCD Section 18.3.2.

Table 1A-1, 10 CFR 50.34(f)(3)(iii), TMI Item I.F.2

Add the following to the end of the ESBWR Resolution statement:

STD SUP 1A.1-1

The Quality Assurance Program described in Chapter 17 also meets the requirements of issue I.F.2 as they apply to the construction and operation of the ESBWR.

Table 1A-1, 10 CFR 50.34(f)(3)(vii), TMI Item II.J.3.1

Add "13.1" as an "Associated Location(s)" and add the following to the end of the ESBWR Resolution statement:

STD SUP 1A.1-1

The ESBWR construction and operations teams have also developed a management plan for the ESBWR project that consists of a properly structured organization with open lines of communication, clearly defined responsibilities, well-coordinated technical efforts, and appropriate control channels.

The organizational structure is discussed in Section 13.1.

Appendix 1B Plant Shielding to Provide Access to Areas and Protect Safety Equipment for Post-Accident Operation [II.B.2]

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

Appendix 1C Industry Operating Experience

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

Appendix 1C.1 Evaluation

Replace the last paragraph with the following.

STD COL 1C.1-1-A
STD COL 1C.1-2-A
STD SUP 1C-1

DCD Tables 1C-1 and 1C-2 are supplemented by Tables 1C-201 and 1C-202. These tables address Generic Letters and Bulletins that have been in effect/issued up to six months before the COL application submittal date, and after the SRP revisions that are applicable to this FSAR. They also address Generic Letter 82-39 and IE Bulletin 2005-02, which were identified in the DCD as the responsibility of the COL applicant. 5021b

Appendix 1C.2 COL Information

1C.1-1-A Handling of Safeguards Information

STD COL 1C.1-1-A

This COL item is addressed in Section 1C.1 and the Table 1C-201 entry for Generic Letter 82-39.

1C.1-2-A Emergency Preparedness and Response Actions

STD COL 1C.1-2-A

This COL item is addressed in Section 1C.1 and the Table 1C-202 entry for IE Bulletin 2005-02.

NAPS SUP 1AA.1-1

Appendix 1AA ESP Information 5021b

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

STD COL 1C.1-1-A

Table 1C-201 Operating Experience Review Results Summary—Generic Letters

No.	Issue Date	Title	Evaluation Result or Location(s) Where Discussed
82-39	12/22/82	Problems with the Submittals of 10 CFR 73.21 Safeguards Information Licensing Review	Not Applicable. Is an administrative communication. The site has an approved procedure for handling Safeguards Information including how to mail such information to authorized recipients.

STD COL 1C.1-2-A

Table 1C-202 Operating Experience Review Results Summary—IE Bulletins

No.	Issue Date	Title	Evaluation Result or Location(s) Where Discussed
2005-02	07/18/05	Emergency Preparedness and Response Actions for Security-Based Events	COLA Part 5, Emergency Plan

Chapter 2 Site Characteristics

2.0 Introduction

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

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

Replace the last two paragraphs with the following paragraphs.

NAPS COL 2.0-1-A

DCD site parameter values for the ESBWR standard plant are identified in DCD Table 2.0-1 and DCD Tier 1, Table 5.1-1.

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. N025 a, b

Table 2.0-201 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

NAPS SUP 2.0-1

- 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. N026 a N025 f N025 b

NAPS SUP 2.0-2

- 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 the first two parts of Table 2.0-201. In accordance with the commitment in N026 a N025 a

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.)

Appendix 2A provides site-specific input values used in ARCON96 analyses of on-site χ/Q values. N029 c

NAPS COL 2.0-2-A through 2.0-30-A

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 as identified in Table 2.0-2R. In the "COL Information" column, the COL Item from the DCD is replaced with information responding to the COL Item and identifying the FSAR section which addresses the SRP section invoked by the COL Item. N026 e

2.0.1 COL Information

2.0-1-A Site Characteristics Demonstration

NAPS COL 2.0-1-A

This COL item is addressed in Section 2.0.

2.0-2-A through 2.0-30-A Standard Review Plan Conformance

NAPS COL 2.0-2-A through 2.0-30-A

These COL items are addressed in Section 2.0.

2.0.2 References

2.0-201 [Deleted] N025 a

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. N025 a

NAPS COL 2.0-2-A through 2.0-30-A

Table 2.0-2R Limits Imposed on Acceptance Criteria in Section II of SRP by ESBWR Design

No26 a

	Section	Subject	ESBWR DCD Parameters, Considerations and/or Limits	COL Information
NAPS COL 2.0-2-A	2.1.1	Site Location and Description	None	COL Item 2.0-2-A is addressed in Section 2.1.1.
NAPS COL 2.0-3-A	2.1.2	Exclusion Area Authority and Control	None	COL Item 2.0-3-A is addressed in Section 2.1.2.
NAPS COL 2.0-4-A	2.1.3	Population Distribution	ESBWR PRA offsite consequence analysis in DCD Reference 2.0-1 is based on a population density of 305 people per square kilometer (790 per square mile).	COL Item 2.0-4-A is addressed in Section 2.1.3. The population density for offsite analysis provided in Section 2.1.3 falls within (is less than) the density used in DCD Reference 2.0-1.
NAPS COL 2.0-5-A	2.2.1–2.2.2	Identification of Potential Hazards in Site Vicinity	Per DCD Table 2.0-1	COL Item 2.0-5-A is addressed in Section 2.2.
NAPS COL 2.0-6-A	2.2.3	Evaluation of Potential Accidents	None considered in vicinity of plant	COL Item 2.0-6-A is addressed in Section 2.2.3.
NAPS COL 2.0-7-A	2.3.1	Regional Climatology	Per DCD Table 2.0-1	The portion of COL Item 2.0-7-A to provide information in accordance with SRP 2.3.1 is addressed in Section 2.3.1. The wind speed used in design of nonsafety-related structures that are not included as part of the ESBWR Standard Plant design is 40 m/s (90 mph).
NAPS COL 2.0-8-A	2.3.2	Local Meteorology	None	COL Item 2.0-8-A is addressed in Section 2.3.2.
NAPS COL 2.0-9-A	2.3.3	Onsite Meteorological Measurements Programs	None	COL Item 2.0-9-A is addressed in Section 2.3.3.

NAPS COL 2.0-2-A through 2.0-30-A

Table 2.0-2R Limits Imposed on Acceptance Criteria in Section II of SRP by ESBWR Design

	Section	Subject	ESBWR DCD Parameters, Considerations and/or Limits	COL Information
NAPS COL 2.0-10-A	2.3.4	Short-Term Dispersion Estimates for Accidental Atmospheric Releases	Per DCD Table 2.0-1. See also Chapter 15.	The portion of COL Item 2.0-10-A to supply information in accordance with SRP 2.3.4 is addressed in Section 2.3.4. Information provided in Table 2.0-201 shows that the site characteristic short-term meteorological dispersion values fall within the site parameter values. This means that dose values given in DCD Chapter 15 remain bounding for this FSAR and less than stipulated in 10 CFR 50.34(a) and the applicable portions of SRP Sections 11 and 15.
NAPS COL 2.0-11-A	2.3.5	Long-Term Diffusion Estimates	Per DCD Table 2.0-1. See Sections 2.3.5 and 12.2.2.1 for a discussion of the generation of these values.	COL Item 2.0-11-A is addressed in Section 2.3.5.
NAPS COL 2.0-12-A	2.4.1	Hydraulic Description Maximum Groundwater Level	Per DCD Table 2.0-1	COL Item 2.0-12-A is addressed in Section 2.4.1.
NAPS COL 2.0-13-A	2.4.2	Floods	Per DCD Table 2.0-1	COL Item 2.0-13-A is addressed in Section 2.4.2.
NAPS COL 2.0-14-A	2.4.3	Probable Maximum Flood on Streams and Rivers	Probable maximum flooding level on streams and rivers does not exceed the maximum flood level defined in DCD Table 2.0-1.	COL Item 2.0-14-A is addressed in Section 2.4.3.
NAPS COL 2.0-15-A	2.4.4	Potential Dam Failures	Potential dam failures do not cause flooding to exceed the maximum flood level defined in DCD Table 2.0-1.	COL Item 2.0-15-A is addressed in Section 2.4.4. N0291 d

NAPS COL 2.0-2-A through 2.0-30-A

Table 2.0-2R Limits Imposed on Acceptance Criteria in Section II of SRP by ESBWR Design

	Section	Subject	ESBWR DCD Parameters, Considerations and/or Limits	COL Information
NAPS COL 2.0-16-A	2.4.5	Probable Maximum Surge and Seiche Flooding	Probable maximum surge and seiche flooding level does not exceed the maximum flood level defined in DCD Table 2.0-1.	COL Item 2.0-16-A is addressed in Section 2.4.5.
NAPS COL 2.0-17-A	2.4.6	Probable Maximum Tsunami Flooding	Probable maximum tsunami flooding level does not exceed the maximum flood level defined in DCD Table 2.0-1.	COL Item 2.0-17-A is addressed in Section 2.4.6.
NAPS COL 2.0-18-A	2.4.7	Ice Effects	None	COL Item 2.0-18-A is addressed in Section 2.4.7.
NAPS COL 2.0-19-A	2.4.8	Cooling Water Canals and Reservoirs	None	COL Item 2.0-19-A is addressed in Section 2.4.8.
NAPS COL 2.0-20-A	2.4.9	Channel Diversions	None	COL Item 2.0-20-A is addressed in Section 2.4.9.
NAPS COL 2.0-21-A	2.4.10	Flooding Protection Requirements	None	COL Item 2.0-21-A is addressed in Section 2.4.10.
NAPS COL 2.0-22-A	2.4.11	Cooling Water Supply	None	COL Item 2.0-22-A is addressed in Section 2.4.11.
NAPS COL 2.0-23-A	2.4.12	Groundwater	Per DCD Table 2.0-1	COL Item 2.0-23-A is addressed in Section 2.4.12.
NAPS COL 2.0-24-A	2.4.13	Accidental Releases of Liquid Effluents in Ground and Surface Waters	The source term provided in DCD Table 12.2-13a, "Liquid Waste Management System Equipment Drain Collection Tank Activity," is used in the effects analysis.	COL Item 2.0-24-A is addressed in Section 2.4.13.
NAPS COL 2.0-25-A	2.4.14	Technical Specifications and Emergency Operation Requirements	None	COL Item 2.0-25-A is addressed in Section 2.4.14.

NAPS COL 2.0-2-A through 2.0-30-A

Table 2.0-2R Limits Imposed on Acceptance Criteria in Section II of SRP by ESBWR Design

	Section	**Subject**	**ESBWR DCD Parameters, Considerations and/or Limits**	**COL Information**
NAPS COL 2.0-26-A	2.5.1	Basic Geologic and Seismic Information	None	COL Item 2.0-26-A is addressed in Section 2.5.1.
NAPS COL 2.0-27-A	2.5.2	Vibratory Ground Motion	Per DCD Table 2.0-1 (and DCD Figures 2.0-1 and 2.0-2)	The portion of COL Item 2.0-27-A to provide information in accordance with SRP 2.5.2 is addressed in Section 2.5.2. Information provided in Table 2.0-201 confirms that reactor building/fuel building (RB/FB), control building (CB), and firewater service complex (FWSC) foundation input response spectra (FIRS) are enveloped by the ESBWR certified seismic design response spectra (CSDRS) referenced at foundation level.
NAPS COL 2.0-28-A	2.5.3	Surface Faulting	ESBWR design assumes no permanent ground deformation from tectonic or non-tectonic faulting.	COL Item 2.0-28-A is addressed in Section 2.5.3. Information to address permanent ground deformation from tectonic or non-tectonic faulting is provided in Section 2.5.3.
NAPS COL 2.0-29-A	2.5.4	Stability of Subsurface Materials and Foundations	Per DCD Table 2.0-1	The portion of COL Item 2.0-29-A to provide information in accordance with SRP 2.5.4 is addressed in Section 2.5.4. Information to address localized liquefaction potential under other than Seismic Category I structures is provided in Section 2.5.4.8. Information to address settlements and differential settlements is provided in Section 2.5.4.10.2. NO29 d
NAPS COL 2.0-30-A	2.5.5	Stability of Slopes	Per DCD Table 2.0-1	COL Item 2.0-30-A is addressed in Section 2.5.5.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Maximum Groundwater Level	0.61 m (2 ft) below plant grade		The DCD site parameter of maximum groundwater level of 0.61 m (2 ft) below plant grade is the same as the design groundwater level in DCD Table 3.4-1. The design plant grade elevation identified in DCD Table 3.4-1 is at 4650 mm, which corresponds to 88.4 m (290 ft) msl for the Unit 3 site as shown in Figure 2.1-201. Therefore, the DCD site parameter value of 0.61 m (2 ft) below plant grade corresponds to a maximum groundwater level no higher than 87.8 m (288 ft) msl for the Unit 3 site.
			ESP 82.3 m (270 ft) msl or 0.3 m (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 82.3 m (270 ft) msl is based on the proposed site grade in the SSAR of 82.6 m (271 ft) msl. With design plant grade for Unit 3 at 88.4 m (290 ft) msl, the operative ESP site characteristic value becomes 0.3 m (1 ft) below the free surface which is higher than 82.3 m (270 ft) msl. With a free surface at 88.4 m (290 ft) msl, the ESP site characteristic corresponds to 88.1 m (289 ft) msl which does not fall within (is higher than) the value established by the DCD site parameter. SSAR Table 1.9-1 provides a value of < 82.3 m (270 ft) msl from SSAR Section 2.4.12.4 which is based on the proposed site grade in the SSAR of 82.6 m (271 ft) msl.
			Unit 3 2.1 m (7 ft) below design plant grade	The Unit 3 site characteristic value for maximum groundwater level below design plant grade is 2.1 m (7 ft) in the power block area based on the maximum groundwater elevation of 86.3 m (283 ft) msl from Section 2.4.12 and the design plant grade elevation of 88.4 m (290 ft) msl. 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 2.1 m (7 ft) below design plant grade, which meets the DCD site parameter limit of not higher than 0.61 m (2 ft) below design plant grade. The Unit 3 site characteristic value falls within (is lower than) the ESP site characteristic value.

NO25 a

- For Information Only -

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Extreme Wind			
	Seismic Category I and II Structures			
	100-year Wind Speed (3-sec gust)[13]	67.1 m/s (150 mph)	**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. NO25a
	Exposure Category	D		The DCD site parameter of extreme wind exposure category is determined using ASCE 7 (DCD Reference 2.0-2). Exposure category is determined by a number of variables including wind speed, building shape and location, and surface roughness. A DCD site parameter of Exposure Category D results in the most severe design wind pressures.
			ESP No value provided	
			Unit 3 Exposure Category D	The Unit 3 site characteristic is Exposure Category D as this value cannot be exceeded. The Unit 3 site characteristic falls within (is the same as) the DCD site parameter value for extreme wind exposure category, i.e., Exposure Category D.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Extreme Wind (continued)			
Non-Seismic Standard Plant Structures			
50-year Wind Speed (3-sec gust)	58.1 m/s (130 mph)	**ESP** No value provided	
		Unit 3 42.9 m/s (96 mph) wind speed, 3-second gust, with a 100-year recurrence interval	The Unit 3 site characteristic value is the same as the ESP and Unit 3 site characteristic value for a 100-year wind speed (3-sec gust) identified above. This ESP and Unit 3 value is 42.9 m/s (96 mph). This value falls within (is less than) the DCD site parameter value for the 50-year wind speed (3-sec gust) of 58.1 m/s (130 mph). Because the 50-year wind speed (3-sec gust) value at Unit 3 can not be higher than the 100-year wind speed (3-sec gust), the Unit 3 site characteristic value for 50-year wind speed (3-sec gust) also falls within (is lower than) the DCD site parameter value for 50-year wind speed (3-sec gust). SSAR Section 2.3.1.3.1 provides the same value for a 100-year wind speed (3-sec gust) as ESP, Appendix A. N025a

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

	Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Maximum Flood (or Tsunami) Level [2]	0.3 m (1 ft) below plant grade		The DCD site parameter of maximum flood (or tsunami) water level of 0.3 m (1 ft) below plant grade is the same as the design flood level in DCD Table 3.4-1. The design plant grade elevation identified in DCD Table 3.4-1 is at 4650 mm, which corresponds to 88.4 m (290 ft) msl for the Unit 3 site as shown in Figure 2.1-201. Therefore, the DCD site parameter value of 0.3 m (1 ft) below plant grade corresponds to a maximum flood water level below 88.1 m (289 ft) msl for the Unit 3 site.
			ESP 82.3 m (270 ft) msl 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 82.3 m (270 ft) msl 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 88.4 m (290 ft) msl. The ESP site characteristic value falls within (is lower than) the DCD site parameter value.
			Unit 3 0.85 m (2.8 ft) below design plant grade based on PMP	The Unit 3 site characteristic value for PMF of 81.5 m (267.39 ft) msl 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 probable maximum precipitation (PMP) flood. As described in Section 2.4.2, this value is 0.85 m (2.8 ft) below design plant grade in the power block area based on the local PMP flood water elevation of 87.54 m (287.2 ft) msl 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. The maximum flood water level in the power block area due to local PMP is 0.85 m (2.8 ft) below design plant grade, which meets the DCD site parameter limit for a maximum flood water level not higher than 0.3 m (1 ft) below design plant grade.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Tornado			
Maximum Tornado Wind Speed[3]	147.5 m/s (330 mph)	**ESP and Unit 3** 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. The ESP site characteristic value falls within (is lower 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. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
Maximum Rotational Speed	116.2 m/s (260 mph)	**ESP and Unit 3** 93.0 m/s (208 mph)	The ESP site characteristic value for design basis tornado maximum rotational speed is defined as the rotation component of the maximum tornado wind speed. The ESP site characteristic value falls within (is lower 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. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
Translational Speed	31.3 m/s (70 mph)	**ESP and Unit 3** 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. The ESP site characteristic value falls within (is lower 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. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

N025a

N025a

N025a

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

NAPS COL 2.0-1-A

Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Tornado (continued)			
Radius	45.7 m (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. N025a
Pressure Drop	16.6 kPa (2.4 psi)	**ESP and Unit 3** 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. The ESP site characteristic value falls within (is lower 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. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value. N025a
Rate of Pressure Drop	11.7 kPa/s (1.7 psi/s)	**ESP and Unit 3** 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. The ESP site characteristic value falls within (is lower 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. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value. N025a

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Tornado (continued)			
Missile Spectrum[3]	Spectrum I of SRP 3.5.1.4, Rev. 2 applied to full building height.	**ESP** No value provided	The DCD site parameter for tornado missile spectrum is based on SRP 3.5.1.4, Rev. 2, July 1981, with Spectrum I missiles applied to full building height. When the missiles in Spectrum I are applied to full building height and not limited to impacts at altitudes less than 9.1 m (30 ft) above all grade levels within 0.8 km (0.5 mi) of the safety-related structures, the DCD site parameter addresses variations in grade levels at a site.
		Unit 3 Spectrum I of SRP 3.5.1.4, Rev. 2 applied to full building height	The Unit 3 site characteristic for tornado missile spectrum is Spectrum I of SRP 3.5.1.4, Rev. 2, applied to full building height. This spectrum fully addresses variations in grade levels at the Unit 3 site and this Unit 3 site characteristic value falls within (is the same as) the DCD site parameter value for tornado missile spectrum.
Precipitation (for Roof Design)			
Maximum Rainfall Rate[4]	49.3 cm/hr (19.4 in/hr)	**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. N025d
		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. N025d

- For Information Only -

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Precipitation (for Roof Design) (continued)			
	Maximum Short Term Rate	15.7 cm (6.2 in) in 5 min	**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. ①
			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. ①

① N025d

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

	Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Precipitation (for Roof Design) (continued)			
	Maximum Roof Load [5]	2873 Pa ($60\ lbf/ft^2$)	**ESP** No value provided	
			Unit 3 2121 Pa ($44.3\ lbf/ft^2$)	The Unit 3 site characteristic value for maximum roof load is based on site characteristic values for both 100-yr snow pack and 48-hr PMWP, each of which are less than the corresponding DCD site parameter value (as shown in comparisons below). The Unit 3-specific roof live load from antecedent snow pack represents a 100-year return ground snow load of 1460 Pa (30.5 lb/sq ft) that on the roof of each safety-related building is taken as 60% of that value based on exposure and thermal conditions per the ASCE 7 Commentary in DCD Reference 2.0-2. Therefore, the roof snow load from the antecedent snow pack is no more than 876 Pa ($18.3\ lbf/ft^2$) for any Unit 3 safety-related building. Also, as described in DCD Table 3G.1-2, the roof scuppers and drains are designed independently to handle the 48-hr probable maximum winter precipitation (PMWP) with no more than 100 mm (4 in) of water accumulation on the roof. The added load from such an accumulation is no more than 1005 Pa ($21\ lbf/ft^2$) for any safety-related Unit 3 building. Because precipitation during a PMWP event is liquid at the North Anna site, the total roof loading includes a rain-on-snow surcharge to account for liquid flowing through the 100-yr snow pack on the roof before it accumulates on the roof. Per Section 7.10 of ASCE 7, 239 Pa ($5\ lbf/ft^2$) accounts for the rain-on-snow surcharge. Therefore, the total maximum roof load (snow pack plus rain) on a Unit 3 safety-related building is 2121 Pa (18.3 + 21 + 5 or $44.3\ lbf/ft^2$). The Unit 3 site characteristic value of 2121 Pa ($44.3\ lbf/ft^2$) falls within (is lower than) the DCD site parameter value of 2873 Pa ($60\ lbf/ft^2$).

- For Information Only -

NAPS COL 2.0-1-A

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

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Precipitation (for Roof Design) (continued)			
Maximum Ground Snow Load[5] (100-year recurrence interval):	2394 Pa (50 lbf/ft^2)	**ESP and Unit 3** 1460 Pa (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 snow pack (to be used in determining extreme winter precipitation loads for roofs). The ESP site characteristic value falls within (is lower than) the DCD site parameter value. 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. ①
Maximum 48-hr Winter Rainfall[5]	91.4 cm (36 in)	**ESP and Unit 3** 52.7 cm (20.75 in) of water (48-hr probable maximum winter precipitation)	The ESP site characteristic value for 48-hr probable maximum winter precipitation is defined as the probable maximum precipitation during the winter months (to be used in conjunction with the 100-year snow pack in determining extreme winter precipitation loads for roofs). The ESP site characteristic value falls within (is lower than) the DCD site parameter value. 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. ①

① N025a

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

	Subject[17]	DCD Site Parameter Value[(1)(17)]	Site Characteristic	Evaluation	
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**				
	Ambient Design Temperature[(6)]				
	2% Annual Exceedance Values				N029d
	Maximum	35.6°C (96°F) dry bulb 26.1°C (79°F) wet bulb (mean coincident)	**ESP and Unit 3** 32.2°C (90°F) dry bulb with 23.9°C (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. The ESP site characteristic values fall within (are lower than) the DCD site parameter values. 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.	N025a
		27.2°C (81°F) wet bulb (non-coincident)	**ESP** No value provided		N029d
			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 2% annual exceedance. Because the 2% site characteristic value is even lower than the 0.4% value, the site's 2% value also falls within (is lower than) the DCD site parameter value for 2% annual exceedance. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same 0.4% value as ESP, Appendix A.	N029d N029d N025a

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Ambient Design Temperature (continued) 2% Annual Exceedance Values (continued)			N029d
	Minimum	–23.3°C (–10°F)	**ESP** No value provided	
			Unit 3 –7.8°C (18°F) (99% annual exceedance value)	The Unit 3 site characteristic value is the ESP site characteristic value for the minimum dry bulb temperature for 99% annual exceedance. This value is defined as the ambient dry-bulb temperature below which dry-bulb temperatures will fall 1% of the time annually. This value is –7.8°C (18°F) and falls within (is higher than) the DCD site parameter value for 2% annual exceedance (i.e., the ambient dry-bulb temperature below which dry-bulb temperatures will fall 2% of the time annually). Because the minimum temperature site characteristic value for 2% is even higher than the 1% value, the site's 2% value also falls within (is higher than) the DCD site parameter value for 2% annual exceedance. SSAR Table 2.3-18 and SSAR Table 1.9-1 provide the same 1% value as ESP, Appendix A. N029d 02.03.01-3 N029e N025a

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Ambient Design Temperature (continued)			
1% Annual Exceedance Values			
Maximum	37.8°C (100°F) dry bulb 26.1°C (79°F) wet bulb (mean coincident)	**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 percent 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) 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 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.

N029d

N029d

N025a

NAPS COL 2.0-1-A

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

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Ambient Design Temperature (continued) 1% Annual Exceedance Values (continued)			N029d
Maximum	27.8°C (82°F) wet bulb (non-coincident)	**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. N029d N025a
Minimum	-23.3°C (-10°F)	**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. N029 d,e 02.03.01-3 N025a

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

NAPS COL 2.0-1-A

Subject(17)	DCD Site Parameter Value(1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Ambient Design Temperature (continued)			
0% Exceedance Values			
Maximum	47.2°C (117°F) dry bulb 26.7°C (80°F) wet bulb (mean coincident)	**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)	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. The Unit 3 site characteristic 0% exceedance values (historic maximum values) for dry bulb with coincident wet bulb temperatures are provided in SSAR Tables 2.3-18 and 1.9-1, and also fall within (are less than) the DCD site parameter values for 0% exceedance.
	31.1°C (88°F) wet bulb (non-coincident)	**ESP** No value provided.	
		Unit 3 31.1°C (88°F) wet-bulb (non-coincident) (100-year return value)	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 falls within (is equal to) the DCD site parameter value for 0% exceedance. The Unit 3 site characteristic 0% exceedance value (historic maximum value) for wet bulb temperature (non-coincident) is provided in SSAR Tables 2.3-18 and 1.9-1, and also falls within (is less than) the DCD site parameter value for 0% exceedance.

02.03.01-2

N029d

02.03.01-2

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Ambient Design Temperature (continued) **0% Exceedance Values (continued)**			
Minimum	–40°C (–40°F)	**ESP** No value provided	
		Unit 3 –29.4°C (–21°F) (0% exceedance value)	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. 02.03.01-2
Soil Properties[16] **Minimum Static Bearing Capacity[7]**			N029d
Reactor/Fuel Building	699 kPa (14,600 lbf/ft^2)		The DCD site parameter of minimum static bearing capacity underlying the reactor building/fuel building foundation is determined by the minimum static bearing capacity for any layer of material under this foundation. As shown in Table 2.5-215, concrete fill, Zone III-IV, and Zone IV materials are under the reactor building/fuel building foundation for Unit 3. Of these, the Zone III-IV material has the lowest minimum bearing capacity value.
		ESP and Unit 3 3830 kPa (80,000 lbf/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 lbf/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. N025a

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

	Subject[17]	DCD Site Parameter Value[(1)(17)]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Soil Properties[16] (continued) **Minimum Static Bearing Capacity (continued)**			
	Control Building	292 kPa (6,100 lbf/ft^2)		The DCD site parameter of minimum static bearing capacity underlying the control building foundation is determined by the minimum static bearing capacity for any layer of material under this foundation. As shown in Table 2.5-215, concrete fill, Zone III, Zone III-IV, and Zone IV materials are under the control building foundation for Unit 3. Of these, the Zone III material has the lowest minimum bearing capacity value.
			ESP 766 kPa (16,000 lbf/ft^2) for Zone III weathered rock	The ESP site characteristic value for minimum bearing capacity of Zone III material is defined as the allowable load-bearing capacity of this layer for supporting plant structures. This value is 766 kPa (16,000 lbf/ft^2) and falls within (is greater than) the DCD site parameter value.
			Unit 3 2394 kPa (50,000 lbf/ft^2) for the mean of Zone III and Zone III-IV materials	The Unit 3 site characteristic value of minimum static bearing capacity for materials underlying the control building is from Section 2.5.4.10.1.c and is the mean of the values for Zone III and Zone III-IV materials beneath the control building. The Unit 3 site characteristic value for minimum bearing capacity of Zone III material is 958 kPa (20,000 lbf/ft^2). The Unit 3 site characteristic value for minimum bearing capacity of Zone III-IV material is 3830 kPa (80,000 lbf/ft^2). The mean of the values for Zone III and Zone III-IV materials beneath the control building is 2394 kPa (50,000 lbf/ft^2). The Unit 3 site characteristic value for Zone III and the mean of the values for Zone III and Zone III-IV materials each fall within (is greater than) the DCD site parameter value. The Unit 3 site characteristic value for Zone III falls within (is greater than) the ESP site characteristic value.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Soil Properties[16] (continued) **Minimum Static Bearing Capacity (continued)**			
Firewater Service Complex	165 kPa ($3450\ lbf/ft^2$)		The DCD site parameter of minimum static bearing capacity underlying the FWSC foundation is determined by the minimum static bearing capacity for any layer of material under this foundation. As shown in Table 2.5-215, structural fill, Zone III, Zone III-IV, and Zone IV materials are under the FWSC foundation for Unit 3. Of these, the Zone III material has the lowest minimum bearing capacity value.
		ESP 766 kPa ($16,000\ lbf/ft^2$) for Zone III weathered rock	The ESP site characteristic value for minimum bearing capacity of Zone III material is defined as the allowable load-bearing capacity of this layer for supporting plant structures. This value is 766 kPa ($16,000\ lbf/ft^2$) and falls within (is greater than) the DCD site parameter value.
		Unit 3 958 kPa ($20,000\ lbf/ft^2$) for Zone III weathered rock	The Unit 3 site characteristic value for minimum bearing capacity of Zone III material is 958 kPa ($20,000\ lbf/ft^2$). The Unit 3 site characteristic value for Zone III falls within (is greater than) the DCD site parameter value. The Unit 3 site characteristic value for Zone III falls within (is greater than) the ESP site characteristic value.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Soil Properties[16] (continued) **Minimum Dynamic Bearing Capacity (continued)**			
Reactor/Fuel Building			
Soft	2700 kPa (56,400 lbf/ft^2)	**ESP** No values provided	
Medium	7300 kPa (152,500 lbf/ft^2)	**Unit 3** 10,250 kPa (214,000 lbf/ft^2)	The Unit 3 site characteristic value for minimum dynamic bearing capacity for the RB/FB structure is from Table 2.5-215 and falls within (is greater than) the DCD site parameter minimum value for any type of soil: hard, medium, or soft. Based on the equivalent uniform shear wave velocity identified below, the materials beneath the RB/FB structure are classified as hard in accordance with Note (7).
Hard	5400 kPa (112,800 lbf/ft^2)		
Control Building			
Soft	2800 kPa (58,500 lbf/ft^2)	**ESP** No values provided	
Medium	2500 kPa (52,300 lbf/ft^2)	**Unit 3** 6895 kPa (144,000 lbf/ft^2)	The Unit 3 site characteristic value for minimum dynamic bearing capacity for the CB structure is from Table 2.5-215 and falls within (is greater than) the DCD site parameter minimum value for any type of soil: hard, medium, or soft. Based on the equivalent uniform shear wave velocity identified below, the materials beneath the CB structure are classified as hard in accordance with Note (7).
Hard	2400 kPa (50,200 lbf/ft^2)		

02.05.04-6

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Soil Properties[16] (continued) **Minimum Dynamic Bearing Capacity (continued)**			
Firewater Service Complex			
Soft	440 kPa (9200 lbf/ft^2)	**ESP** No values provided	
Medium	540 kPa (11,300 lbf/ft^2)	**Unit 3** 1389 kPa (29,000 lbf/ft^2)	The Unit 3 site characteristic value for minimum dynamic bearing capacity for the FWSC structure is from Table 2.5-215 and falls within (is greater than) the DCD site parameter minimum value for any type of soil: hard, medium, or soft. Based on the equivalent uniform shear wave velocity identified below, the materials beneath the FWSC structure are classified as medium in accordance with Note (7).
Hard	670 kPa (14,000 lbf/ft^2)		
Minimum Shear Wave Velocity[8]	300 m/s (1000 ft/s)	**ESP** No value provided	
		Unit 3 Value for each Seismic Category I structure: 2638 m/s (8655 ft/sec) for the reactor building/fuel building 2097 m/s (6880 ft/sec) for the control building 1073 m/s (3520 ft/sec) for the FWSC	The Unit 3 site characteristic value for each Seismic Category I structure is based on the equivalent uniform shear wave velocity over the entire soil column calculated using the formula in Note (8). The value for each structure falls within (is greater than) the DCD site parameter minimum value. As shown in Figures 2.5-229 through 2.5-232, the FB/RB, CB, and FWSC foundations are founded on uniform material. Therefore, the ratio of the largest to the smallest shear wave velocity over each mat foundation level does not exceed 1.7. N026b

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Soil Properties[16] (continued)			
	Liquefaction Potential			
	Seismic Category I structures	None under footprint of Seismic Category I structures resulting from site-specific SSE	**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.
	Other than Seismic Category I structures	See Note (14)	See Evaluation column	Note (14) in DCD Table 2.0-1 identifies a requirement to address liquefaction potential under other than Seismic Category I structures. This requirement is not a site parameter. Section 2.5.4.8 provides the results of the liquefaction analysis for the Unit 3 site and addresses potential liquefaction under other than Seismic Category I structures. Seismic Category II structures have no potential for liquefaction. Structures other than Seismic Category I and II structures are located such that a failure of such a structure does not affect the safety of Seismic Category I structures.
	Angle of Internal Friction	≥30 degrees	**ESP** No value provided	
			Unit 3 ≥30 degrees	The Unit 3 site characteristic value for angle of internal friction is provided in Section 2.5.4.2.5 and falls within (is the same as) the DCD site parameter value.

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

	Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Seismology			
	SSE Horizontal Ground Response Spectra [9]	See DCD Figure 2.0-1		The DCD site parameter values for SSE response spectra at foundation level are identified as the CSDRS. The CSDRS for the CB and RB/FB are shown in DCD Figure 2.0-1 (horizontal) and in DCD Figure 2.0-2 (vertical). The CSDRS for the FWSC are 1.35 times the accelerations shown in DCD Figure 2.0-1 (horizontal) and in DCD Figure 2.0-2 (vertical) per Note (9) in DCD Table 2.0-1.
	SSE Vertical Ground Response Spectra [9]	See DCD Figure 2.0-2		
			ESP No values provided	
			Unit 3 See Figures 2.5-206, 2.5-207, and 2.5-208	The Unit 3 site characteristic values are identified as the FIRS. The CB FIRS are shown in Figure 2.5-206. The RB/FB FIRS are shown in Figure 2.5-207. The FWSC FIRS are shown in Figure 2.5-208. The comparisons of the DCD site parameter (CSDRS for the CB and RB/FB) and Unit 3 site characteristic values (FIRS for the CB and RB/FB) are provided in Figure 2.0-201 for the horizontal spectra and in Figure 2.0-202 for the vertical spectra. These comparisons demonstrate that the Unit 3 site characteristic values fall within (are less than) the values established by the DCD site parameters. The comparisons of the DCD site parameter (CSDRS for the FWSC) and Unit 3 site characteristic values (FIRS for the FWSC) are provided in Figure 2.0-203 for the horizontal spectra and in Figure 2.0-204 for the vertical spectra. These comparisons demonstrate that the Unit 3 site characteristic values fall within (are less than) the values established by the DCD site parameters.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Hazards in Site Vicinity			
Site Proximity Missiles and Aircraft	< about 10^{-7} per year (for site proximity missile hazards)	**ESP** No value provided	
		Unit 3 No site proximity missile hazards identified	The Unit 3 site characteristic value for site proximity missiles value is that there are no site proximity missile sources identified. As provided in Section 2.2, there are no nearby missile sources identified in the site vicinity and this value falls within (is less than) the DCD site parameter value.
	< about 10^{-7} per year (for aircraft hazards)	**ESP** No value provided	
		Unit 3 Annual aircraft crash probability of 1.07×10^{-7} (includes civil and military aircraft)	The Unit 3 site characteristic value for total probability per year of a civil or military aircraft crashing was estimated per NUREG-0800 as shown in Section 2.2.3.2.2 and the total accident probability falls within (is the same as) the DCD site parameter value.
Volcanic Activity	None	**ESP** No value provided	
		Unit 3 No volcanic activity at the site	The Unit 3 site characteristic value for volcanic activity is that there is no evidence of non-tectonic deformation at the site, such as volcanic intrusion, as presented in SSAR Section 2.5.3.8. The Unit 3 site characteristic value falls within (is the same as) the DCD site parameter value.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Hazards in Site Vicinity (continued)			
Toxic Gases	None*		
* Maximum toxic gas concentrations at the Main Control Room (MCR) HVAC intakes	<toxicity limits	**ESP** No value provided	
		Unit 3 < toxicity limits	The Unit 3 site characteristic value for toxic gases is that the control room concentration for each chemical analyzed does not exceed the applicable toxicity limit. Based on this result, Seismic Category I Class 1E toxic gas monitoring instrumentation is not required for the MCR HVAC air intakes. The Unit 3 site characteristic value for toxic gases (control room concentrations < toxicity limits) is presented in Section 6.4.5 and falls within (is the same as) the DCD site parameter value for toxic gases (control room concentrations < toxicity limits).
Required Stability of Slopes[10]			Note (10) in DCD Table 2.0-1 identifies that factors of safety for stability of slopes are not site parameters. These factors are used with slope design features to ensure stability for static and dynamic loading.
Factor of safety for static (non-seismic) loading	1.5	See Evaluation column	Section 2.5.5.2 specifies that the minimum acceptable long-term static (non-seismic) factor of safety against slope stability failure is 1.5.
Factor of safety for dynamic (seismic) loading due to site-specific SSE	1.1	See Evaluation column	Section 2.5.5.2 specifies that the minimum acceptable long-term dynamic (seismic) factor of safety against slope stability failure is 1.1.

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

NAPS COL 2.0-1-A

Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Maximum Settlement Values for Seismic Category I Buildings [15]			
Maximum Settlement at any corner of basemat			
Under Reactor/Fuel Building	103 mm (4.0 inches)	**ESP** No value provided	
		Unit 3 1 mm (0.05 in) for the maximum settlement of a RB/FB corner	The Unit 3 site characteristic value for the maximum settlement of a corner for the RB/FB foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.
Under Control Building	18 mm (0.7 inches)	**ESP** No value provided	
		Unit 3 0.5 mm (0.02 in) for the maximum settlement of a CB corner	The Unit 3 site characteristic value for the maximum settlement of a corner for the CB foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.
Under FWSC Structure	17 mm (0.7 inches)	**ESP** No value provided	
		Unit 3 6.6 mm (0.26 in) for the maximum settlement of a FWSC corner	The Unit 3 site characteristic value for the maximum settlement of a corner for the FWSC foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.

NAPS COL 2.0-1-A

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

Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Maximum Settlement Values for Seismic Category I Buildings (continued)			
Averaged Settlement at four corners of basemat			
Under Reactor/Fuel Building	65 mm (2.6 inches)	**ESP** No value provided	
		Unit 3 1 mm (0.05 in) for the maximum settlement of a RB/FB corner	The Unit 3 site characteristic value for the averaged settlement at four corners is the maximum settlement of a corner because each corner settles the same amount, i.e., the maximum amount for a corner. The maximum settlement of a corner for the RB/FB foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.
Under Control Building	12 mm (0.5 inches)	**ESP** No value provided	
		Unit 3 0.5 mm (0.02 in) for the maximum settlement of a CB corner	The Unit 3 site characteristic value for the averaged settlement at four corners is the maximum settlement of a corner because each corner settles the same amount, i.e., the maximum amount for a corner. The maximum settlement of a corner for the CB foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.
Under FWSC Structure	10 mm (0.4 inches)	**ESP** No value provided	
		Unit 3 6.6 mm (0.26 in) for the maximum settlement of a FWSC corner	The Unit 3 site characteristic value for the averaged settlement at four corners is the maximum settlement of a corner because each corner settles the same amount, i.e., the maximum amount for a corner. The maximum settlement of a corner for the FWSC foundation is provided in Table 2.5-216 and falls within (is less than) the DCD site parameter value.

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

NAPS COL 2.0-1-A

Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Maximum Settlement Values for Seismic Category I Buildings (continued)			
Maximum Differential Settlement along the longest mat foundation dimension			
Within Reactor/Fuel Building	77 mm (3.0 inches)	**ESP** No value provided	
		Unit 3 2 mm (0.07 in)	The Unit 3 site characteristic value for the maximum differential settlement along the longest mat foundation dimension is the maximum settlement of the center of the RB/FB foundation less the maximum settlement for a corner. These values are provided in Table 2.5-216. The difference in these values determines the Unit 3 site characteristic value for the maximum differential settlement for the RB/FB foundation which, as shown, falls within (is less than) the DCD site parameter value.
Within Control Building	14 mm (0.6 inches)	**ESP** No value provided	
		Unit 3 0.5 mm (0.02 in)	The Unit 3 site characteristic value for the maximum differential settlement along the longest mat foundation dimension is the maximum settlement of the center of the CB foundation less the maximum settlement for a corner. These values are provided in Table 2.5-216. The difference in these values determines the Unit 3 site characteristic value for the maximum differential settlement for the CB foundation which, as shown, falls within (is less than) the DCD site parameter value.

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

NAPS COL 2.0-1-A

Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Maximum Settlement Values for Seismic Category I Buildings (continued) **Maximum Differential Settlement along the longest mat foundation dimension (continued)**			
Under FWSC Structure	12 mm (0.5 inches)	**ESP** No value provided	
		Unit 3 11 mm (0.45 in)	The Unit 3 site characteristic value for the maximum differential settlement along the longest mat foundation dimension is the maximum settlement of the center of the FWSC foundation less the maximum settlement for a corner after the installation of the basemat (applied load excluding weight of basemat). These values are provided in Table 2.5-216. The difference in these values determines the Unit 3 site characteristic value for the maximum differential settlement for the FWSC foundation which, as shown, falls within (is less than) the DCD site parameter value.
Maximum Differential Displacement between Reactor/Fuel Buildings and Control Building			
	85 mm (3.3 inches)	**ESP** No value provided	
		Unit 3 2 mm (0.08 in)	The Unit 3 site characteristic value for the maximum differential displacement between the RB/FB foundation and the CB foundation is the maximum settlement of the center of the RB/FB foundation less the maximum settlement of the center of the CB foundation. For the RB/FB and the CB foundations, the maximum settlement of the center of each is provided in Table 2.5-216. The difference in these values determines the Unit 3 site characteristic value for the maximum differential displacement between the RB/FB foundation and the CB foundation which, as shown, falls within (is less than) the DCD site parameter value.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorological Dispersion (χ/Q)[11]			
	EAB χ/Q			
	0–2 hours	2.00E-03 s/m^3	**ESP and Unit 3** 2.26E-04 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. Note that although the EAB location yielding the highest atmospheric dispersion factors was determined by GIS measurement to be 1609 m (1.0 mi) ESE, the SSAR distance of 1416 m (0.88 mi) ESE is conservative and used. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.
	LPZ χ/Q			
	0–8 hours	1.90E-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.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) LPZ χ/Q (continued)			
8–24 hours	1.40E-04 s/m³	**ESP and Unit 3** 1.36E-05 s/m³	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	7.50E-05 s/m³	**ESP and Unit 3** 5.58E-06 s/m³	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.
4–30 days	3.00E-05 s/m³	**ESP and Unit 3** 1.55E-06 s/m³	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. N025a

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

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued)			
Control Room χ/Q * * First value is for unfiltered inleakage. Second value is for air intakes (emergency and normal).		Control Room χ/Q values shown on the same row in DCD Table 2.0-1 are in sets below: first a set for unfiltered inleakage, followed by a set for air intakes (emergency and normal).	
Reactor Building **Unfiltered inleakage**			
0–2 hours	1.90E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.74E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
2–8 hours	1.30E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.17E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
8–24 hours	5.90E-04 s/m^3	**ESP** No value provided	
		Unit 3 4.07E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.

NAPS COL 2.0-1-A

N041b

N041a

N041a

N041a

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Reactor Building (continued)** **Unfiltered inleakage (continued)**			
	1–4 days	5.00E-04 s/m^3	**ESP** No value provided	
			Unit 3 3.42E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
	4–30 days	4.40E-04 s/m^3	**ESP** No value provided	
			Unit 3 2.79E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
	Air intakes (emergency and normal)			
	0–2 hours	1.50E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.25E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
	2–8 hours	1.10E-03 s/m^3	**ESP** No value provided	
			Unit 3 8.88E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.

N041a

N041a

N041a

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Reactor Building (continued)** **Air intakes (emergency and normal) (continued)**			
8–24 hours	5.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 3.41E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value. N041a
1–4 days	4.20E-04 s/m^3	**ESP** No value provided	
		Unit 3 2.69E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value. N041a
4–30 days	3.80E-04 s/m^3	**ESP** No value provided	
		Unit 3 2.20E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value. N041a

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation	
Part 1 – Evaluation of DCD Site Parameters				
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)**				
Passive Containment Cooling System/Reactor Building Roof				
Unfiltered inleakage				
0–2 hours	3.40E-03 s/m^3	**ESP** No value provided		
		Unit 3 1.58E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.	N041a
2–8 hours	2.70E-03 s/m^3	**ESP** No value provided		
		Unit 3 1.34E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.	N041a
8–24 hours	1.40E-03 s/m^3	**ESP** No value provided		
		Unit 3 5.61E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.	N041a
1–4 days	1.10E-03 s/m^3	**ESP** No value provided		
		Unit 3 3.96E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.	N041a

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

NAPS COL 2.0-1-A

Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Passive Containment Cooling System/Reactor Building Roof (continued)** **Unfiltered inleakage (continued)**			
4–30 days	7.90E-04 s/m^3	**ESP** No value provided	
		Unit 3 3.34E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value. N041a
Air intakes (emergency and normal)			
0–2 hours	3.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.31E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value. N041a
2–8 hours	2.50E-03 s/m^3	**ESP** No value provided	
		Unit 3 9.35E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value. N041a
8–24 hours	1.20E-03 s/m^3	**ESP** No value provided	
		Unit 3 3.72E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value. N041a

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

NAPS COL 2.0-1-A

Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Passive Containment Cooling System/Reactor Building Roof (continued)** **Air intakes (emergency and normal) (continued)**			
1–4 days	9.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 2.70E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value. N041a
4–30 days	7.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 2.18E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value. N041a
Blowout Panels/Reactor Building Roof **Unfiltered Leakage**			
0–2 hours	7.00E-03 s/m^3	**ESP** No value provided	N041a N041b
		Unit 3 2.16E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
2–8 hours	5.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.72E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.

- For Information Only -

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Blowout Panels/Reactor Building Roof (continued)** **Unfiltered Leakage (continued)**			N041a, b
	8–24 hours	2.10E-03 s/m^3	**ESP** No value provided	
			Unit 3 7.21E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
	1–4 days	1.70E-03 s/m^3	**ESP** No value provided	
			Unit 3 5.25E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
	4–30 days	1.50E-03 s/m^3	**ESP** No value provided	
			Unit 3 4.20E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
	Air intakes (emergency and normal)			
	0–2 hours	5.90E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.00E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
	2–8 hours	4.70E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.38E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Blowout Panels/Reactor Building Roof (continued)** **Air intakes (emergency and normal) (continued)**			
8–24 hours	1.50E-03 s/m^3	**ESP** No value provided	
		Unit 3 5.23E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
1–4 days	1.10E-03 s/m^3	**ESP** No value provided	
		Unit 3 3.72E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 3.06E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-208 and falls within (is less than) the DCD site parameter value.

