

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
091015S006	<p>The staff requested that GEH justify cases with lower passing frequencies (General). This was identified on slide 6 (33 Hz for Full Column LB)</p> <p>Action 1 Example: For Slide 6, the NRC asked for justification for the 83 percent captured motion energy for the RB/FB full column LB 33 Hz cases to ensure that, had the LB soil column cases been refined such that their passing frequencies were not lower than 50 Hz, the responses from these refined LB cases are still bounded by the BE and UB cases.</p>	CB-FWSC SSSI Report	<p>Refer to similar Item 091015S063.</p> <p>CB-FWSC SSSI report will also be revised to further justify the use of cut-off frequencies < 50 Hz for FWSC-CB SSSI analyses by providing references to figures and tables.</p> <p>Revise CB-FWSC SSSI report to address the issue of missing reference to specific figures.</p>	Closed	Report WG3-U73-ERD-S-0002 Revision 5 provided to the NRC November 30, 2015 (NA3-15-032)
091015S028B	NRC Action #7, Slide 28: FSAR Tables 3A.15-201 through 3A.15-206 should be updated as appropriate to reflect the additional SSI/SSSI analyses performed.	FSAR 3A.15	Revise FSAR Tables 3A.15-201 through 3A.15-206 to add the additional analyses of FWSC cracked model for BE case and SSI and SSSI analyses performed for the FWSC concrete fill soil separation study.	Confirmatory	Included in December 2015 FSAR markups; NA3-15-037 (12/16/2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
091015S029A	Since the FWSC-CB SSSI effects are impacting the responses, the staff questioned whether there are any other neighboring buildings that could contribute to the SSSI effects of the CB and FWSC in the x-direction (perpendicular to the two buildings). As such, please justify why the potential effect of SSSI on other Category I structures (RB/FB) considering the structures aligned in another direction (e.g., RB/FB-TB) will not be important.	COLA Part 10	Revise ITAAC for seismic Category II Structures (Turbine Building, Service Building, and Ancillary Diesel Building) and Radwaste Building to be specific regarding adjacent seismic Category I structures.	Confirmatory	Included in December 2015, COLA Part 10 markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S032A	Staff requested the Figures showing the NEI check was met by comparing PBSRS with the envelope of surface response spectra obtained from final SSI input time-histories at the surface of the LB, BE, and UB soil columns.	FSAR Section 3.7.1	<p>Revise FSAR Sections 3.7.1.1.5.1.1 and 3.7.1.1.5.1.2, and Figures 3.7.1-295 through 3.7.1-306 as follows:</p> <ul style="list-style-type: none"> • Take out the smoothed curves in the NEI check figures and replace with figures showing raw ARS. • Provide corresponding discussion in the FSAR text justifying specific dips in in RB/FB and CB ARS. For CB ARS, refer to the sensitivity study performed to justify dip at ~14hz is inconsequential. • Formally document the sensitivity study but it is not necessary to reference the documents in the FSAR or submit the documents to the NRC as they can remain auditable documents. 	Confirmatory	Included in December 2015, FSAR markups; NA3-15-037 (December 16, 2015).
091015S040B	NRC Action #12, Slides 40 and 60: Staff will review V&V of ACS SASSI for application to North Anna 3 sensitivity analysis. Same as 091015S060B.	FSAR Section 3.7.2 or 3A	Revise FSAR to incorporate conclusions from the RB/FB SSI report, Appendix I.	Confirmatory	Included in December 2015, FSAR markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S042B	NRC Action #13, Slide 43: Dominion will revise the FWSC seismic analysis report to include results from two additional sensitivity analyses on FWSC. The report should also reflect additional SSI/SSSI analysis being performed for soil separation.	FWSC Seismic Analysis Report	Revise the FWSC seismic analysis report (WG3-U63-ERD-S-0001) to refer to FWSC concrete block separation study calculations additional SSI/SSSI analysis being performed for soil separation.	Confirmatory	<p>[Included in December 2015, FSAR markups; NA3-15-037 (December 16, 2015). [FSAR Appendix A.]</p> <p>Report WG3-U63-ERD-S-0001, Revision 2 submitted to NRC December 16, 2016 (NA3-15-033).</p> <p>Report SER-DMN-034 posted in Electronic Reading Room for NRC Audit.</p>
091015S063	Discussion on the last paragraph of Page 17 of 602 is not clear without any reference to specific Figures. Please as an example, discuss with reference to specific Figures in the report.	FWSC Seismic Analysis Report, RB/FB Seismic Analysis Report, CB Seismic Analysis Report	RB/FB, FWSC and CB reports revised to include references. (CB-RB/FB SSSI is being revised as noted in Item 091015S006.)	Closed	<p>Report WG3-U71-ERD-S-0001 (RB/FB) Revision 3 provided to the NRC November 30, 2015 (NA3-15-032)</p> <p>CB and FWSC Seismic Analysis Reports (WG3-U73-ERD-S-001; WG3-U63-ERD-S-0001) submitted December 16, 2015 (NA3-15-033).</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S065B	NRC Action #15, Slide 65: Dominion is revising CB and FWSC seismic analysis reports to clarify the method of determining the potential uplift and contact ratio of the foundation mat. The staff will review this issue during Audit-1.	FWSC Seismic Analysis Report, FSAR Section 3.7.2 or 3A	Revise the FWSC SSI report to correct the following errors: -Section 5.5, Item 1: Change to "The FWSC structure and model..." -Section 5.5, Item 7: Change to "(the FWSC seismic weight...)" Revise the FSAR to present a summary of the methodology to calculate foundation uplift as presented in the RB/FB, CB and FWSC Seismic Analysis Reports (including any alternative methods for uplift calculation).	Confirmatory	Report WG3-U63-ERD- S-0001, Revision 2, submitted to NRC 12/16/2015 (NA3-15- 033). Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S067A	According to the guidance in SRP Acceptance Criteria 3.7.2.II.4, uplift for non-symmetric structures may be more affected by the phasing between the three directions of input motions. The RB/FB building is not a symmetric building. The procedure discussed in Section 5.6, "Base Reactions and Contact Pressures," does not explicitly indicate whether and how the phasing of the input motions is considered in the uplift analysis. Therefore, technical justification should be provided if the effect of different phasing of the input motions is not considered in the calculation of the foundation uplift. If the non-symmetric conditions need to be addressed, then the effect of in-phase and out-of-phase input motions can be considered in the SSI analyses by using plus and minus 1.0 times the magnitude of the input motions. This is especially important as the calculated contact ratio is 84 percent, not much higher than the 80 percent criterion.	RB/FB Seismic Analysis Report, CB Seismic Analysis Report, FSAR Section 3.7.2 or 3A	Revise the RB/FB and CB SSI reports to include the results and methodology used for alternative rigid foundation uplift calculations. Add a summary statement to the FSAR.	Confirmatory	Report WG3-U71-ERD-S-0001, Revision 3 (RB/FB), submitted to NRC November 30, 2015 (NA3-15-032). Report WG3-U73-ERD-S-0001, Revision 2 (CB), submitted to NRC December 16, 2015 (NA3-15-033). Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S067B	<p>NRC Action #16, Slide 67: Dominion is performing uplift calculation for RB/FB to address effect of excitation direction and the RB/FB seismic analysis report will be revised. Staff will review this issue during Audit-1.</p> <p>Item 1 equation in Section 5.6 of RB/FB report S(z) is correct and will not be revised because calculations were performed considering two different directions of the vertical earthquake not the absolute value (please refer to results in Table 5.6-1). Since the RB/FB is not symmetrical, the approach used for the RB/FB differs from the one used for the symmetrical CB and FWSC.</p>	RB/FB Seismic Analysis Report, CB Seismic Analysis Report, FSAR Section 3.7.2 or 3A	Revise the RB/FB and CB SSI reports to include the results and methodology used for alternative rigid foundation uplift calculations. Add a summary statement to the FSAR.	Confirmatory	<p>Report WG3-U71-ERD-S-0001, Revision 3 (RB/FB), submitted to NRC 11/30/2015 (NA3-15-032).</p> <p>Report WG3-U73-ERD-S-0001, Revision 2 (CB), submitted to NRC December 16, 2015 (NA3-15-033).</p> <p>Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).</p>
091015S074A	Table 6.2-1 shows that the maximum relative displacements for NA3 are larger than those for the standard design at a few locations but have not been identified as exceedance. This contradicts with the conclusion drawn in Section 6.2, "Enveloping Maximum Displacements."	FWSC Seismic Analysis Report	Revise the conclusions in the FWSC SSI report, Section 6.2, to note that there are a few exceedances of the relative displacements and such exceedances will be considered in the NA3 site-specific design evaluation.	Closed	Report WG3-U63-ERD-S-0001, Revision 2, submitted to NRC December 16, 2015 (NA3-15-033).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S107A	Discussion of NEI Check for the CB in FSAR markup on page 3-25 did not include the basis of acceptability (as provided in the response to RAI 03.07.02-11) of defining the CB control motion at the CB basemat instead of the bottom of the concrete fill below the CB basemat. This basis should be included in the FSAR Section 3.7.1.	FSAR 3.7.1, FSAR Section 3.7.2 or 3A	Revise FSAR Section 3.7.1 to describe comparison presented in response to RAI 03.07.02-11 that demonstrates why SSI analysis at CB basemat Elevation 241 ft is acceptable.	Confirmatory	Included in December 2015, FSAR markups; NA3-15-037 (December 16, 2015).
091015S108A	In FSAR 3.7.1.1.6 markup on page 38 of 623, the site-dependent SSE at-grade response spectra is defined as envelope of the PBSRS for the RB/FB, CB, and the RG 1.60 spectra normalized to 0.1g PGA. The reference site-dependent OBE at-grade response spectra for OBE exceedance check is then defined as one-third of the site-dependent SSE at-grade response spectra. Per the 10 CFR Part 50, Appendix S, no explicit analysis for the OBE is needed if the OBE is defined as one-third of the SSE. The staff further reviewed this issue. For the site-dependent at grade SSE described in FSAR markup Section 3.7.1.1.6 to be acceptable for establishing the reference OBE without an explicit	FSAR 3.7.1	Revise FSAR Sections 3.7.1, 3.7.1.1 and 3.7.1.1.6, associated Tables 3.7.1-216 and 3.7.1-217, and associated Figures 3.7.1-265, 3.7.1-266 and 3.7.1-267 to incorporate clarifier "manifestation" where Site-Dependent SSE at Grade is described.	Confirmatory	Included in December 2015, FSAR and COLA markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	OBE analysis, the individual PBSRS calculated for each of the Category I structures (RB/FB, CB, and FWSC) should envelope the site-dependent SSE at-grade response spectra. Therefore, defining the site-dependent SSE at-grade response spectra as envelope of the PBSRS calculated for the RB/FB and CB, and the RG 1.60 spectra normalized to 0.1g PGA may be less conservative for the purpose of defining the site-dependent at-grade OBE level earthquake for plant shutdown. As such, the applicant is requested to provide further justification.				
091015S116B	NRC 8/31 Question 4 regarding July 2015 letter and markups [Basis for Damping Values in FSAR Table 3A.13.2-201]. NRC Action #20, Slide 116: NRC will review damping values comparing with those values with DCD model during the audit. The basis should be included in the FSAR.	FSAR 3A.13	Revise FSAR Section 3A.13.2 as follows: "Table 3A.13.2-201 provides the damping values used for the site-specific SSI analyses. The damping values are based on RG 1.61, DCD Table 3.7-1, and the DCD model."	Confirmatory	Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S117D	Question 5 regarding July 2015, letter and markups [Approach and criteria for enhancing site-specific seismic demand]: were evaluations performed for the SSSI effects on soil bearing pressure, lateral pressure, and stability.	FWSC Stability Analysis Report, RB/FB Stability Analysis Report, CB-Stability Analysis Report, FSAR 3.8, FSAR 3.7	<p>As described below: revise the RB/FB, CB and FWSC technical reports on stability to be consistent with the results of the updated SSI/SSSI reports justifying the consideration of licensing basis demands for stability, and soil bearing and lateral pressure calculations. Revise FSAR Sections 3.7 and 3.8 accordingly.</p> <p>CB Stability report Section 3 to be revised as follows (use this as example for RB/FB and FWSC stability reports, as required):</p> <p>“As shown in Appendix B of Reference 2-i, the seismic response analyses of the models representing full (uncracked concrete) stiffness properties of the CB reinforced concrete structure provide conservative seismic load demands for the NA3 rock site with high frequency design motion and bound the effects of concrete cracking as described in Appendix B of Reference 2-i and SSSI as described in</p>	Confirmatory	<p>Stability reports WG3-U63-ERD-S-0002, Revision 1 (FWSC), WG3-U71-ERD-S-0003 Revision 1 (RB/FB), and WG3-U73-ERD-S-0003 Revision 2 (CB), were provided to the NRC November 30, 2015 (NA3-15-030)</p> <p>Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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			Reference 2-k." Make sure that design basis in FSAR Section 2.5.4 and 3.7- 3.8 regarding soil bearing pressures are consistent.		

