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May 29, 2012

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D. C. 20555

Serial No. NA3-12-010  
Docket No. 52-017  
COL/RAB

**DOMINION VIRGINIA POWER**  
**NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION**  
**SEISMIC CLOSURE PLAN (SCP)**

On October 4, 2011, the NRC requested that Dominion submit a schedule for providing revisions to the seismic information in the North Anna Unit 3 S-COLA. On February 13, 2012, Dominion provided a limited Seismic Closure Plan (SCP) (Dominion Letter NA3-12-002) to the NRC of the submittal schedule that was known at that time, and committed to provide a comprehensive SCP in May 2012.

The attached comprehensive SCP addresses the following:

- The seismic work that MHI is performing for the US-APWR standard plant design as documented in the DCD (Docket 52-021). The impact that the currently planned work has on the S-COLA has been included in the SCP.
- The EPRI (2004, 2006) earthquake ground motion model for Central and Eastern United States (CEUS) locations and the recently published updated model for earthquake sources in the CEUS. The new CEUS Seismic Source Characterization (SSC) model is documented in NUREG-2215 and addresses earthquakes through 2008. These models will be used to develop a new hard rock probabilistic seismic hazards analysis (PSHA) and response spectra. In addition, the methodology to develop a new ground motion response spectra (GMRS) from the new hard rock PSHA will follow Regulatory Guide (RG) 1.208.
- The August 23, 2011 earthquake near the North Anna site. As the NRC staff is aware, an earthquake occurred on August 23, 2011 near the North Anna site at Mineral, Virginia, in the Central Virginia Seismic Zone. Dominion is evaluating this event (and other local post-2008 seismic events) to assess the need for a CEUS-SSC model update.
- The status of RAIs. The SCP includes activities to determine the impact of the above changes on submitted RAI responses and outstanding RAIs. Dominion will provide the results of this evaluation to the NRC by September 30, 2012.

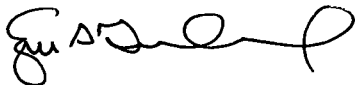
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After the seismic inputs are finalized, Dominion will compare the DCD technical reports listed in Table 1-4 of MHI's March 29, 2012 letter (Accession No. ML12094A34) with the S-COLA using the North Anna Unit 3 seismic results. If it is determined that the seismic loads presented in any of these DCD technical reports do not envelope the Unit 3 results, Dominion will evaluate the ability of the equipment to bear the site-specific loads.

As stated in our February 13, 2012 letter, Dominion recognizes the significance of this portion of the NRC's S-COLA review and is committed to work with the NRC to maintain the nexus between the design certification and issuance of the North Anna Unit 3 combined license.

Please contact Gina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have any questions.

Very truly yours,



Eugene S. Grecheck

Enclosure: Seismic Closure Plan

Commitments made by this letter:

1. Implement the SCP.
2. After the seismic inputs are finalized, Dominion will compare the DCD technical reports listed in Table 1-4 of MHI's March 29, 2012 letter (Accession No. ML12094A34) with the S-COLA using the North Anna Unit 3 seismic results. If it is determined that the seismic loads presented in any of these DCD technical reports do not envelope the Unit 3 results, Dominion will evaluate the ability of the equipment to bear the site-specific loads.
3. Submit the results of the RAI evaluation by September 2012.

cc: U. S. Nuclear Regulatory Commission, Region II  
C. P. Patel, NRC  
T. S. Dozier, NRC  
G. J. Kolcum, NRC  
D. J. Galvin, NRC

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

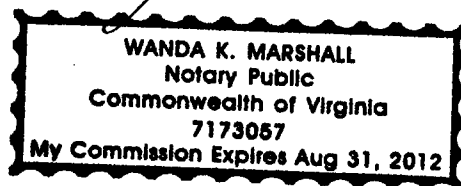
Acknowledged before me this 29<sup>th</sup> day of May, 2012

My registration number is 7173057 and my

Commission expires: August 31, 2012

Wanda K. Marshall

Notary Public



## **Enclosure**

North Anna 3

Seismic Closure Plan

## **North Anna Unit 3 Seismic Closure Plan**

### **Introduction**

On October 4, 2011, the NRC requested that Dominion submit a schedule for providing revisions to the seismic information in the North Anna Unit 3 S-COLA. On February 13, 2012, Dominion provided a limited Seismic Closure Plan (Dominion Letter NA3-12-002) to the NRC of the submittal schedule that was known at that time, and committed to provide a comprehensive SCP in May 2012. The attached comprehensive SCP addresses the following:

- The seismic work that MHI is performing for the US-APWR standard plant design as documented in the DCD (Docket 52-021): The impact that the currently planned work has on the COLA has been included in the SCP.
- The EPRI (2004, 2006) earthquake ground motion model for Central and Eastern United States (CEUS) locations and the recently published updated model for earthquake sources in the CEUS: The new CEUS Seismic Source Characterization (SSC) model is documented in NUREG-2215 and addresses earthquakes through 2008. These models will be used to develop a new hard rock probabilistic seismic hazards analysis (PSHA) and response spectra. In addition, the methodology to develop a new GMRS from the new hard rock PSHA will follow Regulatory Guide (RG) 1.208.
- The August 23, 2011, earthquake near the North Anna site: As the NRC staff is aware, an earthquake occurred on August 23, 2011 near the North Anna site at Mineral, Virginia, in the Central Virginia Seismic Zone. Dominion is evaluating this event (and other local post-2008 seismic events) to assess the need for a CEUS-SSC model update.
- The status of RAIs: The SCP includes activities to determine the impact of the above changes on submitted RAI responses and outstanding RAIs. Dominion will provide the results of this evaluation to the NRC.