N041 a, b

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)**			N041b
Turbine Building			
Unfiltered inleakage			
0–2 hours	1.20E-03 s/m^3	**ESP** No value provided	
		Unit 3 6.71E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value. N041a
2–8 hours	9.80E-04 s/m^3	**ESP** No value provided	
		Unit 3 3.42E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value. N041a
8–24 hours	3.90E-04 s/m^3	**ESP** No value provided	
		Unit 3 1.53E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value. N041a
1–4 days	3.80E-04 s/m^3	**ESP** No value provided	
		Unit 3 1.17E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value. N041a

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

	Subject(17)	DCD Site Parameter Value(1)(17)	Site Characteristic	Evaluation	
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**				
	Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Turbine Building (continued)** **Unfiltered inleakage (continued)**				
	4–30 days	3.20E-04 s/m^3	**ESP** No value provided		
			Unit 3 9.19E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.	N04la
	Air intakes (emergency and normal)				
	0–2 hours	1.20E-03 s/m^3	**ESP** No value provided		
			Unit 3 8.17E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.	N04la
	2–8 hours	9.80E-04 s/m^3	**ESP** No value provided		
			Unit 3 3.96E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.	N04la
	8–24 hours	3.90E-04 s/m^3	**ESP** No value provided		
			Unit 3 1.78E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.	N04la

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

	Subject[17]	DCD Site Parameter Value[(1)(17)]	Site Characteristic	Evaluation	
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**				
	Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Turbine Building (continued)** **Air intakes (emergency and normal) (continued)**				
	1–4 days	3.80E-04 s/m^3	**ESP** No value provided		
			Unit 3 1.50E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.	N041a
	4–30 days	3.20E-04 s/m^3	**ESP** No value provided		
			Unit 3 1.15E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.	N041a
	Fuel Building **Unfiltered inleakage**				
	0–2 hours	2.80E-03 s/m^3	**ESP** No value provided		N041 a,b
			Unit 3 2.62E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value	
	2–8 hours	2.50E-03 s/m^3	**ESP** No value provided		
			Unit 3 1.97E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.	

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

NAPS COL 2.0-1-A

Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Fuel Building (continued)** **Unfiltered inleakage (continued)**			N041 a, b
8–24 hours	1.25E-03 s/m^3	**ESP** No value provided	
		Unit 3 7.26E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.
1–4 days	1.10E-03 s/m^3	**ESP** No value provided	
		Unit 3 6.01E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 5.20E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.
Air intakes (emergency and normal)			
0–2 hours	2.80E-03 s/m^3	**ESP** No value provided	
		Unit 3 2.15E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value N041a
2–8 hours	2.50E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.59E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value. N041a

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

	Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation	
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**				
	Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Fuel Building Source (continued)** **Air intakes (emergency and normal) (continued)**				
	8–24 hours	1.25E-03 s/m^3	**ESP** No value provided		
			Unit 3 5.90E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.	N041a
	1–4 days	1.10E-03 s/m^3	**ESP** No value provided		
			Unit 3 4.70E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.	
	4–30 days	1.00E-03 s/m^3	**ESP** No value provided		
			Unit 3 4.02E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-204 and falls within (is less than) the DCD site parameter value.	N041a

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Radwaste Building** **Unfiltered inleakage**			
				The PCCS vent χ/Q values are assumed to bound the χ/Q values for any release from the RW Building based on distance and direction to the CR receptors, and the PCCS vent χ/Q values are used to evaluate releases from the RW Building in the DCD (Section 15.3.16). The PCCS χ/Q values are compared to the RW Building χ/Q results.
	0–2 hours	3.40E-03 s/m^3	**ESP** No value provided	
			Unit 3 6.13E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
	2–8 hours	2.70E-03 s/m^3	**ESP** No value provided	
			Unit 3 4.90E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.40E-03 s/m^3	**ESP** No value provided	
			Unit 3 2.19E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
	1–4 days	1.10E-03 s/m^3	**ESP** No value provided	
			Unit 3 1.58E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.

N041 a,b

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

NAPS COL 2.0-1-A

Subject [17]	DCD Site Parameter Value [1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Radwaste Building (continued)** **Unfiltered inleakage (continued)**			
4–30 days	7.90E-04 s/m^3	**ESP** No value provided	
		Unit 3 1.29E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
Air intakes (emergency and normal)			
0–2 hours	3.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 4.69E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
2–8 hours	2.50E-03 s/m^3	**ESP** No value provided	
		Unit 3 3.76E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
8–24 hours	1.20E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.66E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
1–4 days	9.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 1.17E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.

N041 a, b

N041 a, b

NAPS COL 2.0-1-A

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

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Control Room χ/Q (continued)** **Radwaste Building (continued)** **Air intakes (emergency and normal) (continued)**			
4–30 days	7.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 9.96E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-207 and falls within (is less than) the DCD site parameter value.
Technical Support Center χ/Q		The Technical Support Center χ/Q values shown on the same row in DCD Table 2.0-1 for unfiltered inleakage and for the air intakes (emergency and normal) were assumed to be the same, therefore, one comparison for each set of TSC χ/Q values is provided below.	
Reactor Building **TSC Unfiltered inleakage and TSC Air intakes (emergency and normal)**			
0–2 hours	1.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 2.63E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
2–8 hours	6.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 2.17E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
8–24 hours	3.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 9.35E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.

N041 a, b

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

NAPS COL 2.0-1-A

N041 a, b

Subject(17)	DCD Site Parameter Value(1)(17)	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Reactor Building (continued)** **TSC Unfiltered inleakage and TSC Air intakes (emergency and normal) (continued)**			
1–4 days	2.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 6.71E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
4–30 days	1.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 5.21E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-201 and falls within (is less than) the DCD site parameter value.
Turbine Building **TSC Unfiltered inleakage and TSC Air intakes (emergency and normal)**			
0–2 hours	2.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 2.00E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is the same as) the DCD site parameter value.
2–8 hours	1.50E-03 s/m^3	**ESP** No value provided	
		Unit 3 1.13E-03 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.

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

NAPS COL 2.0-1-A

N041 a, b

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Meteorological Dispersion (χ/Q) (continued) **Turbine Building (continued)** **TSC Unfiltered inleakage and TSC Air intakes (emergency and normal) (continued)**			
8–24 hours	8.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 4.45E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.
1–4 days	6.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 3.78E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.
4–30 days	5.00E-04 s/m^3	**ESP** No value provided	
		Unit 3 3.27E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-202 and falls within (is less than) the DCD site parameter value.
Passive Containment Cooling System/Reactor Building Roof **TSC Unfiltered inleakage and TSC Air intakes (emergency and normal)**			
0–2 hours	2.00E-03 s/m^3	**ESP** No value provided	
		Unit 3 4.40E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.
2–8 hours	1.10E-03 s/m^3	**ESP** No value provided	
		Unit 3 3.64E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Meteorological Dispersion (χ/Q) (continued) **Passive Containment Cooling System/Reactor Building Roof (continued)** **TSC Unfiltered inleakage and TSC Air intakes (emergency and normal) (continued)**			N041 a, b
	8–24 hours	5.00E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.52E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.
	1–4 days	4.00E-04 s/m^3	**ESP** No value provided	
			Unit 3 1.16E-04 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.
	4–30 days	3.00E-04 s/m^3	**ESP** No value provided	
			Unit 3 8.78E-05 s/m^3	The Unit 3 site characteristic value is provided in Table 2.3-203 and falls within (is less than) the DCD site parameter value.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12]			N029f
NAPS COL 12.2-2-A	χ/Q: Reactor/Fuel Building Ventilation Stack (RB-VS)	$3.0E-07\ s/m^3$	**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. **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.	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. Each ESP site characteristic value that is equal to or less than a DCD site parameter value results in a lower estimated dose for the same source term, and conversely, a higher χ/Q or D/Q results in a higher estimated dose. As shown below, every ESP site characteristic value does not fall within (some are greater than) the DCD site parameter value. As shown further below, every Unit 3 site characteristic value also does not fall within (some are greater than) the DCD site parameter value. Per Note (12) of DCD Table 2.0-1, if a site-specific χ/Q value exceeds the site parameter value, the release concentrations in DCD Table 12.2-17 must be adjusted proportionate to the change in χ/Q using the stack release information in DCD Table 12.2-16, which is replaced by the Unit 3 release information in Table 2.3-16R, to show the 10 CFR 20 limits are met; and the annual average doses in DCD Table 12.2-18b must be changed to show the 10 CFR 50, Appendix I limits are met. Per DCD COL Item 12.2-2-A, calculation bases in DCD Tables 12.2-15 and 12.2-18a are replaced with site-specific values for calculation of airborne concentrations and doses. Tables 12.2-15R and 12.2-18bR identify the replacement of DCD information. This table identifies that there are Unit 3 site characteristic values that do not fall within (are greater than) the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results.
	Turbine Building Ventilation Stack (TB-VS)	$2.0E-07\ s/m^3$		
	Radwaste Building Ventilation Stack (RW-VS)	$2.0E-05\ s/m^3$		
	D/Q: RB-VS	$1.0E-08\ m^{-2}$		
	TB-VS	$6.0E-09\ m^{-2}$		
	RW-VS	$3.0E-08\ m^{-2}$		

(continued)

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	Part 1 – Evaluation of DCD Site Parameters			
	Long Term Dispersion Estimates[12] (continued)			N029f
				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, rather than values for releases from each ventilation stack. Each site characteristic χ/Q value is compared with all three DCD site parameter χ/Q values, which correspond to a value for each of the three buildings with a ventilation stack. Each site characteristic D/Q value is similarly compared with all three DCD site parameter D/Q values.
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	**ESP and Unit 3** 3.7×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 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 the same as) the ESP site characteristic value.
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	**ESP and Unit 3** 3.7×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 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 the same as) the ESP site characteristic value.

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

NAPS COL 2.0-1-A

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 1 – Evaluation of DCD Site Parameters			
Long Term Dispersion Estimates[12] (continued)			
χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	**ESP and Unit 3** 3.3 × 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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 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 the same as) the ESP site characteristic value.
D/Q: RB-VS TB-VS RW-VS	 1.0E-08 m^{-2} 6.0E-09 m^{-2} 3.0E-08 m^{-2}	**ESP and Unit 3** 1.2 × 10^{-8} 1/m^2, annual average, D/Q value, 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 D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 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 the same as) 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.

N029f

02.03.05-2

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12] (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	**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 does not fall within (is greater than) two of the DCD site parameter values.
NAPS ESP VAR 2.0-1a			**Unit 3** 4.2×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	**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 does not fall within (is greater than) two of the DCD site parameter values.
NAPS ESP VAR 2.0-1b			**Unit 3** 4.1×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.

No29f

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12] (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 s/m^3	**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 does not fall within (is greater than) two of the DCD site parameter values. N029f 02.03.05 -2
NAPS ESP VAR 2.0-1c			**Unit 3** 3.7×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	D/Q: RB-VS TB-VS RW-VS	 1.0E-08 m^{-2} 6.0E-09 m^{-2} 3.0E-08 m^{-2}	**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 dispersion 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 does not fall within (is greater than) two of the DCD site parameter values.
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 dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) two of the ESP site characteristic values.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12] (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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 does not fall within (is greater than) two of the DCD site parameter values. N029f
NAPS ESP VAR 2.0-1e			**Unit 3** 4.2×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results.
NAPS ESP VAR 2.0-1f			**Unit 3** 4.1×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration 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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12] (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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 does not fall within (is greater than) two of the DCD site parameter values. N029f
NAPS ESP VAR 2.0-1g			**Unit 3** 3.7×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic values.
	D/Q: RB-VS TB-VS RW-VS	 1.0E-08 m^{-2} 6.0E-09 m^{-2} 3.0E-08 m^{-2}	**ESP** 3.1×10^{-9} $1/m^2$, annual average, 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 D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value falls within (is smaller than) the DCD site parameter values. 02.03.05-2
NAPS ESP VAR 2.0-1h			**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 dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) two of the ESP site characteristic values.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12] (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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 does not fall within (is greater than) two of the DCD site parameter values. No29f
NAPS ESP VAR 2.0-1i			**Unit 3** 4.2×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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 does not fall within (is greater than) two of the DCD site parameter values.
NAPS ESP VAR 2.0-1j			**Unit 3** 4.1×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration 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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates[12] (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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) two of the DCD site parameter values. N029f 02.03.05-2
NAPS ESP VAR 2.0-1k			**Unit 3** 3.7×10^{-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 does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value does not fall within (is greater than) the ESP site characteristic value.
	D/Q: RB-VS TB-VS RW-VS	 1.0E-08 m^{-2} 6.0E-09 m^{-2} 3.0E-08 m^{-2}	**ESP** 6.0×10^{-9} 1/m^2, annual average, 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 D/Q value for use in determining gaseous pathway doses to the maximally exposed individual. The ESP site characteristic value does not fall within (is greater than) two of the DCD site parameter values.
NAPS ESP VAR 2.0-1l			**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 dispersion estimate is provided in Table 2.3-16R. The Unit 3 site characteristic value does not fall within (is greater than) two of the DCD site parameter values. See Section 12.2 for the site-specific concentration 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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS COL 2.0-1-A	**Part 1 – Evaluation of DCD Site Parameters**			
	Long Term Dispersion Estimates (12) (continued)			
	χ/Q: RB-VS TB-VS RW-VS	 3.0E-07 s/m^3 2.0E-07 s/m^3 2.0E-05 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. Each ESP and Unit 3 site characteristic value falls within (is smaller than) the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic values fall within (are the same as) the ESP site characteristic value.
	D/Q: RB-VS TB-VS RW-VS	 1.0E-08 m^{-2} 6.0E-09 m^{-2} 3.0E-08 m^{-2}	**ESP and Unit 3** No value provided for annual average, nearest cow-milk	The ESP and Unit 3 site characteristic values for this long term D/Q 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 values fall within (are the smaller than) the DCD site parameter values. See Section 12.2 for the site-specific concentration and dose analysis inputs and results. The Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

N029f

N026a

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

NAPS SUP 2.0-1

Subject (17)	DCD Site Parameter Value (1)(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			
Exclusion Area Boundary	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.

N026a

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

NAPS SUP 2.0-1

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
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.
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.

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

NAPS SUP 2.0-1

Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter			
Minimum Dry-Bulb Temperature (continued)			02.03.01-2
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.
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.
Ultimate Heat Sink Ambient Air Temperature and Humidity			Although the Unit 3 site characteristic value is presented for comparison with the ESP site characteristic value, the ultimate heat sink (UHS) for the passive Unit 3 ESBWR design does not use safety-related engineered underground reservoirs or storage basins. Comparisons of meteorological conditions are provided as information required per 10 CFR 52.79(b)(1).
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.

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

NAPS SUP 2.0-1

Subject[17]	DCD Site Parameter Value[1][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 Minimum Water Cooling During Any Consecutive 5 days	No value provided	**ESP and Unit 3** 25.3°C (77.6°F) wet-bulb temperature with coincident 27.2°C (80.9°F) 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.
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 2.0-1

Subject(17)	DCD Site Parameter Value(1)(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.	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. N025 a, d N025 d
Proposed Facility Boundaries	No value provided	**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.	N025 f

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-1	**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			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.
	Minimum Lake Water Level	No value provided	**ESP and Unit 3** 242 ft msl	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.

NO25d,e

NO25 d,e

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-1	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Hydrology (continued)			
	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.
	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.

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-1	**Part 2 – Evaluation of ESP Site Characteristics and Design Parameters For Which There is No Corresponding DCD Site Parameter**			
	Hydrology (continued)			
	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** 0.04 m/m (0.04 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.
	Basic Geologic and Seismic Information Capable Tectonic Structures	No value provided	**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 Unit 3 site characteristic value falls within (is the same as) the ESP site characteristic value.

- For Information Only -

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS SUP 2.0-1	**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. N025a
NAPS ESP VAR 2.0-4			**Unit 3** Figure 2.5-205	N025a The Unit 3 site characteristic values are the horizontal and vertical response spectra provided in Figure 2.5-205. The Unit 3 site characteristic values (response spectra) do not fall within (are not lower than) the ESP site characteristic values (response spectra) at every frequency. 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.
	Stability of Subsurface Materials and Foundations **Zone III Weathered Rock (205 ft–298 ft)**			
	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 2.5-215 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).

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

NAPS SUP 2.0-1

Subject[17]	DCD Site Parameter Value[1][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 III Weathered Rock (205 ft–298 ft) (continued)			
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 shear wave velocity in Table 2.5-212. This corresponds to the best estimate 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. N025f1
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 2.5-215 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** 1372 m/sec (4500 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 shear wave velocity in Table 2.5-212. This corresponds to the best estimate 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. N025f1

- For Information Only -

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

NAPS SUP 2.0-1

Subject[17]	DCD Site Parameter Value[1][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 2.5-215. 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 best estimate shear wave velocity in Table 2.5-212. This corresponds to the best estimate 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. N025f1

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-1	**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	N025b 15.06.05-1
	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 **Unit 3** 88.4 m (290 ft) msl	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. N025b

- For Information Only -

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

	Subject(17)	DCD Site Parameter Value(1)(17)	Site Characteristic	Evaluation
NAPS SUP 2.0-1	**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)	See Evaluation column	**ESP** Values in ESP Appendix B tables **SSAR Table 1.9-1** Values in SSAR Section 15.4 tables (maximum values) **Unit 3** Values in DCD Section 15.4 tables	ESP (design) controlling parameters superseded. 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 ESBWR 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. N029b 15.06.05-1 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. 15.05.06-1

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

	Subject[17]	DCD Site Parameter Value[(1)(17)]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			N026a
	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 "Precipitation (for Roof Design), Maximum 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 2.0-5a			**Unit 3** 8.37 cm^3/g	N026b The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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.
NAPS ESP VAR 2.0-5b			**Unit 3** 6.81 cm^3/g	N026b The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b
	Co-60	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 2.0-5c			**Unit 3** 9.19 cm^3/g	N026b The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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)			
	Zn-65	No value provided	**SSAR Table 1.9-1** 200 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 2.0-5d			**Unit 3** 3.63 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b N026b
	Sr-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 2.0-5e			**Unit 3** 2.08 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b N026b

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

	Subject(17)	DCD Site Parameter Value(1)(17)	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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	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 2.0-5f			**Unit 3** 28.75 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b
	Cs-134	No value provided	**SSAR Table 1.9-1** 30 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 2.0-5g			**Unit 3** 22.51 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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	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 2.0-5h			**Unit 3** 22.51 cm^3/g	The Unit 3 site characteristic value listed in Table 2.4-208 (10% K_d) does not fall within (is less than) the SSAR site characteristic value. Measured K_d values are presented in Table 2.4-207 and show that the Unit 3 site characteristic value is conservative. See Section 2.4.13 for the radionuclide transport analysis. N026b N026b
	Y-90	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 15.08 cm^3/g	SSAR Table 1.9-1 does not identify a distribution coefficient for this radionuclide. The Unit 3 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is listed in Table 2.4-208 (10% K_d). See Section 2.4.13 for the radionuclide transport analysis. N026b
	Ni-63	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 65.30 cm^3/g	SSAR Table 1.9-1 does not identify a distribution coefficient for this radionuclide. The Unit 3 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is listed in Table 2.4-208 (10% K_d). See Section 2.4.13 for the radionuclide transport analysis. N026b
	Ag-110m	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 14.71 cm^3/g	SSAR Table 1.9-1 does not identify a distribution coefficient for this radionuclide. The Unit 3 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is listed in Table 2.4-208 (10% K_d). See Section 2.4.13 for the radionuclide transport analysis. N026b

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

NAPS SUP 2.0-2

Subject[17]	DCD Site Parameter Value[1][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)			
Ce-144	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 138.99 cm^3/g	SSAR Table 1.9-1 does not identify a distribution coefficient for this radionuclide. The Unit 3 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is listed in Table 2.4-208 (10% K_d). See Section 2.4.13 for the radionuclide transport analysis. N026b
Np-239	No value provided	**SSAR Table 1.9-1** No value provided **Unit 3** 0.96 cm^3/g	SSAR Table 1.9-1 does not identify a distribution coefficient for this radionuclide. The Unit 3 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is listed in Table 2.4-208 (10% K_d). See Section 2.4.13 for the radionuclide transport analysis. N026b
Pu-239	No value provided.	**SSAR Table 1.9-1** No value provided **Unit 3** 84.59 cm^3/g	SSAR Table 1.9-1 does not identify a distribution coefficient for this radionuclide. The Unit 3 site characteristic value is the distribution coefficient used to assess subsurface hydrological radionuclide transport and is listed in Table 2.4-208 (10% K_d). See Section 2.4.13 for the radionuclide transport analysis. N026b

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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. N029a 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 and AP-1000 do not apply to Unit 3. SSAR Section 15.4 provides estimated doses for postulated ESBWR design basis accidents (DBAs). Since the SSAR was submitted, activity releases were revised for the ESBWR DBAs. The Unit 3 dose from each DBA is provided in DCD Section 15.4, 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. Most 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. N029a

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

	Subject (17)	DCD Site Parameter Value (1)(17)	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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 2A-1 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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	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 (continued)			
	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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**Part 3 – Evaluation of SSAR Bounding Site Characteristics and Design Parameters For Which There is No Corresponding ESP or DCD Value**			
	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.

- For Information Only -

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

NAPS SUP 2.0-2

Subject (17)	DCD Site Parameter Value (1)(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			
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** 71.3 m (234 ft)	The tallest power block building is the turbine building (see DCD Figure 1.2-20) at 57.9 m (190 ft) above finished grade. The height of 57.9 m (190 ft) is based on the highest structural elevation of 60 m (196.85 ft) and a finished ground level grade of 4.5 m (14.76 ft), yielding a height of 55.5 m (182.09 ft), not including the parapet. The parapet of 1 m (3.28 ft) height is added to this for a total height above finished ground level grade of 56.5 m (185.37 ft). This value is rounded to 190 ft. The tallest power block structure is the Turbine Building vent stack (see DCD Table 2A-3) at 71.3 m (234 ft) above finished grade. This is the Unit 3 design characteristic value. The Unit 3 design characteristic value falls within (is equal to) the SSAR Table 1.9-1 design parameter value.

① ① ① ①

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

	Subject[17]	DCD Site Parameter Value[1][17]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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** 20 m (65.6 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 reactor building at 20 m (65.62 ft) nominal, below finished ground level grade (El. 88.24 m (289.50 ft)). The embedment of 20 m (65.62 ft) is based on the lowest elevation of -15.5 m (50.85 ft) and a finished ground level grade of +4.5 m (14.76 ft), yielding a depth of 20 m (65.62 ft), not including lean concrete below the basemat. This Unit 3 design characteristic value is shown in Table 2.5-213. The Unit 3 design characteristic value falls within (is less than) the SSAR Table 1.9-1 design parameter value.
	Normal Plant Heat Sink **Unit 3 Closed-Cycle, Dry and Wet Tower**			
	Make-Up Flow Rate	No value provided	**SSAR Table 1.9-1** ≤84.30 m^3/m (22,269 gpm) maximum (EC mode) **Unit 3** 84.26 m^3/m (22,260 gpm) maximum (EC mode)	The Unit 3 design characteristic value for the hybrid cooling tower makeup rate in EC mode is the expected rate of water withdrawal from Lake Anna to replace water lost from the operation of the tower during this mode. The losses are from evaporation, blowdown, and drift. The Unit 3 design characteristic value for the EC mode of operation 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

NAPS SUP 2.0-2

Subject[17]	DCD Site Parameter Value[1][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** 21.0 m^3/m (5558 gpm) maximum (EC mode)	The Unit 3 design characteristic value for the hybrid cooling tower blowdown rate is the expected rate at which water is lost through blowdown flow from the cooling tower system to the WHTF. The Unit 3 design characteristic value for the EC mode of operation falls within (is less than) 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.

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

	Subject[17]	DCD Site Parameter Value[(1)(17)]	Site Characteristic	Evaluation
NAPS SUP 2.0-2	**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** 4500 MWt	This Unit 3 design characteristic value of 4500 MWt is the rated reactor thermal power, as described in DCD Section 1.1.2.7. The Unit 3 design characteristic value falls within (is the same as) the SSAR Table 1.9-1 design parameter value.

N026a

NAPS COL 2.0-1-A **Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

1. The design of the Radwaste Building uses a set of design parameters that are specified in RG 1.143, Table 2, Class RW IIa instead of the corresponding values given in this table for all parameters except as follows: 1) Tornado: winds speeds, radius, pressure drop and rate of pressure drop; 2) Seismology: horizontal and vertical ground spectra: See DCD Figures 2.0-1 and 2.0-2. N029d
2. Probable maximum flood level (PMF), as defined in Table 1.2-6 of Volume III of DCD Reference 2.0-4.
3. Maximum speed selected is based on Attachment I of DCD Reference 2.0-5, which summarizes the NRC Interim Position on RG 1.76. Concrete structures designed to resist Spectrum I missiles of SRP 3.5.1.4, Rev. 2, will also resist missiles postulated in RG 1.76, Revision 1.
4. Based on probable maximum precipitation (PMP) for one hour over 2.6 km^2 (one square mile) with a ratio of 5 minutes to one hour PMP of 0.32 as found in DCD Reference 2.0-3. Roof scuppers and drains are designed independently to limit water accumulation on the roof to no more than 100 mm (4 in) during PMP conditions. See also DCD Table 3G.1-2.
5. Maximum design roof load accommodates snow load and 48-hour probable maximum winter precipitation (PMWP) in DCD References 2.0-2 and 2.0-6. Roof scuppers and drains are designed independently to limit water accumulation on the roof to no more than an average depth of 100 mm (4 in) during PMWP conditions. See also DCD Table 3G.1-2. N029d
6. ESBWR site parameter zero percent exceedance values are based on conservative estimates of historical high and low values for potential sites. Consistent with DCD Reference 2.0-4, they represent historical limits excluding peaks of less than two hours. One and two percent annual exceedance values were selected in order to bound the values presented in DCD Reference 2.0-4 and available Early Site Permit applications. N029d
7. At foundation level of Seismic Category I structures. For minimum dynamic bearing capacity site-specific application, use the larger value or a linearly interpolated value of the applicable range of shear wave velocities at the foundation level. The shear wave velocities of soft, medium and hard soils are 300 m/sec (1000 ft/sec), 800 m/sec (2600 ft/sec) and greater than or equal to 1700 m/sec (5600 ft/sec), respectively.

NAPS COL 2.0-1-A **Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

8. This is the equivalent uniform shear wave velocity (V_{eq}) over the entire soil column at seismic strain, which is a lower bound value after taking into account uncertainties. V_{eq} is calculated to achieve the same wave traveling time over the depth equal to the embedment depth plus 2 times the largest foundation plan dimension below the foundation as follows:

$$V_{eq} = \frac{\sum d_i}{\sum \frac{d_i}{V_i}}$$

where d_i and V_i are the depth and shear wave velocity, respectively, of the i^{th} layer. The ratio of the largest to the smallest shear wave velocity over the mat foundation width at the foundation level does not exceed 1.7.

9. Safe Shutdown Earthquake (SSE) design ground response spectra of 5% damping, also termed Certified Seismic Design Response Spectra (CSDRS), are defined as free-field outcrop spectra at the foundation level (bottom of the base slab) of the Reactor/Fuel and Control Building structures. For ground surface founded Firewater Service Complex structures, the CSDRS is 1.35 times the values shown in DCD Figures 2.0-1 and 2.0-2.

10. Values reported here are actually design criteria rather than site parameters. They are included here because they don't appear elsewhere in the DCD.

11. If a selected site has a χ/Q value that exceeds the ESBWR reference site value, the COL applicant will address how the radiological consequences associated with the controlling design basis accident continue to meet the dose reference values provided in 10 CFR 50.34(a) and control room operator dose limits provided in General Design Criterion 19 using site-specific χ/Q values.

12. If a selected site has χ/Q values that exceed the ESBWR reference site values, the release concentrations in DCD Table 12.2-17 would be adjusted proportionate to the change in χ/Q values using the stack release information in DCD Table 12.2-16. In addition, for a site selected that exceeds the bounding χ/Q or D/Q values, the COL applicant will address how the resulting annual average doses (DCD Table 12.2-18b) continue to meet the dose reference values provided in 10 CFR 50 Appendix I using site-specific χ/Q and D/Q values. N029d

13. Value was selected to comply with expected requirements of southeastern coastal locations.

14. Localized liquefaction potential under other than Seismic Category I structures is addressed per SRP 2.5.4 in DCD Table 2.0-2.

NAPS COL 2.0-1-A **Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

15. Settlement values are long-term (post-construction) values except for differential settlement within the foundation mat. The design of the foundation mat accommodates immediate and long-term (post-construction) differential settlements after the installation of the basemat.
16. For sites not meeting the soil property requirements, a site-specific analysis is required. I N029d
17. Information in this column and notes (1) through (16) are from DCD Table 2.0-1. In these notes, "DCD" was added before cited tables, figures, and references from the DCD.

NAPS COL 2.0-1-A

Table 2.0-202 Comparison of ESP and Unit 3 Horizontal Spectra for Zone III-IV

I N026a

Freq. (Hz)	Unit 3 SA (g)(1)	ESP SA (g)(2)	Controlling ESP or Unit 3	% Difference
100	0.448	0.555	ESP Spectra	-19.3
50	0.969	1.195	ESP Spectra	-18.9
30	1.206	1.47	ESP Spectra	-18.0
25	1.193	1.476	ESP Spectra	-19.2
20	1.163	1.446	ESP Spectra	-19.6
10	0.877	0.945	ESP Spectra	-7.20
8	0.687	0.717	ESP Spectra	-4.18
6	0.468	0.481	ESP Spectra	-2.70
5	0.367	0.376	ESP Spectra	-2.39
4	0.283	0.287	ESP Spectra	-1.39
3	0.214	0.214	ESP Spectra	0.00
2.5	0.18	0.179	Unit 3 Spectra	0.56
2	0.143	0.142	Unit 3 Spectra	0.70
1	0.0676	0.0677	ESP Spectra	-0.15
0.8	0.0578	0.0576	Unit 3 Spectra	0.35
0.6	0.0492	0.0488	Unit 3 Spectra	0.82
0.5	0.0432	0.0429	Unit 3 Spectra	0.70
0.4	0.0344	0.0343	Unit 3 Spectra	0.29
0.3	0.0234	0.0233	Unit 3 Spectra	0.43
0.2	0.0131	0.01298	Unit 3 Spectra	0.92
0.1	0.00386	0.00382	Unit 3 Spectra	1.05

(1) Values from Table 2.5-201
(2) Values from SSAR Table 2.5-27A

NAPS COL 2.0-1-A

Table 2.0-203 Comparison of ESP and Unit 3 Vertical Spectra for Zone III-IV

I N026a

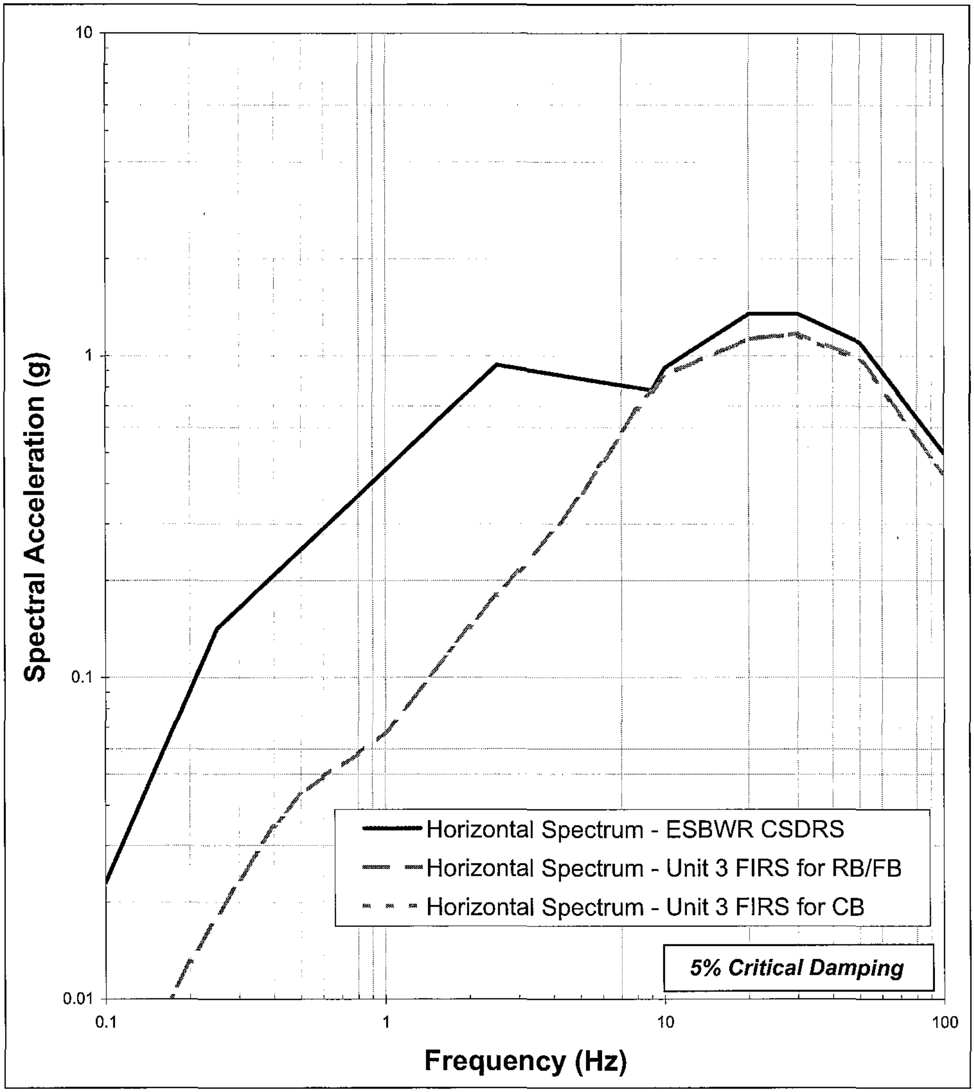
Freq. (Hz)	Unit 3 SA (g)(1)	ESP SA (g)(2)	Controlling ESP or Unit 3	% Difference
100	0.448	0.555	ESP Spectra	-19.3
50	1.085	1.33	ESP Spectra	-18.4
30	1.134	1.38	ESP Spectra	-17.8
25	1.050	1.29	ESP Spectra	-18.6
20	0.965	1.2	ESP Spectra	-19.6
10	0.658	0.708	ESP Spectra	-7.06
8	0.515	0.537	ESP Spectra	-4.10
6	0.351	0.36	ESP Spectra	-2.50
5	0.275	0.282	ESP Spectra	-2.48
4	0.212	0.215	ESP Spectra	-1.40
3	0.161	0.16	Unit 3 Spectra	0.63
2.5	0.135	0.134	Unit 3 Spectra	0.75
2	0.107	0.106	Unit 3 Spectra	0.94
1	0.0507	0.0507	ESP Spectra	0.00
0.8	0.0434	0.0432	Unit 3 Spectra	0.46
0.6	0.0369	0.0366	Unit 3 Spectra	0.82
0.5	0.0324	0.0321	Unit 3 Spectra	0.93
0.4	0.0258	0.0257	Unit 3 Spectra	0.39
0.3	0.0176	0.0174	Unit 3 Spectra	1.15
0.2	0.00983	0.00973	Unit 3 Spectra	1.03
0.1	0.00290	0.00286	Unit 3 Spectra	1.40

(1) Values from Table 2.5-201

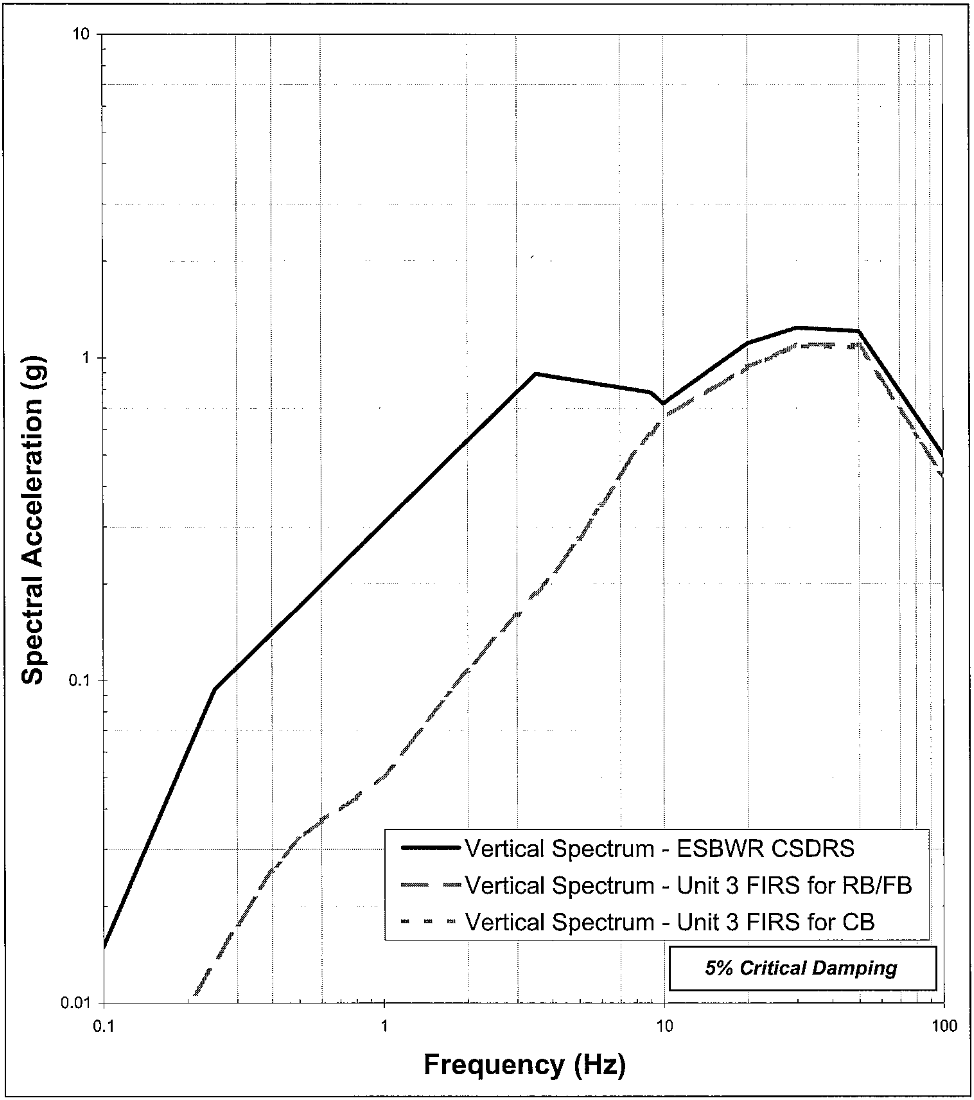
(2) Values from SSAR Table 2.5-27A

NAPS COL 2.0-1-A **Figure 2.0-201 Comparison of Horizontal CSDRS with Unit 3 FIRS for the Reactor Building/Fuel Building and Control Building**

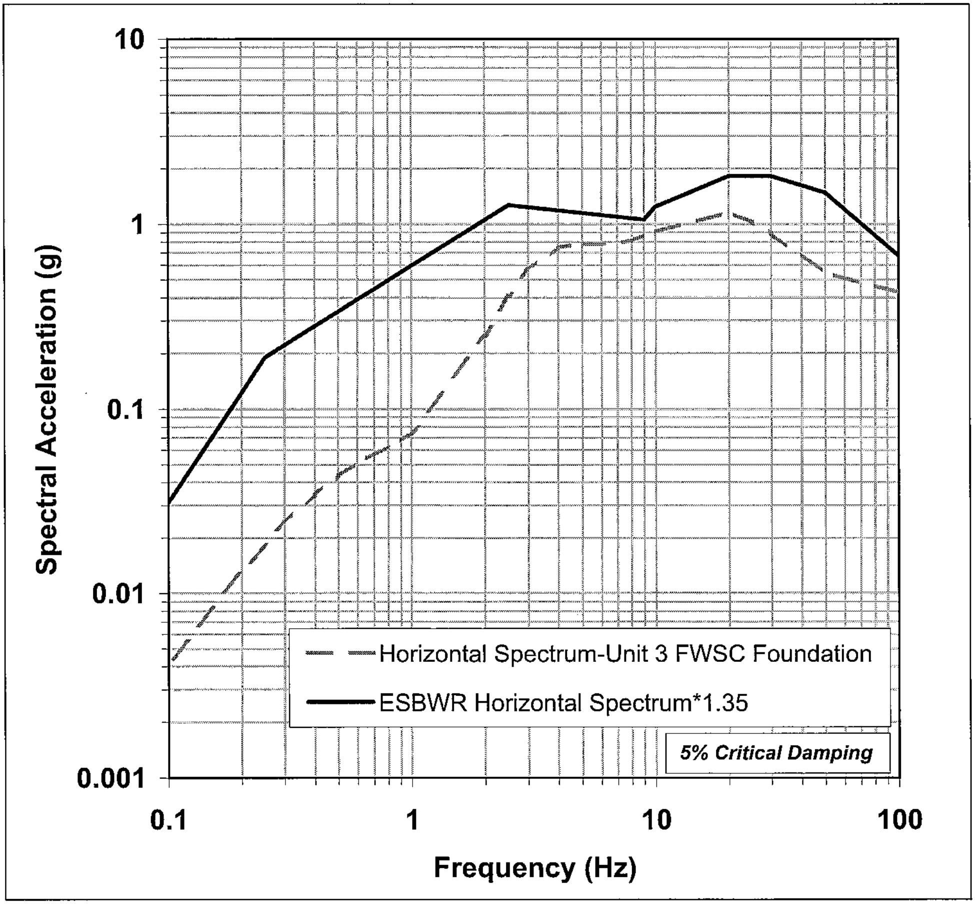
I N026a



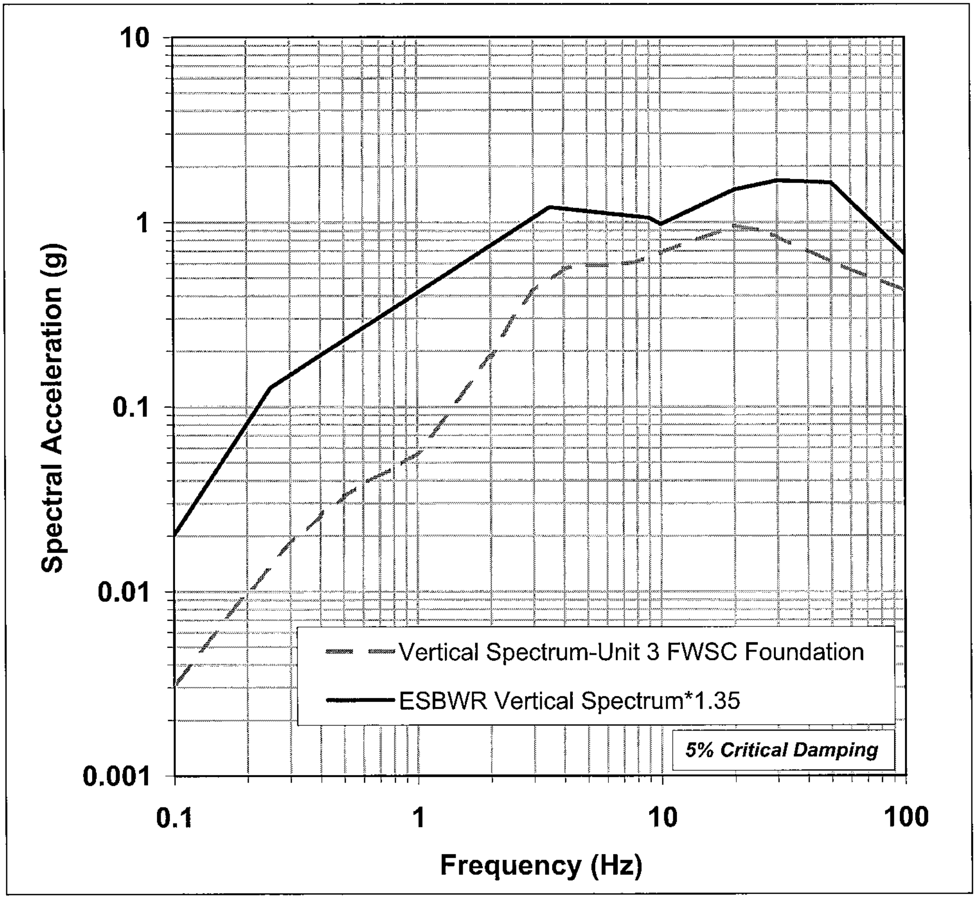
NAPS COL 2.0-1-A **Figure 2.0-202 Comparison of Vertical CSDRS with Unit 3 FIRS for the Reactor Building/Fuel Building and Control Building** I N026a



NAPS COL 2.0-1-A **Figure 2.0-203 Comparison of Horizontal CSDRS with Unit 3 FIRS for the FWSC** I N0260a



NAPS COL 2.0-1-A **Figure 2.0-204 Comparison of Vertical CSDRS with the Unit 3 FIRS for the FWSC** | N026a

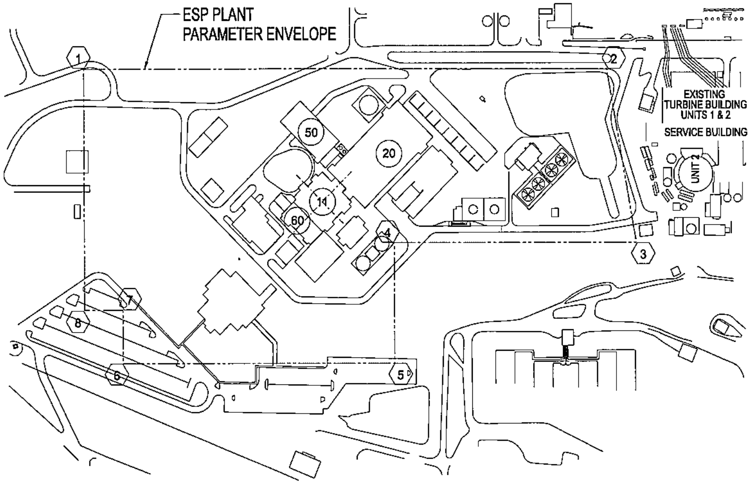


NAPS COL 2.0-1-A

Figure 2.0-205 Unit 3 Power Block Building Locations Within the ESP Proposed Facility Boundary