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S123A	The last sentence on Page 31 second paragraph of the CB/FWSC SSSI report (WG3-U73-ERD-S-0002, Revision 3) states that the SSSI effects on the FWS roof out-of-plane loads are enveloped by the corresponding load used for standard design. However, this statement does not appear to be consistent with the Table 6.4-1 entries. In Table 6.4-1, the equivalent standard design acceleration is shown as 1.74g while the flexible mode SSSI and NA3 Site-specific equivalent SSSI accelerations of the roof are shown as 3.98g and 2.30g, respectively. Please address this issue.	FSAR Section 3.7.2 or 3A	<p>Revise FSAR to describe changes similar to those described in the bullets below.</p> <ul style="list-style-type: none"> • Last sentence in Section 6.4 of CB-FWSC SSSI report was revised to correctly state that SSSI effects amplify the seismic load demand on FWS roof and that this site-specific demand is larger than the corresponding load considered in the standard design • As shown in Table 6.2-1 of FWSC Seismic Analysis report, results of FWSC-CB SSSI analyses defined enveloping out-of-plane demand on FWS roof used for site-specific evaluation of FWSC structures 	Confirmatory	<p>FSAR 07/2015 Markups: Tables 3A.18.1.3-203 and 3A.18.1.3-204 Site-Specific Enveloping Maximum Accelerations of FWSC SDOF Oscillators.</p> <p>Section 3A.18 revisions included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S124A	<p>In the CB and RB/FB SSSI report (WG3-U73-ERD-S-0005), the staff noted (on page 22 of 76) that SSSI of the RB/FB has significant effect on the CB torsional response, and the report discussed how this effect is bounded by the standalone SSI analysis of the CB. The staff also noted (on page 23 of 76) that SSSI of the RB/FB has significant effect on the lateral pressures on the CB west wall facing the RB/FB, and report stated that only significant exceedance that can be observed at the bottom level of the basement has no effects on the CB below-grade wall design. These bases should be reflected in the FSAR markup Section 3A.17.11.</p> <p>In addition, FSAR Section 3A.17.11 markup discusses the SSSI effect of the RB/FB on the CB. On page 372 of 623 of the FSAR markup, it is stated that the site-specific SSSI evaluations show that the SSSI between the CB and the RB/FB have small effects on the seismic response of the CB. However, the FSAR does not discuss how these effects are being considered in the site-specific demand and ISRS. The FSAR should include how these</p>	FSAR 3A.17	<p>Revise FSAR Section 3A.17.11 to explain how exceedances are addressed. FSAR changes will be made to address exceedances in CB response due to RB/FB SSSI effects (similar to how Issue Number 006 will be addressed). This will include an explanation on how these exceedances are addressed in site-specific evaluations. The FSAR change will pull together and summarize information from various reports as per the request from the NRC.</p> <p>Refer to Issue 0910GEN01 for providing further information regarding justification of torsional demand exceedances.</p> <p>Refer to issue 092815A1003.</p>	<p>Closed</p> <p>New Action Item 010616006 is created</p>	Additions to 3A.17.11 included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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	effects are being addressed in the site-specific seismic demand evaluation.				