After the seismic inputs are finalized, Dominion will compare the DCD technical reports listed in Table 1-4 of MHI's March 29, 2012 letter (Accession No. ML12094A34) with the S-COLA using the North Anna Unit 3 seismic results. If it is determined that the seismic loads presented in any of these DCD technical reports do not envelope the Unit 3 results, Dominion will evaluate the ability of the equipment to bear the site-specific loads.

# **North Anna Unit 3**

## **Seismic Closure Plan**

### **Overview of the Impact on the S-COLA**

The following is a summary of the significant S-COLA revisions that will result from implementing the SCP strategy:

1. The geological information of the Mineral, VA, earthquake and the geologic field reconnaissance in the vicinity of the site will be summarized in FSAR Sections 2.5.1 and 2.5.3.
2. A revised site-specific hard rock PSHA will be provided in FSAR Section 2.5.2. The PSHA will be based on the new CEUS model. The new PSHA will also consider the effects of local post-2008 seismic events if determined to be significant. This section will also provide the revised ground motion response spectra (GMRS) for the Unit 3 site. The development of the GMRS from the hard rock PSHA will be based on the guidance in Regulatory Guide (RG) 1.208.
3. The current shear wave velocity ( $V_s$ ) profiles in FSAR Section 2.5.4 will be updated to address the revised Unit 3 layout reflecting the new configuration of the US-APWR standard plant [principally the use of a common basemat for the Reactor Building (R/B) Complex].
4. FSAR Section 3.7.1 will provide the revised foundation input response spectra (FIRS), together with corresponding strain compatible soil profiles for each seismic Category I structure, based on the new PSHA and the updated  $V_s$  profiles. The development of the FIRS from the hard rock PSHA will be based on RG 1.208. Also, the FIRS will be developed for seismic Category II buildings, i.e., the turbine building (T/B) and electrical room (E/R).

The following outline describes the revisions that will be made in FSAR Chapter 3 and its appendices. See the attached table, 'Impacts of Seismic Work on S-COLA,' for changes to specific sections.

#### **5. R/B Complex**

- a. The revised R/B Complex is on a common basemat and consists of the containment internal structure (CIS), pre-stressed concrete containment vessel (PCCV), reactor building (R/B), auxiliary building (A/B), and east and west power source buildings (PS/Bs). The design basis structural models for the R/B Complex will use the dynamic finite element (FE) model that is documented in MHI Technical Report MUAP-10006, Revision 3, with modifications to address North Anna site-specific conditions. The Unit 3 analyses will use:
  - i. Stiffness properties: full (uncracked concrete) stiffness
  - ii. Damping properties: operating basis earthquake (OBE) values
  - iii. A SASSI embedded foundation model which is capable of transmitting frequencies up to 50 Hz for the upper bound (EUB) soil case

## **North Anna Unit 3**

### **Seismic Closure Plan**

- b. The soil-structure interaction (SSI) analyses for the R/B Complex will use the revised site-specific FIRS and new SSI input motions, which will be updated to reflect the new CEUS model.
  - c. The R/B Complex analyses will consider the effects of ground motion incoherency, embedment, and the groundwater table. A study of the effects of incoherency on embedded foundation response will demonstrate that the design basis in-structure response spectra (ISRS), developed from the SSI analyses of a surface-mounted foundation, are adequate.
  - d. The R/B Complex analyses will also demonstrate adequate margins for structure-soil-structure interaction (SSSI) effects.
  - e. The revised FSAR seismic analyses for the R/B Complex will:
    - i. Demonstrate the acceptability of the site-specific seismic design basis by evaluating the effects of the revised ground motions on structural integrity.
    - ii. Confirm that the standard plant structural design is bounding for North Anna Unit 3.
    - iii. Provide new site-specific design basis ISRS.
    - iv. Confirm stability and provide new dynamic bearing pressures.
6. Ultimate Heat Sink Related Structures (UHSRS)
- a. The SSI dynamic and design static FE models for the UHSRS will be revised to incorporate design modifications and modeling changes, including:
    - i. The UHSRS A and B will be integrated into a single structure supported by a common basemat, as will UHSRS C and D. Also, the UHSRS Pipe Chase will be eliminated as a separate structure; an expansion joint will be placed at its center, and each half will be integrated with the adjacent UHSRS.
    - ii. Full (uncracked concrete) stiffness and OBE damping values will be used.
  - b. The SSI analyses for the UHSRS will use the revised site-specific FIRS and new SSI input motions, which will be updated to reflect the new CEUS model.
    - i. The design basis will use the envelope of responses obtained from the analyses of two cases: UHSRS A and B with two basins full of water, and UHSRS A and B with one full basin and one empty basin.

## **North Anna Unit 3 Seismic Closure Plan**

- c. A study will be performed to verify that, for frequencies up to 50 Hz, the effects of the backfill embedment are negligible and enveloped by responses obtained from SSI analyses of surface-mounted foundations.
- d. The UHSRS analyses will also account for SSSI effects.
- e. The revised FSAR seismic analyses for the UHSRS will:
  - i. Demonstrate the acceptability of the site-specific seismic design basis by evaluating the effects of the revised UHSRS design and ground motions on the structural integrity of the new combined UHSRS structure.
  - ii. Provide new site-specific design basis ISRS.
  - iii. Confirm stability and provide new dynamic bearing pressures.