N026a

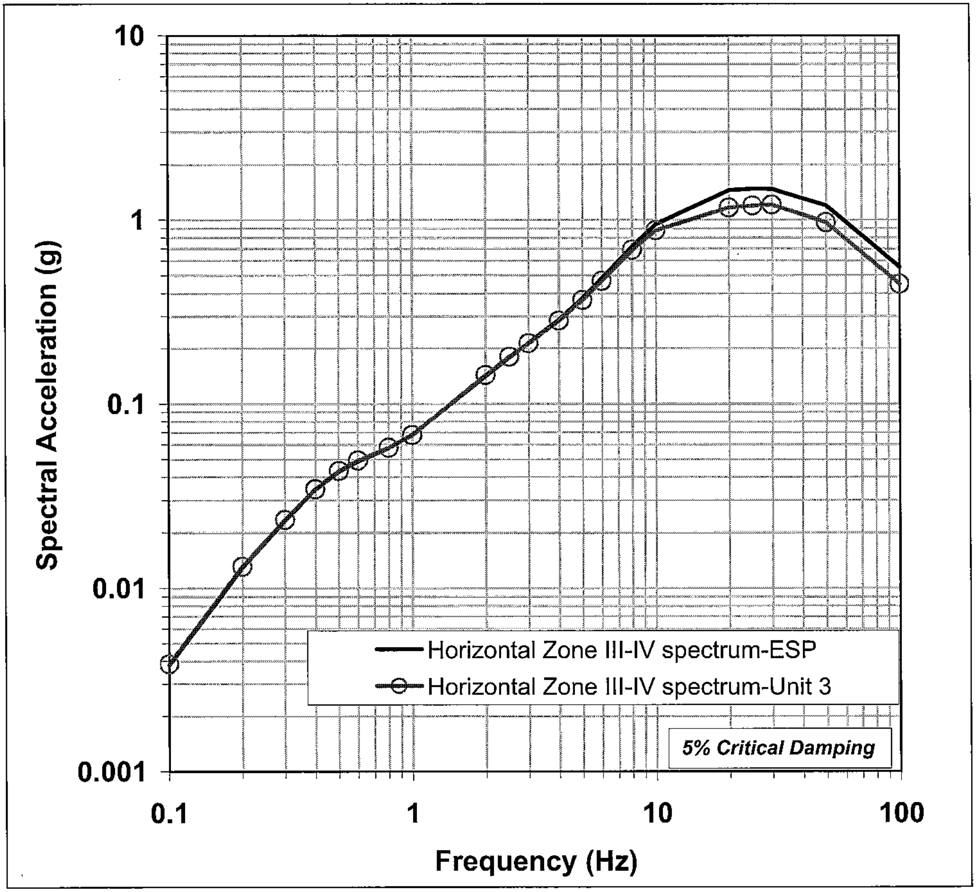
N093



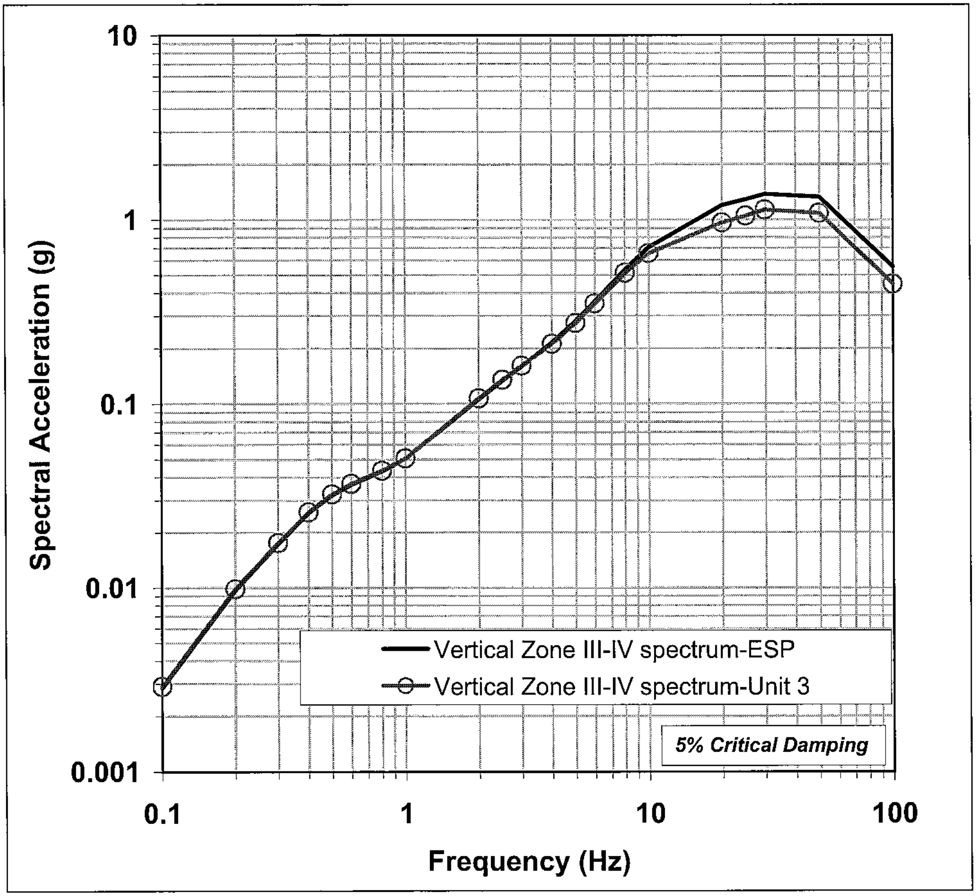
LEGEND
11 REACTOR BUILDING
20 TURBINE BUILDING
50 RADWASTE BUILDING
60 FUEL BUILDING

	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 COL 2.0-1-A **Figure 2.0-206 Comparison of ESP and Unit 3 Horizontal SSE Design Response Spectra** | N026a



NAPS COL 2.0-1-A **Figure 2.0-207 Comparison of ESP and Unit 3 Vertical SSE Design Response Spectra** | N026a



2.1 Introduction

2.1.1 Site Location and Description

NAPS COL 2.0-2-A

The information needed to address DCD COL Item 2.0-2-A 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 2.0-2-A

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 Reactor Building is approximately 450 m (1476 ft) southwest of the center of the Unit 2 Containment Building. | N0262a

NAPS ESP COL 2.1-1

The coordinates of the Unit 3 Reactor Building are: | N0262a

- 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 2.0-2-A

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 elected to participate in the ownership of Unit 3. As a result, rather than Dominion Nuclear North Anna, LLC, purchasing or leasing the ESP Site, Dominion and ODEC continue to jointly own the entire NAPS station, including Unit 3, and Dominion continues to control the existing exclusion area as a single | N0262a 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

NAPS COL 2.0-3-A

The information needed to address DCD COL Item 2.0-3-A 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 2.0-3-A

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 elected to participate in the ownership of Unit 3. As a result, rather than Dominion Nuclear North Anna, LLC, purchasing or leasing the ESP Site, Dominion and ODEC will continue to jointly own the entire NAPS site, including Unit 3, and Dominion will continue to maintain sole control of the existing exclusion area as a single exclusion area and single restricted area for the all reactor units located within the NAPS property, including Unit 3. | N026a

NAPS ESP PC 3.E(1)

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. | N025c

As the owners of NAPS, Dominion and ODEC possess the right to implement the site redress plan. | N025c

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

NAPS COL 2.0-3-A

The lake access and control practices in effect for Units 1 and 2 are maintained for Unit 3. | N026a

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

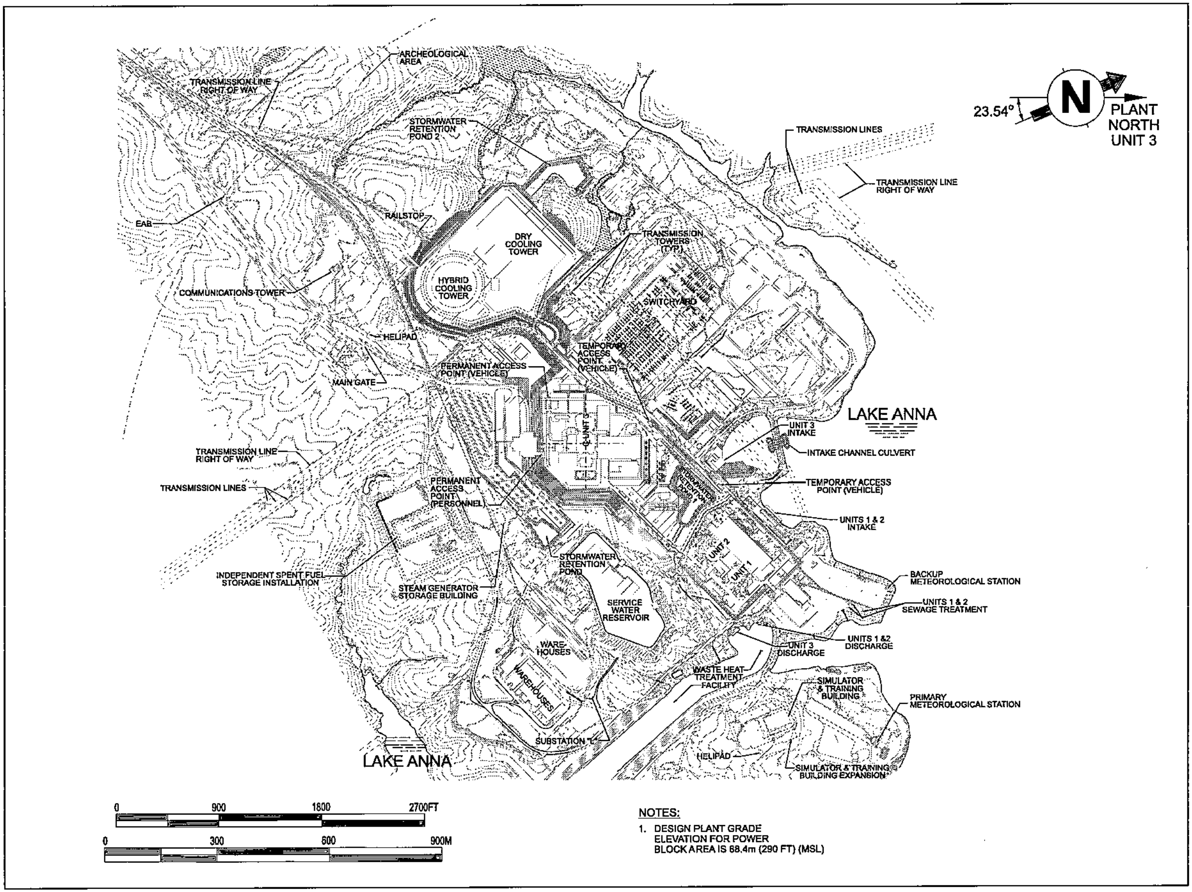
NAPS COL 2.0-4-A

The information needed to address DCD COL Item 2.0-4-A is included in SSAR Section 2.1.3, which is incorporated by reference.

Section 2.1 References

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

Figure 2.1-201 Site Plan with Topography



N026a
N082

2.2 Nearby Industrial, Transportation, and Military Facilities

NAPS COL 2.0-5-A

The information needed to address DCD COL Item 2.0-5-A is included in SSAR Sections 2.2.1 and 2.2.2, which are incorporated by reference with the following supplements. SSAR Section 3.5.1.6 is also incorporated by reference, with no supplements.

2.2.2.1 Industrial Facilities

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

NAPS ESP COL 2.2-1

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.

NAPS COL 2.0-5-A

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. | N0262

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.

NAPS COL 2.0-5-A

One civil airway (V223) and four military training routes (IR714, IR760, VR1754, 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. INo26a

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 three of the military training routes IR714, IR760, and VR1754, which are 16.1 km (10 mi) across, lie within 1.6 km (1 mi) of the Unit 3 site. The centerline of the fourth military training route, VR1755, is more than 12.9 km (8 mi) from Unit 3.

2.2.3 Evaluation of Potential Accidents

NAPS COL 2.0-6-A

The information needed to address DCD COL Item 2.0-6-A is included in SSAR Section 2.2.3, which is incorporated by reference with the following supplements.

2.2.3.1.1 Truck Traffic

02.02.03-1

Add the following at the end of this section.

NAPS COL 2.0-8-A

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: 02.02.03-1

$$r = n_1 \times n_2 \times f \times s \qquad (2.2.3.1.1\text{-}1)$$

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. 02.02.03-1

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 2.61 km (1.62 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 2.61 km (1.62 mi) is also conservative.

Using the conservative inputs to Equation 2.2.3.1.1-1 as described above, an annual exposure rate of 7.8×10^{-7} was obtained, which is less than 10^{-6} per year, so there is a sufficiently low risk from explosion during on-site gasoline tanker truck deliveries. 02.02.03-1

NAPS ESP COL 2.2-2

2.2.3.1.3 On-Site Chemicals

N026c

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 very few chemicals present a flammability or explosive hazard. As shown by the table column labeled "Flammable/Explosive?", three of the materials have flammability and explosive properties that needed analysis. These are hydrogen, hydrazine, and Nalco H-130© (a non-oxidizing biocide). 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. Conservative assumptions were used in the analyses. The meteorological assumptions were: F (stable) stability class with a wind speed of 1 m/sec (3.3 ft/sec); ambient temperature of 25°C (77°F); relative humidity, 50 percent; cloud cover, 50 percent; and atmospheric pressure, 1 atmosphere (14.7 psi). 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. 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.

2.2.3.2.2 Airways

The second and subsequent paragraphs of this SSAR section are supplemented as follows with information on effective plant areas for Unit 3 and the evaluation results.

NAPS COL 2.0-6-A

For the SSAR, which used a PPE approach, the type of reactor with the tallest reactor building height (71.323 m (234 ft) above grade) was evaluated. For Unit 3, the ESBWR Reactor Building, Control Building, Fuel Building, and Radwaste Building are evaluated. See DCD Figures 1.2-1 through 1.2-11 for the nuclear island (Reactor, Control, and Fuel Buildings) and DCD Figures 1.2-21 through 1.2-25 for the Radwaste Building. For flights in the civilian airway, a total effective plant area of 0.062 square kilometers (0.024 square miles) was used in the evaluation. For flights in the military airways, a total effective plant area of 0.083 square kilometers (0.032 square miles) was used in the evaluation. | N026a

For civil airway V223, the Unit 3 result is:

$$PFA = 6.37 \times 10^{-8}$$

For military routes, IR714, IR760, VR1754 and VR1755, the Unit 3 result is:

$$PFA = 3.84 \times 10^{-8}$$

The total of these two accident probabilities meets the NUREG-0800, Section 2.2.3 guideline and is of an order of magnitude of 10^{-7} per year.

NAPS COL 2.0-6-A

2.2.3.4 Fires

I N026a

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 southeast of the Unit 3 control building. The fire line is modeled as 134 m (440 ft) wide at a distance of 387 m (1270 ft) from the nearest safety-related structure, the Unit 3 Control Building.
- The wildfire burns through the forest toward Unit 3 in a uniform fire line perpendicular to the line of closest separation between the 134 m (440 ft) wide fire line and the Unit 3 Control Building. While more of the forested area could burn toward the 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 Control Building is 0.5 kW/m^2. For comparison, this level of thermal radiation is about one third that of incident radiation from the sun on the earth, which is approximately 1.4 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 hydrazine, liquid hydrogen, and Nalco H-130© non-oxidizing biocide were evaluated as potential fire hazards 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.

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. 02.02.03-1

2.2-214 NUREG/CR-6624, Recommendations for Revision of Regulatory Guide 1.78, U.S. Nuclear Regulatory Commission, November 1999. 02.02.03-1

2.2-215 Virginia Department of Motor Vehicles, 2006 Virginia Traffic Crash Facts. 02.02.03-1

N026a

NAPS COL 2.0-5-A

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 Unit 3 Onsite Chemical Storage Locations and Quantities

I N026a
N122a

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Tank or Tote)
Sodium Hydroxide, NaOH 25% Solution	Water Treatment Building (Inside)	1 × 180 gallon (681 liters) Tote
Alum, 48% Solution (Floculant)	Water Treatment Building (Inside)	1 × 300 gallon (1136 liters) Tote
Sodium Hypochlorite 12% Solution	Hybrid Cooling Tower (Adjacent)	1 × 15,870 gallon (60 m^3) Tank Usable Volume
	Station Water Intake (Unit 3 intake bay)	1 × 2113 gallon (8 m^3) Usable Volume
	Adjacent to Unit 3 Sewage Treatment Plant	2 × 330 gallon (1249 liters) Tote
	Plant Service Water Pump House (Inside)	1 × 1057 gallon (4 m^3) Tank Usable Volume
Nalco 3D TRASAR® 3DT177 (Scale/corrosion Inhibitor) (or equivalent)	Hybrid Cooling Tower (Adjacent)	1 × 1056 gallon (4 m^3) Tank or multiple Totes Usable Volume I N122b
	Plant Service Water Pump House (Inside)	1 × 300 gallon (1136 liters) Tote
	Water Treatment Building (Inside)	1 × 55 gallon (208 liters) drum
Nalco 3D TRASAR® 3DT104 (Dispersant) (or equivalent)	Hybrid Cooling Tower (Adjacent)	1 × 5812 gallon (22 m^3) Tank Usable Volume
	Plant Service Water Pump House (Inside)	1 × 400 gallon (1514 liters) Tote
Sodium Bromide (44.7% Solution)	Hybrid Cooling Tower (Adjacent)	1 × 2378 gallon (9 m^3) Tank Usable Volume
	Plant Service Water Pump House (Inside)	1 × 300 gallon (1136 liters) Tote
Nalco H-130, Non-Oxidizing Biocide (or equivalent)	Hybrid Cooling Tower (Adjacent)	3 × 400 gallon (1514 liters) Tote
	Plant Service Water Pump House (Inside)	1 × 300 gallon (1136 liters) Tote
Hydrogen Peroxide 35% Solution	Water Treatment Building (Inside)	1 × 300 gallon (1136 liters) Tote

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Unit 3 Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Tank or Tote)
Sodium Bicarbonate 12% solution (Prepared from dry chemical powder)	Water Treatment Building (Inside)	1 × 200 gallon (757 liters) Mixing Tank
Sodium Bisulfate 10% solution (Prepared from dry chemical powder)	Plant Service Water Pump House (Inside)	1 × 1056 gallon (4 m^3) Tank Usable Volume
Carbon Dioxide	CO_2 Storage Area- Outside the Turbine Building (West side)	1 × 800 gallon (3028 liters) Tank (Cryogenic Storage Tank)
Hydrogen	Hydrogen Storage Area- Outside the Turbine Building (West side)	1 × 18,000 gallon (68 m^3) Tank (Cryogenic Storage Tank)
Nitrogen	Nitrogen Storage Area- Outside the Reactor Building (West side)	1 × 25,000 gallon (95 m^3) Tank (Cryogenic Storage Tank)
Trisodium Phosphate (0.72% Solution)	Aux. Boiler Building	1 × 555 gallon (2.1 m^3) Tank
Sodium Sulfite (2.2% Solution)	Aux. Boiler Building	1 × 555 gallon (2.1 m^3) Tank
Disodium Phosphate (0.18% Solution)	Aux. Boiler Building	1 × 555 gallon (2.1 m^3) Tank
Oxygen, Liquid	Hydrogen Storage Area - Outside the Turbine Building (West side)	1 × 9000 gallon (34 m^3) Tank (Cryogenic Storage Tank)
Diesel Fuel	North East of Service Building Operation Support Center	2 × 215,400 gallon (815 m^3) Tank
	Ancillary Diesel Building	2 × 15,000 gallon (56 m^3) Storage Tank 2 × 400 gallon (1.5m^3) Day Tank
Sulfuric Acid	NA	Not required based on historic Lake Anna alkalinity

N122b

N122b

N092

NAPS ESP COL 2.2-2

Table 2.2-202 North Anna Unit 3 Onsite Chemical Storage Locations and Quantities

Chemical/Material (Formula/Trade/State)	Location	No. × Quantity (Tank or Tote)
Urea (Dry Power aqua solution 40% $(NH_2)_2CO$)	Outside the Diesel Generator Building	2 × 12,800 gallon (48 m^3) Tank

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna Unit 3 On-Site Chemicals, Disposition

I N026a
N122a

Chemical/ Chemical Product*	Toxicity Limit (IDLH)	Flammable/ Explosive?	Vapor Pressure	Disposition
Unit 3 Chemicals				
Sodium Hydroxide, NaOH, 25% Solution	None established	No/No	Not required	No further analysis required.
Alum, 48% Solution	None established	No/No	Not required	No further analysis required.
Sodium Hypochlorite, 12% solution	10 ppm for Chlorine	No/No	Not required	Toxicity analysis in Section 6.4. No other analysis required.
Nalco 3D TRASAR® 3DT177 (Scale/corrosion Inhibitor)	1000 mg/m^3 as phosphoric acid	No/No	23.8 mm Hg @25°C	Toxicity analysis in Section 6.4. No other analysis required
Nalco 3D TRASAR® 3DT104 (Dispersant)	None established	No/No	Not required	No further analysis required
Sodium Bromide, 44.7% Solution	None established	No/No	Not required	No further analysis required
Nalco H-130, Non-Oxidizing Biocide	3,300 ppm as ethanol	Yes (3.3–19%) /Yes	30 mm Hg @25°C	Toxicity analysis in Section 6.4. ALOHA and explosion analyses safe separation distances are provided in Table 2.2-204.
Hydrogen Peroxide, 35% Solution	75 ppm	No/No	5 mm Hg @86°F	Toxicity analysis in Section 6.4. No other analysis required.

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna Unit 3 On-Site Chemicals, Disposition

Chemical/ Chemical Product*	Toxicity Limit (IDLH)	Flammable/ Explosive?	Vapor Pressure	Disposition
		Unit 3 Chemicals (continued)		
Sodium Bicarbonate, 12% Solution (prepared from dry chemical powder)	None established	No/No	Not required	No further analysis required.
Sodium Bisulfate, 10% Solution (prepared from dry chemical powder)	None established	No/No	Not required	No further analysis required.
Carbon Dioxide (Cryogenic Storage Tank)	40,000 ppm	No/No	907.299 psi @75°F	Toxicity (asphyxiation) analysis in Section 6.4, no other analysis required.
Hydrogen, Gas	None established; Asphyxiant	Yes (4–75%)/ Yes	29.030 @–418°F	Toxicity (asphyxiation) analysis in Section 6.4. ALOHA and explosion analyses safe separation distances are provided in Table 2.2-204.
Nitrogen, Gas	None established; Asphyxiant	No/No	65.820 @–294°F	Toxicity (asphyxiation) analysis in Section 6.4. No other analysis required.
Trisodium Phosphate, 0.72% Solution	None established	No/No	Not required	No further analysis required.
Sodium Sulfite, 2.2% Solution	None established	No/No	17.535 mm Hg @93.6°F	No further analysis required.

NAPS ESP COL 2.2-2

Table 2.2-203 North Anna Unit 3 On-Site Chemicals, Disposition

Chemical/ Chemical Product*	Toxicity Limit (IDLH)	Flammable/ Explosive?	Vapor Pressure	Disposition
Unit 3 Chemicals (continued)				
Disodium Phosphate, 0.18% Solution	None established	No/No	Not required	No further analysis required.
Oxygen, Gas	None established; asphyxiant	No/No	36.260 psi @−280°F	Toxicity (asphyxiation) analysis in Section 6.4. No other analysis required.
Diesel Fuel (Unit 3)	None established	Yes (1.3–6.0%)/ No	0.100 psi @100°F	No further analysis is required[1,2].
Sulfuric Acid	NA	NA	Not required	Not required based on historic Lake Anna alkalinity
Urea, $(NH_2)_2CO$ 40% Solution (prepared from dry powder)	None established	No/No	Not required	No further analysis required.

* Properties confirmed by Material Safety Data Sheets (References 2.2-208, 2.2-209, 2.2-210, 2.2-211, and 2.2-212).

1. Chemicals with vapor pressures less than 10 torr (0.193 psi) were not considered significant hazards since at these vapor pressures the chemicals are not very volatile. Under normal conditions, these chemicals do not enter the atmosphere fast enough to reach concentrations hazardous to people and, therefore, are not considered to be an air dispersion hazard. (Reference 2.2-205)
2. A fluid with an extremely low vapor pressure will not explode per NFPA 422 (Reference 2.2-207) which states that the vapor space in tanks storing low vapor pressure liquids is normally too lean to burn. The vapor pressure of diesel fuel is low enough such that the vapor concentration above the liquid (0.36%) is significantly lower than the LFL (1.3%). As a result the air-gas mixture is expected to be too lean to ignite and/or explode.

NAPS ESP COL 2.2-2 **Table 2.2-204 Design Basis Events, Explosions, Flammable Vapor Clouds (Delayed Ignition) and Vapor Cloud Explosions** I N026a

Chemical Evaluated	Quantity (gallons)	Distance to Nearest Safety Related Structure for Unit 3 (ft)	Distance for Explosion to have less than 1 psi of Peak Incident Pressure (ft)(a)	Distance to Lower Flammability Limit (ft)(b)	Safe Distance for Vapor Cloud Explosions (ft)(c)	
						I N026d I N122a
Nalco H-130©	400 (1514 liters)	1,402 (427 m)	86 (26 m)	<33 (<10 m)	72 (22 m)	I N026d
Hydrogen	18,000 ($68\ m^3$)	752 (229 m)	273 (83 m)	222 (68 m)	258 (79 m)	I N026d

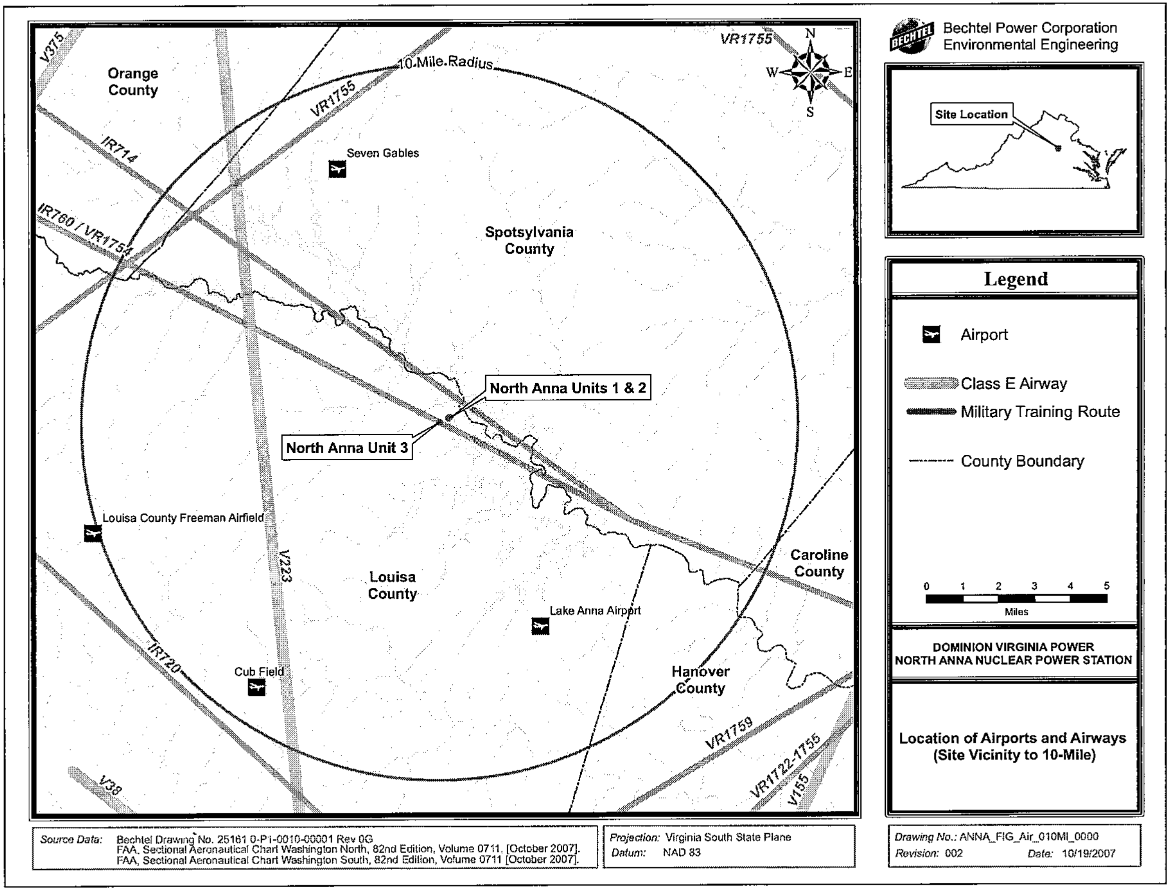
(a) The minimum separation distance required for an in-vessel confined explosion to have less than 1 psi peak incident pressure.

(b) The distance from the spill site where the vapor cloud can exist and still be between the upper and lower flammability limit, presenting the possibility of ignition.

(c) The distance from the spill site to the location where the pressure wave from the detonation of the traveled vapor cloud is at 1 psi overpressure.

Figure 2.2-201 Civilian and Military Airway Routes in NAPS Vicinity

No26al



2.3 Meteorology

2.3.1 Regional Climatology

NAPS COL 2.0-7-A

The information needed to address the DCD COL Item 2.0-7-A is included in SSAR Section 2.3.1, which is incorporated by reference with the following supplement.

2.3.1.2 General Climate

02.03.01-2

This SSAR section is supplemented by inserting, as the third paragraph, the following information about temperature extremes. 02.03.01-2

NAPS COL 2.0-7-A

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. 02.03.01-2

2.3.1.3.1 Extreme Winds

02.03.01-1

This SSAR section is supplemented with information to address wind speeds used for part of the Unit 3 design as follows. 02.03.01-1

NAPS COL 2.0-7-A

Nonsafety-related structures, not included as part of the certified design, are designed in accordance with Part I of the Virginia Uniform Statewide Building Code (Reference 2.3-204), which incorporates by reference the International Building Code (IBC) (Reference 2.3-205). The applicable edition of the IBC invokes Section 6 of American Society of Civil Engineers (ASCE) Standard No. 7 (Reference 2.3-206). ASCE 7, Section 6.5.4, Figure 6.1, defines the basic wind speed for such structures. Unit 3 is not in a Special Wind Region. 02.03.01-1

The basic wind speed for Unit 3 nonsafety-related structures, not included in the certified design, is 40 m/s (90 mph). This design value is defined in Reference 2.3-206 as a 3-second gust at 10 m (33 ft) above the ground that has a 2 percent annual probability of being exceeded (i.e., the 50-year mean recurrence interval).

2.3.1.3.4 Precipitation Extremes

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.

NAPS COL 2.0-7-A

As Section 2.4.7.6 indicates, the design features that demonstrate acceptable roof structure performance are described in DCD Appendix 3G, e.g., for the reactor building, see DCD Section 3G.1.5.

2.3.2 Local Meteorology

NAPS COL 2.0-8-A

The information needed to address the DCD COL Item 2.0-8-A is included in SSAR Section 2.3.2, which is incorporated by reference with the following supplements. INO26a

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.

NAPS COL 2.0-8-A

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. INO26d

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 CIRC hybrid cooling tower and from the Plant Service Water System (PSWS) cooling tower were assessed using the Seasonal/Annual Cooling Tower Impact (SACTI) computer code (Reference 2.3-202). See Section 10.4.5.8 for further description of the hybrid cooling tower design and see Section 9.2.1.2 for the service water cooling tower design.

a. **Salt Deposition**

The service water cooling tower produces higher salt deposition rates than the CIRC hybrid cooling tower even though the CIRC hybrid cooling tower is modeled with a higher drift rate of 0.001 percent. Therefore, only the limiting SACTI analysis for the effects of salt deposition from the service water cooling tower on the Unit 3 electrical transformers is discussed below. The following assumptions were made in the SACTI model for the service water cooling tower: 02.03.02-1

- Drift loss is 0.0005 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 0.0216 mg/cm^2-month is predicted to occur near the Unit 3 transformers during the summer 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 service water 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 CIRC hybrid cooling tower and service water cooling tower 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 CIRC hybrid cooling tower is considered. 02.03.02-1
- The CIRC hybrid cooling tower is modeled as one cell with a combined flow rate of all fans.

A maximum of 9.5 hours of fogging per year at any location due to cooling tower operation is predicted for both the CIRC hybrid cooling tower and service water cooling tower. 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. Both cooling towers incorporate plume-limiting technology; therefore, the predicted annual hours of fogging due to cooling tower operation are conservative. Additionally, the SACTI analysis predicts no icing will occur.

2.3.2.3.2 Ambient Air Temperature Increases

In addition to the CIRC hybrid cooling tower and service water cooling tower, the CIRC dry cooling tower was considered when evaluating the potential for local ambient air temperature increases. The evaluation was based on the following assumptions:

- CIRC hybrid cooling tower height is 55 m (180 ft). 02.03.02-1
- CIRC dry cooling tower height is 19.8 m (65 ft).
- Service water cooling tower height is 18.5 m (61 ft).
- The highest control room HVAC air intakes height is approximately 8 m (26.2 ft).
- Exhaust plume temperatures of the CIRC hybrid and dry cooling towers are no greater than the maximum inlet water temperature of 51.6°C (125°F).

- Exhaust plume temperature of the service water cooling tower is no greater than the maximum inlet water temperature of 39°C (103°F).

The Unit 3 site characteristic 0 percent exceedance value for ambient design temperature is 40.5°C (104.9°F) dry bulb. As shown in DCD Table 3.2-1, the control building HVAC system is classified as Safety Class 3 and is the only HVAC system with safety class components, other than isolation equipment. Operation of the control building HVAC system maintains the control room habitability area (CRHA) within the temperature and relative humidity ranges in DCD Table 9.4-1, which shows the limiting outside air design condition temperature for the control room HVAC intakes is 47.2°C (117°F) dry bulb. NO32

A cooling tower plume would need to raise the local ambient temperature associated with the surrounding air mass at the control room HVAC intakes by more than 6.7°C (12.1°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 the Unit 3 control room HVAC intakes are at a lower elevation than the exhaust plenums of the CIRC hybrid and dry cooling towers, and because the control room HVAC intakes are located approximately 500 m (1640 ft) from the CIRC towers, the thermal plumes from the towers are not expected to raise the local ambient air temperatures at intakes for the control room HVAC systems above the design value. The maximum inlet water temperature of 39°C (103°F) for the service water cooling tower is lower than the limiting outside air design condition temperature of 47.2°C (117°F) for the control room HVAC systems. Therefore, exhaust from the service water cooling tower will not adversely affect the control room HVAC systems due to increases in surrounding ambient air temperature. 02.03.02-1

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 main control room 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. 02.03.02-1

2.3.3 Onsite Meteorological Measurements Program

NAPS COL 2.0-9-A

The information needed to address the DCD COL Item 2.0-9-A is included in SSAR Section 2.3.3, which is incorporated by reference with the following supplement. N026a

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.

NAPS COL 2.0-9-A

The highest building at the Unit 3 site is the Turbine Building at 57.9 m (190 ft) above design plant grade level of 88.4 m (290 ft). The primary meteorological measurements tower is located about 733.4 m (2406 ft) 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 Unit 3 turbine 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 turbine building also does not influence the meteorological measurements taken at the backup meteorological measurements tower. N026a N061c N061c N061c

NAPS COL 2.0-10-A

2.3.4 Short-Term (Accident) Diffusion Estimates

The information needed to address the DCD COL Item 2.0-10-A 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. N061c

NAPS COL 2.0-10-A

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 Turbine Building which is 57.9 m (190 ft) above design plant grade level. Therefore, the closest point on the EAB is more than 10 building N026a N061c 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 Reactor Building. NO61c

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 2A-1. 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. The source and receptor combinations are shown in Table 2.3-201 through Table 2.3-207. DCD Figure 2A-1 shows the locations of postulated accidental releases from Unit 3 and the Unit 3 receptor locations. N041c N041b N041c

NAPS COL 2.0-11-A

2.3.5 Long-Term (Routine) Diffusion Estimates

N026a

The information needed to address DCD COL Item 2.0-11-A is included in SSAR Section 2.3.5, which is incorporated by reference with the following supplements and variances.

2.3.5.1 Basis

N026e

The third through sixth paragraphs of this SSAR section are supplemented as follows with information to address the receptors near the Unit 3 site. 02.03.05-1

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.

02.03.05-1

- Release Height: 10 m (33 ft) (default height).
- Reactor Building Height: 49 m (161 ft).
- Minimum Reactor Building Cross-Sectional Area: 2400 m^2 (25,800 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.

For the dispersion analysis, the ESBWR Reactor Building is used to determine the minimum building cross-sectional area for evaluating building downwash effects. The height of this building is approximately 49 m (161 ft) including parapets. Based on this height and a nominal width of 49 m (161 ft) on the rectangular face of the building, a minimum building cross-sectional area of 2400 m^2 (25,800 ft^2) was used to determine χ/Q and D/Q estimates. The perpendicular face of the building is narrower at the top, but the total area, including stairwells and the elevator shaft, is greater than 2400 m^2 (25,800 ft^2) in that perpendicular direction. For the NAPS site, the χ/Q and D/Q values were found to depend on building height but not cross-sectional area. 02.03.05-1

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 review 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 1.36 km (4453 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 4.20 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 shortest distance from any point on the plant facility boundary to the site boundary

N129

N129

02.03.05-2

02.03.05-2

(EAB) was found to be 1.6 km (1.0 mile) in the direction where the maximum χ/Q is calculated. However, for conservatism, the greater χ/Q from SSAR Section 2.3.5, which is based on a distance of 1.42 km (0.88 miles), is retained for use in this section. The maximum annual χ/Q (no decay, undepleted) at the EAB is 3.70 × 10^{-6} sec/m^3; at a distance of 1.42 km (0.88 mile) to the ESE of the plant facility boundary (Figure 2.0-205). 02.03.05-2 02.03.05-2

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. N026a

---

Add the following at the end of this SSAR section to address annual average χ/Q and D/Q estimates. 02.03.05-3

NAPS COL 2.0-11-A

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). 02.03.05-3 N029g

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.

Section 2.3 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. 02.03.02-1

2.3-203 Institute of Electrical and Electronics Engineers, Std C57.19.100, "IEEE Guide for Application of Power Apparatus Bushings." 02.03.02-1

2.3-204 Virginia Uniform Statewide Building Code, Part I (Virginia Construction Code), Virginia Board of Housing and Community Development. 02.03.01-1

2.3-205 International Building Code, International Code Council, Inc. 02.03.01-1

2.3-206 Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers Standard No. 7 (ASCE 7). 02.03.01-1

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. 02.03.01-2

NAPS ESP COL 2.3-3 **Table 2.3-15R Source to Receptor Distances**

IN026a

IN129

Type[3]	Direction from Unit 3	Distance from Plant Facility Boundary (ft)[1]	Distance from Plant Facility Boundary (miles/km)[1]
Vegetation			
Veg	S	5546	1.05/1.69
Veg	SSW	No Receptor	
Veg	SW	17268	3.27/5.26
Veg	WSW	11021	2.09/3.36
Veg	W	No Receptor	
Veg	WNW	7895	1.50/2.41
Veg	NW	No Receptor	
Veg	NNW	4765	0.90/1.45
Veg	N	5891	1.12/1.80
Veg	NNE	17164	3.25/5.23
Veg	NE	5284	1.00/1.61
Veg	ENE	13230	2.51/4.03
Veg	E	9281	1.76/2.83
Veg	ESE	No Receptor	
Veg	SE	4663	0.88/1.42
Veg	SSE	4669	0.88/1.42
Meat Animal			
Meat	S	13483	2.55/4.11
Meat	SSW	7877	1.49/2.40
Meat	SW	No Receptor	
Meat	WSW	5769	1.09/1.76
Meat	W	No Receptor	
Meat	WNW	18697	3.54/5.70
Meat	NW	No Receptor	
Meat	NNW	No Receptor	

N129

N129

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	No Receptor	
Meat	NNE	8573	1.62/2.61
Meat	NE	8357	1.58/2.55
Meat	ENE	13738	2.60/4.19
Meat	E	19588	3.71/5.97
Meat	ESE	No Receptor	
Meat	SE	8023	1.52/2.45
Meat	SSE	14210	2.69/4.33
Resident			
Res	S	4718	0.89/1.44
Res	SSW	5853	1.11/1.78
Res	SW	6513	1.23/1.99
Res	WSW	No Receptor	
Res	W	No Receptor	
Res	WNW	5802	1.10/1.77
Res	NW	3930	0.74/1.20[2]
Res	NNW	4565	0.86/1.39
Res	N	4949	0.94/1.51
Res	NNE	8194	1.55/2.50
Res	NE	4926	0.93/1.50
Res	ENE	12348	2.34/3.76
Res	E	7981	1.51/2.43
Res	ESE	No Receptor	
Res	SE	4832	0.92/1.47
Res	SSE	No Receptor	

N129

N129

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	3719	0.70/1.13
EAB	SSW	3238	0.61/0.99
EAB	SW	2877	0.54/0.88
EAB	WSW	2891	0.55/0.88
EAB	W	2914	0.55/0.89
EAB	WNW	3393	0.64/1.03
EAB	NW	3919	0.74/1.19
EAB	NNW	4417	0.84/1.35
EAB	N	4847	0.92/1.48
EAB	NNE	5110	0.97/1.56
EAB	NE	4858	0.92/1.48
EAB	ENE	4967	0.94/1.51
EAB	E	5604	1.06/1.71
EAB	ESE	5304	1.00/1.62
EAB	SE	4603	0.87/1.40
EAB	SSE	4180	0.79/1.27

Notes:
1. Distances are from the plant facility boundary. See Figure 2.0-205.
2. Actual distance is 1.36 km (4453 ft).
3. No milk cows or goats within a 5-mile radius of NAPS.

N129

02.03.05-2

N129

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

N026a

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	
							02.03.05-2
Residence	ESE	0.74	4.20E-06	4.10E-06	3.70E-06	1.1E-08[b]	02.03.05-21
EAB[c]	ESE	0.88	3.7E-06	3.7E-06	3.3E-06	1.2E-08[a]	02.03.05-21
Meat Animal	ESE	0.74	4.20E-06	4.10E-06	3.70E-06	1.1E-08[b]	02.03.05-2
Veg. Garden	ESE	0.74	4.20E-06	4.10E-06	3.70E-06	1.1E-08[b]	02.03.05-2

Notes:

χ/Q – sec/m^3

D/Q – 1/m^2

a: direction South and distance of 0.62 mi for maximum D/Q for EAB

b: direction North-Northeast for maximum D/Q for residence, meat animal, and vegetable garden

c: from SSAR Table 2.3-16

02.03.05-2

NAPS ESP
COL 2.3-3

Table 2.3-17R XOQDOQ Predicted Maximum Annual Averages (Ground-Level Release)

N0262a

No Decay Undepleted

Distance In Miles from Site											
ESE	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
X/Q (s/m^3)	2.566E-05	7.927E-06	4.114E-06	2.670E-06	1.524E-06	1.038E-06	7.709E-07	6.052E-07	4.936E-07	4.140E-07	3.546E-07
Distance In Miles from Site											
ESE	5	7.5	10	15	20	25	30	35	40	45	50
X/Q (s/m^3)	3.089E-07	1.823E-07	1.258E-07	7.493E-08	5.206E-08	3.932E-08	3.130E-08	2.583E-08	2.188E-08	1.891E-08	1.660E-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)	4.319E-06	1.563E-06	7.757E-07	4.952E-07	3.553E-07	1.853E-07	7.606E-08	3.951E-08	2.588E-08	1.893E-08	

2.26 Day Decay Undepleted

Distance In Miles from Site											
ESE	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
X/Q (s/m^3)	2.562E-05	7.901E-06	4.094E-06	2.653E-06	1.509E-06	1.024E-06	7.584E-07	5.935E-07	4.825E-07	4.033E-07	3.443E-07
Distance In Miles from Site											
ESE	5	7.5	10	15	20	25	30	35	40	45	50
X/Q (s/m^3)	2.989E-07	1.735E-07	1.178E-07	6.789E-08	4.566E-08	3.339E-08	2.573E-08	2.057E-08	1.688E-08	1.413E-08	1.202E-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)	4.300E-06	1.548E-06	7.634E-07	4.840E-07	3.450E-07	1.766E-07	6.909E-08	3.360E-08	2.064E-08	1.416E-08	
8 Day Decay Depleted	**Distance In Miles from Site**										
ESE	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5
X/Q (s/m^3)	2.428E-05	7.232E-06	3.661E-06	2.333E-06	1.291E-06	8.561E-07	6.216E-07	4.781E-07	3.827E-07	3.154E-07	2.659E-07
	Distance In Miles from Site										
ESE	5	7.5	10	15	20	25	30	35	40	45	50
X/Q (s/m^3)	2.281E-07	1.267E-07	8.293E-08	4.530E-08	2.928E-08	2.076E-08	1.560E-08	1.221E-08	9.839E-09	8.111E-09	6.808E-09
	Segment Boundaries In Miles from Site										
ESE	.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)	3.864E-06	1.329E-06	6.267E-07	3.843E-07	2.666E-07	1.298E-07	4.654E-08	2.097E-08	1.227E-08	8.140E-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

NAPS ESP COL 2.3-2

Table 2.3-201 Unit 3 Reactor Building χ/Q Results (sec/m^3)

Source/Receptor[1]	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
RB to CBL[2]	1.74E-03	1.17E-03	4.07E-04	3.42E-04	2.79E-04
RB-VS to CBL[2]	9.08E-04	6.36E-04	2.36E-04	1.72E-04	1.41E-04
RB to EN[3]	1.14E-03	8.18E-04	2.85E-04	2.32E-04	2.02E-04
RB to ES[3]	1.14E-03	8.25E-04	3.11E-04	2.44E-04	2.02E-04
RB to N[3]	1.25E-03	8.88E-04	3.41E-04	2.69E-04	2.20E-04
RB-VS to ES[3]	6.68E-04	4.60E-04	1.72E-04	1.22E-04	1.03E-04
RB-VS to N[3]	7.28E-04	5.03E-04	1.87E-04	1.34E-04	1.13E-04
RB to TSCE[4]	2.32E-04	1.79E-04	7.54E-05	5.85E-05	4.57E-05
RB to TCSW[4]	2.63E-04	2.17E-04	9.35E-05	6.71E-05	5.21E-05

Note 1: See DCD Figure 2A-1 for building source and intake locations.
Note 2: These results are for confirmation of the Reactor Building to Control Room Unfiltered Inleakage χ/Q values.
Note 3: These results are for confirmation of the Reactor Building to Control Room Intake χ/Q values.
Note 4: These results are for confirmation of the Reactor Building to Technical Support Center Intake and Inleakage χ/Q values.

N026a

N041 a, b, c

NAPS ESP COL 2.3-2

Table 2.3-202 Unit 3 Turbine Building χ/Q Results (sec/m^3)

Source/Receptor	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
TB to CBL[1]	6.71E-04	3.42E-04	1.53E-04	1.17E-04	9.19E-05
TB-VS to CBL[1]	3.17E-04	2.60E-04	1.03E-04	7.44E-05	5.61E-05
TB-TD to CBL[1]	2.50E-04	2.21E-04	8.85E-05	5.84E-05	4.47E-05
TB to EN[2]	8.17E-04	3.96E-04	1.78E-04	1.50E-04	1.15E-04
TB to ES[2]	5.96E-04	3.19E-04	1.37E-04	1.11E-04	8.43E-05
TB to N[2]	5.50E-04	2.97E-04	1.29E-04	1.02E-04	7.88E-05
TB-TD to EN[2]	2.42E-04	2.08E-04	8.50E-05	5.65E-05	4.55E-05
TB-VS to EN[2]	3.49E-04	2.91E-04	1.22E-04	8.16E-05	6.84E-05
TB-VS to N[2]	2.66E-04	2.19E-04	9.22E-05	6.14E-05	5.01E-05
TB to TSCE[3]	9.02E-04	5.82E-04	1.98E-04	1.84E-04	1.62E-04
TB to TSCW[3]	2.00E-03	1.13E-03	4.45E-04	3.78E-04	3.27E-04
TB-TD to TSCW[3]	1.13E-03	7.96E-04	3.55E-04	2.41E-04	2.17E-04

Note 1: These results are for confirmation of the Turbine Building to Control Room Unfiltered Inleakage χ/Q values.
Note 2: These results are for confirmation of the Turbine Building to Control Room Intake χ/Q values.
Note 3: These results are for confirmation of the Turbine Building to Technical Support Center Intake and Inleakage χ/Q values.

N026a

N041
a, b

NAPS ESP COL 2.3-2

Table 2.3-203 Unit 3 Reactor Building Roof/PCCS Vent χ/Q Results (sec/m^3)

Source/Receptor	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
PCCS to CBL[1]	1.58E-03	1.34E-03	5.61E-04	3.96E-04	3.34E-04
PCCS to EN[2]	1.31E-03	9.35E-04	3.66E-04	2.70E-04	2.18E-04
PCCS to ES[2]	1.07E-03	8.29E-04	3.51E-04	2.55E-04	2.08E-04
PCCS to N[2]	1.08E-03	8.53E-04	3.72E-04	2.59E-04	2.17E-04
PCCS to TSCE[3]	3.44E-04	2.80E-04	1.13E-04	8.58E-05	6.63E-05
PCCS to TSCW[3]	4.40E-04	3.64E-04	1.52E-04	1.16E-04	8.78E-05

Note 1: These results are for confirmation of the Passive Containement Cooling System to Control Room Unfiltered Inleakage χ/Q values.
Note 2: These results are for confirmation of the Passive Containement Cooling System to Control Room Intake χ/Q values.
Note 3: These results are for confirmation of the Passive Containement Cooling System to Technical Support Center Intake and Inleakage χ/Q values.