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S125	In the CB and RB/FB SSSI report (WG3-U73-ERD-S-0005), the report (on Page 21 of 76) identified that the vertical ISRS response considering the SSSI effect could exceed by 5 percent at a frequency of 25 Hz and by 25 percent at 50 Hz. The report also stated that these exceedances can be neglected because they are either bounded by the standard design or occur at high frequencies where they could be offset if the effect of incoherency of the ground motion is considered. The staff agrees with the basis that potential exceedances would be addressed when bounded by the standard design. However, the staff needs additional technical justification for using the effect of incoherence in offsetting the SSSI effect. In addition this justification should be included in the FSAR. Alternatively, the applicant can incorporate these exceedances in the site-specific design basis ISRS as appropriate.	FSAR Section 3.7.2 or 3A, FSAR 3A.17	<p>Revise the FSAR (CCR package NA3-15-7012) for already revised CB-RB/FB SSSI Report and the CB Seismic Analysis Report that address exceedances. Incoherency will not be used as justification.</p> <p>Revise FSAR 3A.17.11, to note that ISRS exceedances due to RB/FB SSSI effects are included in CB site-specific ISRS.</p> <p>Similar to above (091015S124B).</p> <p>Refer to issue 092815A1003.</p>	Confirmatory	Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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091015S126	The access tunnel between the RB/FB and CB has been modeled for the SSSI analysis between the CB and RB/FB. Page 14 of 76 of the CB-RB/FB SSSI report (WG3-U73-ERD-S-0005) describes that there are seismic gaps between the access tunnel and the adjacent buildings. FSAR Section 3.7.2.8 markup does not identify the seismic gap requirement between the access tunnel and the adjacent Category I buildings. It also appears that the detailed site-specific design of the access tunnel is not complete. Per DCD Revision 10, Page 3.7-28, this tunnel is classified as seismic Category II. However, no site-specific ITAAC has been provided for this tunnel. As such, the NRC inquired as to how the design commitments for this tunnel are to be tracked.	COLA Part 10	Add ITAAC to COLA for design of SC II Access Tunnel.	Confirmatory	Included in December 2015 COLA Part 10 markups; NA3-15-037 (December 16, 2015).

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

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0910GEN01	For the stability, soil bearing pressure, and lateral soil wall pressure evaluations of the plant structures, where the enveloping of the sensitivity analysis cases with the results of the site specific design basis was not considered, Dominion should have available the technical basis for not enveloping or not scaling the results accordingly. The sensitivity analysis cases refer to both the cracked vs uncracked cases and SSSI vs SSI cases.	CB-FWSC SSSI Report, CB-RB/FB SSSI Analysis Report	Revise the RB/FB – CB SSSI Report and the CB-FWSC SSSI Report, Section 5.5 to make it clear that the calculated and accidental torsional loads plus the shear are bounded by licensing basis analysis (explain how the numbers in Table 5.5-3 were calculated).	Closed	Reports WG3-U73-ERD-S-0002 Revision 5, and WG3-ERD-S-0001 submitted to NRC November 30, 2015 (NA3-15-032)
0910GEN02	<p>NRC will include spent fuel pool rack review in the audit plan for Audit-1.</p> <p>Review of analysis from beginning to end for the racks, including the design changes.</p> <p>SER-DMN-019, Revision 0</p> <p>RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra</p> <p>DCD Report: NEDO-33373-A</p>	North Anna 3 Fuel Rack Seismic Analysis	<p>Dominion agreed to the following actions related to the fuel storage racks, PCCS condenser, and fuel stored in racks site-specific seismic analyses. The NRC will confirm these actions through the electronic reading room or in Audit 2:</p> <p>-Describe in the fuel rack NA3 report, or in a referenced report, the demonstration of the adequacy of the acceleration time histories. [updated November 16, 2015]</p> <p>-Obtain plots of the response spectra of the</p>	Open with NRC	<p>Included in December 2015 FSAR markups; NA3-15-037 (December 16, 2015).</p> <p>Report Status January 4, 2016:</p> <p>•002N8467, Revision 2 (Fuel Racks) and 002N8530, Revision 2 (PCCS Condenser) submitted to NRC via e-mail December 14, 2015 (also submitted in letter dated January 14, 2016)</p> <p>•003N0526, Revision 0 (spent fuel stored in fuel racks) submitted to NRC (letter date January 14,</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	Revision 5		<p>acceleration time histories for comparison to the response spectra determined for NA3 fuel rack seismic analysis report (plots can be included in supporting documents – i.e., ENSA document – and not in the NA3 fuel rack report).</p> <p>-Complete and document the NA3 seismic analysis report for the fuel stored in the racks and demonstrate structural adequacy.</p> <p>-Update the NA3 seismic analysis technical reports for fuel racks and PCCS condenser.</p> <p>-Revise FSAR for the fuel racks and PCCS condenser summarizing the evaluations performed and include the correct report revision number.</p>		<p>2016; NA3-16-001)</p> <p>NRC to check spectral matching supporting document in Audit 2</p>