### **7. Power Source Fuel Storage Vaults (PSFSVs)**

- a. The SSI dynamic and design static FE models for the PSFSVs will be updated, including the following:
  - i. Design enhancements and increased concrete strength will be incorporated.
  - ii. The mesh of the SASSI embedded foundation model will be refined to be capable of transmitting frequencies up to 50 Hz for the upper bound (EUB) soil case.
  - iii. Full (uncracked concrete) stiffness and OBE damping values will be used.
- b. The SSI analyses for the PSFSVs will use the revised site-specific FIRS and new SSI input motions, which will be updated to reflect the new CEUS model.
- c. The results from the SSI analyses will be enveloped to develop the seismic design basis.
- d. The PSFSVs analyses will also account for SSSI effects.
- e. The revised FSAR seismic analyses for the PSFSVs will:
  - i. Demonstrate the acceptability of the site-specific seismic design basis by evaluating the effects of the enhanced PSFSVs design and ground motions on structural integrity.
  - ii. Provide new site-specific design basis ISRS
  - iii. Confirm stability and provide new dynamic bearing pressures



## **North Anna Unit 3 Seismic Closure Plan**

### **8. Essential Service Water Pipe Tunnel (ESWPT)**

- a. The SSI structural models will be updated for the redesign of different segments of the ESWPT.
  - i. Full (uncracked concrete) stiffness and OBE damping values will be used.
- b. The mesh of the SASSI models of buried ESWPT segments will be refined to be capable of transmitting frequencies up to 50 Hz for the upper bound (EUB) soil case.
- c. The SSI analyses for the redesigned ESWPT segments will use the revised site-specific FIRS and new SSI input motions which will be updated to reflect the new CEUS model.
- d. The ESWPT analyses will also account for SSSI effects
- e. The revised FSAR seismic analyses for the ESWPT segments will:
  - i. Demonstrate the acceptability of the site-specific seismic design basis by evaluating the effects of the revised designs of the ESWPT segments and ground motions on structural integrity.
  - ii. Provide new site-specific design basis ISRS.
  - iii. Confirm stability and provide new dynamic bearing pressures.

### **9. T/B and E/R**

The purpose of performing the SSI analyses on the T/B and E/R (seismic Category II structures) is to ensure adequate gaps exist between seismic Category II structures and adjacent seismic Category I structures. The SSI analysis will provide input for evaluating the stability of these buildings during a safe shutdown earthquake (SSE).

- a. The structural models for the SSI analyses will use:
  - i. Stiffness properties: full (uncracked concrete) stiffness for foundation
  - ii. Damping properties: OBE values
  - iii. Site-specific design modifications that reflect departures from the standard plant design (e.g., foundation elevations, separate foundations)
- b. The SSI analyses for the T/B and E/R will use site-specific FIRS and SSI input based on the new CEUS model.

## **North Anna Unit 3**

### **Seismic Closure Plan**

#### **S-COLA Impacts**

Dominion has performed a preliminary review of the S-COLA, based on the strategy described above, to identify the impacts that the seismic work will have on the S-COLA content. The attached table provides a summary of the planned changes, and the dates that the changes will be submitted to the NRC. These changes will be submitted in a form that is agreeable to NRC project management.

#### **RAI Impacts**

Dominion will perform a review of the NRC's Requests for Additional Information (RAIs) to determine if they are impacted by the seismic work described in this SCP. The review will identify RAI responses previously submitted that require revision. The review will also include any seismic-related RAIs issued by the NRC for which Dominion has not yet provided a response. The results of the review, and an associated response schedule, will be provided to the NRC by September 30, 2012.

## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
<b>S-COLA Part 2, FSAR Chapter 1</b>			
FSAR Section 1.2, General Plant Description	Plot plan and general arrangement figures:  Figures 1.2-1R through 1.2-48R Figures 1.2-201 through 1.2-211	Revise figures to reflect changes to the plot plan due to the new standard plant layout and associated site-specific changes	May 2013
FSAR Section 1.8, Interfaces for Standard Design	Table 1.8-202, Departures from the Referenced Certified Design  NAPS DEP 3.7(2) NAPS DEP 3.7(4) NAPS DEP 3.7(5) NAPS DEP 10.4(1)	Delete NAPS DEP 3.7(2), Site Response Analysis: DCD is being revised to allow a site response analysis to be performed considering the material above the control point  Delete NAPS DEP 3.7(4), Temporary Departure Related to Technical Reports MUAP-10001 and MUAP-10006: S-COLA work will be consistent with the MUAPs that will be referenced in DCD Rev. 4  Delete NAPS DEP 3.7(5), Continued Use of RG 1.165: Development of North Anna Unit 3's ground motion response spectra (GMRS) will be based on RG 1.208 rather than on RG 1.165  Update NAPS DEP 10.4(1) to address the departure from the general arrangement and foundation of the standard plant design of the T/B and E/R  Add departure NAPS DEP 3.7(6) to describe any differences in seismic methodologies as a result of applying site-specific soil	May 2013

## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
		properties and vibratory ground motion (e.g., sliding stability approach, embedment assumptions for SSI analyses)	
FSAR Section 1.9, Conformance with Regulatory Criteria	Table 1.9-202, Conformance with Regulatory Guides: RG 1.132 RG 1.165 RG 1.208	Add exception to RG 1.132 for not having borings every 100 ft for tunnels and no boring directly beneath the east PSFSV  Revise conformance evaluations for RG 1.208 and RG 1.165. New PSHA and GMRS analyses will be consistent with RG 1.208 rather than the NRC-withdrawn RG 1.165.	May 2013
<b>S-COLA Part 2, FSAR Chapter 2</b>			
FSAR Section 2.0, Site Characteristics	Table 2.0-201, Evaluation of Site/Design Parameters and Characteristics  Subsections: Geology, Seismology, and Geotechnical Engineering; and Vibratory Ground Motion	Revise the referenced subsections in the table to reflect revised DCD and S-COLA seismic information, including plot plan changes due to the new standard plant layout and associated site-specific changes, revised bearing capacity demands and allowable settlements, and revised GMRS.	February 2013
FSAR Section 2.0, Site Characteristics	Comparisons of Spectra for ESP SSE and Unit 3 GMRS:  Tables 2.0-202 and 2.0-203 Figures 2.0-206 and 2.0-207	Revise comparisons of response spectra for ESP SSE and GMRS to reflect the new GMRS, which will be calculated using the new CEUS input and RG 1.208 guidance.	February 2013
FSAR Section 2.0, Site Characteristics	Figure 2.0-205, Unit 3 Power Block Building Locations Within the ESP Proposed Facility Boundary	Revise power block building locations due to the new standard plant layout and associated site-specific changes	February 2013
FSAR Section 2.1,	Figure 2.1-201, Site Plan	Revise site plan due to the new standard plant layout and associated	October

## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
Geography and Demography	Topography	site-specific changes	2012
FSAR Section 2.4, Hydrology	<p>FSAR Section 2.4.12.4, Design Basis for Subsurface Hydrostatic Loading</p> <p>FSAR Section 2.4.13, Accidental Releases Radioactive of Liquid Effluents to Ground and Surface Waters</p> <p>Figure 2.4-201, Site Layout and Sub-Basin Drainage Areas</p> <p>Figure 2.4-203, Cross-Section Locations</p> <p>Figures 2.4-206 through 2.4-216, Observation Well Location Plan and Piezometric Head Contour Maps</p> <p>Figure 2.4-219, Plan View of Subsurface Pathway for Accidental Release</p>	<p>Revise 'R/B complex and PS/B' to R/B Complex' in Section 2.4.12.4.</p> <p>Revise the location of the Holdup Tank; however, analysis results are not expected to be affected due to conservatisms made regarding the pathway for an accidental release.</p> <p>Revise the background of figures in FSAR Section 2.4 to due to the new standard plant layout and associated site-specific changes</p>	November 2012

### North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
	Figure 2.4-220, Particle Tracks from Auxiliary Building  Figure 2.4-221, Supercritical Flow Regime & Hydraulic Jump Locations		
FSAR Section 2.5, Geology, Seismology and Geotechnical Engineering	SSAR Section 2.5 EPRI-SOG model RG 1.165 discussions	Add content in FSAR Section 2.5. The SSAR was based on the EPRI-SOG model and RG 1.165. The new seismic work is based on the new CEUS-SSC model and RG 1.208.	July 2012
FSAR Section 2.5.1, Basic Geologic and Seismic Information	SSAR Section 2.5.1 EPRI-SOG model RG 1.165 discussions	Replace EPRI-SOG and RG 1.165 discussions in the SSAR and describe the new CEUS-SSC model and information required by RG 1.208. Add a description of the August 2011 Mineral, VA, earthquake.	July 2012
FSAR Section 2.5.2, Vibratory Ground Motion	SSAR Section 2.5.2 PSHA GMRS RG 1.165 methodology  PSHA and GMRS-related tables and figures: Table 2.5-201 Figure 2.5-53R Figure 2.5-201  Figure 2.5-20a2 through -202j	Replace SSAR Section 2.5.2 content, including tables and figures, with new PSHA and GMRS that are calculated with CEUS-SSC input, RG 1.208 methodology, and with R/B Complex basemat foundation level (deeper embedment due to thicker basemat). Several figures and tables will be added to FSAR 2.5.2 to reflect the new PSHA and GMRS development that replaces the SSAR content.	January 2013

### North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
FSAR Section 2.5.3, Surface Faulting	Surface faulting	Update FSAR 2.5.3 with new information related to the August 23, 2011, earthquake near the North Anna site	July 2012
FSAR Section 2.5.4, Stability of Subsurface Materials and Foundations	<p>Shear Wave Velocity Profiles Settlement Liquefaction analysis Bearing capacity Excavations</p> <p>Table 2.5-215 Table 2.5-216 Figure 2.5-209 – 214 Figure 2.5-221 – 222 Figure 2.5-229 – 234 Figure 2.5-241b, f, g, h Figure 2.5-255</p>	<p><u>Shear Wave Velocity</u> Remove discussion that addresses shear wave velocity (<math>V_s</math>) profiles for the East and West PS/Bs as separate structures. Replace the R/B discussion with information to address <math>V_s</math> profiles for the new combined R/B Complex basemat that supports the PCCV, CIS, R/B, PS/Bs, and A/B. Add a discussion concerning the new T/B and ER <math>V_s</math> profiles. Add additional detail to existing information for all of the ESWPT segments. Modify the description of the East and West PSFSVs' as a result of the combined R/B Complex basemat.</p> <p>Remove discussion that addresses <math>V_s</math> profiles for the UHSRS pipe chase as a separate structure, due to the design change that places a joint at its mid-length and integrates each half with the adjacent UHS.</p> <p><u>Settlement</u> Replace the settlement estimates for the separate structures affected by the common R/B Complex basemat change (PCCV, CIS, R/B, PS/Bs, and A/B) with a settlement estimate of the new common R/B Complex basemat. Remove the settlement estimate for the UHSRS pipe chase. Add an estimate for the E/R and revise the T/B estimate (the E/B and T/B will have separate foundations, which will be a departure from the DCD). Revise the estimate to include all ESWPT segments .</p> <p><u>Liquefaction</u> There is a potential need to revise the analyses in FSAR 2.5.4.8, 'Liquefaction Potential,' but the conclusions are likely to remain the</p>	January 2013

## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
		<p>same.</p> <p><u>Bearing Capacity</u> Revise the bearing capacity estimates (both allowable and applied) for the structures affected by the common R/B Complex basemat change (PCCV, CIS, R/B, PS/Bs, and A/B). Revise the T/B estimates and add the E/R estimate, due to separating the T/B and E/R foundations (departure). Revise the estimate to include all ESWPT segments.</p> <p><u>Excavations</u> Revise affected drawings showing the R/B Complex foundation elevation to reflect the common R/B Complex basemat foundation elevations. Remove the A/B, PS/Bs, and UHSRS pipe chase.</p>	
Section 2.5.5, Stability of Slopes	Slope stability	The seismic slope stability analysis described in FSAR Sections 2.5.5.2.3 and 2.5.5.2.4 will need to be re-performed using updated seismic information resulting from the use of the new CEUS model. It is expected that the overall conclusions will remain unaffected (slopes will remain stable), however, values may be revised.	February 2013
<b>S-COLA Part 2, FSAR Chapter 3</b>			
FSAR Section 3.5.1.6, Aircraft Hazards	Total effective plant areas and accident probabilities	Revise total effective plant areas and accident probabilities to incorporate the impact of the new standard plant layout	November 2012
FSAR Section 3.7.1, Seismic Design Parameters	<p>All existing FIRS</p> <p>Information pertaining to separate foundations for the</p>	Revise Section 3.7.1 and Appendix 3.OO (text, table and figures) to address the output of the CEUS methodology, the new RG 1.208 methods, and the new plant layout. The new PSHA revision due to the new CEUS will revise all input profiles and FIRS, which will result	April 2013



## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
<p>FSAR Appendix 3.OO, Site Response Analysis and Development of SSI Analysis Input</p> <p>S-COLA Part 11, Model Properties and Seismic Analysis Results for Site-Specific Seismic Category I Structures (Note: The contents of S-COLA Part 11 will be integrated in the contents of FSAR Sections 3.7 and 3.8, and Appendices 3KK, 3LL, and 3MM. S-COLA Part 11 will be deleted.)</p>	<p>R/B Complex, A/B, and PS/B structures.</p> <p>New T/B FIRS</p> <p>Use of power source building (PS/B) FIRS for seismic analysis of power source fuel storage vaults (PSFSVs)</p> <p>Elimination of UHSRS Pipe Chase between UHS B and C</p>	<p>in revisions to the maximum SSE, the minimum SSE, and the OBE.</p> <p>Remove the description, tables, and figures for the FIRS for the PS/Bs and the current configuration of the R/B complex and replace with new FIRS for the common R/B Complex basemat</p> <p>Add discussion and additional tables and figures, as necessary, for new FIRS for the essential service water pipe tunnel (ESWPT) segments.</p> <p>Add discussion and additional tables and figures, as necessary, for the new FIRS for the T/B</p> <p>Incorporate revised PSFSV FIRS developed at the elevation at the bottom of the PSFSV foundation (instead of using the previously developed FIRS for the PS/Bs).</p> <p>Eliminate the UHSRS pipe chase due to the design change that places a joint at its mid-length and integrates each half with the adjacent UHS</p> <p>Delete DEP 3.7(2), Site Response Analysis</p> <p>Delete DEP 3.7(4), Temporary Departure Related to Technical Reports MUAP-10001 and MUAP-10006</p> <p>Delete DEP 3.7(5), Continued Use of RG 1.165</p>	

## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
		Update NAPS DEP 10.4(1) to address the departure from the general arrangement and foundation of the standard plant design of the T/B and E/R	
FSAR Section 3.7.1.2, Percentage of Critical Damping Values	Damping values	Revise SSE damping values to OBE damping values	April 2013
FSAR Section 3.7.1.3, Supporting Media for Seismic Category I Structures	Basemat dimensions	Revise foundations and dimensions to reflect common R/B Complex basemat	April 2013
FSAR Section 3.7.2, Seismic System Analysis	FSAR commitment to perform site-specific SSI analyses for T/B and A/B  Generation of ISRS using SSE damping values	Revise to reflect the completion of the T/B SSI analyses. The A/B will be included in the SSI analysis for the NI complex.  Revise text to reflect common basemat for PS/Bs, CIS, PCCV, R/B, and A/B  Revise discussion and ISRS to reflect use of OBE damping values to generate ISRS for site-specific structures and site-specific analyses of R/B complex.	April 2013
FSAR Section 3.7.2.1, Seismic Analysis Methods	References to Appendices 3NN and 3LL	Revise to add references to Appendices 3KK, 3LL, 3MM, and 3NN, as appropriate.	April 2013
FSAR Section 3.7.2.2, Natural Frequencies and Responses	References to discussions on dynamic model and development of ISRS	Delete NAPS DEP 3.7(4)  Revise text to reflect common R/B Complex basemat for R/B, PS/Bs, and A/B	April 2013
FSAR Section 3.7.2.3.1, General	References to appendices	Update reference from Appendix 3LL to appropriate appendices	April 2013

## North Anna Unit 3 Seismic Closure Plan

S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
Discussion of Analytical Models			
FSAR Section 3.7.2.3.2, R/B, PCCV, and Containment Internal Structure Lumped Mass Stick Models	All S-COLA text	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.7.2.3.3, East and West PS/Bs Models	All S-COLA text	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.7.2.3.4, Subsystem Coupling Requirements	All S-COLA text	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.7.2.3.6.1, Mass Points and Associated Weights (W)	All S-COLA text	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.7.2.4, Soil-Structure Interaction	All S-COLA text	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.7.2.4.1, Requirements for Site-Specific SSI Analysis of US-APWR Standard	Site-specific analysis of standard plant	Revise text to reflect common R/B Complex basemat structures  Revise reference to Appendix 3NN  Delete NAPS DEP 3.7(2) and NAPS DEP 3.7(4)	April 2013