N026a

N041 a, b

NAPS ESP COL 2.3-2

Table 2.3-204 Unit 3 Fuel Building χ/Q Results (sec/m^3)

Source/Receptor	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
FB to CBL[1]	2.62E-03	1.97E-03	7.26E-04	6.01E-04	5.20E-04
FB to EN[2]	1.23E-03	9.40E-04	3.49E-04	2.85E-04	2.44E-04
FB to ES[2]	1.71E-03	1.29E-03	4.68E-04	3.73E-04	3.28E-04
FB to N[2]	2.15E-03	1.59E-03	5.90E-04	4.70E-04	4.02E-04

Note 1: These results are for confirmation of the Fuel Building to Control Room Unfiltered Inleakage χ/Q values.
Note 2: These results are for confirmation of the Fuel Building to Control Room Intake χ/Q values.

N026a

N041 a, b

NAPS ESP COL 2.3-2

Table 2.3-205 Unit 3 Radwaste Building χ/Q Results (sec/m^3)

Source/Receptor[1]	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
RW-VS to CBL[2]	6.13E-04	4.90E-04	2.19E-04	1.58E-04	1.29E-04
RW to N[3]	4.61E-04	3.74E-04	1.66E-04	1.16E-04	9.85E-05
RW-VS to EN[3]	4.69E-04	3.76E-04	1.61E-04	1.17E-04	9.96E-05
RW-VS to N[3]	4.17E-04	3.29E-04	1.47E-04	1.06E-04	8.60E-05

Note 1: The PCCS vent χ/Q values are assumed to bound the χ/Q values for any relaease from the Radwaste Building based on distance and direction to the Control Room receptors, and the PCCS vent χ/Q values are used to evaluate releases from the Radwaste Building in DCD Section 15.3.16. The PCCS χ/Q values are compared to the Radwaste Building χ/Q results.
Note 2: These results are for confirmation of the Radwaste Building to Control Room Unfiltered Inleakage χ/Q values.
Note 3: These results are for confirmation of the Radwaste Building to Control Room Intake χ/Q values.

N026a

N041 a, b

NAPS ESP COL 2.3-2

Table 2.3-206 Unit 3 Blowout Panels/Reactor Building χ/Q Results (sec/m^3)

Source/Receptor	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
BPN to CBL[1]	2.04E-03	1.67E-03	7.21E-04	4.93E-04	4.20E-04
BPS to CBL[1]	2.16E-03	1.72E-03	6.72E-04	5.25E-04	3.94E-04
BPN to EN[2]	1.78E-03	1.30E-03	5.04E-04	3.72E-04	3.01E-04
BPN to ES[2]	1.43E-03	1.13E-03	4.89E-04	3.44E-04	2.86E-04
BPN to N[2]	1.41E-03	1.15E-03	4.96E-04	3.40E-04	2.93E-04
BPS to EN[2]	1.52E-03	1.16E-03	4.22E-04	3.27E-04	2.64E-04
BPS to ES[2]	1.78E-03	1.25E-03	4.63E-04	3.35E-04	2.73E-04
BPS to N[2]	2.00E-03	1.38E-03	5.23E-04	3.66E-04	3.06E-04

Note 1: These results are for confirmation of the Reactor Building Blowout Panels to Control Room Unfiltered Inleakage χ/Q values.
Note 2: These results are for confirmation of the Reactor Building Blowout Panels to Control Room Intake χ/Q values.

N041 a,b

NAPS ESP COL 2.3-2

Table 2.3-207 Unit 3 Cross Unit χ/Q Results (sec/m^3)

N041b

Source/Receptor	0–2 hr	2–8 hr	8–24 hr	1–4 d	4–30 d
Unit 1/2 Release to Unit 3	5.13E-05	3.67E-05	1.36E-05	9.95E-06	7.51E-06

N041a

NAPS COL 2.0-11-A

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

02-03.05-3
N0299

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	8.349E-06	2.976E-06	1.595E-06	1.023E-06	5.508E-07	3.558E-07	2.538E-07	1.928E-07	1.529E-07	1.252E-07	1.050E-07
SSW	6.537E-06	2.338E-06	1.261E-06	8.122E-07	4.388E-07	2.841E-07	2.030E-07	1.544E-07	1.226E-07	1.005E-07	8.434E-08
SW	5.863E-06	2.085E-06	1.125E-06	7.259E-07	3.931E-07	2.550E-07	1.825E-07	1.390E-07	1.105E-07	9.067E-08	7.617E-08
WSW	5.511E-06	1.940E-06	1.044E-06	6.739E-07	3.656E-07	2.375E-07	1.702E-07	1.298E-07	1.033E-07	8.482E-08	7.132E-08
W	6.877E-06	2.365E-06	1.265E-06	8.167E-07	4.457E-07	2.913E-07	2.098E-07	1.606E-07	1.282E-07	1.056E-07	8.904E-08
WNW	6.006E-06	2.046E-06	1.097E-06	7.084E-07	3.860E-07	2.519E-07	1.812E-07	1.387E-07	1.107E-07	9.113E-08	7.682E-08
NW	6.009E-06	2.064E-06	1.122E-06	7.288E-07	4.001E-07	2.624E-07	1.895E-07	1.454E-07	1.163E-07	9.597E-08	8.104E-08
NNW	5.110E-06	1.747E-06	9.583E-07	6.266E-07	3.458E-07	2.274E-07	1.645E-07	1.264E-07	1.013E-07	8.362E-08	7.067E-08
N	1.299E-05	4.468E-06	2.462E-06	1.613E-06	8.890E-07	5.834E-07	4.214E-07	3.234E-07	2.588E-07	2.136E-07	1.803E-07
NNE	1.657E-05	5.654E-06	3.098E-06	2.029E-06	1.119E-06	7.350E-07	5.312E-07	4.079E-07	3.265E-07	2.695E-07	2.276E-07
NE	1.352E-05	4.622E-06	2.530E-06	1.656E-06	9.142E-07	6.013E-07	4.350E-07	3.343E-07	2.679E-07	2.212E-07	1.870E-07
ENE	8.502E-06	2.817E-06	1.532E-06	1.007E-06	5.622E-07	3.730E-07	2.717E-07	2.100E-07	1.690E-07	1.401E-07	1.188E-07
E	1.668E-05	5.305E-06	2.852E-06	1.885E-06	1.069E-06	7.183E-07	5.283E-07	4.114E-07	3.333E-07	2.779E-07	2.368E-07
ESE	2.566E-05	7.927E-06	4.114E-06	2.670E-06	1.524E-06	1.038E-06	7.709E-07	6.052E-07	4.936E-07	4.140E-07	3.546E-07
SE	1.818E-05	5.672E-06	2.914E-06	1.868E-06	1.056E-06	7.154E-07	5.298E-07	4.149E-07	3.378E-07	2.828E-07	2.420E-07
SSE	9.287E-06	3.113E-06	1.640E-06	1.051E-06	5.752E-07	3.782E-07	2.737E-07	2.104E-07	1.687E-07	1.394E-07	1.179E-07

NAPS COL 2.0-11-A

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

02.03.05-3
NO29

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	8.977E-08	4.929E-08	3.232E-08	1.794E-08	1.188E-08	8.646E-09	6.678E-09	5.373E-09	4.453E-09	3.776E-09	3.259E-09
SSW	7.215E-08	3.970E-08	2.608E-08	1.450E-08	9.599E-09	6.984E-09	5.393E-09	4.338E-09	3.595E-09	3.047E-09	2.629E-09
SW	6.521E-08	3.601E-08	2.372E-08	1.324E-08	8.788E-09	6.409E-09	4.959E-09	3.995E-09	3.315E-09	2.813E-09	2.430E-09
WSW	6.111E-08	3.386E-08	2.236E-08	1.253E-08	8.344E-09	6.101E-09	4.730E-09	3.818E-09	3.174E-09	2.697E-09	2.333E-09
W	7.648E-08	4.280E-08	2.847E-08	1.613E-08	1.083E-08	7.971E-09	6.213E-09	5.038E-09	4.205E-09	3.587E-09	3.113E-09
WNW	6.599E-08	3.696E-08	2.460E-08	1.396E-08	9.406E-09	6.937E-09	5.417E-09	4.399E-09	3.676E-09	3.139E-09	2.727E-09
NW	6.970E-08	3.920E-08	2.616E-08	1.488E-08	1.002E-08	7.391E-09	5.770E-09	4.684E-09	3.913E-09	3.340E-09	2.900E-09
NNW	6.083E-08	3.431E-08	2.294E-08	1.307E-08	8.809E-09	6.497E-09	5.072E-09	4.118E-09	3.439E-09	2.935E-09	2.548E-09
N	1.551E-07	8.723E-08	5.819E-08	3.307E-08	2.223E-08	1.637E-08	1.276E-08	1.034E-08	8.630E-09	7.358E-09	6.382E-09
NNE	1.958E-07	1.103E-07	7.363E-08	4.190E-08	2.821E-08	2.079E-08	1.622E-08	1.316E-08	1.099E-08	9.374E-09	8.135E-09
NE	1.609E-07	9.075E-08	6.066E-08	3.457E-08	2.329E-08	1.718E-08	1.341E-08	1.089E-08	9.095E-09	7.763E-09	6.739E-09
ENE	1.026E-07	5.856E-08	3.948E-08	2.277E-08	1.547E-08	1.148E-08	9.008E-09	7.345E-09	6.158E-09	5.273E-09	4.592E-09
E	2.053E-07	1.190E-07	8.114E-08	4.750E-08	3.260E-08	2.439E-08	1.926E-08	1.579E-08	1.330E-08	1.144E-08	9.993E-09
ESE	3.089E-07	1.823E-07	1.258E-07	7.493E-08	5.206E-08	3.932E-08	3.130E-08	2.583E-08	2.188E-08	1.891E-08	1.660E-08
SE	2.106E-07	1.239E-07	8.534E-08	5.075E-08	3.524E-08	2.661E-08	2.118E-08	1.748E-08	1.481E-08	1.280E-08	1.124E-08
SSE	1.016E-07	5.751E-08	3.860E-08	2.216E-08	1.504E-08	1.116E-08	8.765E-09	7.150E-09	5.999E-09	5.141E-09	4.480E-09

- For Information Only -

NAPS COL 2.0-11-A

Table 2.3-209 Long-Term χ/Q (sec/m^3) for Routine Releases Along Various Distance Segments, No Decay, Undepleted

02.03-05-3
N0299

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	1.648E-06	5.691E-07	2.566E-07	1.538E-07	1.054E-07	5.074E-08	1.844E-08	8.721E-09	5.395E-09	3.785E-09
SSW	1.301E-06	4.530E-07	2.052E-07	1.233E-07	8.461E-08	4.086E-08	1.489E-08	7.045E-09	4.357E-09	3.055E-09
SW	1.161E-06	4.057E-07	1.845E-07	1.111E-07	7.641E-08	3.704E-08	1.359E-08	6.463E-09	4.011E-09	2.820E-09
WSW	1.079E-06	3.772E-07	1.720E-07	1.038E-07	7.154E-08	3.480E-08	1.285E-08	6.151E-09	3.833E-09	2.704E-09
W	1.310E-06	4.595E-07	2.118E-07	1.289E-07	8.930E-08	4.392E-08	1.652E-08	8.030E-09	5.056E-09	3.594E-09
WNW	1.135E-06	3.980E-07	1.830E-07	1.112E-07	7.705E-08	3.792E-08	1.430E-08	6.988E-09	4.415E-09	3.146E-09
NW	1.157E-06	4.120E-07	1.913E-07	1.169E-07	8.126E-08	4.018E-08	1.523E-08	7.444E-09	4.700E-09	3.347E-09
NNW	9.862E-07	3.556E-07	1.660E-07	1.017E-07	7.086E-08	3.515E-08	1.337E-08	6.544E-09	4.132E-09	2.941E-09
N	2.530E-06	9.140E-07	4.254E-07	2.601E-07	1.808E-07	8.941E-08	3.383E-08	1.649E-08	1.038E-08	7.373E-09
NNE	3.191E-06	1.151E-06	5.362E-07	3.280E-07	2.283E-07	1.130E-07	4.287E-08	2.094E-08	1.321E-08	9.393E-09
NE	2.606E-06	9.399E-07	4.391E-07	2.691E-07	1.875E-07	9.297E-08	3.536E-08	1.730E-08	1.093E-08	7.778E-09
ENE	1.584E-06	5.770E-07	2.740E-07	1.697E-07	1.191E-07	5.987E-08	2.324E-08	1.155E-08	7.368E-09	5.283E-09
E	2.967E-06	1.094E-06	5.322E-07	3.345E-07	2.373E-07	1.214E-07	4.835E-08	2.453E-08	1.583E-08	1.145E-08
ESE	4.319E-06	1.563E-06	7.757E-07	4.952E-07	3.553E-07	1.853E-07	7.606E-08	3.951E-08	2.588E-08	1.893E-08
SE	3.062E-06	1.085E-06	5.334E-07	3.389E-07	2.425E-07	1.260E-07	5.154E-08	2.674E-08	1.752E-08	1.282E-08
SSE	1.705E-06	5.933E-07	2.763E-07	1.695E-07	1.182E-07	5.889E-08	2.265E-08	1.124E-08	7.173E-09	5.150E-09

NAPS COL 2.0-11-A

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

02.03.05-3
No29g

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	8.340E-06	2.969E-06	1.590E-06	1.019E-06	5.474E-07	3.529E-07	2.512E-07	1.904E-07	1.507E-07	1.231E-07	1.030E-07
SSW	6.530E-06	2.333E-06	1.257E-06	8.086E-07	4.359E-07	2.816E-07	2.007E-07	1.523E-07	1.207E-07	9.866E-08	8.262E-08
SW	5.856E-06	2.080E-06	1.121E-06	7.224E-07	3.903E-07	2.526E-07	1.804E-07	1.370E-07	1.087E-07	8.892E-08	7.452E-08
WSW	5.504E-06	1.936E-06	1.041E-06	6.705E-07	3.628E-07	2.351E-07	1.681E-07	1.278E-07	1.015E-07	8.308E-08	6.967E-08
W	6.868E-06	2.359E-06	1.260E-06	8.125E-07	4.423E-07	2.883E-07	2.070E-07	1.581E-07	1.259E-07	1.034E-07	8.693E-08
WNW	5.998E-06	2.041E-06	1.093E-06	7.049E-07	3.831E-07	2.494E-07	1.789E-07	1.366E-07	1.087E-07	8.928E-08	7.507E-08
NW	6.001E-06	2.059E-06	1.117E-06	7.252E-07	3.971E-07	2.598E-07	1.871E-07	1.432E-07	1.143E-07	9.404E-08	7.920E-08
NNW	5.103E-06	1.742E-06	9.543E-07	6.231E-07	3.429E-07	2.248E-07	1.622E-07	1.243E-07	9.926E-08	8.173E-08	6.888E-08
N	1.297E-05	4.455E-06	2.452E-06	1.604E-06	8.816E-07	5.770E-07	4.156E-07	3.181E-07	2.538E-07	2.088E-07	1.759E-07
NNE	1.655E-05	5.639E-06	3.086E-06	2.019E-06	1.110E-06	7.273E-07	5.242E-07	4.014E-07	3.205E-07	2.638E-07	2.222E-07
NE	1.350E-05	4.610E-06	2.520E-06	1.647E-06	9.071E-07	5.950E-07	4.294E-07	3.291E-07	2.630E-07	2.166E-07	1.826E-07
ENE	8.490E-06	2.809E-06	1.525E-06	1.001E-06	5.574E-07	3.687E-07	2.678E-07	2.063E-07	1.656E-07	1.369E-07	1.158E-07
E	1.665E-05	5.288E-06	2.839E-06	1.874E-06	1.059E-06	7.094E-07	5.201E-07	4.038E-07	3.261E-07	2.710E-07	2.302E-07
ESE	2.562E-05	7.901E-06	4.094E-06	2.653E-06	1.509E-06	1.024E-06	7.584E-07	5.935E-07	4.825E-07	4.033E-07	3.443E-07
SE	1.815E-05	5.654E-06	2.900E-06	1.857E-06	1.046E-06	7.064E-07	5.213E-07	4.070E-07	3.302E-07	2.756E-07	2.350E-07
SSE	9.275E-06	3.105E-06	1.634E-06	1.045E-06	5.708E-07	3.743E-07	2.701E-07	2.071E-07	1.656E-07	1.364E-07	1.151E-07

NAPS COL 2.0-11-A

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

02.03.05-3
N0299

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	8.787E-08	4.771E-08	3.094E-08	1.680E-08	1.087E-08	7.736E-09	5.842E-09	4.596E-09	3.725E-09	3.089E-09	2.607E-09
SSW	7.050E-08	3.834E-08	2.489E-08	1.351E-08	8.731E-09	6.203E-09	4.677E-09	3.673E-09	2.972E-09	2.460E-09	2.074E-09
SW	6.364E-08	3.471E-08	2.257E-08	1.228E-08	7.951E-09	5.654E-09	4.265E-09	3.351E-09	2.712E-09	2.244E-09	1.891E-09
WSW	5.954E-08	3.256E-08	2.121E-08	1.157E-08	7.502E-09	5.340E-09	4.031E-09	3.168E-09	2.564E-09	2.123E-09	1.788E-09
W	7.446E-08	4.111E-08	2.697E-08	1.486E-08	9.706E-09	6.949E-09	5.269E-09	4.157E-09	3.376E-09	2.802E-09	2.367E-09
WNW	6.431E-08	3.555E-08	2.335E-08	1.291E-08	8.466E-09	6.082E-09	4.626E-09	3.660E-09	2.980E-09	2.479E-09	2.099E-09
NW	6.795E-08	3.772E-08	2.484E-08	1.377E-08	9.036E-09	6.493E-09	4.940E-09	3.908E-09	3.182E-09	2.648E-09	2.242E-09
NNW	5.912E-08	3.287E-08	2.166E-08	1.200E-08	7.858E-09	5.634E-09	4.276E-09	3.375E-09	2.741E-09	2.276E-09	1.922E-09
N	1.508E-07	8.364E-08	5.502E-08	3.040E-08	1.988E-08	1.424E-08	1.080E-08	8.516E-09	6.914E-09	5.737E-09	4.844E-09
NNE	1.907E-07	1.059E-07	6.976E-08	3.863E-08	2.532E-08	1.816E-08	1.380E-08	1.090E-08	8.864E-09	7.367E-09	6.228E-09
NE	1.567E-07	8.721E-08	5.752E-08	3.192E-08	2.094E-08	1.504E-08	1.144E-08	9.046E-09	7.361E-09	6.123E-09	5.181E-09
ENE	9.965E-08	5.604E-08	3.722E-08	2.084E-08	1.375E-08	9.910E-09	7.553E-09	5.983E-09	4.873E-09	4.055E-09	3.432E-09
E	1.990E-07	1.136E-07	7.620E-08	4.324E-08	2.877E-08	2.087E-08	1.598E-08	1.271E-08	1.038E-08	8.662E-09	7.346E-09
ESE	2.989E-07	1.735E-07	1.178E-07	6.789E-08	4.566E-08	3.339E-08	2.573E-08	2.057E-08	1.688E-08	1.413E-08	1.202E-08
SE	2.038E-07	1.179E-07	7.991E-08	4.598E-08	3.091E-08	2.259E-08	1.741E-08	1.391E-08	1.142E-08	9.560E-09	8.134E-09
SSE	9.884E-08	5.519E-08	3.652E-08	2.038E-08	1.344E-08	9.697E-09	7.400E-09	5.869E-09	4.787E-09	3.989E-09	3.381E-09

NAPS COL 2.0-11-A

Table 2.3-211 Long-Term χ/Q (sec/m^3) for Routine Releases Along Various Distance Segments, 2.260 Day Decay, Undepleted

02.03.05-3
N0279

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	1.643E-06	5.658E-07	2.540E-07	1.515E-07	1.034E-07	4.918E-08	1.731E-08	7.815E-09	4.620E-09	3.099E-09
SSW	1.297E-06	4.501E-07	2.029E-07	1.213E-07	8.288E-08	3.951E-08	1.391E-08	6.267E-09	3.693E-09	2.469E-09
SW	1.157E-06	4.029E-07	1.823E-07	1.092E-07	7.476E-08	3.574E-08	1.264E-08	5.711E-09	3.368E-09	2.252E-09
WSW	1.075E-06	3.744E-07	1.699E-07	1.020E-07	6.989E-08	3.351E-08	1.190E-08	5.393E-09	3.185E-09	2.130E-09
W	1.305E-06	4.561E-07	2.091E-07	1.265E-07	8.719E-08	4.224E-08	1.526E-08	7.012E-09	4.177E-09	2.811E-09
WNW	1.131E-06	3.952E-07	1.808E-07	1.093E-07	7.530E-08	3.652E-08	1.325E-08	6.135E-09	3.677E-09	2.487E-09
NW	1.152E-06	4.090E-07	1.889E-07	1.148E-07	7.943E-08	3.871E-08	1.413E-08	6.550E-09	3.926E-09	2.656E-09
NNW	9.822E-07	3.527E-07	1.637E-07	9.973E-08	6.907E-08	3.372E-08	1.231E-08	5.684E-09	3.391E-09	2.283E-09
N	2.520E-06	9.067E-07	4.196E-07	2.551E-07	1.764E-07	8.585E-08	3.120E-08	1.437E-08	8.557E-09	5.755E-09
NNE	3.179E-06	1.142E-06	5.292E-07	3.220E-07	2.228E-07	1.087E-07	3.963E-08	1.832E-08	1.095E-08	7.389E-09
NE	2.597E-06	9.328E-07	4.335E-07	2.642E-07	1.831E-07	8.946E-08	3.273E-08	1.517E-08	9.088E-09	6.141E-09
ENE	1.578E-06	5.722E-07	2.701E-07	1.663E-07	1.160E-07	5.737E-08	2.133E-08	9.991E-09	6.009E-09	4.067E-09
E	2.954E-06	1.085E-06	5.241E-07	3.273E-07	2.307E-07	1.159E-07	4.413E-08	2.102E-08	1.276E-08	8.685E-09
ESE	4.300E-06	1.548E-06	7.634E-07	4.840E-07	3.450E-07	1.766E-07	6.909E-08	3.360E-08	2.064E-08	1.416E-08
SE	3.048E-06	1.075E-06	5.249E-07	3.313E-07	2.355E-07	1.201E-07	4.682E-08	2.274E-08	1.396E-08	9.582E-09
SSE	1.699E-06	5.889E-07	2.727E-07	1.663E-07	1.154E-07	5.659E-08	2.088E-08	9.777E-09	5.894E-09	4.001E-09

NAPS COL 2.0-11-A

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

02.03.05-3
NO299

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	7.899E-06	2.716E-06	1.420E-06	8.947E-07	4.669E-07	2.939E-07	2.050E-07	1.526E-07	1.188E-07	9.566E-08	7.897E-08
SSW	6.185E-06	2.134E-06	1.122E-06	7.101E-07	3.720E-07	2.347E-07	1.639E-07	1.222E-07	9.526E-08	7.674E-08	6.340E-08
SW	5.547E-06	1.902E-06	1.002E-06	6.345E-07	3.332E-07	2.106E-07	1.474E-07	1.100E-07	8.583E-08	6.922E-08	5.723E-08
WSW	5.214E-06	1.771E-06	9.297E-07	5.891E-07	3.098E-07	1.961E-07	1.374E-07	1.027E-07	8.020E-08	6.473E-08	5.357E-08
W	6.506E-06	2.158E-06	1.126E-06	7.138E-07	3.777E-07	2.405E-07	1.693E-07	1.270E-07	9.954E-08	8.058E-08	6.686E-08
WNW	5.682E-06	1.867E-06	9.770E-07	6.193E-07	3.271E-07	2.080E-07	1.463E-07	1.097E-07	8.593E-08	6.955E-08	5.770E-08
NW	5.685E-06	1.884E-06	9.984E-07	6.371E-07	3.391E-07	2.167E-07	1.529E-07	1.150E-07	9.032E-08	7.325E-08	6.088E-08
NNW	4.835E-06	1.594E-06	8.530E-07	5.476E-07	2.930E-07	1.877E-07	1.327E-07	9.991E-08	7.856E-08	6.378E-08	5.304E-08
N	1.229E-05	4.077E-06	2.192E-06	1.410E-06	7.532E-07	4.816E-07	3.400E-07	2.557E-07	2.009E-07	1.629E-07	1.354E-07
NNE	1.568E-05	5.159E-06	2.758E-06	1.774E-06	9.485E-07	6.068E-07	4.287E-07	3.225E-07	2.534E-07	2.056E-07	1.709E-07
NE	1.279E-05	4.218E-06	2.252E-06	1.447E-06	7.747E-07	4.964E-07	3.511E-07	2.644E-07	2.079E-07	1.688E-07	1.404E-07
ENE	8.043E-06	2.570E-06	1.363E-06	8.802E-07	4.763E-07	3.079E-07	2.192E-07	1.660E-07	1.311E-07	1.068E-07	8.918E-08
E	1.578E-05	4.840E-06	2.539E-06	1.647E-06	9.054E-07	5.927E-07	4.260E-07	3.251E-07	2.584E-07	2.118E-07	1.776E-07
ESE	2.428E-05	7.232E-06	3.661E-06	2.333E-06	1.291E-06	8.561E-07	6.216E-07	4.781E-07	3.827E-07	3.154E-07	2.659E-07
SE	1.720E-05	5.175E-06	2.593E-06	1.633E-06	8.942E-07	5.903E-07	4.272E-07	3.278E-07	2.619E-07	2.155E-07	1.814E-07
SSE	8.786E-06	2.841E-06	1.460E-06	9.185E-07	4.874E-07	3.122E-07	2.209E-07	1.664E-07	1.309E-07	1.064E-07	8.852E-08

NAPS COL 2.0-11-A

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

02.03.05-3
N0299

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	6.651E-08	3.443E-08	2.145E-08	1.095E-08	6.764E-09	4.634E-09	3.389E-09	2.593E-09	2.050E-09	1.663E-09	1.376E-09
SSW	5.343E-08	2.771E-08	1.729E-08	8.835E-09	5.456E-09	3.735E-09	2.730E-09	2.087E-09	1.650E-09	1.337E-09	1.106E-09
SW	4.828E-08	2.512E-08	1.571E-08	8.057E-09	4.988E-09	3.421E-09	2.504E-09	1.917E-09	1.517E-09	1.230E-09	1.018E-09
WSW	4.522E-08	2.361E-08	1.480E-08	7.614E-09	4.727E-09	3.249E-09	2.383E-09	1.827E-09	1.447E-09	1.175E-09	9.732E-10
W	5.658E-08	2.983E-08	1.883E-08	9.796E-09	6.130E-09	4.240E-09	3.125E-09	2.406E-09	1.913E-09	1.559E-09	1.295E-09
WNW	4.883E-08	2.577E-08	1.629E-08	8.491E-09	5.330E-09	3.696E-09	2.730E-09	2.106E-09	1.677E-09	1.369E-09	1.139E-09
NW	5.158E-08	2.733E-08	1.732E-08	9.051E-09	5.682E-09	3.940E-09	2.910E-09	2.244E-09	1.787E-09	1.458E-09	1.212E-09
NNW	4.498E-08	2.389E-08	1.516E-08	7.933E-09	4.979E-09	3.451E-09	2.547E-09	1.963E-09	1.562E-09	1.274E-09	1.058E-09
N	1.147E-07	6.077E-08	3.848E-08	2.008E-08	1.258E-08	8.703E-09	6.415E-09	4.939E-09	3.926E-09	3.198E-09	2.655E-09
NNE	1.449E-07	7.685E-08	4.871E-08	2.546E-08	1.597E-08	1.107E-08	8.167E-09	6.294E-09	5.008E-09	4.082E-09	3.393E-09
NE	1.191E-07	6.325E-08	4.014E-08	2.101E-08	1.320E-08	9.151E-09	6.758E-09	5.211E-09	4.149E-09	3.384E-09	2.813E-09
ENE	7.585E-08	4.077E-08	2.608E-08	1.381E-08	8.733E-09	6.090E-09	4.516E-09	3.495E-09	2.791E-09	2.282E-09	1.901E-09
E	1.517E-07	8.281E-08	5.355E-08	2.876E-08	1.837E-08	1.291E-08	9.628E-09	7.488E-09	6.004E-09	4.927E-09	4.118E-09
ESE	2.281E-07	1.267E-07	8.293E-08	4.530E-08	2.928E-08	2.076E-08	1.560E-08	1.221E-08	9.839E-09	8.111E-09	6.808E-09
SE	1.555E-07	8.612E-08	5.627E-08	3.068E-08	1.982E-08	1.405E-08	1.056E-08	8.261E-09	6.659E-09	5.490E-09	4.608E-09
SSE	7.512E-08	4.007E-08	2.552E-08	1.345E-08	8.506E-09	5.932E-09	4.402E-09	3.409E-09	2.724E-09	2.229E-09	1.859E-09

NAPS COL 2.0-11-A

Table 2.3-213 Long-Term χ/Q (sec/m³) for Routine Releases Along Various Distance Segments, 8.000 Day Decay, Depleted

02.03.05-3
N0279

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	1.474E-06	4.851E-07	2.078E-07	1.197E-07	7.930E-08	3.579E-08	1.142E-08	4.704E-09	2.613E-09	1.671E-09
SSW	1.164E-06	3.861E-07	1.661E-07	9.590E-08	6.366E-08	2.879E-08	9.212E-09	3.792E-09	2.104E-09	1.344E-09
SW	1.039E-06	3.457E-07	1.493E-07	8.640E-08	5.747E-08	2.608E-08	8.394E-09	3.472E-09	1.932E-09	1.237E-09
WSW	9.652E-07	3.213E-07	1.392E-07	8.073E-08	5.378E-08	2.449E-08	7.927E-09	3.297E-09	1.841E-09	1.181E-09
W	1.172E-06	3.914E-07	1.714E-07	1.002E-07	6.712E-08	3.089E-08	1.018E-08	4.298E-09	2.424E-09	1.566E-09
WNW	1.016E-06	3.391E-07	1.481E-07	8.647E-08	5.793E-08	2.668E-08	8.818E-09	3.746E-09	2.121E-09	1.375E-09
NW	1.035E-06	3.509E-07	1.548E-07	9.087E-08	6.110E-08	2.827E-08	9.391E-09	3.993E-09	2.260E-09	1.465E-09
NNW	8.820E-07	3.028E-07	1.342E-07	7.903E-08	5.324E-08	2.470E-08	8.226E-09	3.497E-09	1.977E-09	1.279E-09
N	2.263E-06	7.783E-07	3.440E-07	2.021E-07	1.359E-07	6.285E-08	2.083E-08	8.820E-09	4.975E-09	3.213E-09
NNE	2.854E-06	9.800E-07	4.337E-07	2.550E-07	1.716E-07	7.946E-08	2.641E-08	1.122E-08	6.339E-09	4.101E-09
NE	2.331E-06	8.004E-07	3.552E-07	2.092E-07	1.409E-07	6.538E-08	2.179E-08	9.272E-09	5.248E-09	3.399E-09
ENE	1.417E-06	4.912E-07	2.215E-07	1.318E-07	8.948E-08	4.204E-08	1.428E-08	6.165E-09	3.519E-09	2.292E-09
E	2.654E-06	9.313E-07	4.301E-07	2.597E-07	1.781E-07	8.511E-08	2.965E-08	1.305E-08	7.534E-09	4.946E-09
ESE	3.864E-06	1.329E-06	6.267E-07	3.843E-07	2.666E-07	1.298E-07	4.654E-08	2.097E-08	1.227E-08	8.140E-09
SE	2.740E-06	9.232E-07	4.309E-07	2.631E-07	1.819E-07	8.828E-08	3.154E-08	1.419E-08	8.307E-09	5.510E-09
SSE	1.526E-06	5.054E-07	2.235E-07	1.317E-07	8.884E-08	4.140E-08	1.394E-08	6.007E-09	3.432E-09	2.239E-09

NAPS COL 2.0-11-A

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

02.03.05-3
N0299

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 2.0-11-A

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

02.03.05-3
N029

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

NAPS COL 2.0-11-A

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

02-03-05-3
N0299

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

Figure 2.3-201 [Deleted]

N026a
N041c

2.4 Hydrology

2.4.1 Hydrologic Description

NAPS COL 2.0-12-A

The information needed to address DCD COL Item 2.0-12-A is included in SSAR Section 2.4.1, which is incorporated by reference with the following supplements. IN058a

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.

NAPS COL 2.0-12-A

The design plant grade elevation for Unit 3 safety-related structures is 88.4 m (290.0 ft) msl. 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 CIRC. The drainage in these areas will be redirected to drainage swales and storm water 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.

2.4.2 Floods

NAPS COL 2.0-13-A

The information needed to address DCD COL Item 2.0-13-A 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.

NAPS COL 2.0-13-A

The design plant grade for Unit 3 safety-related components and structures is at Elevation 88.4 m (290.0 ft) msl providing 6.89 m (22.61 ft) of freeboard above the design basis flooding level.

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.

NAPS COL 2.0-13-A

The site layout, drainage facilities, and drainage areas are shown on Figure 2.4-201. The safety-related buildings, which consist of the reactor, control, and fuel buildings, are located in the center and along the high point of the power block. From the high point, the site grading falls at a 1 percent slope to drainage ditches located along the northern and southern edges of the power block. The north and south drainage ditches convey the collected runoff from the power block and surrounding areas as shown on Figure 2.4-201 to the plant storm water management basin located in the northeast corner of the site. The storm water management basin 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. I N058b

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 and south drainage ditches through catch basins and storm drains as shown on Figure 2.4-201. Both the north and south drainage ditches also pass through culverts at road crossings and through the switchyard area. 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. I N058a

NAPS COL 2.0-13-A

The PMP runoff analysis was performed on the north and south 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. There are additional ditches in the northeast corner that convey runoff from the power block to the north ditch. However, during the PMP event, these ditches would be inundated by overflows from the north drainage ditch and they were not included in the PMP analysis. I N058b

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 coefficients 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 outlet point. Time of concentration values were estimated for each sub-basin using Natural Resources Conservation Service methodologies (Reference 2.4-201). To account for the non-linear response for large storms such as the PMP, the estimated time of concentration values were reduced by 25 percent as per guidance from the U.S. Army Corps of Engineers (Reference 2.4-202). 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 and south drainage ditches. HEC-RAS was first used to model the PMP flows over the storm water basin emergency spillway and determine the peak PMP water level in the basin, which then became the starting water level at the downstream most cross sections for the north and south drainage ditches. Cross-section data for the storm water basin spillway (outfall) and the north and south drainage ditches are shown on Figure 2.4-203 and Table 2.4-204.

Plant access roads cross the north and south drainage ditches at three 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 of both grass vegetation and rip rap. Manning's n values of 0.030 for grass lined ditches and 0.035 for rip rap lined ditches were used. Land cover in the ditch over bank areas consist of grass vegetation, gravel and pavement. The paved areas are usually small areas located in large gravel areas. Therefore, Manning's n values to describe pavement were not used and values describing gravel cover were used for paved areas. This is a conservative approach as Manning's n values for gravel cover are higher than those for paved areas and produce higher water levels. For the grass over bank areas, a value of 0.030 was used and a value of 0.035 was used for the gravel over bank areas.

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 88.4 m (290.0 ft) msl as shown in Figure 2.1-201. As shown in Table 2.4-204, all cross sections in the power block area have maximum water surface elevations below Elevation 88.4 m (290.0 ft) msl. The maximum PMP water level in the power block area is Elevation 87.54 m (287.2 ft) msl, which is 0.85 m (2.8 ft) below the design plant grade elevation for safety-related structures. N058a

NAPS COL 2.0-13-A

At the eastern edge of the Unit 3 site where the plant access road crosses the south drainage ditch, the grade elevation at the high point between the Unit 3 site and the Units 1 and 2 site is at Elevation 82.98 m (272.25 ft) msl. The maximum water level at the inline weir is Elevation 82.94 m (272.1 ft) msl, which is 0.05 m (0.15 ft) below the high point elevation and 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. N058b N094 a,b

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 limited to the depressed areas. 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.

2.4.3 Probable Maximum Flood on Streams and Rivers

NAPS COL 2.0-14-A

The information needed to address DCD COL Item 2.0-14-A is included in SSAR Section 2.4.3 which is incorporated by reference with the following supplements. IN058a

The third paragraph of this SSAR section is supplemented as follows with information on the design plant grade elevation for Unit 3 safety-related facilities.

The design basis flooding elevation at the Unit 3 site is 81.50 m (267.39 ft) msl. This elevation is 6.89 m (22.61 ft) below the Unit 3 design plant grade elevation of 88.4 m (290.0 ft) msl for safety-related facilities, including the reactor building, which contains the safety-related UHS SSCs. Also, the Fire Water Service Complex (FWSC), which provides an on-site source of water supply to the UHS is at the same grade elevation as the reactor building. The FWSC components are above the design plant grade elevation and are therefore above the design basis flooding elevation. Because the site grade and access to the connection on Unit 3 for supply of make-up water to the UHS are above the design basis flooding elevation, the water supply to the UHS is capable of withstanding the PMF on streams and rivers without loss of the UHS safety functions.

2.4.4 Potential Dam Failures

NAPS COL 2.0.15-A

The information needed to address DCD COL Item 2.0-15-A is included in SSAR Section 2.4.4, which is incorporated by reference with the following supplements. I N058b

The second paragraph in this SSAR section is supplemented as follows to address the ESBWR UHS design.

NAPS ESP COL 2.4-6
NAPS ESP COL 2.4-7

DCD Section 9.2.5 describes the UHS and addresses NRC requirements to provide sufficient emergency cooling capability. The UHS for the passive ESBWR design is in the reactor building and does not use safety-related engineered underground reservoirs or storage basins. The service water system is not safety-related for the ESBWR. 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.

2.4.5 Probable Maximum Surge and Seiche Flooding

NAPS COL 2.0-16-A

The information needed to address DCD COL Item 2.0-16-A is included in SSAR Section 2.4.5, which is incorporated by reference. I N058a

2.4.6 Probable Maximum Tsunami Flooding

NAPS COL 2.0.17-A

The information needed to address DCD COL Item 2.0-17-A is included in SSAR Section 2.4.6, which is incorporated by reference. I N058b

2.4.7 Ice Effects

NAPS COL 2.0-18-A

The information needed to address DCD COL Item 2.0-18-A is included in SSAR Section 2.4.7, which is incorporated by reference with the following supplements. I N058a

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.

NAPS COL 2.0-18-A

The emergency cooling water for Unit 3 is provided from the UHS as described in DCD Section 9.2.5. I N058b

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 nonsafety-related systems. The emergency cooling system for Unit 3 is provided by the UHS, described in DCD Section 9.2.5, which is not affected by ice conditions. There is no safety-related system interconnection or inter-system reliance between normal and emergency cooling.

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.

NAPS COL 2.0-18-A

The design of the Unit 3 intake is such that approach velocities are less than 0.5 fps. The SSAR stated that flow less than 1 fps would not produce sufficient turbulence to generate frazil ice. While this low flow may not produce sufficient turbulence to generate frazil ice, based on criteria stated in SSAR Reference 27 and others, there are other extreme climate factors that could combine and could cause formation of such ice. However, the Plant Service Water System (PSWS), which uses pumps in the Unit 3 intake for water make-up, is not safety-related. Information on the UHS is found in DCD Section 9.2.5. IN058b

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.

NAPS COL 2.0-18-A

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. I N058b

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.

Ice forces are accounted for in the design of the Unit 3 intake structure. It should also be noted that the intake and associated pumps for Unit 3 do not perform safety-related functions. The PSWS is supplied by pumps in the intake structure, but this system is not safety-related. Emergency cooling needed during a DBA is supplied by a separate UHS as discussed in DCD Section 9.2.5. Therefore, no safety-related Unit 3 facilities are affected by ice layer 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 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 structure. However, since the PSWS is not safety-related and emergency cooling is provided by the UHS, no safety-related facilities are affected by ice floe accumulation on the lake.

2.4.7.6 Ice and Snow Roof Loads on Safety Related Structures

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.

NAPS COL 2.0-18-A Acceptable roofing structure performance for each safety-related roof is described in DCD Appendix 3G, e.g., for the Reactor Building, see DCD Section 3G.1.5. I N058b

2.4.8 Cooling Water Canals and Reservoirs

NAPS COL 2.0-19-A The information needed to address DCD COL Item 2.0-19-A is included in SSAR Section 2.4.8, which is incorporated by reference with the following supplements. I N058a

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 DCD Section 9.2.5. The IC/PCCS pools have their own water in place during Unit 3 operation for safety-related cooling in the event that use of the UHS is required. The North Anna Reservoir and Waste Heat Treatment Facility (WHTF), which comprise Lake Anna, are not used for safety-related water withdrawal for Unit 3.

2.4.9 Channel Diversions

NAPS COL 2.0-20-A The information needed to address DCD COL Item 2.0-20-A is included in SSAR Section 2.4.9, which is incorporated by reference. I N058a

2.4.10 Flooding Protection Requirements

NAPS COL 2.0-21-A

The information needed to address DCD COL Item 2.0-21-A is included in SSAR Section 2.4.10, which is incorporated by reference with the following supplements. IN058a

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 88.4 m (290.0 ft) msl (a greater height above the maximum design basis Lake Anna flood level of 81.5 m (267.39 ft) msl than was assumed in the SSAR). IN058a

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 structure pump house is located in a separate intake channel 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 Elevation 77.7 m (255 ft) msl and protects the Unit 3 intake channel area from flood events up to the 100-year flood on Lake Anna, which has an estimated flood level at Elevation 77.7 m (255.0 ft) msl (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 make-up water intake structure 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 make-up water intake structure pump house is not a safety-related structure.

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.

NAPS COL 2.0-21-A 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 87.5 m (287.2 ft) msl, which is 0.9 m (2.8 ft) below Elevation 88.4 m (290.0 ft) msl, 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 flooding as a result of design basis flood events or 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. I N058b

2.4.11 Low Water Considerations

NAPS COL 2.0-22-A The information needed to address DCD COL Item 2.0-22-A is included in SSAR Section 2.4.11, which is incorporated by reference with the following supplements. I N058a

2.4.11.5 Plant Requirements

This SSAR section is supplemented as follows with information on the operational modes for the circulating water cooling system (CIRC) with respect to low water conditions.

NAPS ESP COL 2.4-10 The Unit 3 CIRC 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 76.2 m (250 ft) msl at the dam, and adequate reservoir discharge is being maintained, the EC mode is used. However, if the reservoir water level falls below Elevation 76.2 m (250 ft) msl 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.

As discussed in Section 2.4.14, Unit 3 will be shut down when the water level in Lake Anna drops below Elevation 73.762 m (242.0 ft) msl.

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.

NAPS COL 2.0-22-A

The Unit 3 UHS is described in DCD Section 9.2.5. Lake Anna is not relied on as a safety-related source of water withdrawals for emergency cooling. | N058b

2.4.12 Groundwater

NAPS COL 2.0-23-A

The information needed to address DCD COL Item 2.0-23-A is included in SSAR Section 2.4.12, which is incorporated by reference with the following supplements and variances. | N058a | N058a

2.4.12.1.2 Local Hydrogeology

The third paragraph of this SSAR section is supplemented as follows based on additional borings. | N058a

NAPS COL 2.0-23-A

Borings drilled as part of the ESP subsurface investigation program (SSAR Appendix 2.5.4B) and the Unit 3 subsurface investigation program (Appendix 2.5.4AA) penetrated saprolite to depths ranging from about 1.52 m (5 ft) to 24.99 m (82 ft). The saprolite penetrated by these borings is classified as a micaceous, silty-clayey, fine to coarse sand or sandy silt, with occasional (less than 10 percent) to some (between 10 and 50 percent) rock fragments. | N058b

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 Appendix 2.5.4AA) 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 May 2007 in observation wells at the site exhibit water level elevations ranging from about Elevation 72.54 m (238 ft) msl (relative to NAVD88) to Elevation 95.70 m (314 ft) msl, with corresponding ground surface elevations of about Elevation 86.25 m (283 ft) and Elevation 102.11 m (335 ft) msl, 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 ISFSI, respectively. Figure 2.4-206 shows the locations of the observation wells.

Piezometric head contour maps (Figure 2.4-207 through Figure 2.4-214), prepared using water levels measured from December 2002 through May 2007 (Table 2.4-15R), indicate that groundwater flow is generally to the north and east, toward Lake Anna. Freshwater Creek and Elk Creek, both of which flow to Lake Anna, form hydrologic boundaries to the 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 2.4-214, and using the maximum groundwater level observed in OW-901 (Elevation 88.08 m (289 ft) msl) and the minimum level observed in OW 848 (Elevation 73.76 m (242 ft) msl), with a

NAPS ESP VAR 2.0-3 distance between the two wells of 346.86 m (1,138 ft), results in a calculated hydraulic gradient toward Lake Anna of about 1.22 m (4 ft) per 30.48 m (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 Appendix 2.5.4AA). 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, 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.

NAPS ESP VAR 2.0-2

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.

Bulk densities for the bedrock range from 23.56 kN/m^3 (150 pounds per cubic foot) (pcf)) for highly to moderately 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):

NAPS ESP VAR 2.4-1

$$\text{Void Ratio} = \text{moisture content} \times \text{specific gravity}$$

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):

Total Porosity = void ratio / (1 + 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.

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 0.085 m/day (0.28 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 304.8 m (1000 ft) between the Unit 3 radwaste building and the closest point along the shoreline of Lake Anna, the groundwater travel time is estimated to be about 10 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.

NAPS COL 2.0-23-A

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 IN058b 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.

NAPS COL 2.0-23-A

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 May 2007 to provide data on groundwater flow direction, gradient, and seasonal groundwater level fluctuations at the site. I N058b

Prior to site earthwork activities, some observation wells will need to be closed. As discussed in Section 2.5.4.5.1, the design plant grade elevation for Unit 3 is 88.4 m (290 ft). To achieve this elevation, excavation will be required in the southern portion of the power block area while lower areas to the north will need to be filled. As a result, existing observation wells in these and other areas of the site will be closed prior to the start of earthwork activities. An evaluation of the existing observation well locations will be performed to determine which wells will be closed 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. Closed wells will be grouted 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 first paragraph of this SSAR section is supplemented as follows with information on the design plant grade elevation for Unit 3.

NAPS COL 2.0-23-A

This maximum groundwater level means that a permanent dewatering system is not needed for safe operation of Unit 3, based on the groundwater design bases for safety-related SSCs as described in DCD Section 3.4.1 and the comparison with the DCD site parameter value for maximum groundwater level as shown in Table 2.0-201. IN058b

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 88.4 m (290 ft), 5.8 m (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 96.93 m (318 ft) (B-919) to 82.91 m (272 ft) (B-928) and the piezometric head contour maps (Figure 2.4-207 through Figure 2.4-214) indicate that groundwater level elevations in this area range from about 91.44 to 80.77 m (300 to 265 ft).