North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
092815A1002	Revise COLA Part 10 as necessary to include the 220' elevation for the FWSC SSI Input Response Spectra in the definition of the SSE. Other parts of the COLA (e.g., Part 7) also will be reviewed to determine if other changes need to be made.	COLA Part 10, COLA Part 7	Revise COLA Part 10 as necessary to include the 220' elevation for the FWSC SSI Input Response Spectra in the definition of the SSE. Other parts of the COLA (e.g., Part 7) also will be reviewed to determine if other changes need to be made.	Confirmatory	Included in December 2015 COLA Parts 7 and 10 markups; NA3-15-037 (December 16, 2015).
092815A1003	September 29, 2015: Revise FSAR to describe the methodology used to address exceedances in sensitivity studies, including acceptance criteria. These sensitivity studies refer to stiffness variations, SSSI analyses, and soil separation. Also describe use of scaling if SSSI analyses of FWSC-CB and CB-RB/FB yield results that exceed ISRS from FWSC and CB SSI analyses, and describe use of scaling if SSSI analyses of FWSC-CB yield results that exceed load demands from FWSC SSI analyses.	FWSC Seismic Analysis Report, FSAR Section 3.7.2 or 3A	<p>Revise the FSAR as described in the issue description. Revise the FWSC seismic analysis report (WG3-U63-ERD-S-0001) to further clarify the approach for enhancing ISRS for effects of cracking (Appendix B, Section B.5). As required, revise other technical reports to reflect the methodology in the issue description.</p> <p>Note: The following issues were closed to this issue:</p> <p>091015S075A, 091015S117A, 091015S117B, 091015S117C, 091015S124A, 091015S124B, and</p>	Confirmatory	<p>Included in December 2015, FSAR markups; NA3-15-037 (December 16, 2015).</p> <p>Revised FWSC, CB, and RB/FB Seismic Analysis Reports submitted to NRC:</p> <p>•WG3-U63-ERD-S-0001, Revision 2 (FWSC) and WG3-U73-ERD-S-0001, Revision 2 (CB); NA3-15-033 (December 16, 2015)</p> <p>•WG3-U71-ERD-S-0001, Revision 3 (RB/FB); NA3-15-032 (November 30, 2015)</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
			091015S125.		
092815A1004	<p>Technical Report SER-DMN-034: Shear capacity of concrete fill under FWSC:</p> <p>NRC requested technical basis for using ACI-207.1R-18 versus ACI- 318.</p>	SER-DMN-034 (Effects of Soil Separation of FWSC)	<p>Revise SER-DMN-034 to provide a further explanation regarding the code governing the design and construction of concrete fill (has to be done as part of Audit 2).</p> <p>Change the SER-DMN-034 report title to add “and effects of separation between concrete fill and surrounding soil.”</p>	Open with NRC	<p>Report posted in reading room.</p> <p>(February 2, 2016) NRC is mostly closed, except for RGS ITAAC RAI</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
			<p>October 29, 2015 – add report SER-DMN-034 to the reading room for NRC review once the revision is completed.</p> <p>(January 20, 2016 call) Submit a response to RAI 2.5.4-26 regarding FWSC concrete fill.</p>		
092815A1005	Technical Report SER-DMN-034: Soil Separation: NRC requested additional explanation and basis to describe exceedances in FWSC responses due to separation between the concrete fill and the surrounding soil. NRC also asked how these will be documented.	<p>FWSC Seismic Analysis Report, SER-DMN-034 (Effects of Soil Separation of FWSC)</p> <p>WG3-U63-ERD-S-0001r3</p> <p>FSAR 3G.10</p> <p>FSAR Table 3G.10-204</p>	<p>Revise SER-DMN-034 to state that the exceedances due to concrete fill soil separation will be addressed (including ISRS and other seismic demands). Provide the criteria and approach for enhancing the ISRS to bound exceedances due to soil separation following the approach described in Appendix B of FWSC SSI report (WG3-U63-ERD-S-0001). Also include the conclusions of the FWSC soil separation study and provide reference to SER-DMN-034 in WG3-U63-ERD-S-0001.</p> <p>October 29, 2015 – add report SER-DMN-034 to the</p>	Open with NRC	<p>SER-DMN-034 posted in reading room. [Audit 2 item.]</p> <p>Discussed at March 3, public meeting.</p> <p>WG3-U63-ERD-S-0001r3 delivered to NRC on March 11, 2016</p> <p>Draft FSAR changes provided to NRC on March 11, 2016.</p> <p>NRC will close in Audit 2.</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
			<p>reading room for NRC review once the revision is completed.</p> <p>March 3, 2016 - FSAR 3A.17.14.5 will be revised to include discussion on how separation between concrete fill and surrounding soil can affect load demands on FWSC shear keys at NA3 site.</p> <p>FSAR 3G.10 and Table 3G.10-204 will be revised to present:</p> <ul style="list-style-type: none"> • Description of updated evaluation of FWSC structures • Reinforcement added to FWSC basemat and FWSC shear keys • Available safety margins that include effects of soil separation 		

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
092815A1006	CB-FWSC SSSI Report and CB-RB/FB SSSI Report editorial changes.	CB-FWSC SSSI Report	<p>Revise the CB-FWSC SSSI Report:</p> <p>-On page 18, 2nd to last paragraph (starting with “the max aspect ratio”), add a reference to Appendix C to end of last sentence.</p> <p>-On Page 16, in last paragraph of Section 4.2, add a reference to Figures 6.3-1 through 6.3-12.</p> <p>-Provide explanation and basis in Conclusion Section to describe exceedances describe in Section 5.6.</p> <p>Page 32 of the CB-FWSC SSSI Report states that the site-specific design of the CB design envelops the SSSI effects of the FWSC on the CB seismic response. However, there are some exceedances of SSSI effects such as EW/Vertical accelerations in Figure 5.2-1 and Torsion in Figure 5.2-2. Revise the FSAR to address these inconsistencies</p>	Closed	Report WG3-U73-ERD-S-0002, Revision 5, submitted to NRC November 30, 2015 (NA3-15-032)

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
092815A1007	For Report SER-DMN-032: Expand the scope of document to state that all SSSI and sensitivity effects are captured. The NRC will review this in Audit 2.	SER-DMN-032 (NA3 Seismic SSI Analyses Results for CB and FWSC Structural Evaluation)	Revise SER-DMN-032 to expand the scope of document to state that all SSSI and sensitivity effects are captured. The NRC will review this in Audit 2.	Open with NRC	SER-DMN-032, Revision 3 delivered to electronic reading room on March 11, 2016 [Audit 2]
1202150001	Revised site-specific stick models which include the additional oscillators under cracked condition should be included in the FSAR for the RB/FB, CB, and FWSC. [NRC call on December 2, 2015]	FSAR 3A	Revise FSAR Section 3A.17.9 to describe and include figures that show the additional SDOF oscillators used in the seismic analysis stick models for sensitivity studies to adequately capture the out-of-plane vibration of flexible walls and slabs in the RB/FB, CB, and FWSC up to 50 Hz under cracked concrete conditions. The properties of additional oscillators and figures that show these stick models are in report SER-DMN-014.	Open with NRC	Draft FSAR changes provided to NRC on March 11, 2016 Audit 2 item
1202150002	NRC requested that the FSAR be updated to include comparisons of the DCD demands with the NA3 site-specific demands, which represent the envelope of the base cases and the sensitivity analyses and will be used in the NA3 site-specific design evaluation. The comparisons	SER-DMN-019, Rv1: SER-DMN-032 Revision 3 FSAR 3A.18.1	The FSAR will be updated per the roadmap provided to the NRC via e-mail January 4, 2016 and discussed in teleconference January 6, 2016. Discussed in presentation made at the March 3, public	Open with NRC	SER-DMN-032, Revision 3, and SER-DMN-019, Revision 1 delivered to electronic reading room on March 11, 2016 Draft FSAR changes provided to NRC on March 11, 2016

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	should clearly identify the exceedances. The level of details and the format of the presentation should be consistent with those for the DCD demands. [NRC call on December 2, 2015]	Figures will be added to FSAR 3A.17 FSAR 3A.18.2	meeting. Changes to reports and FSAR as described in presentation during March 3, public meeting (slides 18 - 63). Revise bounding load curves so that they start at zero load demand on the X-axis.		Audit 2 item
010616001	To consider ISRS exceedances in the FSAR markup, the 10 percent criterion is applied to the concrete cracking analyses, SSSI analyses, and soil separation analyses. The technical explanation for the case of concrete cracking is acceptable. The technical explanation for soil separation for FWSC is also acceptable. However, the FSAR markup does not provide a technical justification on why the SSSI effect on CB can use the 10 percent criterion. The staff thinks that the SSSI cases are more realistic than the SSI case and any exceedance from the SSSI analyses should be considered. In fact, the SSSI effect on FWSC is considered in full (and governs). [NRC email from M. Eudy January 6, 2016]	WG3-U73-ERD-S-0002 WG3-U73-ERD-S-0005 FSAR 3A	Revise the criteria in CB-FWSC and CB-RB/FB SSSI reports and bounding reports to specify that any exceedance of ISRS up to 50Hz is to be considered as significant by site-specific design. Revise FSAR 3A.17.11 (and any related section) to remove the discussion on applying a 10 percent criterion for considering exceedances due to SSSI effects.	Open with NRC	Reports transmitted to NRC on March 11, 2016 Draft FSAR changes provided to NRC on March 11, 2016
010616002	References should be updated to	Determine	Reconcile the list of	Open with	Reports revised and