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S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
Plant			
FSAR Section 3.7.2.5, Development of Floor Response Spectra	Development of ISRS	Revise text to reflect common R/B Complex basemat structures  Replace references to Appendix 3H, MUAP-10001, and MUAP-08005 with MUAP-10006  Delete NAPS DEP 3.7(4)	April 2013
FSAR Section 3.7.2.8, Interaction of Non-Category I Structures with Seismic Category I Structures	Basis for not performing site-specific structure-soil-structure (SSSI) analyses	Add site-specific SSSI analyses and results	April 2013
FSAR Section 3.7.2.8.6, PS/Bs	All S-COLA text	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.7.3.9, Methods of Seismic Analysis of Aboveground Tanks	Reference to appendix	Revise reference to Appendix 3LL to appropriate appendix	April 2013
FSAR Section 3.7.4.1	Comparison with RG 1.12	Revise location of seismic monitor description to reflect common R/B Complex basemat	April 2013
FSAR Section 3.7.5	COL information	Revise references to appropriate appendices for COL 3.7(3), 3.7(12), and 3.7(26)	April 2013
FSAR Section 3.7.6, References	References	Delete text and incorporate the DCD text by reference	April 2013
FSAR Section 3.8.4.1.3.1, ESWPT	Configuration of ESWPT and UHSRS Pipe Chase	Revise Figure 3.8-201 to reflect new configuration  Eliminate the UHSRS Pipe Chase due to the design change that places a joint at its mid-length and integrates each half with the	May 2013

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S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
		adjacent UHS  Revise text that discusses ESWPT segments	
FSAR Section 3.8.4.1.3.2, UHSRS	Discussion of UHS basin foundations  Discussion of UHSRS Pipe Chase	Revise reference from Appendix 3LL to Appendix 3KK  Update the discussion of the separate foundations for the UHS basins to reflect the combined foundation for Basin A with B, and Basin C with D  Remove discussion on UHSRS Pipe Chase as a separate structure	May 2013
FSAR Section 3.8.4.1.3.3, PSFSV	Reference to appendix	Revise the reference from Appendix 3LL to 3MM	May 2013
FSAR Section 3.8.4.4.2, East and West PS/Bs	All S-COLA text	Delete text and incorporate the DCD text by reference	May 2013
FSAR Section 3.8.4.4.3.1, ESWPT	ESWPT	Revise text that discusses ESWPT segments	May 2013
FSAR 3.8.4.4.3.2, UHSRS	Discussion on soil springs  Discussion on RSA	Revise reference from Appendix 3LL to Appendix 3KK  Revise discussion on soil springs to reflect use of super-elements for the UHSRS, rather than soil springs  Revise the seismic analyses discussion to be based only SSI analyses. RSA will not be performed.	May 2013
FSAR Section 3.8.5.1.2, Power Source Buildings	PS/Bs	Delete text (and referenced table and figure) and incorporate the DCD text by reference	May 2013
FSAR Section 3.8.5.1.3.1, ESWPT	References to Segment 1	Revise text that discusses ESWPT segments. Update all descriptions pertaining to building interfaces with the ESWPT	May 2013

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	ESWPT Segment 2 interface with T/B		
FSAR Section 3.8.5.4.3, UHSRS	All S-COLA text	Delete text and incorporate the DCD text by reference	May 2013
FSAR Section 3.8.5.4.4, Analysis of Settlement	Settlement of standard plant structures	Revise text to reflect common NI basemat	May 2013
FSAR Section 3.8.5.5, Structural Acceptance Criteria	Sliding, overturning, and bearing pressure	Revise sliding/overturning analyses results to incorporate revised input and to reflect a common R/B Complex basemat and DCD sliding stability methodology and criteria  Add sliding/overturning analyses for the T/B  Revise the bearing pressures based on revised input and change to common R/B Complex basemat	May 2013
FSAR Section 3.8.6, COL Item	COL 3.8(29)	Revise reference to appropriate appendix	May 2013
FSAR Appendix 3H, Model Properties for Lumped Mass Stick Models of R/B-PCCV-Containment Internal Structure on a Common Basemat	Use of MUAP-10001, Rev. 1 LSM properties, as addressed in DEP 3.7(3)	Delete text and incorporate the DCD text by reference	May 2013
FSAR Appendix 3KK, Site Specific Analysis for UHSRS	Site-specific analysis for UHSRS	Create new appendix to incorporate the updated input ground motion, and the updated model that combines the foundation of UHS Basin A with UHS Basin B, and UHS Basin C with UHS Basin D, and combines the UHSRS Pipe Chase and revised site-specific analysis	May 2013

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S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
		<p>results for the UHSRS (previously addressed in Appendix 3LL with reference to S-COLA Part 11)</p> <p>Add SSSI effects for UHSRS</p> <p>Revise to reflect use of super-elements for UHSRS, rather than solid springs</p> <p>Revise the seismic analyses discussion to be based only on SSI analyses. RSA will not be performed</p> <p>Revise seismic analyses to assume full (uncracked concrete) stiffness and OBE damping. Single-degree-of-freedom (SDOF) will be introduced in the model where appropriate to capture out-of-plane responses.</p>	
FSAR Appendix 3LL, Site Specific Analysis for ESWPT	Site-specific analysis for ESWPT	<p>Revise to incorporate the updated input ground motion and revised site-specific analysis results for ESWPT (previously addressed in Appendix 3LL with reference to S-COLA Part 11)</p> <p>Update all descriptions pertaining to building interfaces with the ESWPT</p> <p>Add SSSI effects for ESWPT</p> <p>Eliminate UHSRS Pipe Chase</p> <p>Revise fill concrete minimum compressive strength from 3000 psi to 2500 psi</p>	May 2013