As discussed in Section 2.5.4.5.1, the Unit 3 design plant grade elevation will be achieved by excavation in the southern portion of the power block area and filling in lower areas to the north. A 3-horizontal to 1-vertical (3H:1V) slope will be cut into the existing natural ground surrounding the southern and eastern sides 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 Pro 4.2 (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 82.60 to 86.26 m (271 to 283 ft). Therefore, the maximum groundwater level elevation in the power block area of Unit 3 is 86.26 m (283 ft) or

2.134 m (7 ft) below the design plant grade elevation of 88.4 m (290 ft). This maximum groundwater level means that a permanent dewatering system is not needed for safe operation of Unit 3, based on the groundwater design bases for safety-related SSCs as described in DCD Section 3.4.1 and the comparison with the DCD site parameter value for maximum groundwater level as shown in Table 2.0-201.

2.4.13 Accidental Releases of Liquid Effluents to Ground and Surface Waters

NAPS COL 2.0-24-A

The information needed to address DCD COL Item 2.0-24-A is included in SSAR Section 2.4.13, which is incorporated by reference with the following supplements. IN058a

Mitigating design features considered acceptable by BTP 11-6 (Reference 2.4-210) are incorporated into the design of Unit 3 to preclude an accidental release of liquid effluents. Descriptions of these features are provided below.

Below-grade tanks containing radioactivity are located on levels B1F and B2F of the Radwaste Building. The Radwaste Building is designed to seismic requirements as specified in DCD Table 3.2-1. In addition, compartments containing high level liquid radwaste are steel lined up to a height capable of containing the release of all liquid radwaste in the compartment. Releases as a result of major cracks in tanks result in the release of the liquid radwaste to the compartment and then to the building sump system for containment in other tanks or emergency tanks. Because of these design capabilities, it is considered remote that any major event involving the release of liquid radwaste into these volumes results in the release of these liquids to the groundwater environment via the liquid pathway.

The Condensate Storage Tank (CST), part of the Condensate Storage and Transfer System (CS&TS), is the only above-grade tank that contains radioactivity outside of containment. The CS&TS, described in DCD Section 9.2.6, meets GDC 60 by compliance with RG 1.143, Position C.1.2 for design features provided to control the release of liquid effluents containing radioactive material. The basin surrounding the tank is designed to prevent uncontrolled runoff in the event of a tank failure. The basin volume is sized to contain the total tank capacity. Tank overflow is also collected in this basin. A sump located inside the retention basin has provisions for sampling collected liquids prior to routing them to the Liquid Waste Management System (LWMS) or the storm sewer as per sampling and release requirements. These design features are intended to preclude the release of liquids from the CST to either the ground or surface water environment via the liquid pathway.

NAPS ESP PC 3.E(3)

The mitigating design features described above demonstrate that the radioactive waste management systems, structures, and components for Unit 3, as defined in RG 1.143, include features to preclude accidental releases of radionuclides into potential liquid pathways. Nevertheless, in accordance with SRP 11.2, an analysis of accidental releases of radioactive liquid effluents in groundwater and surface water is performed. Descriptions and results of these analyses are provided herein. | NO25c

The source term provided in DCD Table 12.2-13a, Liquid Waste Management System Equipment Drain Collection Tank Activity, is used in the analysis of an accidental release of liquid effluents from an equipment drain collection tank and the radwaste building structure to the groundwater system. This source term is appropriate because these tanks collect radioactive liquids from various pieces of plant equipment and are upstream of liquid processing by the LWMS.

The CST is used as the source in the analysis of an accidental release of liquid effluent to the surface water system. The radionuclide concentrations expected to be present in the CST are as given in Table 2.4-212.

2.4.13.1 Groundwater

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.

2.4.13.1.1 Accident Scenario

A liquid radwaste tank outside of containment is postulated to rupture with its contents released to the groundwater. The volume of the liquid assumed to be released and the associated radionuclide concentrations were selected to produce an accident scenario that leads to the most adverse contamination of groundwater, or surface water via the groundwater pathway.

Radwaste tanks outside of containment are located on the levels B1F and B2F of the radwaste building as shown on DCD Figure 1.2-25. The radwaste tanks having the largest volumes include the three equipment drain collection tanks and the equipment drain sample tank, all in the lowest level, B2F. Each of these tanks has a volume of 140 m^3 (37,000 gal) according to DCD Tables 12.2-13a and 12.2-13b.

Estimates of activity concentrations in various liquid radwaste tanks are provided in DCD Tables 12.2-13a through 12.2-13g. Of these tanks, the limiting tank in terms of radionuclide activity is the Equipment Drain Collection Tank, and its activity is provided in DCD Table 12.2-13a. Values are also provided in Table 2.4-206.

The accident scenario assumes that one of the equipment drain collection tanks ruptures and its contents are released to the groundwater. Note that this accident scenario is extremely conservative because the radwaste building is seismically designed in accordance with RG 1.143, Class RW-IIa, as described in DCD Section 12.2.1.4. Also, the concrete in each tank cubicle is provided with a steel liner, as described in Section 11.2.2.3, to prevent any potential liquid releases to the environment.

2.4.13.1.2 **Model**

Figure 2.4-217 illustrates the model used to evaluate an accidental release of radioactive liquid effluent to groundwater, or to surface water via the groundwater pathway. The key elements and assumptions embodied in the model are described and discussed below.

As indicated above, one of the equipment drain collection tanks is assumed to be the source of the release, with each tank having a capacity of 140 m^3 (37,000 gal) and radionuclide concentrations as given in DCD Table 12.2-13a. These tanks are located on the lowest level of the radwaste building (level B2F), which has a floor elevation of 244 ft msl. One of the tanks is postulated to rupture, and 80 percent of the liquid volume (112 m^3 or 29,600 gal) is assumed to be released following the guidance provided in BTP 11-6. Following tank rupture, it is conservatively assumed that a pathway is created that allows the entire 112 m^3 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 it ignores the barriers presented by the basemat and the steel liners incorporated into the tank cubicles of the radwaste building, which is seismically designed. It should also be recognized that level B2F of the radwaste building is well below the water table. Piezometric head contour maps presented in Figure 2.4-207 through Figure 2.4-214 indicate that the ambient water table in the vicinity of the radwaste building is about 270 ft msl, or 26 ft above the floor elevation. If the basemat or exterior walls of the radwaste building and associated steel liners were to fail simultaneously, groundwater would flow into the radwaste building, precluding the release of liquid effluents out of the building. Only if the interior of the radwaste 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 radwaste building to groundwater is extremely conservative, given the design features of the radwaste building intended to prevent an accidental release and the hydrogeologic conditions at the site.

With the postulated instantaneous release of the contents of an equipment drain collection 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 2.4-214 indicate that the groundwater pathway from the radwaste building is 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 radwaste building and the south edge of the cove, a distance of about 305 m (1000 ft) based on Figure 2.1-201. 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 enter the surface water system via Lake Anna. As noted above, the portion of Lake Anna closest to the release point is the cove that is used for the water supply intake for Unit 3. This cove was created to construct the intakes for two units (an earlier Unit 3 and a Unit 4) that were not completed. The water-supply intake for Unit 3 is located at the end of the cove, which serves as the forebay for Unit 3's water-supply intake. This cove is separated from the rest of the lake by a cofferdam. Openings in the cofferdam are provided to convey water from the North Anna Reservoir to the water-supply intake. This intake provides make-up water to the normal plant circulating water and service water cooling systems, and supplies water to the potable, demineralized, and fire protection water systems. The make-up water flow rates are about 1.42 m^3/s (50 cfs) and about 0.96 m^3/s (34 cfs) in the energy conservation and maximum water conservation modes, respectively. Under normal operating conditions, any contaminated groundwater discharging to the cove is entrained, mixed, and diluted with surface water in the Unit 3 intake forebay area and subsequently abstracted from the cove by the water-supply intake for Unit 3. Any radionuclides introduced into the make-up water systems are either circulated through the closed-cycle, wet cooling towers associated with the normal plant circulating water and service water cooling systems, or enter the potable, demineralized, and fire protection systems. Volatile radionuclides in the circulating water passing through wet cooling towers are lost to the atmosphere. Non-volatile radionuclides concentrate in the circulating water due to evaporative losses and are discharged with the cooling tower blowdown to the discharge canal. The blowdown discharge, about 0.34 m^3/s (12 cfs) in energy conservation mode and about 0.25 m^3/s in maximum water conservation mode, mixes in the discharge canal with 120 m^3/s (4246 cfs) of circulating water from Units 1 and 2 as illustrated in SSAR Figure 2.4-13. Radionuclides transported by the flow in the discharge canal then pass through the WHTF, enter the North Anna Reservoir through Dike 3, and undergo additional mixing and dilution in the reservoir (SSAR Figure 2.4-13). Most of the flow and associated dissolved radionuclide constituents are then recirculated upstream to the water intakes for Units 1, 2 and 3, while a relatively small fraction of the flow discharges from the North Anna Dam to the North Anna River.

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 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 North Anna Dam and near the confluence with the Little River.

2.4.13.1.3 **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 an equipment drain collection tank. Analysis of liquid effluent release commences with a screening model, 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, as necessary, after the screening results for each step are available.

This analysis accounts for the parent radionuclides assumed present in the radwaste 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 assumed present in an equipment drain collection, 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:

$$R\frac{\partial C}{\partial t} = D\frac{\partial^2 C}{\partial x^2} - v\frac{\partial C}{\partial x} - \lambda RC \qquad (2.4.13\text{-}2)$$

where: C = radionuclide concentration; R = retardation factor; D = coefficient of longitudinal hydrodynamic dispersion; v = average linear velocity; and λ = radioactive decay constant. The retardation factor is defined from the relationship:

$$R = 1 + \frac{\rho_b K_d}{n_e} \qquad (2.4.13\text{-}3)$$

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:

$$v = -\frac{K}{n_e}\frac{dh}{dx} \qquad (2.4.13\text{-}4)$$

where: K = hydraulic conductivity; and dh/dx = hydraulic gradient. The radioactive decay constant can be written as:

$$\lambda = \frac{\ln 2}{t_{1/2}} \qquad (2.4.13\text{-}5)$$

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:

$$\frac{dC}{dt} = \frac{\partial C}{\partial t} + \frac{dx}{dt}\frac{\partial C}{\partial x} \qquad (2.4.13\text{-}6)$$

Conservatively neglecting hydrodynamic dispersion, the characteristic equations for Equation 2.4.13-2 can be expressed as follows:

$$\frac{dC}{dt} = -\lambda C \qquad (2.4.13\text{-}7)$$

$$\frac{dx}{dt} = \frac{v}{R} \qquad (2.4.13\text{-}8)$$

The solutions of the system of equations comprising Equation 2.4.13-7 and Equation 2.4.13-8 can be obtained by integration to yield the characteristic curves of Equation 2.4.13-2. For the parent radionuclide, the equations representing the characteristic curves can be obtained as:

$$C_1 = C_{10}\exp(-\lambda_1 t) \qquad (2.4.13\text{-}9)$$

$$t = R_1 L / v \qquad (2.4.13\text{-}10)$$

where: C_1 = concentration of the parent radionuclide; C_{10} = initial 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:

$$R_2 \frac{\partial C_2}{\partial t} = D \frac{\partial^2 C_2}{\partial x^2} - v \frac{\partial C_2}{\partial x} + d_{12} \lambda_1 R_1 C_1 - \lambda_2 R_2 C_2 \qquad (2.4.13\text{-}11)$$

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 2.4.13-11, again conservatively neglecting hydrodynamic dispersion, can be derived as:

$$\frac{dC_2}{dt} = d_{12} \lambda_1' C_1 - \lambda_2 C_2 \qquad (2.4.13\text{-}12)$$

$$\frac{dx}{dt} = \frac{v}{R_2} \qquad (2.4.13\text{-}13)$$

where: $\lambda_1' = \lambda_1 R_1 / R_2$. Recognizing that Equation 2.4.13-12 is formally similar to Equation B.43 of Reference 2.4-214, these equations can be integrated to yield:

$$C_2 = K_1 \exp(-\lambda_1' t) + K_2 \exp(-\lambda_2 t) \qquad (2.4.13\text{-}14)$$

$$t = R_2 L / v \qquad (2.4.13\text{-}15)$$

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:

$$R_3 \frac{\partial C_3}{\partial t} = D \frac{\partial^2 C_3}{\partial x^2} - v \frac{\partial C_3}{\partial x} + d_{13} \lambda_1 R_1 C_1 + d_{23} \lambda_2 R_2 C_2 - \lambda_3 R_3 C_3 \qquad (2.4.13\text{-}16)$$

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 2.4.13-16, again conservatively neglecting hydrodynamic dispersion, can be derived as

$$\frac{dC_3}{dt} = d_{13}\lambda_1' C_1 + d_{23}\lambda_2' C_2 - \lambda_3 C_3 \qquad (2.4.13\text{-}17)$$

$$\frac{dx}{dt} = \frac{v}{R_3} \qquad (2.4.13\text{-}18)$$

where: $\lambda_1' = \lambda_1 R_1 / R_3$; and $\lambda_2' = \lambda_2 R_2 / R_3$. Considering the formal similarity of Equation 2.4.13-17 to Equation B.54 of Reference 2.4-214, Equation 2.4.13-17 and Equation 2.4.13-18 can be integrated to yield:

$$C_3 = K_1 \exp(-\lambda_1' t) + K_2 \exp(-\lambda_2' t) + K_3 \exp(-\lambda_3 t) \qquad (2.4.13\text{-}19)$$

$$t = R_3 L / v \qquad (2.4.13\text{-}20)$$

for which:

$$K_1 = \frac{d_{13}\lambda_3 C_{10}}{\lambda_3 - \lambda_1'} + \frac{d_{23}\lambda_2' d_{12}\lambda_3 C_{10}}{(\lambda_3 - \lambda_1')(\lambda_2' - \lambda_1')}$$

$$K_2 = \frac{d_{23}\lambda_3 C_{20}}{\lambda_3 - \lambda_2'} - \frac{d_{23}\lambda_2' d_{12}\lambda_3 C_{10}}{(\lambda_3 - \lambda_2')(\lambda_2' - \lambda_1')}$$

$$K_3 = C_{30} - \frac{d_{13}\lambda_3 C_{10}}{\lambda_3 - \lambda_1'} - \frac{d_{23}\lambda_3 C_{20}}{\lambda_3 - \lambda_2'} + \frac{d_{23}\lambda_2' d_{12}\lambda_3 C_{10}}{(\lambda_3 - \lambda_1')(\lambda_3 - \lambda_2')}$$

To estimate the radionuclide concentrations in groundwater discharging to Lake Anna, Equation 2.4.13-9, Equation 2.4.13-14, and Equation 2.4.13-19 were applied as appropriate along the groundwater pathline that would originate at the radwaste building and terminate at the Lake Anna shoreline. The analysis was performed sequentially as described below.

a. **Transport Considering Radioactive Decay Only**

An initial screening analysis was performed considering radioactive decay only. This analysis assumed that all radionuclides migrate at the same rate as groundwater and considered no adsorption and retardation, which would otherwise result in lower radionuclide concentrations. The concentrations of the radionuclides assumed to be released from an equipment drain collection tank were decayed for a period equal to the groundwater travel time from the point of release to Lake Anna, using

Equation 2.4.13-9, Equation 2.4.13-14, or Equation 2.4.13-19 as appropriate with $R_1 = R_2 = R_3 = 1$. Any radionuclide having a concentration of less than 0.01 times its ECL was eliminated from consideration because its concentration would be well below its regulatory limit. Any radionuclide having a concentration greater than or equal to 0.01 times its ECL was retained for further evaluation.

Evaluating transport considering radioactive decay only requires an estimate of the groundwater travel time. The groundwater travel time between the radwaste building and Lake Anna has been estimated using the following site-specific hydrogeologic characteristics:

K = 3.4 ft/day

dh/dx = 0.040 ft/ft

$n_e = 0.25$

Note that the hydraulic conductivity (3.4 ft/day) was established as a site characteristic in the SSAR based on hydraulic testing of 13 observation wells completed in the water table aquifer, with the 3.4 ft/day value being the maximum of the 13 observations. Subsequently, three additional observation wells were installed and tested as part of the Unit 3 subsurface investigation, increasing the total number of hydraulic conductivity observations to 16 for the saprolite material. Table 2.4-16R summarizes these data. A review of these observations indicates that 14 out of the 16 values (87.5 percent) are less than or equal to 3.4 ft/day. Because a value of 3.4 ft/day is greater than 87.5 percent of the observed data, it is considered to be a conservative value. The two values that exceed 3.4 ft/day include those observed at OW-945 (3.8 ft/day) and OW-946 (9.9 ft/day), which are located 2000 to 2500 ft upgradient from the radwaste building (see Figure 2.4-206). These values are not representative of the hydrogeologic conditions along the groundwater pathway between the radwaste building and Lake Anna. Hence, the 3.4 ft/day value established as site characteristic is conservative and is considered appropriate for assessing an accidental release of liquid effluent to the groundwater.

Using the above values in Equation 2.4.13-4, the average linear velocity is calculated to be:

$$v = -\frac{K}{n_e}\frac{dh}{dx} = \frac{3.4}{0.25} \times 0.040 = 0.544 \text{ ft/day}$$

The groundwater travel time is then:

$$t = L / v = 1000 / 0.54 = 1840 \text{ days} = 5.03 \text{ years}$$

Using Equation 2.4.13-9, Equation 2.4.13-14, or Equation 2.4.13-19 as appropriate with R = 1, the initial concentrations were decayed for a period of 5.03 years. Radioactive decay data and decay chain specifications were taken from NUREG/CR-5512, Vol. 1, Table E.1 (Reference 2.4-214). Radioactive decay data for some of the shorter-lived radionuclides were obtained from Reference 2.4-211. Table 2.4-206 summarizes the results and identifies those radionuclides for which the ratio of groundwater concentration to ECL would exceed 0.01. These include H-3, Mn-54, Fe-55, Co-60, Ni-63, Zn-65, Sr-90, Y-90, Ru-106, Ag-110m, Cs-134, Cs-137, Ce-144, and Pu-239.

b. **Transport Considering Radioactive Decay and Adsorption**

Radionuclides retained from the screening analysis (H-3, Mn-54, Fe-55, Co-60, Ni-63, Zn-65, Sr-90, Y-90, Ru-106, Ag-110m, Cs-134, Cs-137, Ce-144, and Pu-239) were further evaluated and screened considering adsorption and retardation in addition to radioactive decay. Distribution coefficients for these elements were assigned using literature values. In particular, K_d values were selected assuming the literature data to be log-normally distributed and selecting the 10th percentile of the distribution to conservatively assign a value for the radionuclide transport analysis. NUREG/CR-6697 (Reference 2.4-215), Attachment C, Table 3.9-1 is used to assign the mean and standard deviation for each of the distributions. In the case of Y-90, no data were available to assign a K_d value for yttrium. Instead, adsorption characteristics for yttrium were assumed to be similar to that of scandium, as these two elements lie adjacent in the periodic table. The K_d value for Y-90 was then estimated as the 10th percentile of the distribution for scandium using the mean and standard deviation from NUREG/CR-6697.

To assess the validity of the Kd values derived from NUREG/CR-6697 as described above, site-specific Kd values were determined for Mn, Fe, Co, Ni, Zn, Sr, Ru, Ag, Cs, Ce, and Pu 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. Kd 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. Table 2.4-207 summarizes the results along with the values estimated from NUREG/CR-6697. Comparing the site-specific Kd values against those assumed in the transport analysis indicates the following:

- The Kd values assumed for 6 elements (Fe, Zn, Sr, Ru, Cs, Ce) are less than the minimum observed values.
- The Kd values assumed for 2 elements (Mn, Co) are bounded by the 1 percentile of the observed data.
- The Kd values assumed for 2 elements (Ag, Pu) are bounded by the 10th percentile of the observed data.
- The Kd value assumed for 1 element (Ni) is bounded by the 25th percentile of the observed data.

Based on the above comparison, the Kd values derived from NUREG/CR-6697 are conservative relative to the site-specific values. The literature values were therefore retained for the transport analysis.

Retardation factors were calculated using Equation 2.4.13-3 with the distribution coefficients established 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, as described in Section 2.4.12.1.2. The concentration for each radionuclide was then determined at the point of groundwater discharge to Lake Anna using Equation 2.4.13-9 or Equation 2.4.13-14 and the appropriate initial concentration, decay rate, and retardation factor. Results are summarized in Table 2.4-208 and indicate that groundwater concentration to ECL ratios for H-3, Sr-90, Y-90, and Pu-239 would exceed 0.01.

c. **Transport Considering Radioactive Decay, Adsorption, and Dilution**

As discussed in Section 2.4.13.1.2, the H-3, Sr-90, Y-90, and Pu-239 isotopes discharging with the groundwater to Lake Anna are entrained, mixed, and diluted in the surface water, flow of which is induced by the water-supply intake for Unit 3. A dilution factor was estimated to account for the mixing and dilution as described below.

The total radionuclide flux in the groundwater was calculated using NUREG-0868 (Reference 2.4-216), Equation 3.23 as a basis.

Conservatively ignoring hydrodynamic dispersion, this equation can be restated as:

$$F_{GW} = n_e v C_{GW} A \qquad (2.4.13\text{-}21)$$

where: F_{GW} = total radionuclide flux in groundwater; C_{GW} = radionuclide concentration in the groundwater; A = cross-sectional area normal to the direction of groundwater flow; and the other terms are as defined previously. The cross-sectional area of the plume is conservatively assumed to extend over the entire saturated thickness of the unconfined aquifer and the entire length of the radwaste building. The saturated thickness is taken to extend from the water table to the top of the Zone III-IV, slightly weathered to moderately weathered rock. In the vicinity of the radwaste building, Figure 2.4-207 through Figure 2.4-214 indicate a water table elevation of about 82.30 m (270 ft) msl, while Table 2.5-208 indicates the Zone III-IV top of rock elevation to be 74.37 m (244 ft) msl. These values result in a saturated thickness of about 7.92 m (26 ft). DCD Figure 1.2-25 indicates the radwaste building to be 65 m (213 ft) in length normal to the direction of groundwater flow. The assumption that the plume extends the entire length of the building is conservative because the characteristic dimensions of the sources from which a release is postulated are a relatively small fraction of the 65 m length. The cross-sectional area is then the product of 26 ft and 213 ft, or 5540 ft^2.

The total radionuclide flux in the surface water of Lake Anna, induced by pumping from the water-supply intake for Unit 3, is calculated as:

$$F_{SW} = Q C_{SW} \qquad (2.4.13\text{-}22)$$

where: F_{SW} = total radionuclide flux in surface water; Q = surface water flow rate; and C_{SW} = radionuclide concentration in the surface water. This approach for calculating the radionuclide flux in surface water is justified, considering that any radionuclides released to the groundwater would likely discharge to the Unit 3 intake forebay area, which has been isolated from the rest of the lake and from which the water intake for Unit 3 will obtain water. The surface water flow is determined by the water supply requirements for Unit 3, which total 1.42 m^3/s (50 cfs) when running in the energy conservation mode and 0.96 m^3/s (34 cfs) in the maximum water conservation mode. There are times of the year when the combination wet and dry cooling towers used for normal plant cooling could function in a completely dry mode, particularly during cold weather. Under these conditions, no make-up water is required for the normal plant circulating water system, which comprises most of the total demand. However, these conditions are expected to persist for relatively short durations and are not representative of transport conditions over longer time scales.

Because the total radionuclide flux must be conserved, radionuclide concentrations in the surface water are estimated by equating Equation 2.4.13-21 and Equation 2.4.13-22 and solving for C_{SW}:

$$C_{SW} = \frac{n_e vA}{Q} C_{GW} \qquad (2.4.13\text{-}23)$$

where the quantity $n_e vA/Q$ defines the dilution factor. Assuming for conservatism that the plant is operating in the maximum water conservation mode, the dilution factor is calculated using the previously defined values for n_e, v, A, and Q to be:

$$\frac{n_e vA}{Q} = \frac{0.25 \times 0.54/86,400 \times 5540}{34} = 2.56 \times 10^{-4}$$

This dilution factor is applied to the H-3, Sr-90, Y-90, and Pu-239 concentrations reported in Table 2.4-209 to account for dilution in addition to radioactive decay and adsorption. Table 2.4-210 summarizes the resulting concentrations, which represent the concentrations in the surface water withdrawn by the water-supply intake for Unit 3. It is seen that the concentrations of each of these radionuclides are below their respective ECLs.

Most of the 0.96 m^3/s (34 cfs) withdrawn from Lake Anna is used as make-up water to replenish evaporative losses from cooling towers that are part of closed-cycle cooling systems. As discussed in Section 2.4.13.1.2, the non-volatile radionuclides concentrate in the circulating water by a factor of about four, prior to being discharged to the discharge canal. Even then, concentrations are well below ECLs. It should also be noted that radionuclides released in cooling tower blowdown discharge would mix with circulating water discharge from Units 1 and 2 (up to 120.2 m^3/s (4246 cfs)) as long as these units are operating. If Units 1 and 2 are shutdown, a minimum of 15.04 m^3/s (531 cfs) will continue to be circulated to provide adequate dilution for normal plant releases. These flows from Units 1 and 2 would further dilute the radionuclides discharged from Unit 3, which is not accounted for in Table 2.4-209.

As described in Section 2.4.13.1.2, there is an atmospheric pathway associated with the accidental release of liquid effluents to groundwater, which entails the release of tritium to the atmosphere, as water vapor, from the evaporation of cooling water from the Unit 3 wet cooling towers. Table 2.4-209 indicates a tritium concentration of 5.08×10^{-7} μCi/cm^3 (508 pCi/l) for surface water withdrawn as makeup water to the circulating water system and contributed by the accidental release. This value is about one-twentieth the 9417 pCi/l value evaluated previously in FEIS Appendix H.3 (Reference 2.4-217). The FEIS determined that the doses associated with a concentration of 9417 pCi/l were insignificant when compared to the maximally exposed individual (MEI) dose from atmospheric releases from the stacks of Unit 3. Because the predicted concentration of 508 pCi/l is about a factor of twenty less than 9417 pCi/l, the dose associated with this atmospheric pathway is also insignificant.

2.4.13.1.4 **Compliance with 10 CFR 20**

The radionuclide transport analysis presented above demonstrates that each of the radionuclides that could be accidentally released to groundwater would be individually below its ECL. However, 10 CFR 20, Appendix B, Table 2, imposes additional requirements when the identity and concentration of each radionuclide in a mixture are known. In this case, the ratio present in the mixture and the concentration otherwise established in 10 CFR 20, Appendix B for the specific radionuclide not in a mixture must be determined. The sum of such ratios for all of the radionuclides in the mixture may not exceed "1" (i.e., "unity").

This sum of fractions approach was applied to the radionuclide concentrations conservatively estimated as described in Section 2.4.13.1.3. Results are summarized in Table 2.4-210. The ratios for the mixture sum to 5.64×10^{-2}. This value is multiplied by a factor of four to account for concentration of radionuclides in circulating water due to evaporative losses, which results in a value of 2.26×10^{-1}. This value is below unity and demonstrates that an accidental release of radioactive liquid effluent in groundwater complies with the 10 CFR 20 limits at the entrance of the discharge canal. The 2.26×10^{-1} value is bounding because the 0.25 m^3/s (9 cfs) of blowdown discharge would be diluted with a minimum of 15.04 m^3/s (531 cfs) of flow from Units 1 and 2 within the discharge canal and prior to the end of the canal, which is designated as the release point to unrestricted areas.

2.4.13.2 Surface Water

The purpose of this section is to provide a conservative analysis of a postulated, accidental release of radioactive liquid effluents to the surface water at the Unit 3 site. The key assumptions and accident scenario are described. The dilution analysis is presented along with various plant operating scenarios. The bounding case is identified. The radionuclide concentrations to which a water user might be exposed are compared against the regulatory limits for the bounding case.

2.4.13.2.1 Assumptions

The key assumptions adopted in this analysis area are as follows:

- The accidental release of radioactive liquid effluents to surface water results from a failure of the CST.
- The radionuclide inventory for the CST is based on 80 percent of the volume capacity of that tank as recommended in BTP 11-6. Based on the CST capacity of 4885 m^3 (172,512 ft^3) given in DCD Table 9.2-10, the volume of liquid released is 3908 m^3 (138,010 ft^3).
- The containment dike surrounding the CST fails simultaneously, allowing the liquid contents of the CST to enter the Stormwater Retention Pond 1, which discharges to the North Anna Reservoir as shown in Figure 2.1-201.
- The discharge canal behaves as a fully mixed system.
- The liquid effluent release limits established in 10 CFR 20 apply at the end of the discharge canal, which is designated as the release point to unrestricted areas in accordance with SSAR Section 2.1.1.3.

2.4.13.2.2 Accident Scenario

Figure 2.1-201 illustrates the locations of the plant facilities and hydrologic features involved in an accidental liquid release of liquid effluent to surface water from a failure of the CST.

With the postulated release of the contents of the CST and concurrent failure of the CST containment dike, the liquid effluent would enter the storm drain system and collect in Stormwater Retention Pond 1. The outlet from Pond 1 discharges to the North Anna Reservoir just outside the forebay area for the Unit 3 intake. This forebay area is separated from the North Anna Reservoir by a cofferdam (the outer berm) that was constructed for the abandoned Units 3 and 4. The intake channel culvert installed through the cofferdam conveys water from the reservoir to the forebay.

Depending on the operating status of Units 1, 2, and 3, liquid effluent discharged from Pond 1 to the North Anna Reservoir can be entrained in the circulating water intakes for Units 1 and 2, or entrained in the Unit 3 intake. When Units 1, 2, and 3 are operating normally or Unit 3 is operating by itself, the discharge from Pond 1 is assumed to be entrained in the make-up water flow for Unit 3 due to the proximity of the Pond 1 outfall to the culvert entrance to the Unit 3 intake forebay. When the circulating water pumps for Units 1 and 2 are operating and Unit 3 is shutdown, the Pond 1 discharge is assumed to be entrained in the circulating water flow for Units 1 and 2.

For the cases in which liquid effluent is entrained in the make-up water flow for Unit 3, radionuclides introduced into the make-up water system are circulated through the closed-cycle, wet cooling towers associated with the normal plant circulating water and service water cooling systems. Volatile radionuclides in the circulating water passing through wet cooling towers are lost to the atmosphere, while any radionuclides remaining in solution are subject to drift loss to the atmosphere and subsequent deposition. Non-volatile radionuclides concentrate in the circulating water due to the evaporative losses and are discharged with the cooling tower blowdown to the discharge canal. This blowdown discharge mixes in the discharge canal with circulating water flow discharge from Units 1 and 2. In the event that Unit 3 is not operating and liquid effluent is entrained by the circulating water flow for Units 1 and 2, radionuclides enter the once-through circulating water system and enter the discharge canal with the circulating water flow.

2.4.13.2.3 **Dilution Analysis**

Based on the accident scenario described above, the liquid effluent resulting from a failure of the CST and its containment dike would be entrained by the intake structures for Units 1 and 2 or Unit 3, circulated through their respective wet cooling systems, and released to the discharge canal. Depending on plant operating statuses, four alternative dilution scenarios are possible, which are described below. It is conservatively assumed that Unit 3 operates in the maximum water conservation mode, as opposed to the energy conservation mode, because of the lower dilution potential of the maximum water conservation mode.

1. **Units 1, 2, and 3 normal operation** - All three units are operating at capacity. The combined circulating water flow rate for Units 1 and 2 is Q_{12} = 120.2 m^3/s (4246 ft^3/s) (Reference 2.4-218). The make-up flow rate for Unit 3, Q_{3MU}, is about 0.96 m^3/s (34 ft^3/s). The blowdown discharge rate for Unit 3, Q_{3BD}, is about 0.25 m^3/s (9 ft^3/s).

2. **Units 1 and 2 shutdown; Unit 3 normal operation** - Units 1 and 2 are shutdown, and Unit 3 is operating at capacity. For Units 1 and 2, a minimum of Q_{12} = 15.0 m^3/s (531 ft^3/s) is circulated to provide dilution of normal plant releases. The make-up flow rate for Unit 3, Q_{3MU}, is about 0.96 m^3/s (34 ft^3/s), and the blowdown discharge rate for Unit 3, Q_{BD}, is about 0.25 m^3/s (9 ft^3/s).

3. **Units 1 and 2 normal operation; Unit 3 shut down** - Units 1 and 2 are operating at capacity, and Unit 3 is shut down. The combined circulating water flow rate for Units 1 and 2 is Q_{12} = 120.2 m^3/s (4246 ft^3/s). The make-up and blowdown flow rates are zero for Unit 3.

4. **Units 1, 2, and 3 all shut down** - Units 1, 2, and 3 are all shut down. For Units 1 and 2, a minimum of Q_{12} = 15.0 m^3/s (531 ft^3/s) is circulated to provide dilution of normal plant releases. The make-up and blowdown flow rates are zero for Unit 3.

For scenarios 1 and 2 involving entrainment into the Unit 3 cooling system with subsequent release to the discharge canal, conservation of mass requires:

$$C_{3MU} = \frac{Q_{P1}}{Q_{3MU}} C_{CST} \qquad (2.4.13\text{-}24)$$

$$C_{3BD} = NC_{3MU} \qquad (2.4.13\text{-}25)$$

$$C_{DC} = \frac{Q_{3BD}}{Q_{3BD} + Q_{12}} C_{3BD} \qquad (2.4.13\text{-}26)$$

where: C_{CST} = radionuclide concentration in CST; C_{3MU} = radionuclide concentration of make-up water entrained in Unit 3 intake;

C_{3BD} = radionuclide concentration in blowdown discharge water; C_{DC} = radionuclide concentration in discharge canal; N = number of cycles of concentration for the Unit 3 wet cooling towers; Q_{P1} = flow rate from Pond 1 into Lake Anna; Q_{3MU} = makeup water flow rate for Unit 3; and Q_{12} = circulating water flow rate for Units 1 and 2. For scenarios 3 and 4 involving entrainment into the circulating water system of Units 1 and 2 with subsequent release to the discharge canal, conservation of mass requires:

$$C_{DC} = \frac{Q_{P1}}{Q_{12}} C_{CST} \qquad (2.4.13\text{-}27)$$

Using the equations above, concentrations of a radionuclide released from the CST with a relative concentration of one (unity) are calculated for each of the alternative dilution scenarios described above. A value of N = 4 is assumed. A value of Q_{P1} = 0.017 m^3/s (0.60 ft^3/s) is used based on the outflow and storage characteristics of Stormwater Retention Pond 1. This value assumes a Pond 1 stage elevation of 79.90 m (262.13 ft) msl corresponding to 3908 m^3 (138,010 ft^3) of storage, which is the volume of liquid assumed to be released from the CST. Note that the radionuclide concentrations and discharge flow rate from Pond 1 assume that the pond is initially dry. If there were water in the pond prior to the CST failure, the radionuclide concentrations in the discharge would be more dilute and less conservative than those assumed. Table 2.4-211 summarizes the results. Of the various alternatives evaluated, scenario 2 produces the maximum relative concentration (1.18E-03) at the end of the discharge canal.

2.4.13.2.4 **Compliance with 10 CFR 20**

To determine regulatory compliance, the maximum relative concentration (1.18E-03) determined in Section 2.4.13.2.3 is used to scale the radionuclide concentrations assumed for the CST. Table 2.4-212 summarizes the results.

The results presented in Table 2.4-212 demonstrate that each of the radionuclides potentially released from the CST to surface water is below its ECL. However, 10 CFR 20, Appendix B, Table 2, imposes additional requirements when the identity and concentration of each radionuclide in a mixture are known. In this case, the ratio present in the mixture and the concentration otherwise established in 10 CFR 20, Appendix B for the specific radionuclide not in a mixture must be determined. The sum of such ratios for all of the radionuclides in the mixture may not exceed "1" (i.e., "unity").

For the bounding scenario summarized in Table 2.4-212, the ratios sum to 1.7×10^{-1}. This value is below unity, demonstrating that an accidental liquid release of radioactive liquid effluent in surface water complies with 10 CFR 20 limits at the end of the discharge canal, which is designated as the release point to unrestricted areas.

NAPS COL 2.0-25-A

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.

The plant elevation is also above flood and groundwater elevations for Regulatory Treatment of Non-Safety Systems (RTNSS) SSCs used to provide the makeup water to the UHS (IC/PCCS pools) from 72 hours to 7 days after an accident. The Seismic Category I FWSC SSCs are therefore also protected from external floods. Therefore, no technical specifications or emergency procedures are required to prevent hydrological phenomena from degrading the UHS. | N066

NAPS ESP COL 2.4-2

Unit 3 will shutdown when the water level in Lake Anna drops below Elevation 73.762 m (242.0 ft) msl. 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.

Section 2.4 References

2.4-201 U.S. Department of Agriculture, Soil Conservation Service (now known as Natural Resources Conservation Service), Technical Release 55, *Urban Hydrology for Small Watersheds,* June 1986.

2.4-202 U.S. Army Corps of Engineers, EM 1110-2-1417 *Flood-Runoff Analysis*, August 1994.

2.4-203 U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-RAS, River Analysis System, Version 3.1.3, May 2005.

2.4-204 Chow, Ven Te, *Open-Channel Hydraulics*, 1959.

2.4-205 Craig, R. F., Soil Mechanics, published by Chapman and Hall, 1994.

2.4-206 Heath, R. C., Basic Ground-Water Hydrology, U.S. Geological Survey Water-Supply Paper 2220, 1998.

2.4-207 Commonwealth of Virginia, Department of Health, Office of Drinking Water, Waterworks Operation Permit No. 2109600, November 9, 2005.

2.4-208 Virginia Department of Environmental Quality (DEQ), Annual Report of Water Withdrawals For the Period: January 1, 2006 to December 31, 2006. January 31, 2007.

2.4-209 Waterloo Hydrogeologic, Inc., Visual MODFLOW Pro Version 4.2, Computer program for 3D groundwater flow modeling, 2007

2.4-210 Branch Technical Position 11-6, Postulated Radioactive Releases Due to Liquid-Containing Tank Failures, NUREG-0800, U. S. Nuclear Regulatory Commission, March 2007.

2.4-211 International Commission on Radiation Protection (ICRP), Radionuclide Transformations - Energy and Intensity of Emissions, ICRP Publication 38, Volumes 11-13, Pergamon Press, New York, 1983.

2.4-212 Javandel, I., Doughty, C., and C. F. Tsang, Groundwater Transport: Handbook of Mathematical Models, Water Resources Monograph 10, American Geophysical Union, 1984.

2.4-213 Konikow, L. F., and J. D. Bredehoeft, Computer Model of Two-Dimensional Solute Transport and Dispersion in Ground Water, Chapter C2, Book 7, Techniques of Water-Resources Investigations of the United States Geological Survey, 1978.

2.4-214 Kennedy, W. E., and Strenge, D. L., Residual Radioactive Contamination From Decommissioning, NUREG/CR-5512, Volume 1, Pacific Northwest Laboratory, October 1992.

2.4-215 Yu, C., LePoire, D., E. Gnanapragasam, J. Arnish, S. Kamboj, B. M. Biwer, J. J. Cheng, A. Zielen, and S. Y. Chen, Development of Probabilistic RESRAD 6.0 and RESRAD-BUILD 3.0 Computer Codes, NUREG/CR-6697, Argonne National Laboratory, November 2000.

2.4-216 Coddell, R. B., K. T. Key, and G. Whelan, A Collection of Mathematical Models for Dispersion in Surface Water and Groundwater, NUREG-0868, U. S. Nuclear Regulatory Commission, June 1982.

2.4-217 Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site, NUREG-1811, Vol. 1, December 2006.

2.4-218 Updated Final Safety Analysis Report, North Anna Power Station, Revision 38.

NAPS COL 2.0-23-A

Table 2.4-15R Quarterly Groundwater Level Elevations

N058b

Observation Well No.	Well Depth* (ft)	Reference Point Elev. (ft)	Reference Point Stickup** (ft)	Top of Well Screen Elev. (ft)	Well Screen Length (ft)	Groundwater Level Elevations 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
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
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
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
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
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
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
OW-847	49.8	319.7	1.5	280.6	9.6	285.4	287.0	289.5	290.8	293.3	***	***	294.24
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
OW-849	49.8	298.5	1.5	259.4	9.7	265.5	269.5	271.7	270.8	269.5	270.21	***	270.03
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
OW-945	54.5	283.1	1.50	240.1	10	N/A	N/A	N/A	N/A	N/A	***	***	271.59
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
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
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
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
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
P-10	22.5	286.4	2.4	267.0	5	274.4	274.8	275.2	275.2	275.3	275.48	275.4	275.17
P-14	N/A	327.1	N/A	N/A	N/A	271.6	272.2	272.8	273.1	273.8	273.99	274.03	274.09
P-18	N/A	329.0	N/A	N/A	N/A	285.7	286.5	287.5	288.4	289.9	290.48	290.72	290.9

NAPS COL 2.0-23-A **Table 2.4-15R Quarterly Groundwater Level Elevations**

Observation Well No.	Well Depth* (ft)	Reference Point Elev. (ft)	Reference Point Stickup** (ft)	Top of Well Screen Elev. (ft)	Well Screen Length (ft)	Groundwater Level Elevations 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
P-19	58.5	322.3	N/A	N/A	5	284.3	285.2	286.3	287.3	288.9	***	***	290.46
P-20	61.0	320.6	N/A	N/A	5	274.9	275.4	275.8	275.0	276.7	277.1	276.95	276.95
P-21	58.5	319.2	N/A	N/A	5	Dry	261.2	262.0	262.4	263.4	263.74	263.65	263.88
P-22	60.0	320.5	N/A	N/A	5	276.8	277.8	278.6	278.9	279.5	279.79	279.58	279.45
P-23	41.2	296.4	1.9	258.7	5	261.1	262.6	263.3	263.1	263.5	263.56	263.34	263.35
P-24	25.0	293.4	2.3	271.3	5	276.4	277.1	278.4	278.3	278.4	278.82	278.8	278.08
WP-3	N/A	317.9(?)****	N/A	266.5	5	299.7	301.0	302.8	302.3	302.1	302.42	302.2	302.09
Lake Anna Water Level Elevation						248.1	250.1	250.4	250.1	250.1	250.1	250.1	249.8
Service Water Reservoir Water Level Elevation						314.6	313.3	314.6	314.6	314.5	314.5	314.4	314.5

I N141

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
* Below ground surface at time of installation
** Above ground surface at time of installation
*** Valid reading not obtained.
**** Estimated elevation; not a survey result. See SSAR Appendix 2.5.4B.
N/A – not available

I N141

NAPS COL 2.0-23-A

Table 2.4-16R Hydraulic Conductivity Value

I N058b

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 1×10^{-3}	3.8 to 2.8
OW-946 [f]	30.4–40.4	303.6–293.6	Saprolite	3.5 to 2.6×10^{-3}	9.9 to 7.4
OW-947 [f]	45.0–55.0	268.3–258.3	Saprolite	2.4 to 1.6×10^{-4}	0.67 to 0.46
OW-949 [f]	92.5–102.5	243.2–233.2	Quartz Gneiss	8.4 to 6.7×10^{-4}	2.4 to 1.9
Packer Test Results					
B-949 [f]	84.0–89	250.8–245.8	Quartz Gneiss	1.7×10^{-4}	0.48
	94.5–99.5	240.3–235.3	Quartz Gneiss	2.2×10^{-3}	6.28

NAPS COL 2.0-23-A

Table 2.4-16R Hydraulic Conductivity Value

Observation Well No.	Depth Interval Tested (ft)	Elevation	Material	Hydraulic Conductivity cm/sec	Hydraulic Conductivity 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 2.0-23-A
NAPS ESP VAR 2.4-2
ESP COR

Table 2.4-17R North Anna Power Station Water Supply Wells

1N058b

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 2.4-203
d. SSAR Reference 49

NAPS COL 2.0-13-A

Table 2.4-201 Unit 3 Sub-Basin Drainage Areas | N058b

Sub-Basin	Drainage Area (ft^2)	Drainage Area (acres)
B	334,935	7.67
S1	156,241	3.60
S2	100,005	2.30
S3	84,803	1.95
S4	384,081	8.82
N1	91,773	2.11
N2	181,035	4.16
N3	267,867	6.15
N4	168,076	3.86
N5	432,662	9.93
Total	2,201,478	50.55

| N094b
| N094b
| N094b
| N094b
| N094b

NAPS COL 2.0-13-A

Table 2.4-202 Unit 3 Sub-Basin Point of Interest (POI) Drainage Areas | N058b

Sub-Basin	Contributing Upstream Sub-Basins	Total POI Drainage Area (acres)
B	All	50.55
S1	S1, S2, S3, S4	16.67
S2	S2, S3, S4	13.07
S3	S3, S4	10.77
S4	S4	8.82
N1	N1, N2, N3, N4, N5	26.21
N2	N2, N3, N4, N5	24.10
N3	N3, N4, N5	19.94
N4	N4	3.86
N5	N5	9.93

| N094b
| N094b
| N094b
| N094b
| N094b
| N094b
| N094b
| N094b
| N094b

NAPS COL 2.0-13-A

Table 2.4-203 Unit 3 Site PMP Peak Discharges | N058b

Sub-Basin	POI Drainage Area (acres)	Composite Runoff Coefficient	Time of Concentration (min)	Rainfall Intensity (in/hr)	PMP Peak Discharge (cfs)	
B	50.55	0.98	14.5	39.0	1932.0	| N094b
S1	16.67	0.98	15.4	37.5	612.6	| N094b
S2	13.07	0.97	14.6	39.0	494.4	| N094b
S3	10.77	0.99	14.1	40.2	428.6	| N094b
S4	8.82	0.99	13.0	42.5	371.1	| N094b
N1	26.21	0.97	14.5	39.0	991.5	| N094b
N2	24.10	0.97	13.8	40.8	953.8	| N094b
N3	19.44	0.96	11.9	45.5	871.0	| N094b
N4	3.86	0.97	10.7	50.0	187.2	| N094b
N5	9.93	0.94	10.7	50.0	466.7	

NAPS COL 2.0-13-A

Table 2.4-204 Unit 3 Site PMP Water Levels

I N058b

Ditch	Cross Section	Discharge (cfs)	Maximum Water Level (ft)	Ditch/ Channel Bottom Width (ft)	Ditch/ Channel Invert El. (ft)	Bank El. (ft)
Outfall	630	1932.0	271.7	377	260.0	270.0
	565	1932.0	271.7	396	260.0	270.0
	425	1932.0	271.7	Weir	N/A	N/A
	300	1932.0	265.0	160	240.0	270.0
	0	1932.0	265.0	160	240.0	270.0
South	1774	371.1	287.0	4	282.0	286.0
	1720	371.1	286.9	4	281.8	286.0
	1570	371.1	286.6	4	281.6	286.0
	1512	371.1	286.4	4	281.5	286.0
	1414	371.1	286.3	4	281.4	286.0
	1365	371.1	286.1	4	281.3	286.0
	1317	371.1	286.0	4	281.2	286.0
	1265	371.1	285.8	4	281.2	286.0
	1177	371.1	285.5	4	281.0	284.0
	1063	428.6	284.9	4	280.8	284.0
	1013	428.6	284.5	4	280.6	284.0
	922	428.6	284.3	4	280.4	283.7
	820	494.4	282.7	4	280.0	281.4
	800	494.4	282.6	4	280.0	281.3
	782	485.7	282.1	4	280.0	281.2
	717	404.8	280.5	4	278.0	279.5
	615	338.4	278.4	4	276.3	277.5
	557	320.8	276.0	4	273.7	275.2
	497	320.8	273.9	4	271.7	273.1
	440	320.8	272.2	4	270.2	271.4