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	use the current revisions. For example, the FWSC stability report still refers to Revision 0 of the SER-DMN-034 (not the current Revision 2). [NRC email from M. Eudy January 6, 2016]	which reports are impacted.	references in the seismic demand (Phase 1) reports and determine if any report revisions are necessary.	NRC	available for NRC review.
010616003	In the FSAR markup and WG3-U73-ERD-S-0001R2 (CB SSI analysis), the short duration of 0.015 s should be replaced with a better estimate of 0.02 s because there are 4 points outside of the 80 percent contact ratio domain. It is also recommended to include the 73 percent contact ratio in the FSAR for the additional SSI analysis using rigid beams to properly consider the interior wall stiffness. This contact ratio value combined with the short duration gives the staff more confidence in the validity of the linear SSI calculation. [NRC email from M. Eudy January 6, 2016]	FSAR 3A	Revise the CB SSI analysis in the FSAR Section 3A.17.13.5 to correct the duration of uplift from 0.015 sec to 0.02 sec; and include a description of the results of the additional uplift evaluation (the 73 percent contact ratio) and justifications.	Open with NRC	Draft FSAR changes provided to NRC on March 11, 2016
010616004	SER-DMN-034 (Revision 2) Tables 6.1-1 and 6.1-2 provide seismic shear forces and stresses in FWSC concrete fill for fully-bonded and soil-separated models, respectively. Please explain how the maximum seismic shear forces and stresses in these tables are developed.	SER-DMN-034	Section 4.4 of the report describes the methodology used for calculations of the shear stress and force demands.	Closed	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	[NRC email from M. Eudy January 6, 2016]				
010616005	In the second paragraph on page 352 of the FSAR markup, ACS SASSI is described as used for the SSSI analyses. The staff has the impression that ACS SASSI is only used for the sensitivity study of RB/FB to consider concrete cracking; therefore, please confirm the accuracy of that statement. [NRC email from M. Eudy January 6, 2016]	FSAR 3A	Revise FSAR Section 3A.17.11 to remove "and ACS SASSI" from the list of computer programs used for the site-specific SSSI analyses.	Open with NRC	Draft FSAR changes provided to NRC on March 11, 2016
010616006	As part of Action Item 091015S124A, the SSSI of the RB/FB has significant effect on the lateral pressures on the CB west wall facing the RB/FB, and report stated that the only significant exceedance that can be observed at the bottom level of the basement has no effects on the CB below-grade wall design. The staff could not find a description of the basis in the FSAR markup for the SSSI effect of RB/FB on the CB lateral pressures. [NRC email from M. Eudy January 6, 2016]	FSAR 3A	Revise FSAR Section 3A.17.11 to include information provided in the CB-RB/FB report that indicates there are no SSSI effects on the CB below-grade wall design.	Open with NRC	Draft FSAR changes provided to NRC on March 11, 2016

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
01151600A	FSAR Section 3.8.1 does not identify any departures, whereas, Sections 3.8.2, 3.8.3, 3.8.4, and 3.8.5 identify NAPS DEP 3.7-1. This departure relates to the NA3 site-specific ground response spectra for seismic structural loads and floor response spectra.	FSAR Section 3.8	Revise the FSAR Section 3.8.1 to add introductory text that recognizes the site-specific analyses and reports in Appendix 3G. Other related FSAR changes to Section 3.8 will be made per Item 01151600C.	Open with NRC Audit 2	Discussed on teleconference February 3, 2016 Draft FSAR changes provided to NRC on March 11, 2016
01151600B	In FSAR 3.8.2, corresponding to NAPS DEP 3.7-1, the only change is to replace a paragraph in the DCD with a new paragraph which states: "A finite-element analysis model supplemented with hand calculation is used to determine the stresses in the different components of the PCCS condenser and supports. Details of this analysis, including relevant drawings and results, can be found in DCD Reference 3.8-1, and details of the site specific analysis, which uses the same approach as the DCD but with	NA	No follow-up action required. The change in Section 3.8.2.4.1.5 is necessary for the PCCS condenser to modify the information regarding the site-specific finite element analysis and add the site-specific report to the references to supplement DCD Reference 3.8-1. No similar changes are required for the other components in the 3.8 sections.	Closed	Discussed on teleconference February 3, 2016

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>Unit 3 seismic loads, can be found in Reference 3.8-201.”</p> <p>This reference is the PCCS condenser seismic analysis report. Why aren't comparable departures also given to all structures and structural components in this FSAR Section 3.8.2 and the other FSAR sections?</p>				
01151600C	<p>In FSAR Section 3.8.4, corresponding to NAPS DEP 3.7-1, the statement is made that “Unit 3 site-specific structural evaluations for the RB/FB, CB, and FWSC are described in Sections 3G.7 through 3G.10.” This statement is important and needed because it ties DCD 3.8.4 to the detailed description in Appendix 3G. Explain why the other FSAR sections do not also include this statement.</p>	FSAR 3.8	FSAR Section 3.8 (including Subsections 3.8.1 – 3.8.5) will be changed to include references to the new site-specific sections in Appendix 3G in instances where the DCD Section 3.8 refers to Appendix 3G.	Open with NRC Audit 2	<p>Discussed on teleconference February 3, 2016</p> <p>Draft FSAR changes provided to NRC on March 11, 2016</p>
01151600D	<p>In FSAR Section 3.8.4, a new paragraph is added regarding the structural acceptance criteria. It states:</p> <p>“The structural acceptance criteria for the site-specific structural evaluations of the RB, CB, FB, and FWSC, which are described in Sections 3G.7 through 3G.10, are the same as the acceptance</p>	<p>RB/FB, CB and FWSC structural reports, as necessary: WG3-T11-DRD-S-0001r1</p> <p>WG3-U97-ERD-S-0001r1</p>	<p>NA3 FSAR reinforced concrete section analyses will be performed consistent with the DCD methodology using SSDP-2D for all seismic Category I structures</p> <p>NA3 structural evaluations will apply the acceptance criteria consistent with the</p>	Open with Dominion Audit 2	<p>Discussed on teleconference February 3, 2016</p> <p>Revised reports delivered to NRC staff on March 11, 2016</p> <p>Draft FSAR changes provided to NRC on March 11, 2016</p>

North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>criteria for the standard design provided in this section, with the exception that the Unit 3 structural evaluations of the non-containment RB and FB structures may use the acceptance criteria of either: 1) the ASME BPVC, Section II, Division 2, Subsection CC, "Code for Concrete Containments," or 2) the ACI 349-01, rather than apply the more limiting of these two criteria as described in DCD Sections 3.8.4.5.1 and 3.8.4.5.3. This is an acceptable alternative to the standard design approach because the RB and FB are not part of the containment pressure boundary and applying the more limiting ASME BPVC criteria is not required."</p> <p>Justification would be needed for this change because, the reason the more limiting criterion was placed in the DCD is that the containment is integrally connected to the RB (unlike other containments) and thus, the RB provides support and interacts with the containment. During design certification, the applicant specified this criterion to address this issue. While the revised criterion seems reasonable for</p>	<p>WG3-U71-ERD-S-0004r1</p> <p>WG3-U73-ERD-S-0004r2</p> <p>COLA Part 7</p> <p>COLA FSAR 3.8.4.5</p>	<p>DCD:</p> <ul style="list-style-type: none"> - For overstress conditions identified now and through detailed design, an alternate stress check using a P-M diagram will be performed to show the member meets the more limiting of the 2004 ASME and the ACI 349-01 criteria - Structural evaluation reports will include the P-M diagram for these alternate stress checks, demonstrating that the acceptance criteria are met <p>(a) Technical reports will be revised, as necessary (Fuel Building Structural Design Report)</p> <p>(b) COLA revisions will be determined:</p> <ul style="list-style-type: none"> -Part 7, Departures Report, will be revised to include the proposed approach -FSAR Section 3.8.4.5 will be revised to clarify the approach for demonstrating that the standard design acceptance criteria are met -FSAR will be reviewed to determine if any other 		