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S-COLA Part	Summary of Affected Contents of S-COLA	Summary of Planned Revisions to Content	Scheduled Submittal Date to NRC
		<p>For upper bound (EUB) profiles, extend the maximum SSI cutoff frequencies for embedded models up to 50 Hz</p> <p>Revise seismic analyses to assume full (uncracked concrete) stiffness and OBE damping. SDOF will be introduced in the model where appropriate to capture out-of-plane responses and member stiffness properties will be adjusted, if necessary, to assure conservative design.</p>	
FSAR Appendix 3MM, Site Specific Analysis for PSFSVs	Site-specific analysis for PSFSVs	<p>Add new appendix to incorporate the updated input ground motion and revised site-specific analysis results for PSFSVs (previously addressed in Appendix 3LL with reference to S-COLA Part 11)</p> <p>Revise fill concrete minimum compressive strength from 3000 psi to 2500 psi</p> <p>Revise analysis to reflect use of super-elements for PSFSVs, rather than soil springs</p> <p>Revise seismic analyses to be based only on SSI analyses. RSA will not be performed.</p> <p>Revise PSFSV roof thickness to be a constant thickness, with the bottom of the roof slab sloped to match the top of the roof slab</p> <p>Revise seismic analyses to assume full (uncracked concrete) stiffness and OBE damping. SDOF will be introduced in the model where appropriate to capture out-of-plane responses and member</p>	May 2013



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		<p>stiffness properties will be adjusted, if necessary, to assure conservative design.</p> <p>For EUB profiles, extend the maximum SSI cutoff frequencies for embedded to 50 Hz</p>	
FSAR Appendix 3NN.1, Introduction	SSI analysis for PCCV, CIS, R/B, and PS/B	<p>Revise text to reflect common R/B Complex structures and reference to MUAP-10006</p> <p>Update all descriptions pertaining to building interfaces with the ESWPT</p>	May 2013
Appendix 3NN.2, Seismological and Geotechnical Considerations	Description of use of LB, BE, and UB profiles' properties from Appendix 3OO in SSI analyses	<p>Update descriptions based on revised properties from Appendix 3OO</p> <p>Revise text to reflect updated R/B Complex configuration</p> <p>Update all descriptions pertaining to building interfaces with the ESWPT</p>	May 2013
Appendix 3NN.3.1, ACS SASSI Model Description and Analysis Approach	Used R/B Complex stiffness values from MUAP-10001, Rev. 1 in the site-specific analyses for structural evaluation and generation of ISRS	<p>Use full shear stiffness (uncracked concrete) values for site-specific analyses of R/B Complex. Use OBE damping. SDOF will be introduced where appropriate in the dynamic FE model to capture out-of-plane vibration effects. Revise text to reflect common R/B Complex and reference to MUAP-10006.</p> <p>Update all descriptions pertaining to building interfaces with the ESWPT</p>	May 2013
Appendix 3NN.3.2, ACS SASSI Model Description and Analysis Approach	Used dynamic FE models for PS/B seismic models, resulting in DEP 3.7(3)	Delete text and incorporate the DCD text by reference	May 2013
Appendix 3NN.3.2,	Used PS/B complex stiffness	Delete text and incorporate the DCD text by reference	May 2013

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<b>S-COLA Part</b>	<b>Summary of Affected Contents of S-COLA</b>	<b>Summary of Planned Revisions to Content</b>	<b>Scheduled Submittal Date to NRC</b>
ACS SASSI Model Description and Analysis Approach	values from MUAP-10001, Rev. 1 in the site-specific analyses for structural evaluation and generation of ISRS		
Appendix 3NN.4, Seismic Analysis Results	Comparisons of R/B Complex and PS/B standard plant analysis results to site-specific analyses results	Update comparisons based on revised analyses' results  Revise text to reflect updated R/B Complex configuration  Add SSSI effect for R/B Complex  Update all descriptions pertaining to building interfaces with the ESWPT	May 2013
FSAR Appendix 3NN.3, ACS SASSI Model Description and Analysis Approach  FSAR Appendix 3NN.4, Seismic Analysis Results	Cutoff frequencies for site-specific SSI analyses of R/B Complex and PS/B surface models are at 50 Hz	Add discussion of results of studies with cutoff frequencies extended up to 50 Hz for the upper bound (EUB) soil cases  Delete portion related to PS/B model and analyses	May 2013
FSAR Appendix 3NN.6, Lateral Earth Pressure	Lateral earth pressure	Revise to reflect updated R/B complex configuration  Update SASSI calculated earth pressures in the figures to show results from SSI analyses of R/B Complex  Update all descriptions pertaining to building interfaces with the ESWPT	May 2013

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<b>S-COLA Part</b>	<b>Summary of Affected Contents of S-COLA</b>	<b>Summary of Planned Revisions to Content</b>	<b>Scheduled Submittal Date to NRC</b>
FSAR Appendix 3NN.7, Reference	Reference	Delete reference to MUAP-10001. Update MUAP-10006 revision number.	May 2013
<b>S-COLA Part 2, FSAR Chapter 6</b>			
FSAR Section 6.4, Habitability Systems	6.4.4.2 Toxic Gas Protection  Table 6.4-201 MCR Toxic Gas Concentrations	Revise Table 6.4-201 due to changes in distance for the MCR Habitability analysis due to the T/B moving south.	October 2012
<b>S-COLA Part 2, FSAR Chapter 8</b>			
FSAR Section 8.2, Offsite Power System	Figure 8.2-202, 500/230 kV Switchyard Arrangement	Revise site plan to reflect common foundation and new plant layout	December 2012
FSAR Section 8.3, Onsite Power Systems	Layout of site structures  Ground grid and lightning protection system	Revise to reflect plot plan and building arrangement changes. A change in the arrangement/relationship of the site structures could affect the design, arrangement, and location of the ground grid and the lightning protection system.	December 2012
<b>S-COLA Part 2, FSAR Chapter 9</b>			
FSAR Section 9.2.5	UHS Pipe Chase design  Figure 9.2.5-1R, Ultimate Heat Sink Flow Diagram	Update figure and text to eliminate the UHSRS Pipe Chase due to the design change that places a joint at its mid-length and integrates each half with the adjacent UHS	November 2012
FSAR Section 9.4	Table 9.4-201, Equipment Design Data	Site-specific cooling and heating loads may change for Non-Class 1E and Class 1E Electrical Rooms due to building size or equipment layout changes	November 2012