N094
a,b

NAPS COL 2.0-13-A

Table 2.4-204 Unit 3 Site PMP Water Levels

Ditch	Cross Section	Discharge (cfs)	Maximum Water Level (ft)	Ditch/ Channel Bottom Width (ft)	Ditch/ Channel Invert El. (ft)	Bank El. (ft)
South	404	320.8	272.3	18.5	267.5	271.0
	380	320.8	272.1	Weir	N/A	N/A
	379	320.8	272.1	Weir	N/A	N/A
	332	320.8	272.1	8	266.2	271.0
	278	439.0	272.0	8	266.1	271.0
	195	612.6	271.8	8	266.0	271.0
North	1312	653.4	287.2	2	284.0	286.0
	1245	653.4	287.2	Weir	N/A	N/A
	1190	653.4	287.2	4	283.0	286.0
	1108	871.0	287.1	4	282.4	286.0
	987	871.0	287.1	4	281.5	284.0
	845	953.8	287.0	4	281.2	284.0
	802	953.8	286.8	4	281.2	284.0
	742	953.8	286.8	4	280.9	284.0
	662	953.8	286.7	4	280.8	284.0
	550	953.8	286.4	4	280.5	284.0
	500	953.8	286.4	Weir	N/A	N/A
	375	991.5	285.8	0	281.0	284.0
	288	991.5	284.7	0	280.1	283.2
	180	991.5	282.4	0	279.5	281.8
	90	991.5	277.7	0	273.7	278.1
	0	991.5	274.0	0	270.2	274.0
	-100	991.5	272.2	0	269.7	271.8

N094
a, b

NAPS COL 2.0-23-A

**Table 2.4-205 North Anna Power Station Groundwater Use [a]
January 1, 2006 to December 31, 2006
(Millions of Gallons)**

N058b

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 2.0-24-A **Table 2.4-206 Results of Groundwater Transport Analysis Considering Radioactive Decay Only** N058b

Parent Radionuclide	Progeny in Chain	Half-life[1] (days)	Branching Fraction[1] d_{12}	d_{13}	d_{23}	Decay Rate[2] (days^{-1})	Collection Tank Conc[3] (MBq/m^3)	Collection Tank Conc (μCi/cm^3)	Ground Water Conc[4] (μCi/cm^3)	ECL[5] (μCi/cm^3)	Ground Water Conc / ECL
H-3		4.51E+03				1.54E-04	9.73E+01	2.63E-03	2.0E-03	1.00E-03	1.98E+00
Na-24		6.25E-01				1.11E+00	4.74E+01	1.28E-03	0.0E+00	5.00E-05	0.00E+00
P-32		1.43E+01				4.85E-02	1.98E+01	5.35E-04	1.1E-42	9.00E-06	1.20E-37
Cr-51		2.77E+01				2.50E-02	2.61E+03	7.05E-02	7.4E-22	5.00E-04	1.49E-18
Mn-54		3.13E+02				2.21E-03	9.83E+01	2.66E-03	4.5E-05	3.00E-05	1.51E+00
Mn-56		1.07E-01				6.48E+00	7.59E+01	2.05E-03	0.0E+00	7.00E-05	0.00E+00
Fe-55		9.86E+02				7.03E-04	3.08E+03	8.32E-02	2.3E-02	1.00E-04	2.29E+02
Fe-59		4.45E+01				1.56E-02	3.82E+01	1.03E-03	3.8E-16	1.00E-05	3.79E-11
Co-58		7.08E+01				9.79E-03	1.76E+02	4.76E-03	7.3E-11	2.00E-05	3.63E-06
Co-60		1.93E+03				3.59E-04	6.25E+02	1.69E-02	8.7E-03	3.00E-06	2.91E+03
Ni-63		3.51E+04				1.97E-05	3.24E+00	8.76E-05	8.4E-05	1.00E-04	8.44E-01
Cu-64		5.29E-01				1.31E+00	5.92E+01	1.60E-03	0.0E+00	2.00E-04	0.00E+00
Zn-65		2.44E+02				2.84E-03	2.65E+03	7.16E-02	3.9E-04	5.00E-06	7.73E+01
Rb-89		1.06E-02				6.54E+01	1.25E+00	3.38E-05	0.0E+00	9.00E-04	0.00E+00
	Sr-89	5.05E+01	1.0000			1.37E-02	1.43E+02	3.86E-03	4.3E-14	8.00E-06	5.33E-09
Sr-90		1.06E+04				6.54E-05	2.23E+01	6.03E-04	5.3E-04	5.00E-07	1.07E+03
	Y-90	2.67E+00	1.0000			2.60E-01	6.95E-01	1.88E-05	5.3E-04	7.00E-06	7.64E+01
Sr-91		3.96E-01				1.75E+00	5.68E+01	1.54E-03	0.0E+00	2.00E-05	0.00E+00
	Y-91m	3.45E-02	0.5780			2.01E+01			0.0E+00	2.00E-03	0.00E+00

NAPS COL 2.0-24-A **Table 2.4-206 Results of Groundwater Transport Analysis Considering Radioactive Decay Only**

Parent Radionuclide	Progeny in Chain	Half-life[1] (days)	Branching Fraction[1] d_{12}	d_{13}	d_{23}	Decay Rate[2] (days^{-1})	Collection Tank Conc[3] (MBq/m^3)	Collection Tank Conc (μCi/cm^3)	Ground Water Conc[4] (μCi/cm^3)	ECL[5] (μCi/cm^3)	Ground Water Conc / ECL
	Y-91	5.85E+01		0.4220	1.0000	1.18E-02	6.28E+01	1.70E-03	5.9E-13	8.00E-06	7.42E-08
Sr-92		1.13E-01				6.14E+00	3.25E+01	8.78E-04	0.0E+00	4.00E-05	0.00E+00
	Y-92	1.48E-01	1.0000			4.68E+00	2.67E+01	7.22E-04	0.0E+00	4.00E-05	0.00E+00
Y-93		4.21E-01				1.65E+00	5.98E+01	1.62E-03	0.0E+00	2.00E-05	0.00E+00
Zr-95		6.40E+01				1.08E-02	1.34E+01	3.62E-04	8.2E-13	2.00E-05	4.09E-08
	Nb-95m	3.61E+00	0.0070			1.92E-01			6.1E-15	3.00E-05	2.02E-10
	Nb-95	3.52E+01		0.9930	1.0000	1.97E-02	8.76E+00	2.37E-04	1.8E-12	3.00E-05	6.06E-08
Mo-99		2.75E+00				2.52E-01	2.07E+02	5.59E-03	3.3E-204	2.00E-05	1.67E-199
	Tc-99m	2.51E-01	0.8760			2.76E+00	1.72E+01	4.65E-04	3.2E-204	1.00E-03	3.23E-201
Ru-103		3.93E+01				1.76E-02	2.39E+01	6.46E-04	5.4E-18	3.00E-05	1.79E-13
	Rh-103m	3.90E-02	0.9970			1.78E+01	2.33E-02	6.30E-07	5.4E-18	6.00E-03	8.93E-16
Ru-106		3.68E+02				1.88E-03	8.17E+00	2.21E-04	6.9E-06	3.00E-06	2.31E+00
	Rh-106	3.45E-04	1.0000			2.01E+03	2.95E-05	7.97E-10	6.9E-06	NA[6]	
Ag-110m		2.50E+02				2.77E-03	2.67E+00	7.22E-05	4.4E-07	6.00E-06	7.36E-02
	Ag-110	2.85E-04	0.0133			2.43E+03			5.9E-09	NA[6]	
Te-129m		3.36E+01				2.06E-02	4.29E+01	1.16E-03	3.9E-20	7.00E-06	5.62E-15
	Te-129	4.83E-02	0.6500			1.44E+01			2.6E-20	4.00E-04	6.41E-17
Te-131m		1.25E+00				5.55E-01	4.85E+00	1.31E-04	0.0E+00	8.00E-06	0.00E+00
	Te-131	1.74E-02	0.2220			3.98E+01			0.0E+00	8.00E-05	0.00E+00

NAPS COL 2.0-24-A

Table 2.4-206 Results of Groundwater Transport Analysis Considering Radioactive Decay Only

Parent Radionuclide	Progeny in Chain	Half-life[1] (days)	Branching Fraction[1] d_{12}	d_{13}	d_{23}	Decay Rate[2] (days^{-1})	Collection Tank Conc[3] (MBq/m^3)	Collection Tank Conc (μCi/cm^3)	Ground Water Conc[4] (μCi/cm^3)	ECL[5] (μCi/cm^3)	Ground Water Conc / ECL
	I-131	8.04E+00		0.7780	1.0000	8.62E-02	6.89E+02	1.86E-02	2.8E-71	1.00E-06	2.78E-65
Te-132		3.26E+00				2.13E-01	1.21E+00	3.27E-05	5.9E-175	9.00E-06	6.56E-170
	I-132	9.58E-02	1.0000			7.24E+00	6.58E+01	1.78E-03	6.1E-175	1.00E-04	6.08E-171
I-133		8.67E-01				7.99E-01	5.51E+02	1.49E-02	0.0E+00	7.00E-06	0.00E+00
	Xe-133m	2.19E+00	0.0290			3.17E-01			3.5E-257	NA[6]	
	Xe-133	5.25E+00		0.9710	1.0000	1.32E-01			9.5E-109	NA[6]	
I-134		3.65E-02				1.90E+01	4.38E+01	1.18E-03	0.0E+00	4.00E-04	0.00E+00
I-135		2.75E-01				2.52E+00	2.19E+02	5.92E-03	0.0E+00	3.00E-05	0.00E+00
	Xe-135m	1.06E-02	0.1540			6.53E+01			0.0E+00	NA[6]	
	Xe-135	3.79E-01		0.8460	1.0000	1.83E+00			0.0E+00	NA[6]	
Cs-134		7.53E+02				9.21E-04	7.36E+01	1.99E-03	3.7E-04	9.00E-07	4.07E+02
Cs-136		1.31E+01				5.29E-02	7.25E+00	1.96E-04	1.1E-46	6.00E-06	1.87E-41
Cs-137		1.10E+04				6.30E-05	2.09E+02	5.65E-03	5.0E-03	1.00E-06	5.03E+03
	Ba-137m	1.77E-03	0.9460			3.91E+02	3.71E-03	1.00E-07	4.8E-03	NA[6]	
Cs-138		2.24E-02				3.09E+01	5.62E+00	1.52E-04	0.0E+00	4.00E-04	0.00E+00
Ba-140		1.27E+01				5.46E-02	1.75E+02	4.73E-03	1.3E-46	8.00E-06	1.58E-41
	La-140	1.68E+00	1.0000			4.13E-01	2.62E+01	7.08E-04	1.5E-46	9.00E-06	1.62E-41
Ce-141		3.25E+01				2.13E-02	2.97E+01	8.03E-04	7.6E-21	3.00E-05	2.52E-16
Ce-144		2.84E+02				2.44E-03	7.86E+00	2.12E-04	2.4E-06	3.00E-06	7.97E-01

NAPS COL 2.0-24-A

Table 2.4-206 Results of Groundwater Transport Analysis Considering Radioactive Decay Only

Parent Radionuclide	Progeny in Chain	Half-life[1] (days)	Branching Fraction[1] d_{12}	d_{13}	d_{23}	Decay Rate[2] (days^{-1})	Collection Tank Conc[3] (MBq/m^3)	Collection Tank Conc (μCi/cm^3)	Ground Water Conc[4] (μCi/cm^3)	ECL[5] (μCi/cm^3)	Ground Water Conc / ECL
	Pr-144m	5.07E-03	0.0178			1.37E+02			4.3E-08	NA[6]	
	Pr-144	1.20E-02		0.9822	0.9990	5.78E+01	1.03E-03	2.78E-08	2.4E-06	6.00E-04	3.99E-03
W-187		9.96E-01				6.96E-01	1.15E+01	3.11E-04	0.0E+00	3.00E-05	0.00E+00
Np-239		2.36E+00				2.94E-01	7.17E+02	1.94E-02	6.5E-237	2.00E-05	3.24E-232
	Pu-239	8.79E+06	1.0000			7.89E-08			5.2E-09	2.00E-08	2.60E-01

1. Values from Table E.1, NUREG/CR-5512 (Reference 2.4-214) and ICRP Publication 38 (Reference 2.4-211) for Sr-92, Rh-106, Ag-110, Ba-137m, Xe-133m, Xe-133, Xe-135m, Xe-135, and Pr-144m.
2. Values calculated from Equation 2.4.13-5.
3. Values from DCD Table 12.2-13a.
4. Values calculated from Equation 2.4.13-9, Equation 2.4.13-14, or Equation 2.4.13-19 depending on position in decay chain for a travel time of 5.03 years.
5. Values from 10 CFR 20, Appendix B, Table 2, Column 2.
6. ECL is not available.

NAPS COL 2.0-24-A

N058bl

Table 2.4-207 Comparison of Site-Specific K_d Values Against NUREG/CR-6697 Derived Values

	K_d (cm^3/g)										
Sample	Mn	Fe	Co	Ni	Zn	Sr	Ru	Ag	Cs	Ce	Pu
B-949/R3	>8,145	>45,497	>15,765	>1,616	>5,110	68.5	>1,148	>31,091	>19,504	>10,422	8,680
B-951/R5	>12,196	>20,291	>18,778	>892	>4,217	60.2	>1,200	>12,729	6,863	>10,232	443
B-901/R20	>7,858	>5,146	2,364	>615	>2,411	14.8	>632	>12,792	387	>6,753	295
B-901/R22	5,499	>14,207	5,459	>811	>4,147	33	>988	>9,903	574	>7,073	351
B-901/S5	4.5	>13,456	6.5	40.6	11.8	3.9	>272	28.6	68	329.1	5.3
B-901/S8	>6,525	>5,646	>9,423	12.7	>7,190	166.4	>1,448	28.6	181	>9,572	34.3
B-904/S10	36.9	>12,489	58.3	342	136	3.6	>328	73.2	241	4,175	96.5
B-913/S9	12,492	>14,397	13,082	129	>5,901	14.5	>1,429	43.4	796	>10,149	177
B-913/S10	7,903	>6,505	5,711	162	>6,702	8.4	>1,080	6	141	>9,182	735
B-917/S12	8,046	>30,209	5,747	643	>5,511	7.6	>1,171	25.7	154	>8,831	305
B-917/S14	>10,470	>16,121	6,559	17.7	>4,563	6.6	>936	32.6	118.9	>6,893	209
B-917/S15	4,692	>4,504	3,991	53.3	>2,764	3.8	>524	16.6	64.9	>5,419	192
B-919/S8	>4,121	>40,524	3,840	387	>3,426	14.8	>1,007	232	378	>7,750	896
B-920/S11	>15,785	>19,392	8,768	>623	>7,905	25.5	>1,593	>482	379	>12,056	311
B-928/S7	3,801	>6,104	3,244	>424	>8,103	7.6	>1,212	>304	104	>11,468	528
B-929/S12	3,453	>19,967	5,331	45	>6,270	7.1	>1,264	2.5	104.9	>8,887	536
B-931/S11	3,988	>28,132	5,151	>369	>6,070	4.7	>1,149	44.4	67.5	>10,519	333
B-932/S6	9,013	>16,288	6,739	766	>5,684	11.2	>1,367	>12,665	159	10,449	2,488
B-951/S7	>21,374	>25,330	>20,653	>806	>6,991	26.8	>1,665	>12,716	3,406	>12,914	3,874
B-951/S9	6,143	>24,220	8,818	>658	>6,162	12.7	>1,472	>8,190	336	>13,194	3,603

NAPS COL 2.0-24-A

Table 2.4-207 Comparison of Site-Specific K_d Values Against NUREG/CR-6697 Derived Values

	K_d (cm^3/g)										
Sample	**Mn**	**Fe**	**Co**	**Ni**	**Zn**	**Sr**	**Ru**	**Ag**	**Cs**	**Ce**	**Pu**
Min =	4.5	4504	6.5	12.7	11.8	3.6	272	2.5	64.9	329.1	5.3
10% =	3111.4	5596.0	2133.4	38.3	2183.5	3.9	504.4	15.5	68.0	5294.6	90.3
25% =	4087.8	10993.0	3953.3	110.1	3966.8	7.0	975.0	28.6	115.4	7028.0	204.8
50% =	7191.5	16204.5	5729.0	405.5	5597.5	12.0	1160.0	152.6	211.0	9377.0	342.0
Max =	21374	45497	20653	1616	8103	166.4	1665	31091	19504	13194	8680
Mean =	7577.3	18421.3	7474.4	470.6	4963.7	25.1	1094.3	5070.3	1701.4	8813.4	1204.6
NUREG K_d =	8.37	6.81	9.19	65.3	3.63	2.08	28.75	14.71	22.51	138.99	84.59
Percentile[a] =	0.60%	< Min	0.20%	21.80%	< Min	< Min	< Min	9.50%	< Min	< Min	9.50%

a. Rank of NUREG K_d value as a percentage of the site-specific K_d data.

N058b

NAPS COL 2.0-24-A

Table 2.4-208 Results of Groundwater Transport Analysis Considering Radioactive Decay and Adsorption

Parent Radionuclide	Progeny in Chain	Decay Rate[1] (days^{-1})	Branching Fraction[2]	Initial Conc (µCi/cm^3)	Literature Kd[3] m	Literature Kd[3] s	10% Kd (cm^3/g)	Retard Factor[4]	Ground Water Conc[5] (µCi/cm^3)	ECL[6] (µCi/cm^3)	Ground Water Conc / ECL
H-3		1.54E-04		2.63E-03				1.00	1.98E-03	1.00E-03	1.98E+00
Mn-54		2.21E-03		2.66E-03	5.06	2.29	8.37	62.25	2.30E-113	3.00E-05	7.68E-109
Fe-55		7.03E-04		8.32E-02	5.34	2.67	6.81	50.80	2.57E-30	1.00E-04	2.57E-26
Co-60		3.59E-04		1.69E-02	5.46	2.53	9.19	68.19	4.76E-22	3.00E-06	1.59E-16
Ni-63		1.97E-05		8.76E-05	6.05	1.46	65.30	478.58	2.50E-12	1.00E-04	2.50E-08
Zn-65		2.84E-03		7.16E-02	6.98	4.44	3.63	27.57	2.16E-64	5.00E-06	4.32E-59
Sr-90		6.54E-05		6.03E-04	3.45	2.12	2.08	16.22	8.57E-05	5.00E-07	1.71E+02
	Y-90	2.60E-01	1.0000	1.88E-05	6.84	3.22	15.08	111.30	8.57E-05	7.00E-06	1.22E+01
Ru-106		1.88E-03		2.21E-04	7.37	3.13	28.75	211.30	0.00E+00	3.00E-06	0.00E+00
Ag-110m		2.77E-03		7.22E-05	5.38	2.10	14.71	108.61	2.82E-245	6.00E-06	4.70E-240
Cs-134		9.21E-04		1.99E-03	6.10	2.33	22.51	165.64	3.73E-125	9.00E-07	4.14E-119
Cs-137		6.30E-05		5.65E-03	6.10	2.33	22.51	165.64	2.63E-11	1.00E-06	2.63E-05
Ce-144		2.44E-03		2.12E-04	7.60	2.08	138.99	1017.54	0.00E+00	3.00E-06	0.00E+00
Np-239		2.94E-01		1.94E-02	2.84	2.25	0.96	8.00	0.00E+00	2.00E-05	0.00E+00
	Pu-239	7.89E-08	1.0000	0.00E+00	6.86	1.89	84.59	619.72	3.68E-07	2.00E-08	1.84E+01

1. Values calculated from Equation 2.4.13-5.
2. Values from Table E.1, NUREG/CR-5512 (Reference 2.4-214).
3. Mean and standard deviation from NUREG/CR-6697, Attachment C, Table 3.9-1 (Reference 2.4-215); Sc values used as surrogates for Y.
4. Values calculated from Equation 2.4.13-3.
5. Values calculated from Equation 2.4.13-9 for parent and Equation 2.4.13-14 for progeny.
6. Values from 10 CFR 20, Appendix B, Table 2, Column 2.

NAPS COL 2.0-24-A

Table 2.4-209 Results of Groundwater Transport Analysis Considering Radioactive Decay, Adsorption, and Dilution

I N058b

Radionuclide	Groundwater Concentration[1] (μCi/cm³)	Surface Water Concentration[2] (μCi/cm³)	ECL[3]	Surface Water Concentration / ECL
H-3	1.98E-03	5.08E-07	1.00E-03	5.08E-04
Sr-90	8.57E-05	2.20E-08	5.00E-07	4.40E-02
Y-90	8.57E-05	2.20E-08	7.00E-06	3.14E-03
Pu-239	3.68E-07	9.45E-11	2.00E-08	4.72E-03

1. Values from Table 2.4-208.
2. Surface water concentration = groundwater concentration * dilution factor of 2.56×10^{-4}.
3. Values from 10 CFR 20, Appendix B, Table 2, Column 2.

NAPS COL 2.0-24-A **Table 2.4-210 Compliance with 10 CFR Part 20 for an Accidental Release of Radioactive Liquid Effluent in Groundwater** I N058b

Parent Radionuclide	Progeny in Chain	Concentration/ECL Decay[1]	Decay and Adsorption[2]	Decay, Adsorption, and Dilution[3]	Minimum
H-3		1.98E+00	1.98E+00	5.08E-04	5.08E-04
Na-24		0.00E+00			0.00E+00
P-32		1.20E-37			1.20E-37
Cr-51		1.49E-18			1.49E-18
Mn-54		1.51E+00	7.68E-109		7.68E-109
Mn-56		0.00E+00			0.00E+00
Fe-55		2.29E+02	2.57E-26		2.57E-26
Fe-59		3.79E-11			3.79E-11
Co-58		3.63E-06			3.63E-06
Co-60		2.91E+03	1.59E-16		1.59E-16
Ni-63		8.44E-01	2.50E-08		2.50E-08
Cu-64		0.00E+00			0.00E+00
Zn-65		7.73E+01	4.32E-59		4.32E-59
Rb-89		0.00E+00			0.00E+00
	Sr-89	5.33E-09			5.33E-09
Sr-90		1.07E+03	1.71E+02	4.40E-02	4.40E-02
	Y-90	7.64E+01	1.22E+01	3.14E-03	3.14E-03
Sr-91		0.00E+00			0.00E+00
	Y-91m	0.00E+00			0.00E+00
	Y-91	7.42E-08			7.42E-08
Sr-92		0.00E+00			0.00E+00
Y-92		0.00E+00			0.00E+00
Y-93		0.00E+00			0.00E+00
Zr-95		4.09E-08			4.09E-08
	Nb-95m	2.02E-10			2.02E-10
	Nb-95	6.06E-08			6.06E-08

NAPS COL 2.0-24-A

Table 2.4-210 Compliance with 10 CFR Part 20 for an Accidental Release of Radioactive Liquid Effluent in Groundwater

Parent Radionuclide	Progeny in Chain	Concentration/ECL: Decay[1]	Decay and Adsorption[2]	Decay, Adsorption, and Dilution[3]	Minimum
Mo-99		1.67E-199			1.67E-199
	Tc-99m	3.23E-201			3.23E-201
Ru-103		1.79E-13			1.79E-13
	Rh-103m	8.93E-16			8.93E-16
Ru-106		2.31E+00	0.00E+00		0.00E+00
	Rh-106	0.00E+00			0.00E+00
Ag-110m		7.36E-02	4.70E-240		4.70E-240
	Ag-110	0.00E+00			0.00E+00
Te-129m		5.62E-15			5.62E-15
	Te-129	6.41E-17			6.41E-17
Te-131m		0.00E+00			0.00E+00
	Te-131	0.00E+00			0.00E+00
	I-131	2.78E-65			2.78E-65
Te-132		6.56E-170			6.56E-170
	I-132	6.08E-171			6.08E-171
I-133		0.00E+00			0.00E+00
	Xe-133m	0.00E+00			0.00E+00
	Xe-133	0.00E+00			0.00E+00
I-134		0.00E+00			0.00E+00
I-135		0.00E+00			0.00E+00
	Xe-135m	0.00E+00			0.00E+00
	Xe-135	0.00E+00			0.00E+00
Cs-134		4.07E+02	4.14E-119		4.14E-119
Cs-136		1.87E-41			1.87E-41
Cs-137		5.03E+03	2.63E-05		2.63E-05
	Ba-137m	0.00E+00			0.00E+00
Cs-138		0.00E+00			0.00E+00

NAPS COL 2.0-24-A

Table 2.4-210 Compliance with 10 CFR Part 20 for an Accidental Release of Radioactive Liquid Effluent in Groundwater

Parent Radionuclide	Progeny in Chain	Concentration/ECL: Decay[1]	Decay and Adsorption[2]	Decay, Adsorption, and Dilution[3]	Minimum
Ba-140		1.58E-41			1.58E-41
	La-140	1.62E-41			1.62E-41
Ce-141		2.52E-16			2.52E-16
Ce-144		7.97E-01	0.00E+00		0.00E+00
	Pr-144m	0.00E+00			0.00E+00
	Pr-144	3.99E-03			3.99E-03
W-187		0.00E+00			0.00E+00
Np-239		3.24E-232	0.00E+00		0.00E+00
	Pu-239	2.60E-01	1.84E+01	4.72E-03	4.72E-03
				Sum of Fractions =	5.64E-02

1. Table 2.4-206
2. Table 2.4-208
3. Table 2.4-209
4. No ECLs are published for Rh-106, Ag-110, Xe-133m, Xe-133, Xe-135m, Xe-135, Ba-137m, and
   Pr-144m. However, their half-lives are short (on the order of days or less) and they decay to near-zero
   concentrations. Their ratios have been taken as zero.

N0586

NAPS COL 2.0-24-A **Table 2.4-211 Dilution Factors for Various Plant Operating Scenarios**

Scenario	Q_{CST} (ft^3/s)	Q_{3MU} (ft^3/s)	Q_{3BD} (ft^3/s)	Q_{12} (ft^3/s)	Q_{DC} (ft^3/s)	N	C_{CST} (μCi/cm^3)	C_{3MU} (μCi/cm^3)	C_{3BD} (μCi/cm^3)	C_{DC} (μCi/cm^3)
1	0.60	34	9	4246	4255	4	1.00E+00	1.76E-02	7.06E-02	1.49E-04
2	0.60	34	9	531	540	4	1.00E+00	1.76E-02	7.06E-02	1.18E-03
3	0.60	0	0	4246	4246	-	1.00E+00	-	-	1.41E-04
4	0.60	0	0	531	531	-	1.00E+00	-	-	1.13E-03

NAPS COL 2.0-24-A

Table 2.4-212 Compliance with 10 CFR 20 for an Accidental Release of Radioactive Liquid Effluent in Surface Water

N058b

Radionuclide	ECL (μCi/cm^3)	CST Conc (MBq/m^3)	CST Conc (μCi/cm^3)	Surface Water Conc (μCi/cm^3)	Surface Water Conc / ECL
H-3	1.00E-03	3.7E+02	1.0E-02	1.2E-05	1.2E-02
Na-24	5.00E-05	3.2E-02	8.6E-07	1.0E-09	2.0E-05
P-32	9.00E-06	6.6E-04	1.8E-08	2.1E-11	2.3E-06
Cr-51	5.00E-04	5.0E-02	1.4E-06	1.6E-09	3.2E-06
Mn-54	3.00E-05	5.8E-04	1.6E-08	1.8E-11	6.2E-07
Mn-56	7.00E-05	3.8E-01	1.0E-05	1.2E-08	1.7E-04
Fe-55	1.00E-04	1.7E-02	4.6E-07	5.4E-10	5.4E-06
Fe-59	1.00E-05	5.0E-04	1.4E-08	1.6E-11	1.6E-06
Co-58	2.00E-05	1.7E-03	4.6E-08	5.4E-11	2.7E-06
Co-60	3.00E-06	3.3E-03	8.9E-08	1.1E-10	3.5E-05
Ni-63	1.00E-04	1.7E-05	4.6E-10	5.4E-13	5.4E-09
Cu-64	2.00E-04	4.8E-02	1.3E-06	1.5E-09	7.7E-06
Zn-65	5.00E-06	1.7E-02	4.6E-07	5.4E-10	1.1E-04
Rb-89	9.00E-04	3.5E-01	9.5E-06	1.1E-08	1.2E-05
Sr-89	8.00E-06	1.4E-01	3.8E-06	4.5E-09	5.6E-04
Sr-90	5.00E-07	2.2E-02	5.9E-07	7.0E-10	1.4E-03
Y-90	7.00E-06	4.0E-04	1.1E-08	1.3E-11	1.8E-06
Sr-91	2.00E-05	6.4E-02	1.7E-06	2.0E-09	1.0E-04
Y-91	8.00E-06	6.6E-04	1.8E-08	2.1E-11	2.6E-06
Sr-92	4.00E-05	1.5E-01	4.1E-06	4.8E-09	1.2E-04
Y-92	4.00E-05	9.3E-02	2.5E-06	3.0E-09	7.4E-05
Y-93	2.00E-05	6.4E-02	1.7E-06	2.0E-09	1.0E-04
Zr-95	2.00E-05	1.3E-04	3.5E-09	4.1E-12	2.1E-07
Nb-95	3.00E-05	1.3E-04	3.5E-09	4.1E-12	1.4E-07
Mo-99	2.00E-05	1.2E-01	3.2E-06	3.8E-09	1.9E-04
Tc-99m	1.00E-03	3.3E-02	8.9E-07	1.1E-09	1.1E-06
Ru-103	3.00E-05	3.3E-04	8.9E-09	1.1E-11	3.5E-07

NAPS
COL 2.0-24-A

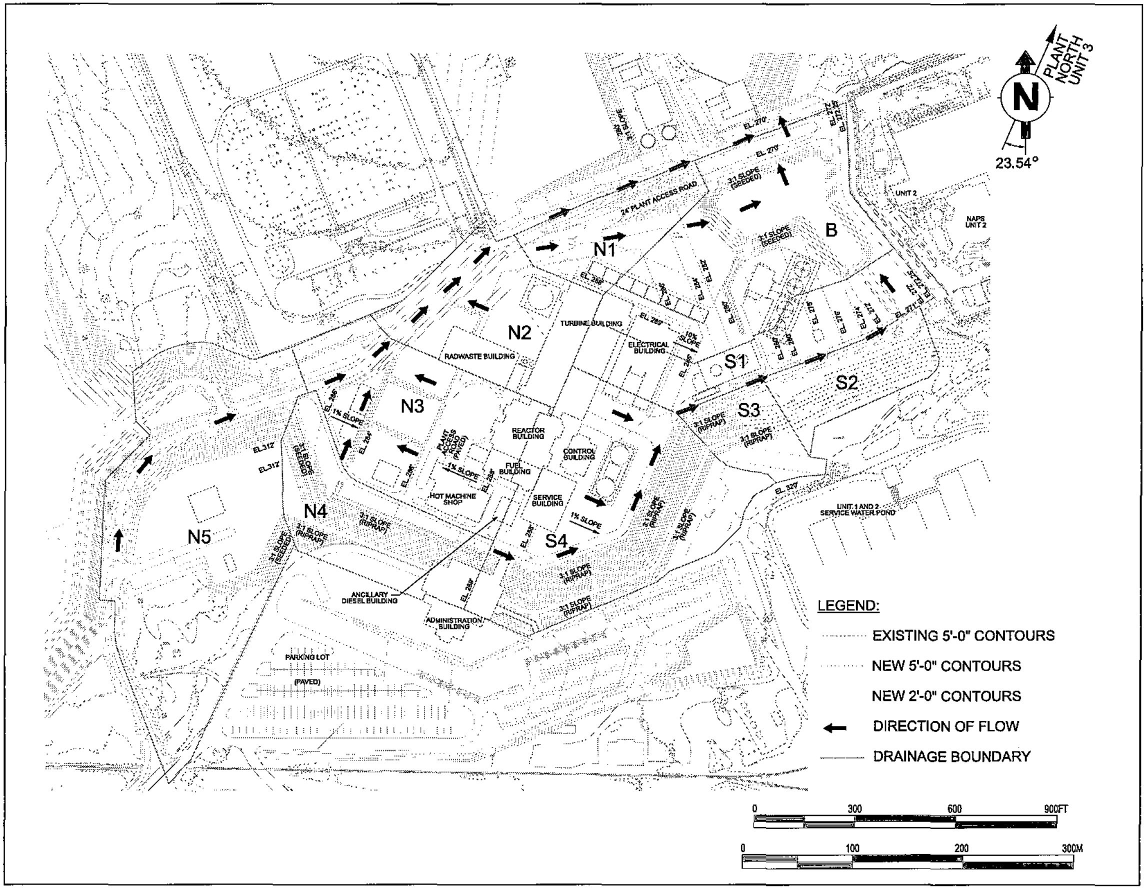
Table 2.4-212 Compliance with 10 CFR 20 for an Accidental Release of Radioactive Liquid Effluent in Surface Water

Radionuclide	ECL ($\mu Ci/cm^3$)	CST Conc (MBq/m^3)	CST Conc ($\mu Ci/cm^3$)	Surface Water Conc ($\mu Ci/cm^3$)	Surface Water Conc / ECL
Rh-103m	6.00E-03	3.3E-04	8.9E-09	1.1E-11	1.8E-09
Ru-106	3.00E-06	5.0E-05	1.4E-09	1.6E-12	5.3E-07
Rh-106	None	5.0E-05	1.4E-09	1.6E-12	
Ag-110m	6.00E-06	1.7E-05	4.6E-10	5.4E-13	9.0E-08
Te-129m	7.00E-06	4.1E-02	1.1E-06	1.3E-09	1.9E-04
Te-131m	8.00E-06	1.6E-03	4.3E-08	5.1E-11	6.4E-06
I-131	1.00E-06	7.9E-01	2.1E-05	2.5E-08	2.5E-02
Te-132	9.00E-06	7.6E-04	2.1E-08	2.4E-11	2.7E-06
I-132	1.00E-04	7.4E+00	2.0E-04	2.4E-07	2.4E-03
I-133	7.00E-06	5.3E+00	1.4E-04	1.7E-07	2.4E-02
I-134	4.00E-04	1.4E+01	3.8E-04	4.5E-07	1.1E-03
I-135	3.00E-05	7.6E+00	2.1E-04	2.4E-07	8.1E-03
Cs-134	9.00E-07	7.3E-01	2.0E-05	2.3E-08	2.6E-02
Cs-136	6.00E-06	6.5E-02	1.8E-06	2.1E-09	3.5E-04
Cs-137	1.00E-06	2.1E+00	5.7E-05	6.7E-08	6.7E-02
Ba-137m	None	1.2E-03	3.2E-08	3.8E-11	
Cs-138	4.00E-04	7.0E-01	1.9E-05	2.2E-08	5.6E-05
Ba-140	8.00E-06	1.6E-01	4.3E-06	5.1E-09	6.4E-04
La-140	9.00E-06	6.6E-03	1.8E-07	2.1E-10	2.3E-05
Ce-141	3.00E-05	5.0E-04	1.4E-08	1.6E-11	5.3E-07
Ce-144	3.00E-06	5.0E-05	1.4E-09	1.6E-12	5.3E-07
Pr-144	6.00E-04	5.0E-05	1.4E-09	1.6E-12	2.7E-09
W-187	3.00E-05	4.9E-03	1.3E-07	1.6E-10	5.2E-06
Np-239	2.00E-05	3.8E-01	1.0E-05	1.2E-08	6.1E-04
				Sum =	1.7E-01

Figure 2.4-201 Site Layout and Sub-Basin Drainage Areas

N058 b

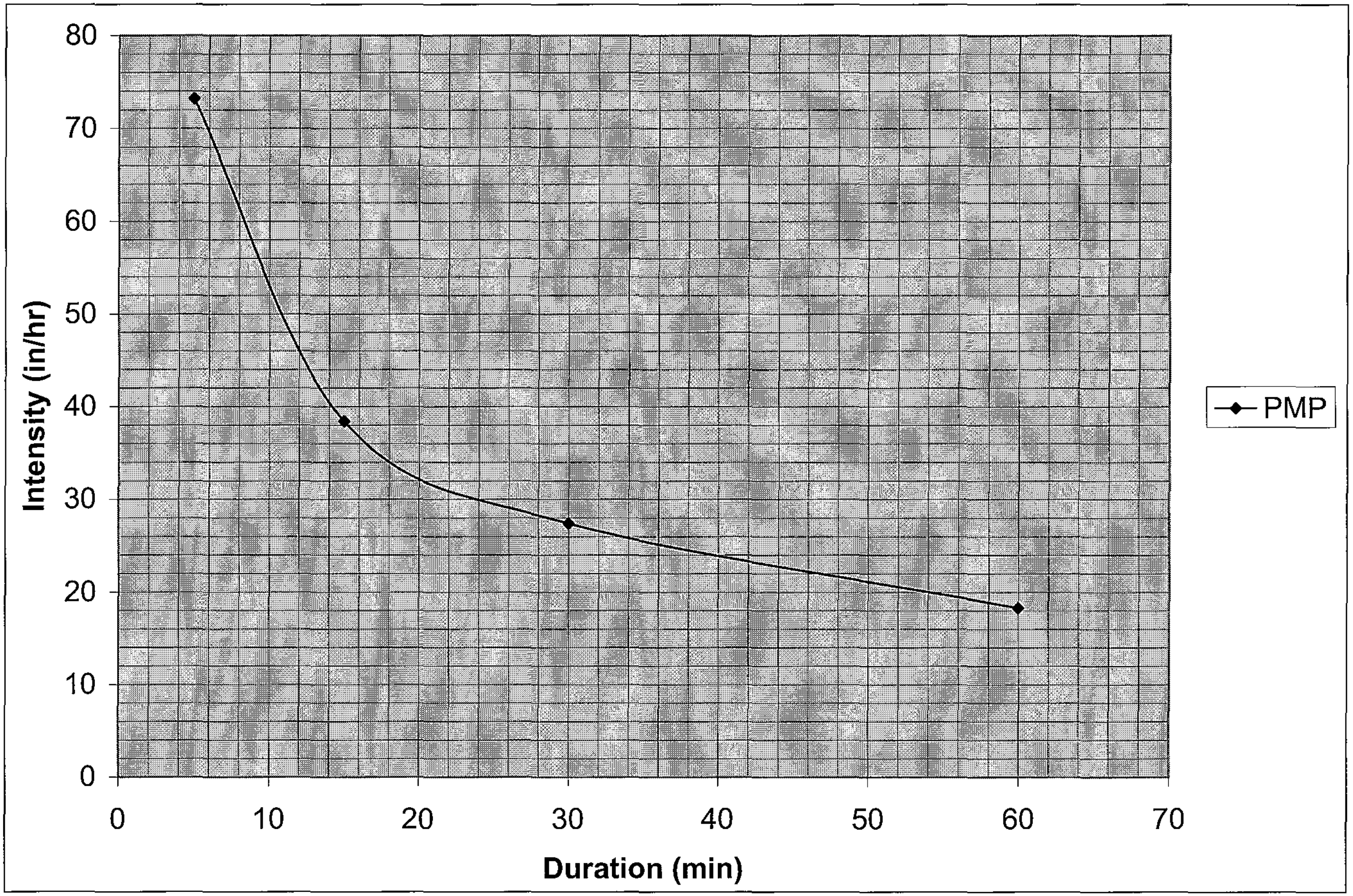
N094 a, b



- For Information Only -

N058b

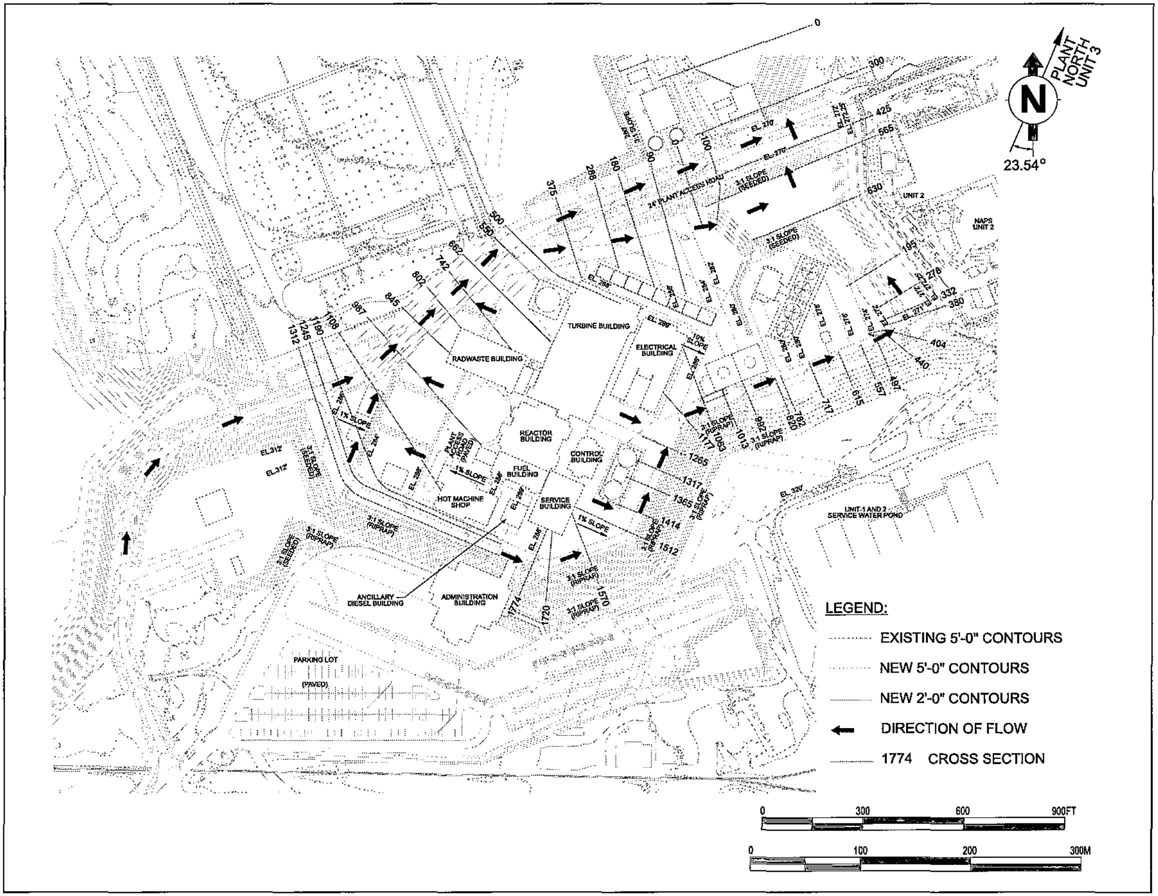
NAPS COL 2.0-13-A Figure 2.4-202 Unit 3 Site PMP Duration- Intensity Curve