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	structural members sufficiently distant from the RB/ containment interface (e.g., FB where an overstressed condition was identified), justification would be needed to completely revise the criterion as defined above.		sections need to be revised - FSAR markups will be provided to NRC (c) Response to RAI 03.07.02-17 will be revised		
020116001	<p>The RCCV report (WG3-T11-DRD-S-0001) indicates that the method using “thermal ratios” evaluated by 3D nonlinear analyses applied in the standard design is not used for NA3. The effects of concrete cracking due to the thermal load are considered by reducing the thermal stress in SSDP-2D.</p> <p>1. Is this change in the method of calculating thermal stresses considered a departure from the method used in the standard design?</p> <ul style="list-style-type: none"> The applicant is requested to explain why this change is acceptable and does not result in the less conservative results. During Audit 2, the staff requests that Dominion provide a detailed presentation of the DCD method and the NA 3 method 	<p>WG3-T11-DRD-S-001</p> <p>COLA Part 7</p>	<p>To better clarify the basis and justification for using the SSDP-2D method in the NA3 RCCV structural evaluation, Technical Report WG3-T11-DRD-S-001 will be revised.</p> <p>COLA Part 7 departure discussion will be revised to clarify why the SSDP-2D method was used. [discussed on February 17, 2016 teleconference with NRC]</p>	<p>Open with NRC</p> <p>Audit 2</p>	<p>WG3-T11-DRD-S-0001r1 delivered to NRC on March 11, 2016</p> <p>Draft FSAR changes provided to NRC on March 11, 2016</p>

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>for site-specific evaluation of the thermal effect in combination with other applicable loads.</p> <p>2. Also, are the design thermal loads considered same as the DCD thermal loads? [NRC email from M. Eudy February 1, 2016]</p>				
020116002	<p>The local models were developed for GDCS pool stress analysis (Figures 4.17 through 19 of WG3-T12-ERD-S-0001 - Internal structure design report) and seismic loads are evaluated using spectral analysis.</p> <p>1. Are these models the same as the DCD model?</p> <p>2. Please describe the spectral analysis method and explain any differences between the DCD and site-specific model in this regard. Is this method discussed in the FSAR?</p> <p>3. Is the lateral seismic pressure load on the pool walls due to vertical compression of the pool water due to vertical component of the earthquake included in the evaluation?</p>	None	Item discussed on February 17, 2016 teleconference with NRC. No additional action necessary. NRC staff will review during Audit 2.	Open with NRC Audit 2	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	[NRC email from M. Eudy February 1, 2016]				
020116003	<p>1. On Page 5 of 002N8530 Revision 2, please clarify the sentence “all spectra for the fuel racks are taken at 3 percent damping consistent with Reference 1,” since the report is related to PCCS.</p> <p>2. Page 4 of this report indicates that the analysis is performed using the first 10 modes of the model up to 45.3 Hz. However, the input appears to have some energy content beyond this cut-off frequency. Please justify.</p> <p>[NRC email from M. Eudy February 1, 2016]</p>	002N8530 FSAR 3G	<p>Item discussed on February 1, 2016, teleconference with NRC.</p> <p>The reference to the “fuel racks” in the PCCS report is a typo. Report 002N8530 will be revised to correct the typo.</p> <p>FSAR reference to this report will be revised to indicate the new revision (the report is incorporated by reference into the FSAR).</p> <p>Calculations, which will be available for audit, explain in more detail the basis for the cut-off frequency of the first 10 modes of the model up to 45.3 Hz.</p>	Open with Dominion Audit 2	
020116004	1. Per DE-ES-0089R0 (Drywell Head Report) Table 2-2, the design stress for flange bolt is 198 MPa vs the allowable limit of 198 MPa. While the allowable stress limit is not exceeded, it appears that there is very little design	FSAR Figure 3G.1-51	<p>Item discussed during February 17, 2016 teleconference with NRC..</p> <p>Discussed in a presentation at the March 3, public meeting.</p> <p>Consider if a change to the</p>	Open with Dominion Audit 2	To be discussed at March 16, 2016 public teleconference

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>margin for any uncertainties in the calculation.</p> <p>2. Please identify the conservatism in the analysis that provide assurance that the design bolt stress will not exceed the allowable limit.</p> <p>– Note that DCD Figure 3G.1-51 shows the standard plant bolt stress as 166 MPa. However, the site-specific bolt stress is 198 MPa.</p> <p>– The FSAR should reflect this change.</p> <p>[NRC email from M. Eudy February 1, 2016]</p>		FSAR is needed to explain or clarify the information on Figure 3G.1-51 regarding pre-load value for the drywell head flange bolts.		
020116005	<p>The staff requests that Dominion provide during Audit 2 a brief presentation on how the site-specific seismic demand (shear force, overturning moments, torsional loads, vertical acceleration) obtained from the lumped mass model was specified in the static NASTRAN model.</p> <p>[NRC email from M. Eudy February 1, 2016]</p>	FSAR 3G.7, 3G.8, 3G.9, 3G.10	<p>Item discussed during February 17, 2016, teleconference with NRC and in a presentation made at the March 3 public meeting;</p> <p>Clarify FSAR 3G.10.5.2 (also 3G.7, 3G.8, 3G.9) regarding 6 degrees of freedom by stating moment loads at each floor elevation are considered to address effects of floor rocking on</p>	Open with Dominion Audit 2	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
			<p>wall axial forces.</p> <p>Dominion to provide information describing the magnitude of shear forces applied at each nodal location, in particular the loads applied to RCCV and pedestal.</p> <p>Comparison of NASTRAN results with bounding shear, bending and torsion diagrams from LMSM were presented during March 3, meeting that demonstrate NASTRAN loads are applied correctly and are consistent with LMSM load demand distribution.</p>		
020916001	ITAACs (COLA Tier 1, Sections 2.4.20, 2.4.21, and 2.4.22) for category I underground tunnels, category II Access tunnel, and the Radwaste tunnel indicate that these buried Category I and II structures are designed and constructed to accommodate the dynamic, static, and thermal load conditions associated with various loads and load combinations identified in the FSAR Tier 2, Section 3.7.3.13. Note that DCD Tier 2, Section 3.7.3 13 seventh bullet appears to describe the	COLA Part 10	<p>Discussed in presentation at the March 3, public meeting.</p> <p>The NRC asked that Dominion verify if the tunnel ITAAC should reference Section 3.7.1 as well as the current reference to Section 2.5.2 to ensure that the FIRS is consistent with the method used for the SC I structures. Dominion will add Section 3.7.1 to the ITAAC reference statements</p>	<p>Open with NRC</p> <p>Audit 2</p>	Draft FSAR changes provided to NRC on March 11, 2016