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FSAR Sections 9.5 and 9A  Figure 9.5-201, Fire Protection System Schematic  Figure 9.5-204, Fire Main Arrangement  Figures 9A-13R, 14R, 20R, and 27R, Fire Zones and Fire Areas	Fire zones and fire areas for ESWPT and PSFSVs  Figure 9.5-201, Fire Protection System Schematic  Figure 9.5-204, Fire Main Arrangement  Figures 9A-13R, -14R, -20R, and -27R, Fire Zones and Fire Areas	Update Fire Hazard Analysis Summary and Fire Zone/Fire Area Interfaces  Revise Figures 9.5-201, 9.5.1-204, and 9A-27R to reflect new plant layout  Revise Figure 9A-13R and -14R to reflect wall alignment changes  Revise Figures 9A-20R through 9A-26R to reflect new T/B layout  Revise Figure 9A-201 to reflect new UHSRS layout	November 2012
<b>S-COLA Part 2, FSAR Chapter 11</b>			
FSAR Section 11.5, Process Effluent Radiation Monitoring and Sampling System	FSAR Figures 11.5-2aR through 11.5-2eR, 11.5-2gR through 11.5-2kR, Locations of Radiation Monitors	Revise radiation monitor location figures to reflect new plant layout figures	December 2012
<b>S-COLA Part 2, FSAR Chapter 12</b>			
FSAR Section 12.3,	Figures 12.3-1R through 12.3-6R, 12.3-11R,	Revise radiation zone maps to reflect building arrangement changes. It is unlikely that the internal building layout and radiation zones will	December

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	Radiation Zone Maps  Table 12.3-1R, Thicknesses of Concrete Walls	be affected.  Revise thicknesses of concrete walls that enclose major components to be consistent with Chapter 3	2012
<b>S-COLA Part 2, FSAR Chapter19</b>			
Chapter 19, Probabilistic Risk Assessment and Severe Accident Evaluation	Seismic margins  External events PRA	Revise seismic margins, if required  Revise external events PRA, if required	January 2013
<b>S-COLA Part 7, Departures Report</b>			
DEP 3.7(1), Seismic Spectra Exceedance	Groundwater level for overturning and sliding, alternative methodology for overturning	Delete the section of the departure associated with the PS/B basemat design  Update all descriptions pertaining to building interfaces with the ESWPT	May 2013
DEP 3.7(2) Site Response Analysis	Site response analysis methodology	Delete departure. DCD Revision 4 will allow a site response analysis to be performed considering the material above the control point	May 2013
DEP 3.7(4), Temporary Departure Related to Technical Reports MUAP-10001 and 10006	Seismic analysis methodologies	Delete DEP 3.7(4). Temporary departure will no longer be applicable	May 2013

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NAPS DEP 3.7(5), Continued Use of Regulatory Guide 1.165	Continued use of RG 1.165	Delete NAPS DEP 3.7(5) to reflect the change in PSHA/GMRS methodology to that of RG 1.208 from that of RG 1.165.	May 2013
NAPS DEP 3.7(6), Seismic Methodology Assumptions	Seismic analysis methodologies	Add NAPS DEP 3.7(6) to describe any differences in seismic methodologies as a result of applying site-specific soil properties and vibratory ground motion (e.g., sliding stability approach, embedment assumptions for SSI analyses)	May 2013
NAPS DEP 10.4(1)	Main Condenser Type Change	Update NAPS DEP 10.4(1) to address the departure from the general arrangement and foundation of the standard plant design of the T/B and E/R	May 2013
NAPS ESP VAR 2.0-4, Vibratory Ground Motion	NAPS ESP VAR 2.0-4, Vibratory Ground Motion  PSHA/GMRS-related revisions	Revise variance NAPS ESP VAR 2.0-4  The PSHA and GMRS will be revised due to the use of the new CEUS models. The new common R/B Complex basemat will also create a minor change to the descriptive text.	May 2013
<b>S-COLA Part 8, Enclosures</b>			
S-COLA Part 8	Physical Security Plan (PSP)  Loss of Large Areas (LOLA) Report  Physical Security Plant Systems Report  Supplement to US-APWR	Revise documents due to new standard plant layout and associated site-specific changes	PSP, LOLA: November 2012  January 2013: Supplement to HAE Supplement

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	High Assurance Evaluation (HAE) Assessment  Supplement to US-APWR Design Certification Physical Security Element Review (SER)		to SER  February 2013: PSPSR
<b>S-COLA Part 10</b>			
S-COLA Part 10	Figure A.3-1  Figure A.3-2	Revise figure due to new standard plant layout and associated site-specific changes  Update concrete wall thickness to be consistent with FSAR Chapter 3	December 2012
<b>S-COLA Part 11, Enclosures</b>			
S-COLA Part 11, Model Properties and Seismic Analysis Results for Site-Specific Category I Structures	All contents	The contents of S-COLA Part 11 will be integrated into the contents of FSAR Sections 3.7 and 3.8, and Appendices 3KK, 3LL, and 3MM	May 2013