NAPS COL 2.0-13-A Figure 2.4-203 Cross-Section Locations

N058b

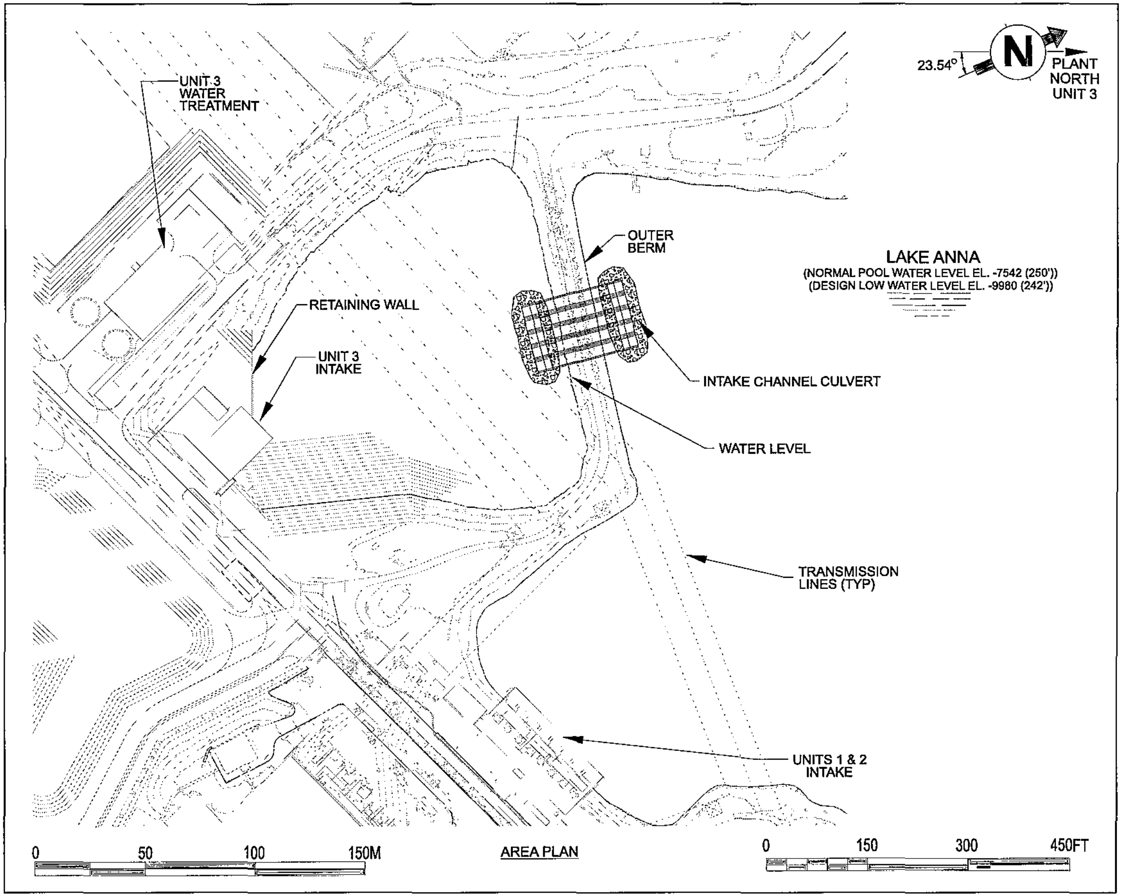
N094a



- For Information Only -

NAPS ESP COL 2.4-9 **Figure 2.4-204 Unit 3 Make-up Water Intake Location**

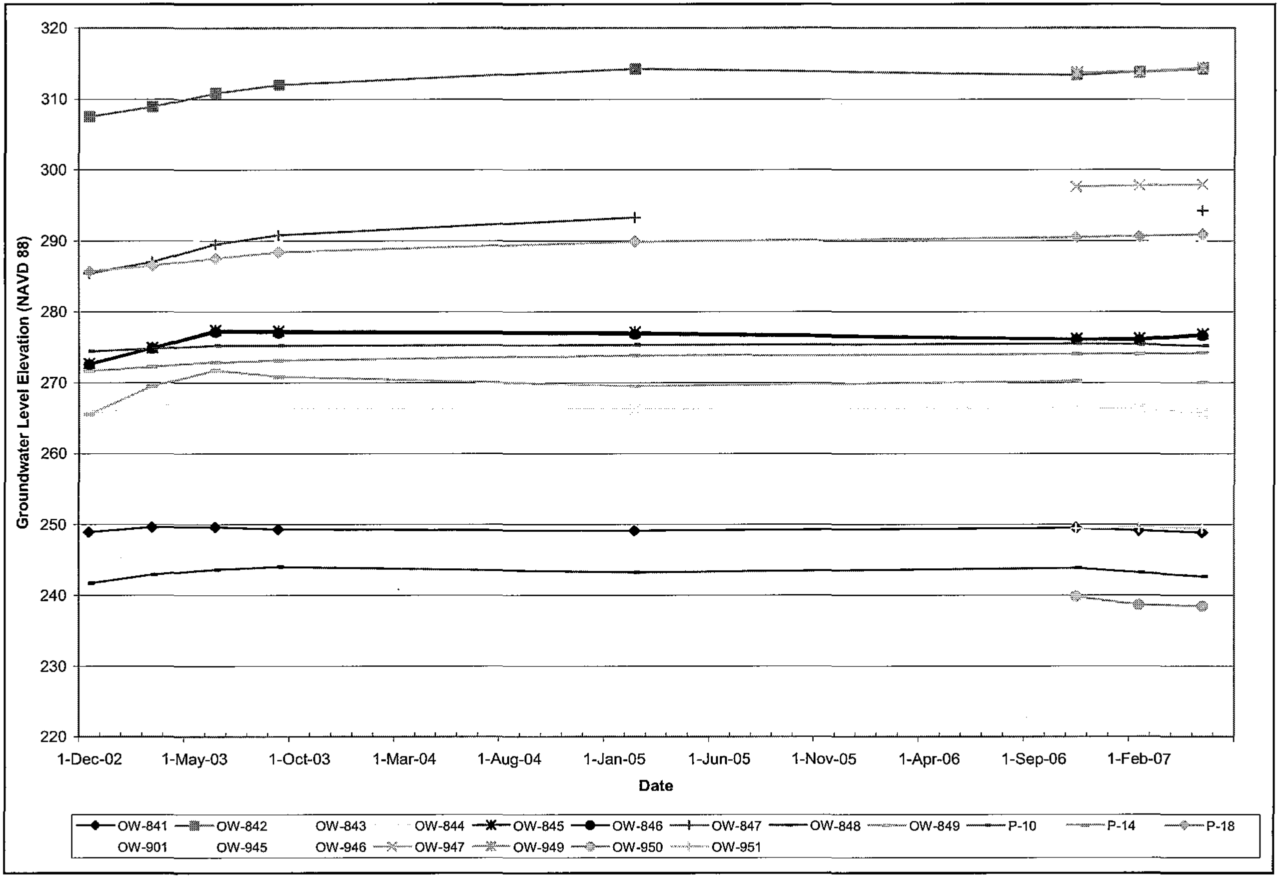
N058b



N094c

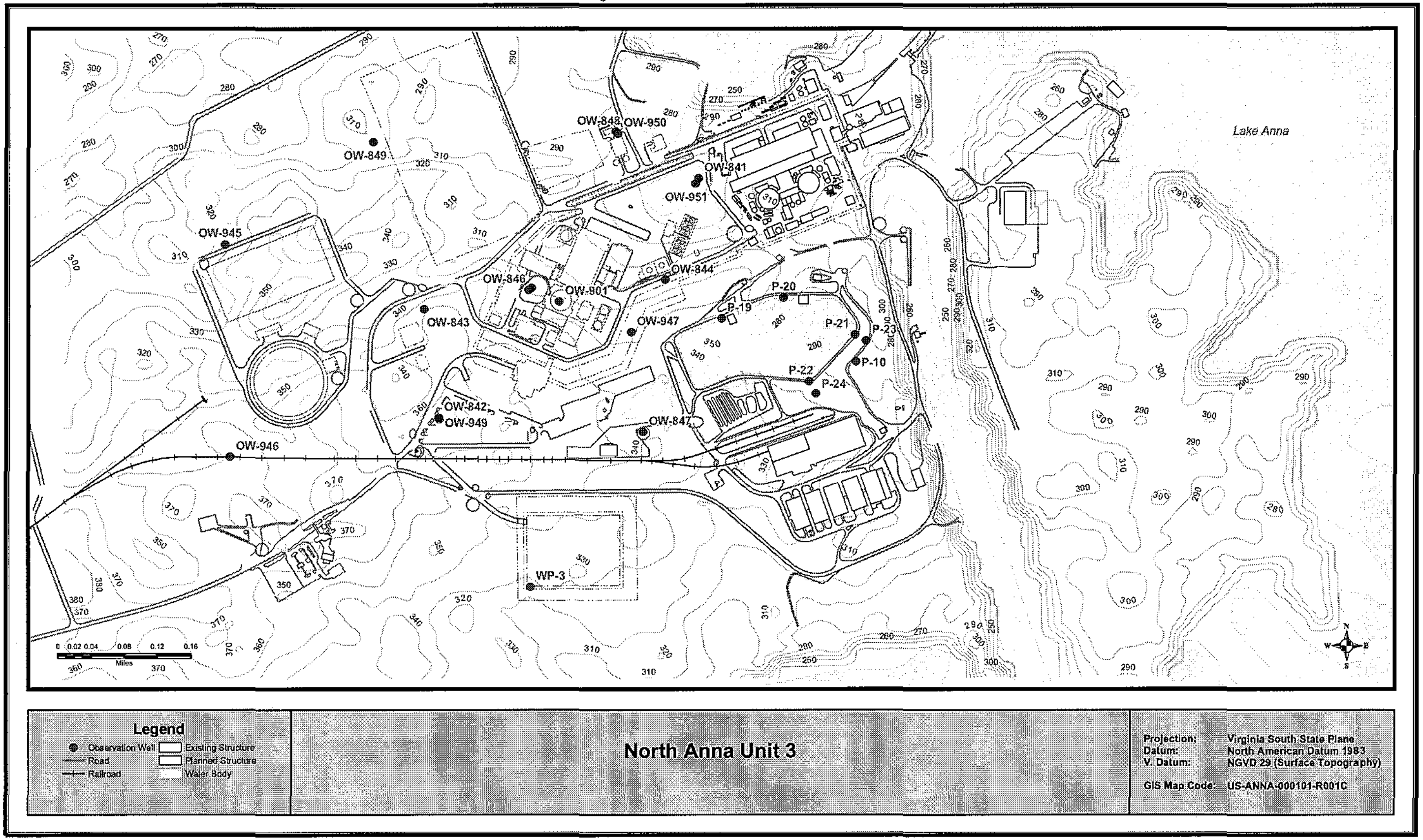
N058b

NAPS COL 2.0-23-A **Figure 2.4-205 Groundwater Level Hydrographs**



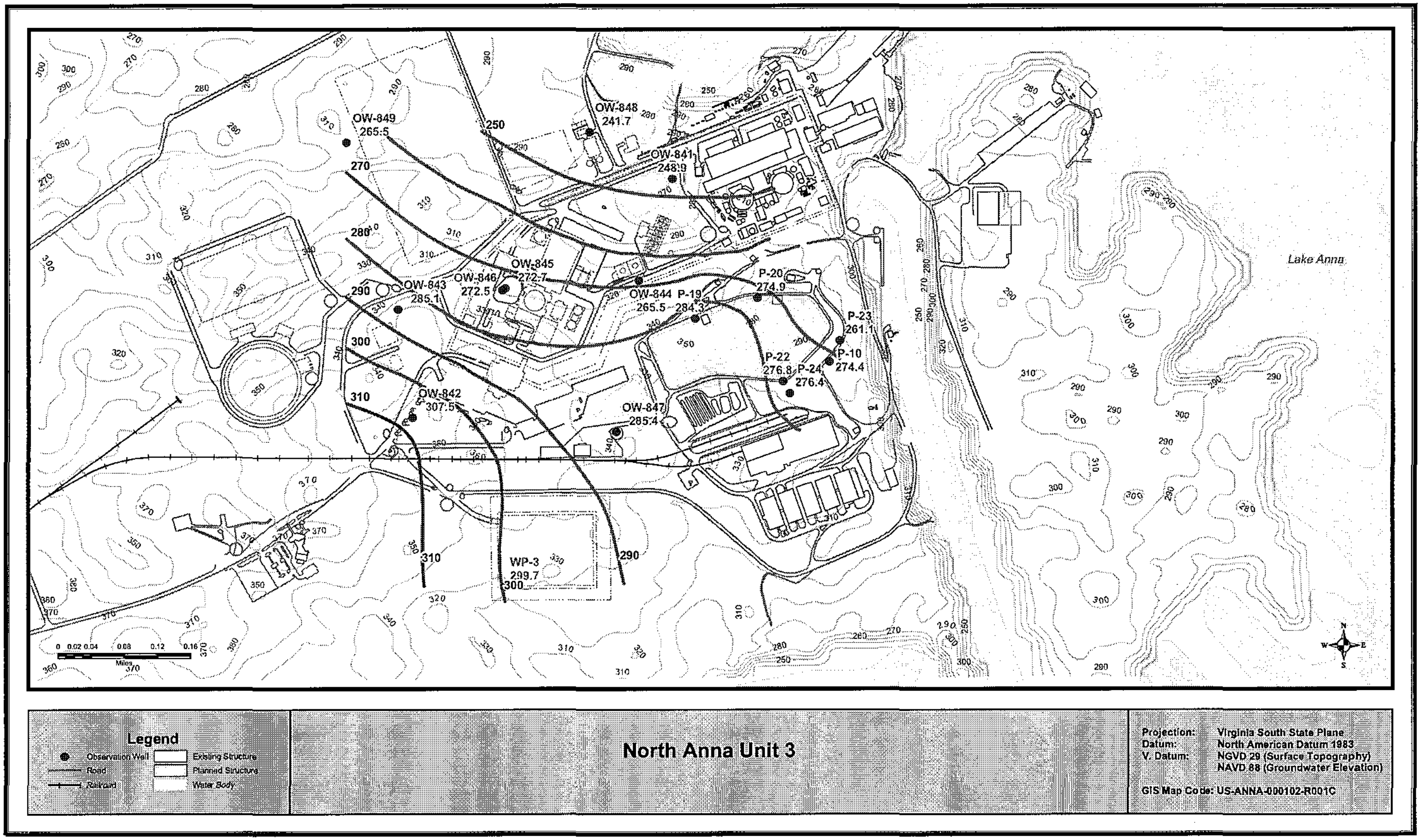
N058b
N094a

NAPS COL 2.0-23-A **Figure 2.4-206 Observation Well Location Plan**



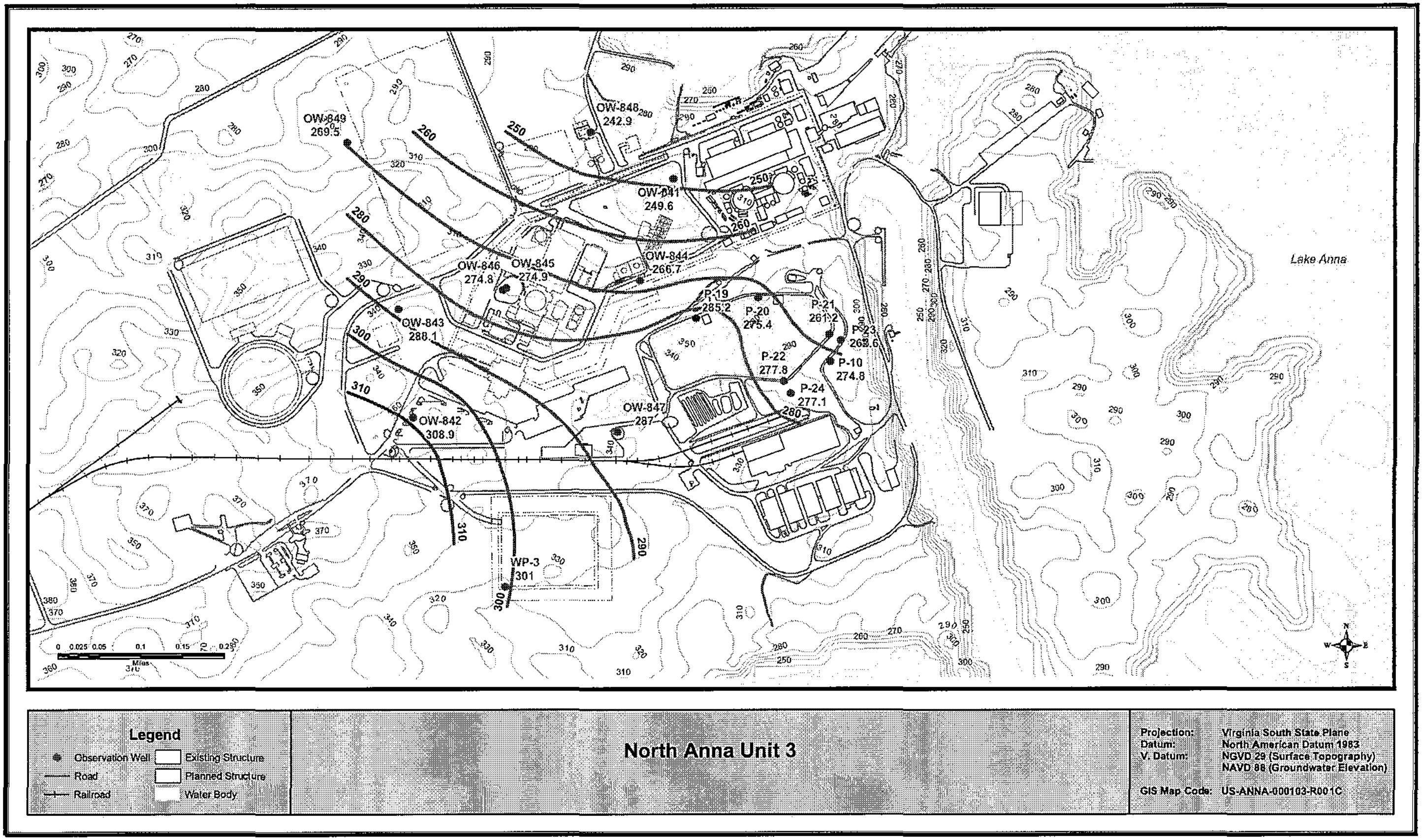
N058b
N094a

NAPS COL 2.0-23-A **Figure 2.4-207 Piezometric Head Contour Map: December 2002**



NAPS COL 2.0-23-A **Figure 2.4-208 Piezometric Head Contour Map: March 2003**

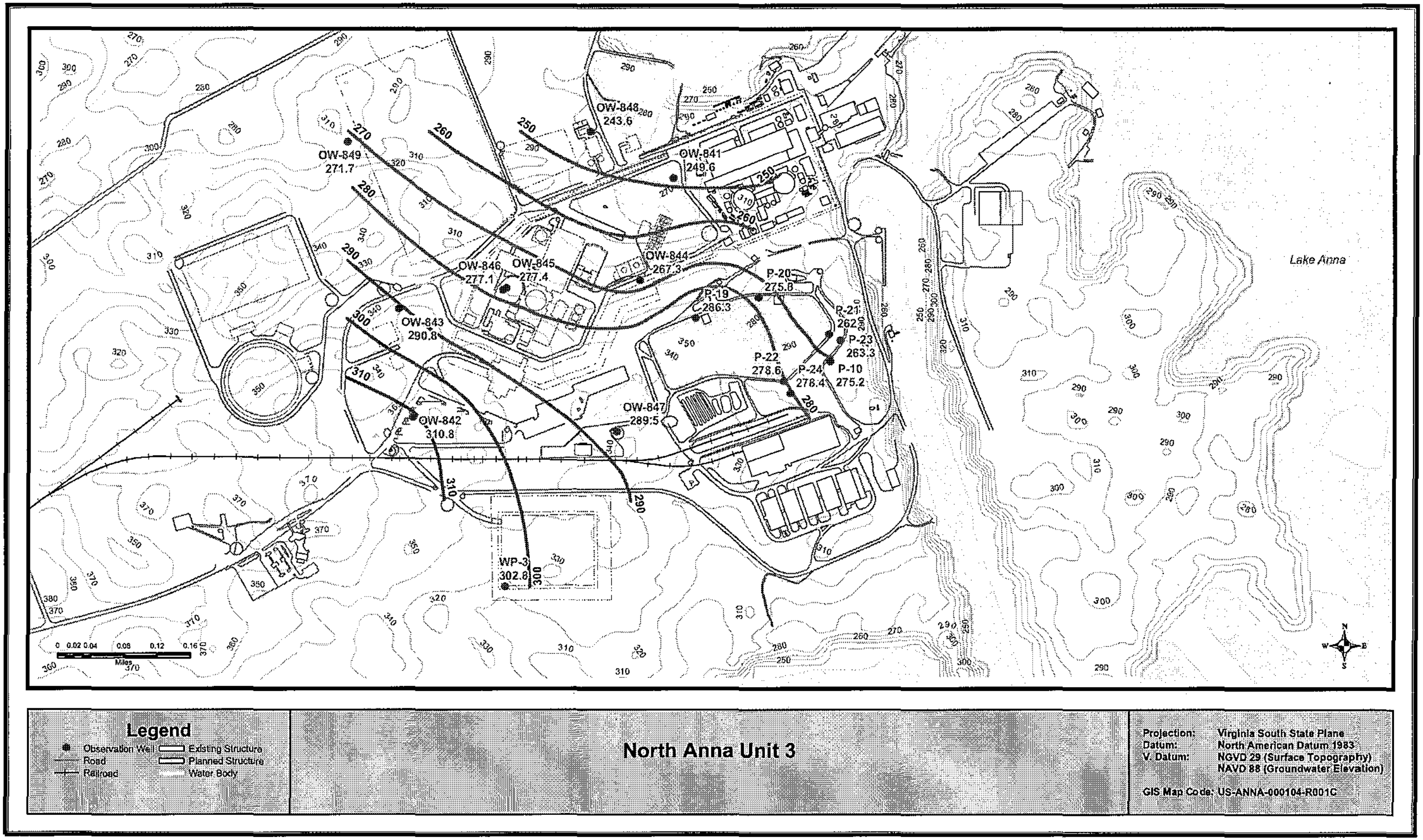
N058b
N094a



- For Information Only -

N058b
N094a

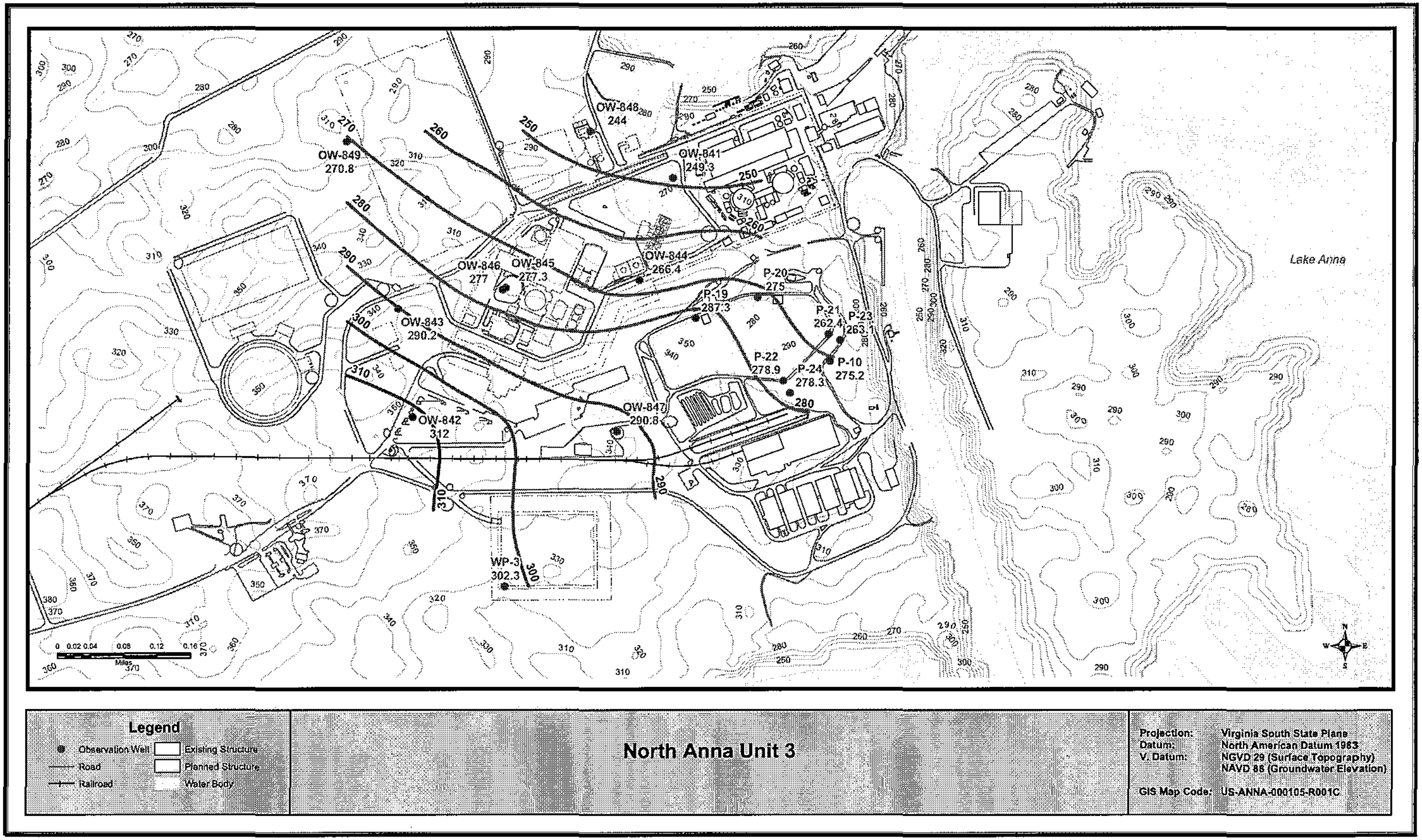
NAPS COL 2.0-23-A Figure 2.4-209 Piezometric Head Contour Map: June 2003



- For Information Only -

N058b
N094a

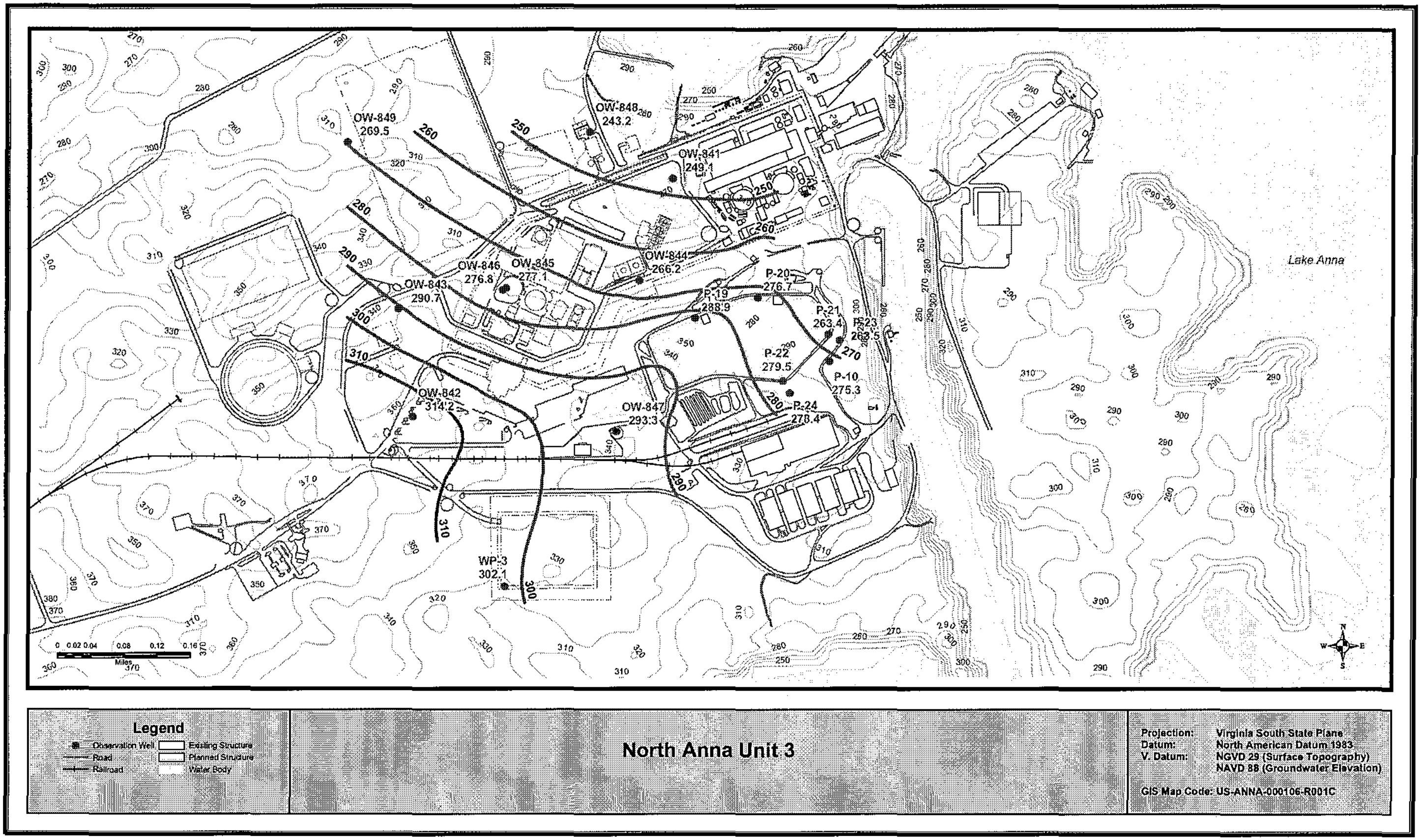
NAPS COL 2.0-23-A **Figure 2.4-210 Piezometric Head Contour Map: September 2003**



- For Information Only -

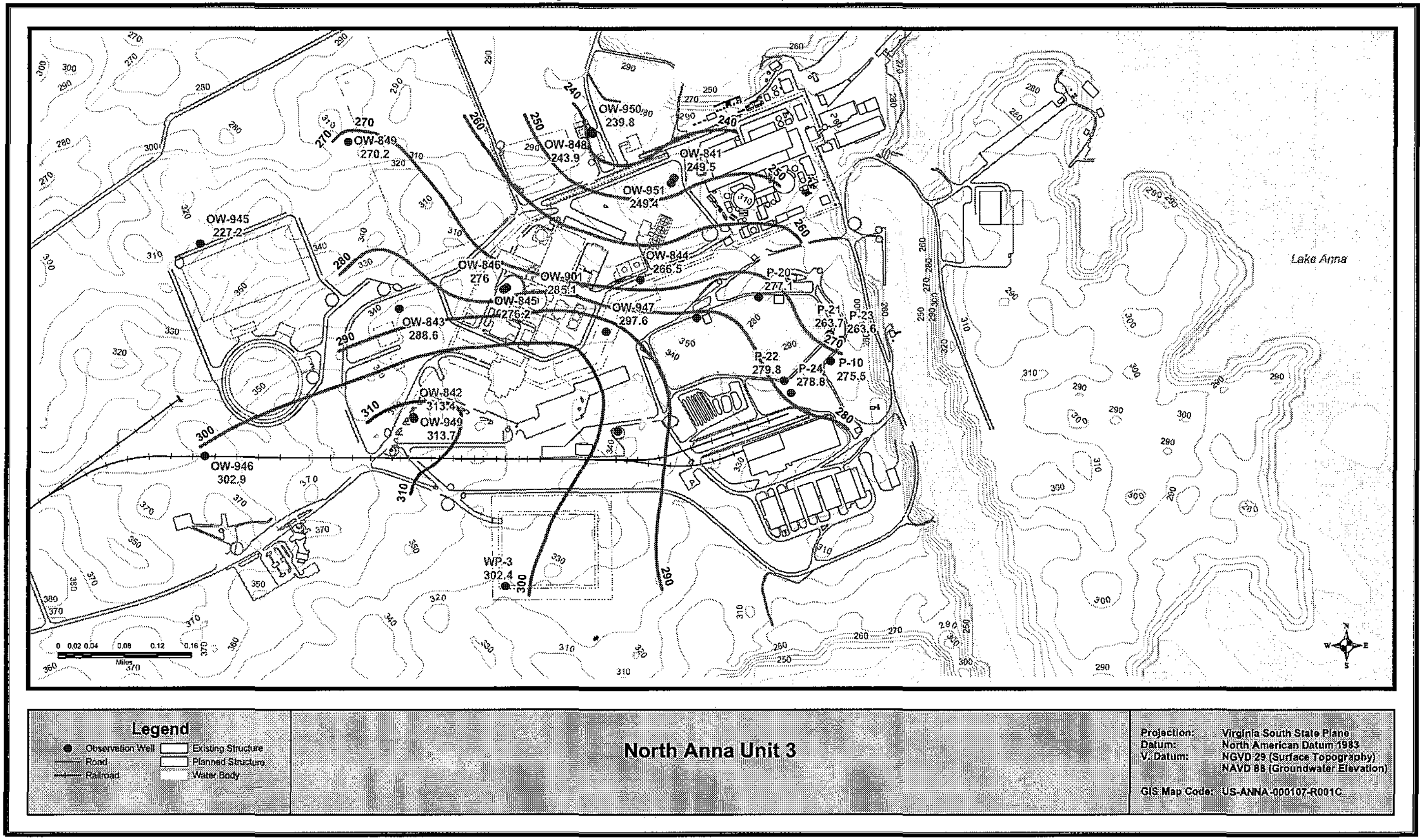
N058b
N094a

NAPS COL 2.0-23-A **Figure 2.4-211 Piezometric Head Contour Map: February 2005**



N058 b
N094 a

NAPS COL 2.0-23-A **Figure 2.4-212 Piezometric Head Contour Map: November 2006**



NAPS COL 2.0-23-A Figure 2.4-213 Piezometric Head Contour Map: February 2007

N058b
N094a

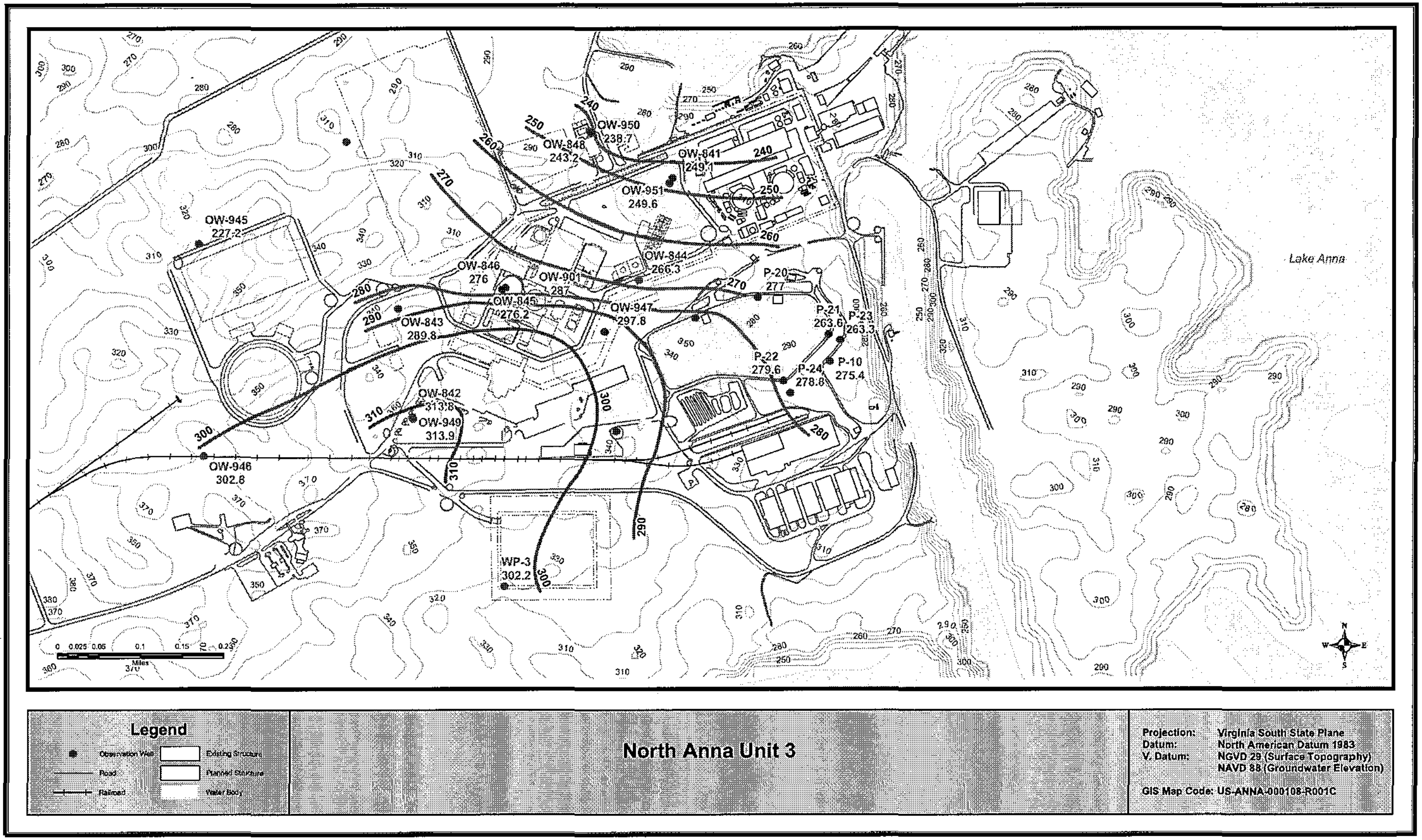


Figure 2.4-214 Piezometric Head Contour Map: May 2007

N058 b
N094 a

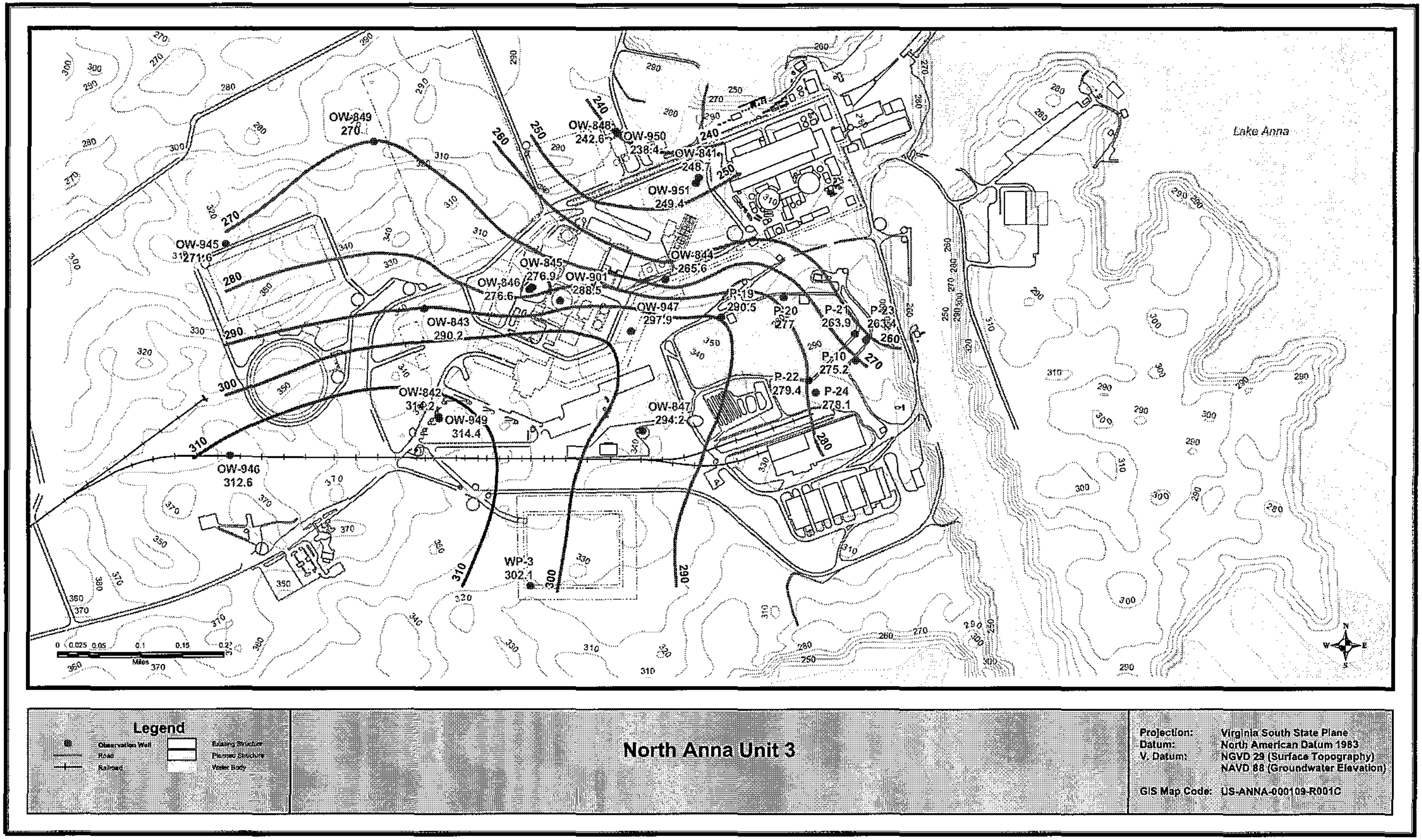


Figure 2.4-215 Water Supply Well location Plan

N058 b
N094 a

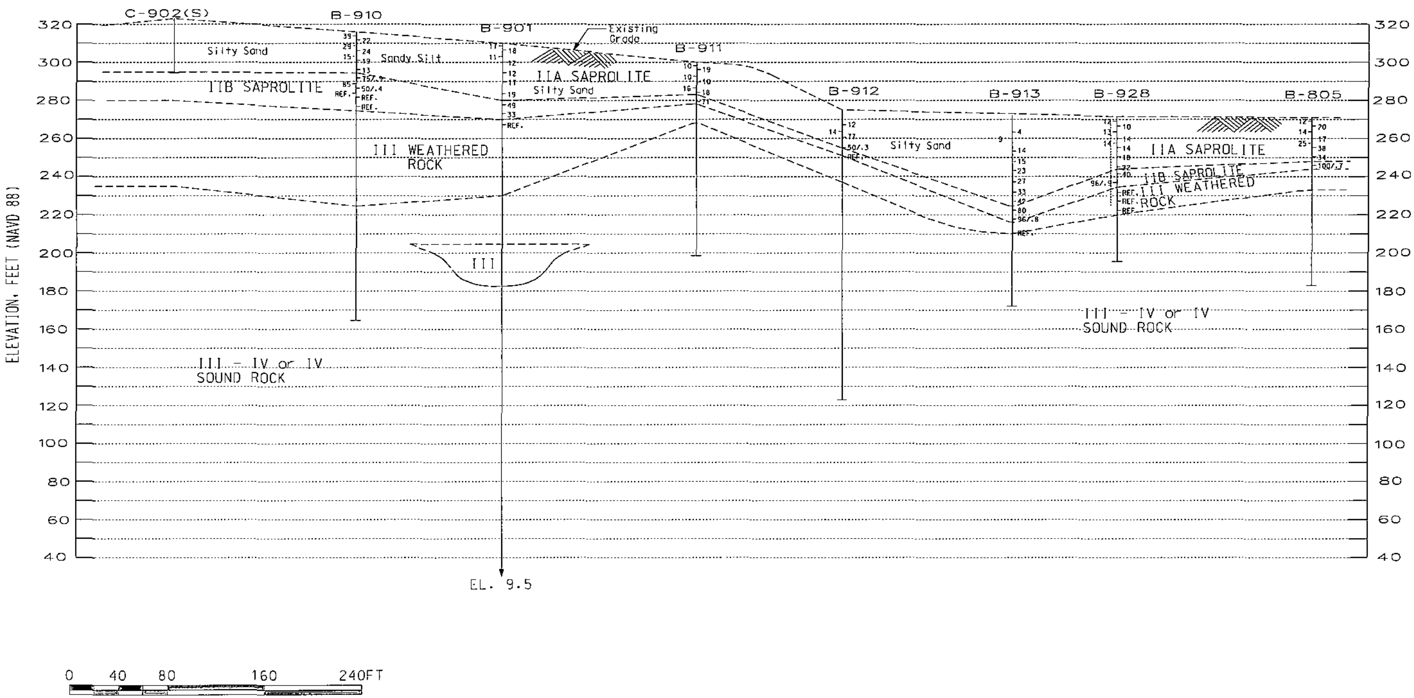
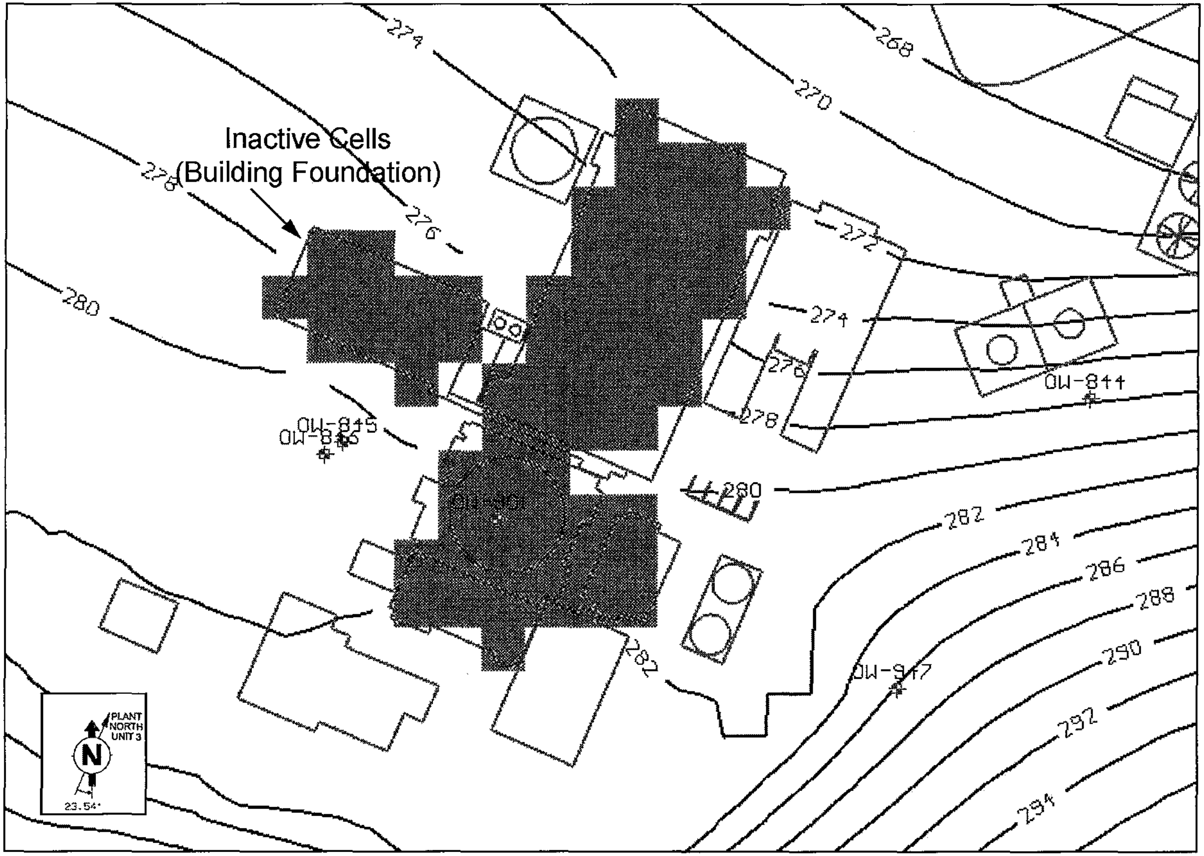


Figure 2.4-216 Piezometric Head Contour Map of Post-Construction Groundwater Elevation Contours Around the Unit 3 Power Block (contours in ft)

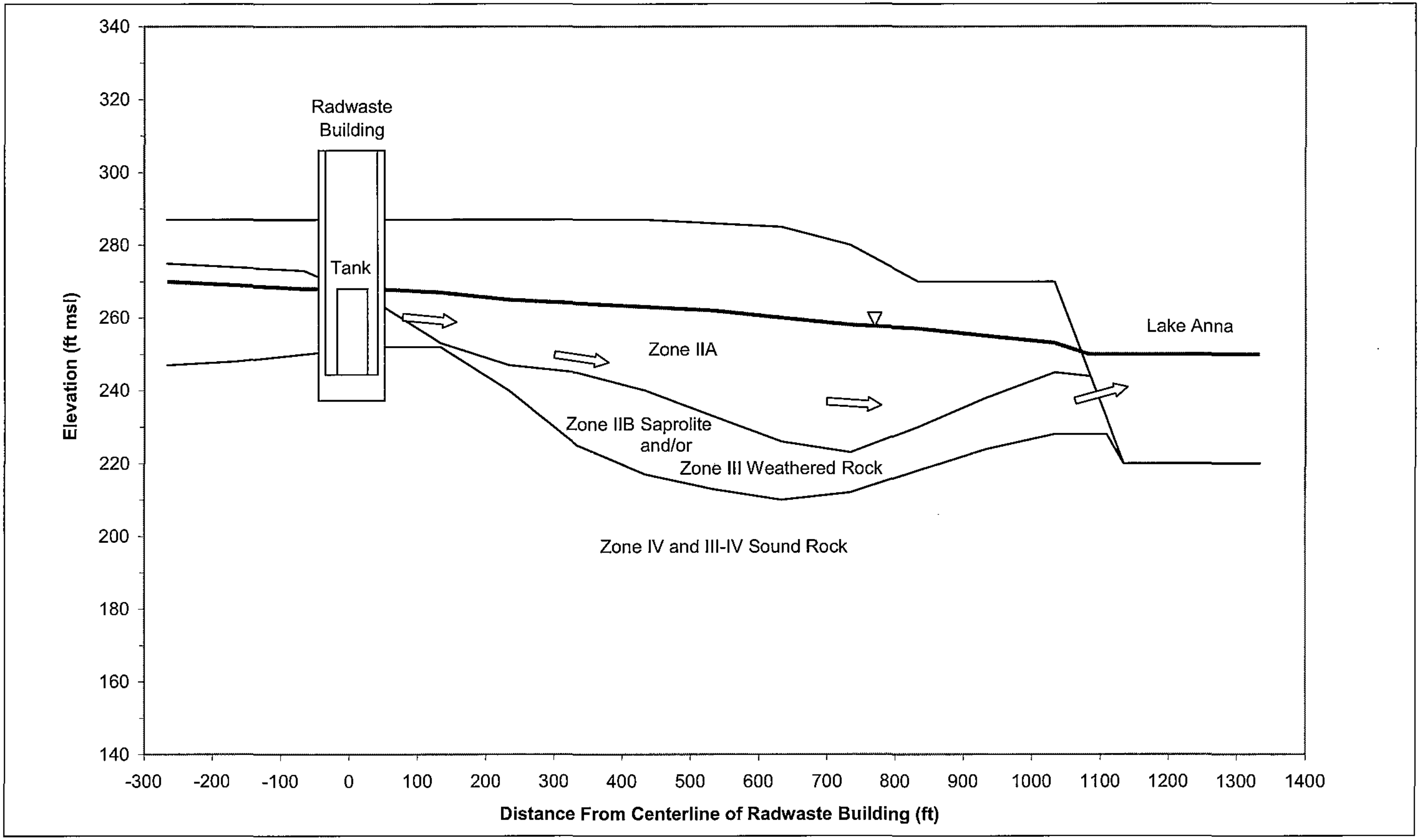
N058b



N094a

N058b

NAPS COL 2.0-24-A **Figure 2.4-217 Model for Evaluating Radionuclide Transport in Groundwater**



2.5 Geology, Seismology, and Geotechnical Engineering

2.5.1 Basic Geologic and Seismic Information

NAPS COL 2.0-26-A

The information needed to address DCD COL Item 2.0-26-A is included in SSAR Section 2.5.1, which is incorporated by reference with the following supplements. I N058a

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.

NAPS COL 2.0-26-A

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, 55 borings, 23 cone penetrometer tests (CPTs), 6 test pits, 3 sets of borehole geophysical logging, 3 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 Appendix 2.5.4AA. I N058b

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.

The tenth paragraph of Item b of this SSAR section is 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 Appendix 2.5.4AA, encountered the top of the moderately to highly weathered rock (Zone III) from about

Elevation 62.78 to 86.86 m (206 to 285 ft). 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. The top of the slightly weathered to moderately weathered rock (Zone III-IV) was encountered in the borings at elevations ranging from about 56.99 to 89.0 m (187 to 292 feet) 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 53.03 to 84.73 m (174 and 278 feet) 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.