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>various loads that are considered for the design.</p> <p>However, it does not include any potential environmental loads such as tornadoes, missiles, external floods, etc. The applicant is requested to explain how these loads, as applicable, to the underground Category I and II structures will be considered in the design. [NRC email from M. Eudy February 9, 2016]</p> <p>The heading of ITAAC Table 2.4.22-1 should be "ITAAC for Radwaste Tunnel"</p> <p>For the FWSC, Part 10, Tier I, Section 1.1.1 markup was revised to define additional site-specific SSI input response spectra at elevation 220 ft. However, the corresponding Note 4 of Table 5.1-1 (see Page 872 of the FSAR mark-up) does not reflect this change. Dominion should revise Note 4 to reflect this change.</p> <p>[last two items added via email from M. Eudy February 18, 2016]</p>		<p>for the development of FIRS for the tunnels.</p> <p>ITAAC Table 2.4.22-1 and Note 4 of ITAAC Table 5.1-1 will be revised.</p>		

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
020916002	<p>Section 9.1.2.4 of DCD indicates that the spent fuel pool and buffer pool are reinforced concrete structures with a stainless steel liner. The storage racks and pool liners are designed to meet seismic Category I requirements. Pool liner and anchorage are designed to the same loads and load combinations as the pool concrete structure in accordance with Table 3.815, except that load factors for all cases are equal to 1.0, and the acceptance criteria follow ASME Section III, Division 2, CC3700.</p> <p>However, the FSAR markup (Section 3.8 or 9.0) does not include a site-specific assessment of the fuel/buffer pool liners and the associated anchorages due to site-specific seismic demand including the local effect of the reactions of the storage racks on the pool liners. The applicant is requested to address this issue. [NRC email from M. Eudy February 9, 2016]</p>	None	<p>Discussed in a presentation at the March 3, public meeting.</p> <p>The fuel pool liners and embedments are designated seismic Category I, and the verification is included in ITAAC Table 2.16.5-2 #12 and Table 2.16.7-2 #8, using the definition of SSE for NA3.</p> <p>No further action is required.</p>	<p>Open with NRC</p> <p>Audit 2</p>	
020916003	Report 002N8467 indicates that NA3 bounding response spectra (RS) at Node 2 (of SER-DMN-019, Revision 0) was used as input for site-specific assessment of the SFP rack in the FB. The	None	<p>Discussed in a presentation at the March 3, public meeting (slides 129 – 146).</p> <p>No further actions.</p>	<p>Open with NRC</p> <p>Audit 2</p>	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>staff needs confirmation and additional information with regard to the following items:</p> <ul style="list-style-type: none"> • Confirm that RS at Node 2 conservatively represents the spectra at the base of the SFP in the FB not at the center of RB/FB base mat (i.e., it includes the effect of basemat rocking and torsional effect). • Confirm that input RS is an envelope that considers the effect of stiffness variation and SSSI effect. • Confirm that the synthesized time histories used for transient analyses envelop the RS and they are statistically independent as recommended in SRP Section 3.7.1. • Confirm that friction factor used for FSR in the FB for the nonlinear analysis is consistent with the DCD values. • The report indicates that Table 1 summarizes forces for the FSR obtained from the SSE time history analysis. Please provide a comparison of the forces provided in Table 1 of SERDMN019, Revision 0 based on the site-specific response spectrum approach 				

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>and time history approach and explain any significant differences.</p> <ul style="list-style-type: none"> Clarify whether the stress summary comparison provided in Tables 2 and 3 is based on the RS or time history approach? <p>[NRC email from M. Eudy February 9, 2016]</p>				
020916004	<p>Report 002N8467 indicates that both RSA and transient dynamic analyses (using synthetic time histories) were used for site-specific assessment of the FSRs. Concerning these RSA and transient analyses, the applicant is requested to provide a presentation discussing the two methods of dynamic analyses and how the results of these analyses are used in the site-specific assessment of the FSRs. Are the site-specific methods the same as the DCD approach?</p> <p>[NRC email from M. Eudy 02/09/16]</p>	None	<p>Discussed in a presentation at the March 3, public meeting (slides 119 through 128).</p> <p>No further action.</p>	Open with NRC Audit 2	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
020916005	<p>Report 002N8467 in Page 20 indicates that the time histories for evaluation of deep pit FSR were generated from the response spectra for the new FSR in the buffer pool. The report also stated that this is conservative because the new FSR are located above the buffer pool. As such, the staff requests that the applicant provide a figure which presents comparisons of response spectra at these two locations to ensure that the spectra at the location of the new FSR envelopes the spectra at the deep pit location.</p> <p>[NRC email from M. Eudy February 9, 2016]</p>	002N8467	<p>Discussed in a presentation made at the March 3, public meeting (slides 141 through 145).</p> <p>Revise report 002N8467 to explain why the use of non-bounding values is conservative. Discuss during Audit 2.</p>	<p>Open with Dominion</p> <p>Audit 2</p>	
021816001	<p>Issues related to the RAI response to 04-02-1 on fuel and control rod:</p> <p>On June 24, 2014 the NRC staff issued to the applicant RAI 130-7580 to address the concern regarding North Anna 3 (NA3) fuel assembly and control blade seismic exceedances. On December 16, 2015, the applicant provided a response to RAI 130-7580 addressing the staff's concern. The applicant indicated in its response that while the NA3 site-specific peak SSE</p>	None	Information presented on February 24, 2016 call.	<p>Closed to new AI 030916001A-D</p>	Was discussed in 2/24/16 NRC non-public teleconference.

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>accelerations for the fuel assemblies exceeded the ESBWR standard design envelope, the site-specific analysis was bounded by the demonstrated capability of the GE14 fuel; therefore, the GE14E fuel to be used at NA3 is in compliance with all the applicable regulations. The staff reviewed the applicant's response and determined that additional clarification with the applicant is needed in order to resolve the staff's concerns. The following list details the items for which the staff is seeking further clarification on.</p> <p>The staff noted that the applicant justifies acceptability of the site-specific analysis results via comparison of the GE14E fuel with the demonstrated capability of GE14 fuel. The staff is seeking clarification regarding where the GE14 fuel demonstrated peak seismic and dynamic accelerations were documented.</p> <p>[via emails J. Shea February 18, 2016 and February 22, 2016]</p>				

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
021816002	<p>Issues related to the RAI response to 04-02-1 on fuel and control rod:</p> <p>[See intro under Item 021816001]The staff understands that the site-specific seismic analysis exceeds the ESBWR standard design envelope, and so the staff is seeking clarification on the following statements made by the applicant:</p> <p>a. RAI Response – “Based on the evaluation of the fuel assemblies (Reference 3), the site-specific seismic conditions result in fuel assembly seismic accelerations that exceed the standard design values but are bounded by the standard design report’s acceptance limits for the GE14E fuel.”</p> <p>- Please clarify what “standard design report’s acceptance limits for the GE14E fuel” are.</p> <p>b. WG3-002N9544 – “The North Anna Unit 3 site-specific seismic loads are less than the design basis loads.”</p> <p>- Please clarify what the “design</p>	None	Information presented on February 24, 2016 call.	Closed to new AI 030916001A-D	Was discussed in February 24, 2016 NRC non-public teleconference.

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>basis loads" are.</p> <p>[via emails J. Shea February 18, 2016 and February 22, 2016]</p>				
021816003	<p>Issues related to the RAI response to 04-02-1 on fuel and control rod:</p> <p>[See intro under Item 021816001]</p> <p>The staff reviewed SER-DMN-019 in the ERR which presented the site-specific peak SSE accelerations for the fuel assemblies. The staff seeks clarification regarding the location of the detailed finite-element analysis for the fuel assemblies and fuel assembly components in the references provided.</p> <p>[via emails J. Shea February 18, 2016 and February 22, 2016]</p>	None	Information presented on February 24, 2016 call.	Closed to new AI 030916001A-D	Was discussed in February 24, 2016 NRC non-public teleconference.
021816004	<p>Issues related to the RAI response to 04-02-1 on fuel and control rod:</p> <p>[See intro under Item 021816001]</p> <p>The staff noted the applicant reported that the site-specific maximum fuel channel oscillation</p>	None	Information presented on February 24, 2016 call.	Closed to new AI 030916001A-D	Was discussed in February 24, 2016 NRC non-public teleconference.