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 revealed highly to moderately weathered rock (Zone III) intervals in the Zone III-IV and Zone IV rock. These intervals were encountered in several of the borings at varying elevations ranging from 87.47 to 47.55 m (287 to 156 ft). The intervals ranged in thickness from about 1.5 to 6.1 m (5 to 20 ft). (Appendix 2.5.4AA)

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. (Appendix 2.5.4AA)

Saprolite

The last paragraph 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 about 70.71 to 102.11 m (232 to 335 ft). The thickest Zone IIA saprolite encountered was about 17.98 m (59 ft) while the median thickness was about 7.62 m (25 ft). The saprolite is generally described in the boring logs as a yellowish red and reddish yellow clayey silt, silty sand and sand with relict rock fabric. The top of the Zone IIB saprolite was encountered at elevations ranging from about 65.53 to 91.74 m (215 to 301 ft). The thickest Zone IIB saprolite encountered was about 11.88 m (39 ft) while the median thickness was about 2.74 m (9 ft). The saprolite is generally described in the boring logs as a pale yellow to gray to orange brown, silty, fine to coarse sand and very severely weathered, soft to moderately hard gneiss with traces of clay, mafic minerals, and iron oxide staining.

k. **Artificial Material** N058a

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. (Appendix 2.5.4AA)

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)
NAPS ESP VAR 2.5-2

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. N025 C,e

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.

NAPS COL 2.0-26-A

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 25 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 25 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 Appendix 2.5.4AA, 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. I N058b

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 Appendix 2.5.4AA, 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 (Appendix 2.5.4AA) indicate that Zones III-IV and IV are suitable bearing surfaces on which to found the Seismic Category I structures. 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 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. N025c

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 N025c 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.

NAPS COL 2.0-26-A

A detailed discussion of Unit 3 site groundwater conditions based on the Unit 3 subsurface investigation is provided in Section 2.4.12. I N058b

2.5.2 Vibratory Ground Motion

NAPS COL 2.0-27-A

The information needed to address DCD COL Item 2.0-27-A is included in SSAR Section 2.5.2, which is incorporated by reference with the following variances and supplements.

2.5.2.5 Seismic Wave Transmission Characteristics of the Site

The third paragraph in this SSAR section is supplemented as follows with information to address the materials under the foundations of the Seismic Category I structures for Unit 3.

NAPS COL 2.0-27-A

The Reactor Building/Fuel Building (RB/FB) and the Control Building (CB) are founded on sound bedrock, both Zone IV and Zone III-IV. The FWSC is founded on Zone III weathered rock and structural fill.

The fourth paragraph in this SSAR section is supplemented as follows with information to address the seismic wave transmission characteristics of site materials under Unit 3.

The seismic wave transmission characteristics of the site materials are described in Section 2.5.4.7. The description includes the shear wave velocity profile for the Unit 3 site and the variation of shear modulus and damping with strain for Zone II and III materials above the sound bedrock. Shear wave velocity profiles for rock and soil under Unit 3 are described in Section 2.5.4.7. The shear wave velocity profiles extend from design plant grade at an elevation of 88.4 m (290 ft) to over 30 m (100 ft) below the depth at which the bedrock under the site reaches a velocity of about 2.80 km/s (9200 fps). The shear wave profile of bedrock is used to evaluate amplification of the 2.80 km/s (9200 fps) hard rock SSE ground motion to the top of competent rock, selected to be at the top of the Zone III-IV material (Elevation 83.2 m (273 ft)), with a best-estimate shear wave velocity of 1.28 km/s (4200 fps). Note that this best estimate is less than the best estimate value given in Table 2.5-212, for Zone III-IV rock, because there is some Zone III weathered rock present at Elevation 83.2 m (273 ft). Also, because the subsurface investigation for Unit 3 was performed specific to the locations of the RB/FB, CB, and FWSC, the data obtained on site materials resulted in a change in the control point elevation from 76.2 m (250 ft) to 83.2 m (273 ft). The change in control point, along with the change in control point SSE response spectra, is a variance from the SSAR. Free-field outcrop ground motions at two additional horizons within this profile are also evaluated; one at the base of the foundation for the CB and the other at the base of the foundation for the RB/FB (at elevations of 73.5 m (241 ft) and 68.3 m (224 ft), respectively).

NAPS ESP VAR 2.0-4

The fourth paragraph in this SSAR section is further supplemented to address the subsurface profile of seismic wave transmission characteristics for the FWSC as follows.

The subsurface profile of the above analyses was supplemented to include material between the top of competent material under the FWSC (Elevation 72.2 m (237 ft)) and the base of the foundation (Elevation 86.0 m (282 ft)) for analysis of ground motions for the dynamic design of the FWSC.

The fifth paragraph of this SSAR section is supplemented as follows with information to address the subsurface profile of seismic wave transmission characteristics for Unit 3 areas outside of the power block.

Finally, a thicker soil profile of in situ material above the 83.2 m (273 ft) elevation is used to evaluate liquefaction potential and slope stability at the site. Section 2.5.4.7.3 and Section 2.5.4.7.4 describe the site-specific acceleration-time histories developed for the hard rock SSE and the results of rock and soil column amplification/attenuation analyses.

2.5.2.6.7 Selected SSE Ground Motion

c. **Selection of Enveloping Horizontal SSE Spectrum** I N058a

The sixth paragraph of Item c in this SSAR section is supplemented as follows with information to address the subsurface shear wave velocity for the Unit 3 site.

NAPS COL 2.0-27-A

Section 2.5.4.7 describes site-specific subsurface shear wave velocity and related material property information for the site. Based on these data, a site shear wave velocity profile has been developed. This profile has been used to calculate the amplification by subsurface material above the 2.80 km/s (9200 fps) hard rock Unit 3 site SSE ground motion at a control point located on the top of competent Zone III-IV rock. As noted in Section 2.5.2.5, a shear wave velocity for the Zone III-IV material of 1.28 km/s (4200 fps) has been used in the control point SSE analysis. The elevation of the top surface of the Zone III-IV material varies across the site, as shown in the six subsurface profiles in Figure 2.5-215 through Figure 2.5-220. The top of the Zone III-IV material has been chosen to be at an elevation of 83.2 m (273 ft) in the control point SSE analysis. I N058b

The seventh paragraph of Item c in this SSAR section is supplemented as follows with information to address the subsurface shear wave velocity for the Unit 3 site.

Both high frequency and low frequency time histories were developed for the evaluation of the effect of site-specific subsurface shear wave velocities between the 2.80 km/s (9200 fps) and 1.28 km/s (4200 fps) control points. These time histories were made to match spectra that, in composite, matched the hard rock SSE spectrum but that, individually, are based on the high and low frequency reference probability response spectra shapes.

The ninth paragraph of Item c in this SSAR section is supplemented as follows with information to address the DBE stochastic model for the Unit 3 site.

A stochastic model described in SSAR Reference 170, with some modifications to account for the conditions at the Unit 3 site, was used to generate 60 randomizations of the Unit 3 site-specific rock column velocity profile between elevations with shear wave velocities of 2.80 km/s (9200 fps) and 1.28 km/s (4200 fps).

The tenth paragraph of Item c in this SSAR section is supplemented as follows with information to describe the inputs to the SHAKE2000 computer runs for the Unit 3 site.

A set of SHAKE2000 runs was performed on each of the 60 randomized rock profiles using the two input hard rock motions. The site was modeled by horizontal layers overlying a uniform half-space of hard bedrock subjected to the vertically propagating shear wave time histories. The response spectra from the SHAKE2000 analyses were defined at 301 frequencies from 0.1 to 100 Hz. The enveloped log-average spectrum for the Zone III-IV hypothetical rock outcrop control point at Elevation 83.2 m (273 ft) and shear wave velocity of 1.28 km/s (4200 fps) was fit with a smooth fitting function. See Figure 2.5-201. The resultant fitting function was used to obtain the response spectrum for the same set of 21 frequencies as used in the SSAR. This 21-frequency set of response spectral ordinates defines the rock response spectrum for the corresponding hypothetical rock outcrop control point on the top of Zone III-IV material. This horizontal spectrum is shown in Figure 2.5-205.

The last paragraph of Item c of this SSAR section is supplemented as follows with two new paragraphs to address the output to the SHAKE2000 computer runs for the Unit 3 site.

Output from the same SHAKE2000 runs was also collected and used to develop smooth horizontal free-field outcrop motions at elevations corresponding to the bases of the foundations of the CB and RB/FB (73.5 m (241 ft) and 68.3 m (224 ft), respectively). The SHAKE2000 results and derived smooth fitting functions for these elevations are shown in Figure 2.5-202 and Figure 2.5-203. These horizontal spectra are shown in Figure 2.5-206 and Figure 2.5-207.

Finally, SHAKE2000 runs were performed incorporating the material properties up to the base of the foundation of the FWSC. Again, smooth free-field horizontal spectra were developed in the same way for this elevation. See Figure 2.5-204 and Figure 2.5-208.

d. **Development of Vertical SSE Spectra**

Zone III-IV Hypothetical Rock Outcrop Control Point SSE Spectrum

N058a

The third paragraph of Item d of this SSAR section is supplemented as follows to address the horizontal response spectrum and elevation at the top of competent material for Unit 3 site.

The horizontal SSE spectral accelerations, V/H ratios, and vertical SSE spectral accelerations for the Zone III-IV hypothetical rock outcrop control point are listed in Table 2.5-201. The vertical SSE spectrum is calculated by multiplying the selected horizontal SSE spectral amplitude at each frequency by the applicable V/H ratio for that frequency from NUREG/CR-6728 (SSAR Reference 171). The selected horizontal and vertical spectra at the top of competent material at Elevation 83.2 m (273 ft) are plotted in Figure 2.5-205.

The third paragraph of Item d of this SSAR section is supplemented as follows with two new paragraphs to address the foundation horizon for Unit 3 Seismic Category I structures.

CB and RB/FB Foundation Horizon Spectra

The horizontal SSE spectral accelerations, V/H ratios, and vertical SSE spectral accelerations for the CB and RB/FB foundation horizons are listed in Table 2.5-202 and Table 2.5-203, respectively. The vertical SSE spectrum is calculated by multiplying the selected horizontal SSE spectral amplitude at each frequency by the applicable V/H ratio for that frequency from SSAR Reference 171. The selected horizontal and vertical spectra at the base of the CB and RB/FB foundation elevations are plotted in Figure 2.5-206 and Figure 2.5-207, respectively.

FWSC Foundation Spectra

The horizontal SSE spectral accelerations, V/H ratios, and vertical SSE spectral accelerations for the ground surface at the FWSC location are listed in Table 2.5-204. The vertical SSE spectrum is calculated by multiplying the selected horizontal SSE spectral amplitude at each frequency by the applicable V/H ratio for that frequency from SSAR Reference 171. The selected horizontal and vertical spectra for the ground surface at the location of the FWSC are plotted in Figure 2.5-208.

2.5.2.6.8 Additional Sensitivity Studies

I N058a

The last paragraph of this SSAR section is supplemented with a new paragraph on sensitivity studies.

NAPS COL 2.0-27-A

The SSAR sensitivity analyses for the reference probability and performance-based approaches were not re-performed for the FSAR.

I N058b

2.5.2.6.9 Additional Modification of the Selected Spectrum

I N058a

The last paragraph of this SSAR section is supplemented as follows with information explaining why additional modification of the selected spectrum is unnecessary for Unit 3.

NAPS COL 2.0-27-A

The potential modifications to the selected spectrum were not performed for Unit 3 because, as shown in Table 2.0-201, the certified seismic design response spectra (CSDRS) for Seismic Category I structures bound the high-frequency content in the foundation input response spectra (FIRS).

I N058b

2.5.2.6.10 Approach to Develop the EDS

I N058a

The last paragraph of this SSAR section is supplemented as follows with information explaining why additional modification of the selected spectrum is unnecessary for Unit 3.

NAPS COL 2.0-27-A

The potential modifications to the selected spectrum described in SSAR Section 2.5.2.6.9 were not performed for Unit 3 because, as shown in Table 2.0-201, the CSDRS for Seismic Category I structures bound the high-frequency content in the FIRS.

I N058b

2.5.2.7 Operating Basis Earthquake

I N058a

This SSAR section is supplemented as follows with information regarding the operating basis earthquake.

NAPS COL 2.0-27-A

The comparison of CSDRS and FIRS for Seismic Category I structures is provided in Section 2.0. The DCD OBE ground motion is chosen to be one-third of the CSDRS per DCD Section 3.7.1. Consistent with SSAR Section 2.5.2.7, the Unit 3 OBE ground motion would be one-third of the FIRS. Because one-third of the CSDRS exceeds one-third of the FIRS, the DCD OBE bounds the site OBE.

I N058b

2.5.3 Surface Faulting

NAPS COL 2.0-28-A

The information needed to address DCD COL Item 2.0-28-A is included in SSAR Section 2.5.3, which is incorporated by reference with the following supplements. I N058a

NAPS COL 2.0-28-A

2.5.3.2.5 Unit 3 Subsurface Investigation

I N058b

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 2.0-29-A

The information needed to address DCD COL Item 2.0-29-A is included in SSAR Section 2.5.4, which is incorporated by reference with the following supplements. I N058a

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.

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 55 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 76.2 m (250 ft) to Elevation 102.1 m (335 ft), with a median of about Elevation 90.2 m (296 ft). The design grade elevation for Unit 3 is Elevation 88.4 m (290 ft).

a. **Zone IV Bedrock**

The Unit 3 subsurface investigation (Appendix 2.5.4AA) 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 53.0 m (174 ft) to Elevation 84.7 m (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 57.0 m (187 ft) to Elevation 89.0 m (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 62.8 m (206 ft) to Elevation 86.9 m (285 ft). The maximum thickness measured is about 23.5 m (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 30 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 11.9 m (39 ft) while the median thickness was about 2.7 m (9 ft). The top of Zone IIB saprolite encountered ranges from about Elevation 65.5 m (215 ft) to Elevation 91.7 m (301 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 70 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 18.0 m (59 ft) while the median thickness was about 7.6 m (25 ft). The top of Zone IIA saprolite ranges from about Elevation 70.7 m (232 ft) to Elevation 102.1 m (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 Figure 2.5-214. 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 cone penetrometer tests 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 subsurface field investigation was performed during August through November 2006. The majority of the investigation was 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:

- 55 exploratory borings (MACTEC Engineering and Consulting, Raleigh, North Carolina)
- 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)
- 3 sets of borehole geophysical logging and 3 sets of suspension P-S velocity logging (GEOVision, Corona, California)
- 2 sets of electrical resistivity tests (MACTEC Engineering and Consulting, Raleigh, North Carolina)
- Survey of exploration points (McKim and Creed, Virginia Beach, Virginia)

The exploration program was performed using the guidance in RG 1.132 (SSAR Reference 153). The fieldwork was performed under an audited and approved quality assurance program 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). 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 3.7 m (12 ft) square area surrounded by a 1.8 m (6 ft) high chain link fence, or in an adjacent secured area. Each sample and core 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 Appendix 2.5.4AA. 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 55 borings drilled ranged from 6.7 m (22 ft) to 91.4 m (300 ft) in depth. The 91.4 m (300 ft) deep boring was drilled at the center of the Reactor Building (RB) location, to about 65.5 m (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 25 mm (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 1.5 m (5 ft) long "HQ" core barrel with a split inner barrel.

The soil was sampled using an SPT sampler at 0.76 m (2.5 ft) intervals to about 4.6 m (15 ft) depth and at 1.5 m (5 ft) intervals below 4.6 m (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.

Energy measurements were made on the automatic SPT hammers used by the four drill rigs that performed the borings. The 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 82.8 percent, with an overall average of 79.2 percent. The N-values shown on the boring logs (Appendix 2.5.4AA) 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.

Undisturbed 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. Undisturbed 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 Appendix 2.5.4AA, 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 178 kN (20 ton) self-contained cone rig. Each CPT was advanced to refusal, to depths ranging from about 0.91 m (3 ft) to 18.3 m (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 0.91 m (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 4.0 m (13 ft) to 8.8 m (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 about 0.61 m (2 ft) to 1.4 m (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 19 liter (5 gal) 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 quality assurance program 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 460 m (1500 ft) southwest 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 Appendix 2.5.4AA, except for the RCTS test results which are included in Appendix 2.5.4AAS1. Appendix 2.5.4AA includes 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, b) soil properties, c) RCTS results, and d) chemical properties.

a. **Rock 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 Appendix 2.5.4AA. 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 55 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. I N058a

The shear and compression wave velocities in Table 2.5-212 are based on suspension P-S velocity logging performed as part of the Unit 3 exploration program (Appendix 2.5.4AA). These results are summarized in Section 2.5.4.4.4.

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 Appendix 2.5.4AA. The tests were run mainly on the silty sand samples with more than 90 percent having fines contents of less than 50 percent. Figure 2.5-225 shows fines content versus depth from these tests. The median fines content for the Zone IIA saprolite is about 25 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 93 tests performed is 19 percent. For the relatively small percentage of samples that exhibited plasticity, the median liquid limit was 34 percent while the plasticity index was 11 percent.

The measured SPT N-values from 358 tests ranged from 2 to refusal (defined as >100 blows/0.3 m (1 ft)), with a median value of 15 blows/0.3 m (1 ft). These are plotted versus depth on Figure 2.5-226. The N_{60} median value adjusted for hammer energy is 20 blows/0.3 m (1 ft). The effective angle of internal friction of a medium dense coarse-grained saprolite (N = 20 blows/0.3 m (1 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 was 13.2 kPa (0.275 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' = 6.0 kPa (0.125 ksf) were adopted for the Zone IIA saprolite. This compares with φ' = 30 degrees and c' = 12.0 kPa (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 19.6 kN/m^3 (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 152 m/s (500 feet per second (fps)) to 366 m/s (1200 fps) in the upper 12.2 m (40 ft), with a best estimate of about 259 m/s (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 best estimate low strain (i.e., 10^{-4} percent) shear modulus has been derived from the shear wave velocity of 259 m/s (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). | N058a

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 15.7 kN/m^3 (100 pcf) to 19.8 kN/m^3 (126 pcf), with a median value of 18.2 kN/m^3 (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 15 sieve analyses of Zone IIB silty sand samples are shown in Appendix 2.5.4AA. The samples had fines contents ranging from about 15 to 25 percent. These fines contents are shown versus depth in Figure 2.5-225. The Zone IIB USCS classification is SM.

The measured SPT N-values from 127 tests ranged from 24 to refusal (defined as >100 blows/0.3 m (1 ft)), with a median value of 75 blows/0.3 m (1 ft). These are plotted versus depth on Figure 2.5-226. The N_{60} median value adjusted for individual hammer energy is 100 blows/0.3 m (1 ft). The effective angle of internal friction of a very dense sand (N = 100 blows/0.3 m (1 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 20.4 kN/m^3 (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 366 m/s (1200 fps) to 762 m/s (2500 fps) with a best estimate of about 488 m/s (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 best estimate shear wave velocity of 488 m/s (1600 fps). | N058a

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 Fill

Structural fill for placing beneath and around major power block structures is obtained from crushing the sound rock removed from the deep excavation for some of these structures, including the Reactor Building, Fuel Building, Control Building and Radwaste Building. The rock is crushed down to well-graded, angular or sub-angular gravel-sized particles. 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/0.3 m (1 ft) and φ' = 40 degrees were selected as reasonable and conservative.

IN025g
IN025g

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 at 9.1 m (30 ft) depth. The chloride content of the soil, measured in 14 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 4.7 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 11 tests ranges from about 3 to 11 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 15.2 m (50 ft) depth. The chloride content, measured in 4 tests, is less than 10 ppm, while the pH ranges from 6.7 to 7.4. These results suggest very low corrosion potential. The sulfate content measured in 4 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. IN058a

NAPS ESP COL 2.5-3

Figure 2.5-214 shows the excavation plan for the safety-related and other major facilities, and includes the plan outline of these structures. Figure 2.5-214 gives the plan dimensions and the bottom of foundation elevations for the major structures. Also shown in Figure 2.5-214 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 are superimposed on Figure 2.5-215 through Figure 2.5-220 to produce Figure 2.5-229 through Figure 2.5-234. IN058a

NAPS COL 2.0-29-A

Logs of the core borings, observation wells, CPTs and test pits are in Appendix 2.5.4AA. IN058b

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 0.3 m (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 0.9 m (3 ft) to 30.5 m (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 (91.4 m (300.0 ft) depth), B-907 (61.1 m (200.5 ft) depth) and B-909 (61.5 m (201.9 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 Appendix 2.5.4AA. Plots of the shear and compression wave velocity results versus depth are presented in Section 2.5.4.4.4. The descriptions below are summarized from the more detailed description in Appendix 2.5.4AA.

For all of the tests, all three borings were logged as partially-cased borings, filled with clear water or polymer-based drilling mud, with a 102 mm (4 in) PVC or steel casing placed in the top 12.2 m (40 ft) (B-901 and B-907) or 24.4 m (80 ft) (B-909) 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 2.08 m (6.82 ft) long and 38 mm (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 of 3.0 m (10 ft)/minute, collecting data continuously at 0.015 m (0.05 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 2.5 m (8.2 ft) long and 44 mm (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 3.0 m (10 ft)/minute, collecting data continuously at 0.015 m (0.05 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 2.31 m (7.58 ft) long and 48 mm (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 2.5 mm (0.1 in) diameter spot about 50 mm (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 0.91 m (3 ft)/minute, collecting data continuously at 0.0024 m (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 shear and compressional wave velocity measurements of a 1.0 m (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 7.0 m (23 ft) long cable suspended probe containing a source near the bottom, and two geophone receivers spaced 1.0 m (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 0.5 m (1.65 ft) or 1.0 m (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 1.0 m (3.3 ft) high column of soil or rock around the borehole. For quality assurance, analysis is also performed on source-to-receiver data.

2.5.4.4.3 Seismic Tests with Cone Penetrometer

The tests were performed at 1.5 m (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 shear wave velocity (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 compression wave velocity (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 7.6 m (25 ft) depth in boring B-909, and to about 10.7 m (35 ft) depth in borings B-901 and B-907.

For the Zone IIA saprolite, the average shear wave velocity generally increases with depth from around 15.2 m/s (500 fps) at the ground surface to 366 m/s (1200 fps) as it transitions to Zone IIB saprolite. The median value within the layer is about 259 m/s (850 fps). This compares with a median of about 290 m/s (950 fps) noted in the SSAR. The results of the compression wave tests in Zone IIA saprolite are fairly consistent at around 549 m/s (1800 fps), while the low strain Poisson's ratio can be taken as 0.35.

For the Zone IIB saprolite, the average shear wave velocity generally ranges from around 366 m/s (1200 fps) to 762 m/s (2500 fps) as it transitions to Zone III saprolite. The median value within the layer is about 488 m/s (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 compression velocity of water. The compression wave velocity from SSAR Table 2.5-45 of 1067 m/s (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 Reactor Building, at the Fuel Building, and close to the FWSC. The elevations of the bottom of the RB/FB building mat (Elevation 68.3 m (224 ft)), and Control Building mat (Elevation 73.5 m (241 ft)) are shown on these figures as well as the top of competent material in this area (top of Zone III-IV at about Elevation 83.2 m (273 ft)), and the design plant grade (Elevation 88.4 m (290 ft)).

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 610 m/s (2000 fps) to 1219 m/s (4000 fps), with a best estimate value of 914 m/s (3000 fps). For Zone III-IV partially weathered rock, the range of V_s is approximately 914 m/s (3000 fps) to 2438 m/s (8000 fps), with a best estimate value of 1372 m/s (4500 fps). For Zone IV fresh rock, the range of V_s is approximately 2438 m/s (8,000 fps) to 3048 m/s (10,000 fps), with a best estimate value of 2743 m/s (9000 fps).

In Figure 2.5-237, Zone IV bedrock extends up to around Elevation 61 m (200 ft), although about 6.1 m (20 ft) of Zone III rock was identified (from the V_s, RQD and core description) as extending below Elevation 61.0 m (200 ft) in B-901. From Elevation 61.0 m (200 ft) to about Elevation 68.6 m (225 ft), all the borings show Zone III-IV. Above about Elevation 68.6 m (225 ft), B-907 shows mostly Zone III material while B-901 shows Zone III-IV rock. In B-909, rock was not encountered above about Elevation 68.6 m (225 ft). These V_s profiles demonstrate that, whereas previously the "top of competent rock" was the top of the Zone III-IV, 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. As noted above, top of competent rock at the location of the RB and FB is at about Elevation 83.2 m (273 ft). The V_s profiles also demonstrate, along with the RQD profile in Figure 2.5-224, that above about Elevation 53.3 m (175 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: I N058a

- 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

2.5.4.5.1 Extent of Excavations, Fills and Slopes

Figure 2.5-214, the bottom of foundation 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 88.4 m (290 ft), up to 12.2 m (40 ft) of soil will be excavated. The location of original ground surface is shown in the cross-sections. There are some lower areas to the northeast that will be backfilled. (Directions are with respect to true north.) The total estimated cut to achieve finish grade is about 550,500 m^3 (720,000 cubic yards), while the amount of backfilling is about 336,400 m^3 (440,000 cubic yards). Benched 3-horizontal to 1-vertical (3H:1V) slopes extend up from plant grade around the southern perimeter of the area. On the northeastern perimeter of plant grade, a 2 percent slope extends downwards towards the plant grade for Units 1 and 2. The stability of the 3H:1V slopes is addressed in Section 2.5.5.

Figure 2.5-214 shows the outline of the power block foundations. The vertical cuts in soil shown on the foundation cross-sections in Figure 2.5-229 through Figure 2.5-234 will be supported by a tied-back wall system, with the tie-backs anchored into the underlying bedrock where feasible.

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 6.1 m (20 ft) in height will adhere to OSHA regulations (SSAR Reference 162). As noted in the previous section, a vertical soil cut and tie-back 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 6.1 m (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 vertical soil cut and tie-back 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 460 m (1500 ft) from the center of the Unit 2 containment building, whereas the originally planned Unit 3 Reactor Building was only about 90 m (300 ft) from the Unit 2 Reactor Building. 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 1.5 m (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.

NAPS ESP PC 3.E(6)

- 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. IN025c
- 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. N025g

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. The concrete fill is used to replace any moderately to severely weathered rock (Zone III) exposed at the bottom of the excavations for the Seismic Category I RB/FB and Control Building foundation mats. The concrete fill will be designed to result in a shear wave velocity in the same range as that of the Zone III-IV rock. N058a 02.05.04-3

The granular structural fill material 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 fill. The rock will be crushed down to well-graded, angular or sub-angular gravel-sized particles, with less than 5 percent passing the number 200 sieve. The soundness of the aggregate will be confirmed using sulfate soundness and Los Angeles abrasion tests. This structural fill will be placed in thin lifts and compacted to at least 95 percent of the maximum dry density as determined by ASTM D 1557 (SSAR Reference 165), and to within 3 percent of its optimum moisture content. Compaction will be performed with a heavy steel-drummed vibratory roller, except within 1.5 m (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/0.3 m (1 ft) and φ' = 40 degrees were assumed as reasonable and conservative for this structural fill.

As an alternative or supplement to the onsite crushed rock, dense-graded aggregate can be used as structural fill material. Dense graded aggregate such as Size 21A or 21B as specified by the Virginia Department of Transportation Road and Bridge Specifications (SSAR Reference 166) is suitable 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, i.e., a minimum of one test per 930 m^2 (10,000 ft^2) of fill placed. It also includes requirements for an on-site testing laboratory for quality control (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 quality assurance program. 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.

NAPS COL 2.0-29-A

2.5.4.6 Groundwater Conditions

IN058b

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 72.5 m (238 ft) to Elevation 95.7 m (314 ft) between December 2002 and August 2007. (The groundwater generally occurs at depths ranging from about 5.5 m (18 ft) to 7.6 m (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 0.076 m (0.25 ft) to 3.02 m (9.9 ft)/day, with a geometric mean value of 0.53 m (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 0.15 m (0.5 ft) to 1.92 m (6.3 ft)/day, with a geometric mean value of 0.62 m (2.05 ft)/day. Groundwater movement at the site is generally to the 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 maximum allowable ground water level for operation of the power block area of Unit 3 is Elevation 87.8 m (288 ft) which is at 0.6 m (2 ft) below design plant grade at Elevation 88.4 m (290 ft). Section 2.4.12.4 indicates that the maximum groundwater level in the power block area of Unit 3 is Elevation 86.3 m (283 ft).

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 152 m (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 wells were spaced on 6.1 m (20 ft) centers around the perimeters of the originally planned Units 3 and 4 containment excavations.

Although an approximately 12.2 m (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 Elevation 73.2 m (240 ft). The excavation for Unit 3 is at least 305 m (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

Maximum allowable groundwater level is at least 0.6 m (2 ft) below plant grade, i.e., Elevation 87.8 m (288 ft). This water level was used in bearing capacity and settlement analyses and in computing hydrostatic pressures on the buried structure walls (Section 2.5.4.10). As 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.

NAPS COL 2.0-29-A

2.5.4.7 Response of Soil and Rock to Dynamic Loading

I N058b

The RB/FB common 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. A similar scheme is followed for the CB foundation, although some thin layers of Zone III material may be present at foundation level. The other Seismic Category I structure (the FWSC) is founded on compacted structural fill placed on top of Zone III weathered rock. (The structural fill replaces in-situ saprolite.) The foregoing foundation subgrades are illustrated on Figure 2.5-229 through Figure 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 fill, the Zone III weathered rock, the Zone III-IV slightly to moderately weathered rock, and the Zone IV slightly weathered to fresh rock. Since the bedrock supports the majority of the Seismic Category I structures, it is considered first.

a. **Bedrock**

Shear wave velocity of the bedrock at the RB/FB basemat (B-901 and B-907) and the edge of the CB (B-909) is shown versus elevation in Figure 2.5-237. Below about Elevation 44.2 m (145 ft), the shear wave velocity is fairly constant at between around 2740 m/s (9,000 fps) and 3050 m/s (10,000 fps). As noted in Section 2.5.4.4.4, Figure 2.5-237 shows Zone IV bedrock extending up to around Elevation 61 m (200 ft), although about 6.1 m (20 ft) of Zone III rock was identified (from V_s, RQD and core description) extending below Elevation 61.0 m (200 ft) in B-901. From Elevation 61.0 m (200 ft) to about Elevation 68.6 m (225 ft), all the borings show Zone III-IV with shear wave velocities ranging from about 1220 m/s (4000 fps) to 2440 m/s (8000 fps). Above about Elevation 68.6 m (225 ft), B-907 shows mostly Zone III material while B-901 shows Zone III-IV rock, with top of competent material (mostly Zone III-IV rock but can include Zone III) at Elevation 83.2 m (273 ft).

Figure 2.5-240 shows best-fit values applied to the measured shear wave velocity profiles in Figure 2.5-237. Above about Elevation 56.1 m (184 ft), there are two profiles, with one representing the mostly unweathered and unfractured rock profile, and the other the more weathered and fractured profile. The median shear wave velocities derived from the Figure 2.5-237 values and used in the randomization model for input into the SHAKE (Reference 2.5-211) analysis (Section 2.5.4.7.4) are shown in Figure 2.5-241. The median profile indicates that V_s = 2800 m/s (9200 fps) is reached at about Elevation 45.1 m (148 ft). Figure 2.5-242 shows the 60 randomized rock profiles used in the SHAKE analysis, with these profiles enveloping the two design profiles.

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 SHAKE analysis. 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 boring B-947, on the planned 3H:1V slope to the southeast of the FWSC shown on Figure 2.5-214, with ground elevation at around 96.0 m (315 ft). Boring B-947 is shown on Subsurface Profile D-D' on Figure 2.5-218. This profile was used in the slope stability analyses presented in Section 2.5.5 and for the peak ground acceleration used in the liquefaction analysis in Section 2.5.4.8.

The second soil profile is that of the engineered structural fill beneath the FWSC. As noted in Section 2.5.4.5.3, the primary source of structural fill is crushed rock obtained from the power block excavation.

For the natural soil profile, the measured shear wave velocity profiles in Figure 2.5-227 were averaged vertically in 1.5 m (5 ft) intervals to obtain the average, upper bound and lower bound profiles shown in Figure 2.5-243. 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 76.2 m (250 ft). The same bedrock profile described above in Section 2.5.4.7.1.a, with top of competent rock at Elevation 83.2 m (273 ft) at the RB location, was assumed for the SHAKE analysis to extend below Elevation 76.2 m (250 ft). (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.)

For the structural fill beneath the FWSC, there are no measured shear wave velocities, since the fill 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 fill, i.e., N_{60} = 50 blows/0.3 m (1 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 1.5 m (5 ft) intervals to obtain the average shear wave velocity profile shown in Figure 2.5-245. As shown in Figure 2.5-232, the top of weathered rock beneath the FWSC is at around Elevation 73.2 m (240 ft), overlain by Zone IIB saprolite. For the dynamic analysis, it was conservatively assumed that the Zone IIB saprolite is removed and structural fill placed above about Elevation 73.2 m (240 ft) to the bottom of the FWSC at Elevation 86.0 m (282 ft), as illustrated in Figure 2.5-245. The upper and lower bounds shown in this figure are 1.225 and 0.816 times the mean value of shear wave velocity, respectively, which correspond to 1.5 and 0.67 times the shear modulus. As with the bedrock profile, this soil fill profile was randomized for input into the SHAKE analysis. As noted above, subsurface information indicated that the top of weathered rock was at about Elevation 73.2 m (240 ft). The very high SPT N-values at the bottom of the boring beneath the FWSC (B-921) suggest that the top of weathered rock in this case can be assumed to be the top of competent material. The same bedrock profile described above in Section 2.5.4.7.1.a, with top of competent rock at Elevation 83.2 m (273 ft) at the RB location, was assumed for the SHAKE analysis to extend below Elevation 73.2 m (240 ft) at the FWSC. Table 2.0-201 provides an evaluation of the DCD site parameter value and the corresponding Unit 3 site characteristic value for shear wave velocity.

NAPS COL 2.0-29-A

2.5.4.7.2 Variation of Shear Modulus and Damping with Strain

1N058b

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 10.7 m (35 ft). Curve 1 is almost identical to the average of the EPRI curves (SSAR Reference 170) for depths 0 to 6.1 m (20 ft), and 6.7 m (20 ft) to 15.2 m (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 7.6 m (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 2.7 m (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 fill is bedrock excavated to construct the Unit 3 power block, crushed down to well-graded, angular 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 fill 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 fill is about 10.7 m (35 ft). For the granular materials (Zone IIA and Zone IIB saprolite, and the structural fill), the average of the EPRI curves (SSAR Reference 170) for depths 0 to 6.1 m (20 ft), and 6.1 m (20 ft) to 15.2 m (50 ft) was selected. This curve is shown on Figure 2.5-248. 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 damping ratio.

2.5.4.7.3 Site Specific Acceleration-Time Histories

The time histories for the Unit 3 site are described in SSAR Section 2.5.4.7.3. These time histories were used for the rock and soil column amplification/attenuation analysis described in Section 2.5.4.7.4.

2.5.4.7.4 Rock and Soil Column Amplification/Attenuation Analysis

NAPS ESP COL 2.5-5

The SHAKE2000 (Reference 2.5-211) computer program was used to compute the site dynamic responses for the soil and rock profiles described in Section 2.5.4.7.1 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 low frequency case, an earthquake with moment magnitude of 7.2 and an acceleration at hard bedrock level ($V_s \geq 2800$ m/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. One rock profile and two soil profiles were analyzed. | N058a

a. **Rock**

Figure 2.5-242 shows the 60 randomized rock profiles used in the SHAKE analysis to obtain the seismic response at the top of competent material, which is at Elevation 83.2 m (273 ft) at the RB/FB location. The response spectrum at the top of competent material is shown in Figure 2.5-205. Response spectra at the horizons that represent the bottom of the RB/FB basemat and the bottom of the CB basemat were also developed from the SHAKE runs. These are shown in Figure 2.5-206 for the CB and in Figure 2.5-207 for the RB/FB.

b. **Soil**

For the natural soil profile, the randomized profile described in Section 2.5.4.7.1 along with the shear modulus and damping ratio relationships with strain described in Section 2.5.4.7.2 were input into the SHAKE analysis. Figure 2.5-249 and Figure 2.5-250 show the maximum acceleration versus depth profiles obtained from SHAKE 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 peak ground acceleration 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 low frequency earthquake is 0.30g, while the corresponding acceleration using the high frequency earthquake is 0.56g.

For the structural fill profile, the randomized profile described in Section 2.5.4.7.1 along with the shear modulus and damping ratio relationships with strain described in Section 2.5.4.7.2 were input into the SHAKE analysis. The seismic response spectrum developed at the top of the fill column corresponds to that for use in the FWSC design, as shown in Figure 2.5-208.

NAPS COL 2.0-29-A

2.5.4.8 Liquefaction Potential

I N058b

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 fill 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.

NAPS ESP PC 3.E(7)

The only Seismic Category I structure not founded on rock or on concrete on rock at the Unit 3 site is the FWSC. The FWSC is founded on engineered structural fill after removal of the Zone IIA saprolite. (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.) No Zone IIA saprolite is within the zone of influence of the FWSC loading. Thus, even if the Zone IIA saprolite is liquefiable, such liquefaction does not impact the stability of any Seismic Category I structure. Note that the Seismic Category II Service Building and the radwaste building are also founded on engineered structural fill. I N025c I N021

The peak ground accelerations 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.

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 low frequency earthquake is 0.30g, while the corresponding acceleration using the high frequency earthquake is 0.56g. The low frequency 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 peak ground accelerations 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 peak ground accelerations, 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 1.2 m (4 ft) thick zone in one CPT, a 0.61 m (2 ft) thick and a 0.30 m (1 ft) thick zone in one CPT, and two 0.15 m (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 (low frequency) and 5.4 (high frequency) 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 0.15 m (0.5 ft) or 0.30 m (1.0 ft) thick layers, with the thickest continuous zone of FS < 1.1 being only 0.45 m (1.5 ft) thick.

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 about 41 mm (1.6 in).

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 or II structure.

The conclusions from the foregoing sections on the analysis of liquefaction potential of Zone IIA saprolite are as follows:

- 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 peak ground acceleration for low frequency and M = 5.4 with 0.56g peak ground acceleration for high frequency) and ignored age, structure, fabric, and mineralogy effects. 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 0.61 m (2 ft) thick and a 1.2 m (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 two 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 only 0.45 m (1.5 ft).
- Estimated maximum dynamic settlements of the Zone IIA saprolite due to earthquake shaking are about 41 mm (1.6 in). This settlement will be outside the zone of loading influence of any of the seismic Category I or II 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 or II structure.

2.5.4.9 Earthquake Design Basis

See Sections 2.5.2.6.7 and 2.5.2.7 for the SSE and OBE, respectively.

2.5.4.10 Static Stability

NAPS ESP COL 2.5-6

As with the Units 1 and 2, and the originally planned Units 3 and 4, the Unit 3 RB/FB is founded on Zone III-IV or Zone IV bedrock. If Zone III weathered rock or fractured rock is encountered at foundation subgrade level, then it will be removed and replaced with lean concrete. The subgrade of the other Seismic Category I structures and the Seismic Category II structures depends on their elevation and location. Table 2.5-213 shows the bottom of foundation elevations and depths for the Seismic Category I structures (RB/FB, CB, FWSC), the Seismic Category II structures (Service Building and Ancillary Diesel Building), Turbine Building, and the Radwaste Building. The cross-sections in Figure 2.5-229 through Figure 2.5-234 show the materials supporting these structures (except for the service building). The subsurface profiles beneath the Seismic Category I structures used for bearing capacity and settlement analyses are shown on Figure 2.5-251. The corresponding profiles beneath the Seismic Category II structures and the radwaste building are shown on Figure 2.5-252. There may be several materials immediately beneath the foundations of the larger structures (e.g., the turbine building) because of the variable stratigraphy and the different depths of the parts of the building, and because any Zone IIA saprolite beneath the shallow Seismic Category I or II structures (and the radwaste building) is removed and replaced with structural fill. Table 2.5-213 also shows the design static and dynamic design loads for these structures.

N095 a, b N021

2.5.4.10.1 Bearing Capacity

a. **Bedrock**

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 958 kPa (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 6.9 MPa (1.0 kips per square inch (ksi) (144 ksf)) in Table 2.5-212. The 958 kPa (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 958 kPa (20 ksf) allowable static bearing capacity is greater than the maximum static bearing pressure from the RB/FB basemat, the RB/FB 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 lean concrete.

The Zone III-IV and Zone IV bedrock have design unconfined compressive strengths of 62 MPa (9 ksi (1296 ksf)) and 117 MPa (17 ksi (2448 ksf)), respectively (Table 2.5-212). The allowable static values of the bearing capacity of 3830 kPa (80 ksf) and 7660 kPa (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., 12,400 kPa (259 ksf) for Stratum III-IV, and 23,460 kPa (490 ksf) for Stratum IV. For 17 MPa (2500 psi) concrete fill, the computed allowable bearing capacity is 10,240 kPa (214 ksf) (Reference 2.5-215) for both static and dynamic loading.

b. **Soil**

For granular soils like the Zone IIB saprolite and the engineered structural fill, bearing capacity is based on Terzaghi's bearing capacity equations modified by Vesic (SSAR Reference 180). The ultimate (gross) bearing capacity of a footing, q_{ult}, supported on homogeneous soils can be estimated by (SSAR Reference 180):

$$q_{ult} = cN_c\zeta_c + \gamma' D_f N_q \zeta_q + 0.5\gamma' B N_\gamma \zeta_\gamma$$

where:

- c = undrained shear strength for clay (c_u) or cohesion intercept for (c,ϕ) soil
- $\gamma' D_f$ = effective overburden pressure at base of foundation
- γ' = effective unit weight of soil
- D_f = depth from ground surface to base of foundation
- B = width of foundation
- N_c, N_q, and N_γ are bearing capacity factors (defined in SSAR Reference 180), and
- ζ_c, ζ_q, and ζ_γ are shape factors (defined in SSAR Reference 180)

These equations use the effective unit weight of the soil, the width and depth of the foundation, and bearing capacity and shape factors that are a function of the angle of internal friction of the soil. Consequently, each foundation has a different bearing capacity, depending on the foundation dimensions. For large foundations that are founded at large depths below grade, these equations can give very large bearing capacity values, even when a factor of safety of 3 is included for the allowable bearing value. In such situations, settlement, discussed in Section 2.5.4.10.2, normally governs.

c. **Allowable Bearing Capacity for Structures**

Table 2.5-215 gives the estimated allowable bearing capacity for the three Seismic Category I, the two Seismic Category II structures, and the radwaste building based on the materials underlying the structures shown in Figure 2.5-251 and Figure 2.5-252. Where the structure bears on soil (Zone IIB saprolite or structural fill), the theoretical allowable capacities of the soil are very large, for the reasons explained above. The design static bearing capacity given in Table 2.5-215 is generally the minimum value for any layer beneath the structure. For the CB, there may be a very limited thickness of Zone III material beneath the foundation, but this will not govern the allowable bearing capacity. The allowable static bearing capacity for this structure was conservatively chosen as 2395 kPa (50 ksf), the mean of the values for Zone III and Zone III-IV. For structures on soil, settlement estimates are needed to determine what value of bearing pressure can be realistically applied.

Table 2.5-215 also contains values of allowable bearing capacity under dynamic or transient loading conditions. For bedrock subgrade, as noted earlier, these values are equivalent to 20 percent of the ultimate crushing strength. For soils, the values represent an increase of one third over the allowable static bearing capacity values. Note that the allowable static and dynamic bearing capacity values in Table 2.5-215, for the Category I RB/FB, CB and FWSC foundations, exceed the design soil or rock applied bearing stresses given in Table 2.5-213.

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 192 kPa (4 ksf) because of settlement considerations. (The 192 kPa (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 192 kPa (4 ksf), especially for larger foundations.

d. **Groundwater Effects**

NAPS ESP COL 2.5-4

Based on the conservative assumption of the groundwater table being 0.6 m (2 ft) below grade, there can be a hydrostatic uplift force on any buried structure. All of the below-ground structures shown in Table 2.5-213 (i.e., all except the FWSC and service building) have applied foundation loads that are at least 6 ksf, and so there are no net uplift forces. 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

I N058a

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 soil layers

Δp_i = vertical applied pressure at center of layer i

Δh_i = thickness of layer i

E_i = elastic modulus of layer i

The stress distribution below the 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 (Δp) 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:

l = length of footing

b = width of footing

z = depth below footing at which pressure is computed

R1 = $(l^2 + z^2)^{0.5}$

R2 = $(b^2 + z^2)^{0.5}$

R3 = $(l^2 + b^2 + z^2)^{0.5}$

Settlement estimates were made using the preceding relationships and the soil and rock properties given in Table 2.5-212. These estimates were made for each Seismic Category I and II structure, and the radwaste building, and are presented in Table 2.5-216. The applied pressures from the foundations are shown on Table 2.5-216.

As would be anticipated, the settlement of the structures founded on Zone III-IV or Zone IV bedrock is negligible. Similarly, settlements of structures sitting on the dense to very dense structural fill or Zone IIB saprolite overlying rock are modest in light of the large applied pressures. Differential settlements within the structure are close to 50 percent of the total settlement except for the turbine building where parts of the structure are founded on bedrock and other parts are on soil. In such a case, the differential settlement within the structure can approach the total settlement value.

Note that the total and differential settlements under the RB/FB, CB and FWSC are well within the limits stated in Table 2.0-201.

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. The earth pressure coefficients are Rankine values, assuming level backfill and a zero friction angle between the soil and the wall. Hydrostatic pressures are conservatively based on the groundwater table being 0.6 m (2 ft) below grade. A surcharge pressure of 23.9 kPa (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 low frequency acceleration of 0.31g was used for developing the seismic active earth pressure diagrams. Use of the peak high frequency acceleration was considered overly conservative given the low magnitude (energy) of this earthquake.

Recognizing the limitation of the Reference 2.5-217 method for design of building walls, Ostadan (Reference 2.5-218) developed a method to compute seismic soil pressure that focused on building walls rather than soil retaining walls. This method specifically considers the following: a) the movement of the walls is limited due to the presence of the floor diaphragms and the walls are considered non-yielding; b) the frequency content of the design motion is fully taken into account; and c) appropriate soil properties, in terms of soil shear wave velocity and damping, are included in the analysis. The method is flexible to allow for consideration of soil nonlinear effects where soil nonlinearity is expected to be significant. This method was used to estimate the seismic lateral at-rest pressures against the buried structure walls. The response spectrum at the bottom of the RB/FB was used in this analysis.

Figure 2.5-229 through Figure 2.5-234 show structural fill between below-ground structures, e.g., between the RB and CB in Figure 2.5-232. In this situation, the at-rest lateral pressure due to the structural fill is used to compute wall pressures. The same figure shows structural fill between the vertical excavation support wall and the below-ground RB wall. Zone IIA and IIB saprolite are on the other side of the wall and are in an active condition after excavation within the wall. 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.

Lateral earth pressure diagrams for the active and at-rest cases are given in Figure 2.5-253 and Figure 2.5-254, respectively.

Note that the lateral pressures in Figure 2.5-253 and Figure 2.5-254 are best estimate 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.

NAPS COL 2.0-29-A

2.5.4.11 Design Criteria

IN058b

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 and the radwaste building. 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. For soils, this factor of safety can be reduced to 2.25 when dynamic or transient loading conditions apply.

Section 2.5.4.10 also discusses factors of safety related to lateral earth pressures. The lateral pressures shown in Figure 2.5-253 and Figure 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.

NAPS COL 2.0-29-A

2.5.4.12 Techniques to Improve Subsurface Conditions

IN058b

NAPS ESP COL 2.5-8

For Unit 3, any Zone IIA saprolite beneath or within the zone of influence of Seismic Category I or II structures is removed and replaced with compacted structural fill. Improvement of the Zone IIA saprolite as described SSAR Section 2.5.4.12 is suitable for non-Seismic Category I and II structures.

Zones of weathered or fractured rock encountered immediately beneath the RB/FB basemat 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

N048
a, b