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>exceeds the standard design value; however, the site-specific maximum fuel channel oscillation is bounded by the ABWR seismic scram testing. The staff seeks clarification regarding the location of the analysis/calculation which determines the site-specific fuel channel oscillation.</p> <p>[via emails J. Shea February 18, 2016 and February 22, 2016]</p>				
021816005	<p>Issues related to the RAI response to 04-02-1 on fuel and control rod:</p> <p>[See intro under item 021816001]</p> <p>The staff could not find the applicant's discussion regarding NRC Information Notice 2012-09, "Irradiation Effects on Fuel Assembly Spacer Grid Crush Strength." The staff seeks clarification regarding the information notice and its applicability to NA3.</p> <p>[via emails J. Shea February 18, 2016 and February 22, 2016]</p>	TBD	Information presented on February 24, 2016 call.	Closed to new AI 030916001A-D	Was discussed in February 24, 2016 NRC non-public teleconference.

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
022616001	<p>DCD Table 3G.1-43 and the FSAR Table 3G.7-218 include pool stress summary of the GDCS Pool wall plate among others for the DCD and site-specific seismic loads, respectively. Please explain why the calculated stresses for the site-specific condition remain unchanged from the DCD condition.</p> <p>[via email M. Eudy February 26, 2016]</p>	TBD	<p>Discussed in a presentation made at the March 3, public meeting. No further action.</p>	<p>Open with NRC</p> <p>Audit 2</p>	
022616002	<p>There appear to have some inconsistencies in some corresponding entries between Table B-2b of NEDE-33572P, Revision 3 and Tables 1 and 2 of 002N8530, Revision 2. For example, in Table 1 (002N8530) for the upper header Pm stress category in service level C-1, the allowable stress is listed as 291.4 MPa whereas the corresponding allowable stress in Table B-2b (NEDE-33572P) is listed as 137.9 MPa. Please address this issue and as appropriate check all other table entries for consistency with NEDE-33572P Tables. Should revise the report as appropriate.</p> <p>[via email M. Eudy February 26, 2016]</p>	TBD	<p>Discussed in a presentation made at the March 3, public meeting. No further action.</p>	<p>Open with NRC</p> <p>Audit 2</p>	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
022616003	Report 002N8530, Revision 2 should have a reference to the applicable design report or similar documents that provides the basis of the key findings (summarized in 002N8530, Revision 2) from the site-specific reanalysis of the PCCS. [via email M. Eudy February 26, 2016]	002N8530	Discussed in a presentation made at the March 3, public meeting. A reference will be added to the report (002N8530) to refer to the design basis calculation that was performed on the PCCS.	Open with Dominion Audit 2	
022616004	DCD Section 3.8.1.4.1.3 discusses concrete cracking considerations for the RCCV. However, for evaluation of RCCV for site-specific seismic load, this method was not used as discussed in FSAR 3G.7.5.2. As such why NAPS DEP 3.7-1 was not posted against the FSAR Section 3.8.1.4.1.3? A similar issue is noted in the DCD Section 3.8.3.4 where it is stated that "The effects of concrete cracking of the containment structure on the accidental thermal stresses in the containment internal structures are accounted for in the form of thermal ratios as described in Subsection 3.8.1.4.1.3." [via email M. Eudy February 26, 2016]	FSAR Section 3.8	Discussed in a presentation made at the March 3, public meeting. Being addressed through AI 01151600A and 01151600C.	Open with Dominion Audit 2	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
022616005	<p>The applicant identified departure NAPS DEP 3.7-1 in FSAR 3.8.3.5.1 regarding the structural acceptance criteria for the diaphragm floor. The departure states: "The structural acceptance criteria for the site-specific structural evaluation of the diaphragm floor are in accordance with ANSI/AISC N690, unless it is shown that the structural evaluation results over-estimate the stresses or that the diaphragm floor is otherwise acceptable." The staff could not locate a further evaluation of this departure regarding the structural acceptance criteria in FSAR Section 3.8, Appendix 3G, nor in Part 7 – Departures. Please provide further details of evaluation of this departure regarding the acceptance criteria and include this evaluation in the appropriate location(s) of the FSAR.</p> <p>[via email M. Eudy February 26, 2016]</p>	FSAR 3.8.3.5.1	<p>Discussed in a presentation made at the March 3, public meeting.</p> <p>The words "unless it is shown that the structural evaluation results over-estimate the stresses or that the diaphragm floor is otherwise acceptable" will be deleted from FSAR Subsection 3.8.3.5.1.</p>	Open with Dominion Audit 2	
022616006	SER-DMN-032-Revision 2 (CB/FWSC Bounding Report), Tables 3.2-1 to 3.2-6 present FWSC "concrete cracking amplification factors" that are calculated as the ratio of the	SER-DMN-32 FSAR 3A.17.9.3	<p>Discussed in a presentation made at the March 3, public meeting.</p> <p>A statement has been added in Revision 2 of</p>	Open with Dominion Audit 2	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>enveloped result of SSI analyses of the FWSC cracked concrete model over those of the uncracked concrete model. The tables cover amplification factors for most seismic load demands but not for the shear key demand. Please provide a table that shows the enveloped lateral force demands for the FWSC shear keys from the SSI analyses of the cracked and uncracked concrete models, respectively, and their ratios (concrete cracking amplification factors).</p> <p>[via email M. Eudy February 26, 2016]</p>		<p>Bounding Report (SER-DMN-032) and FSAR 3A.17.9.3 markups stating that design basis analysis of UC_{SSE} models bound concrete cracking effects on FWSC shear keys lateral load demands.</p> <p>The NRC indicated that it will review this further in Audit 2.</p> <p>Dominion to provide a comparisons of driving forces at bottom of FWSC basemat to demonstrate the load demands on cracked shear keys are enveloped by uncracked condition , i.e. the cracking amplification factor for shear keys is =1.</p>		
022616007A	<p>FSAR Section 3G (mid-section, page 570 of 903) states that "Unit 3 site-specific subgrade conditions are used in the evaluations, as described in the sections below." However, in the subsequent sections, the applicant describes that "soft site" subgrade conditions used in the DCD are also used in NA3 site-specific structural evaluations.</p> <p>(a) Please clarify these conflicting</p>	FSAR 3G	<p>Discussed in a presentation made at the March 3, public meeting.</p> <p>FSAR Appendix 3G will be revised to eliminate the conflict identified in the question.</p>	Open with Dominion Audit 2	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	statements. [via email M. Eudy February 26, 2016]				
022616007B	<p>FSAR Section 3G (mid-section, page 570 of 903) states that "Unit 3 site-specific subgrade conditions are used in the evaluations, as described in the sections below." However, in the subsequent sections, the applicant describes that "soft site" subgrade conditions used in the DCD are also used in NA3 site-specific structural evaluations.</p> <p>(b) Please provide a justification that "soft soil" subgrade condition applied at the NA3 rock site provides conservatism with respect to forces and deformations induced in the Category I structures.</p> <p>[via email M. Eudy February 26, 2016]</p>	TBD	<p>Discussed in a presentation made at the March 3, public meeting.</p> <p>Dominion will review the exception noted in DCD Section 3.8.5.4 for impact on NA3.</p> <p>Dominion will demonstrate that use of soft springs for NA3 evaluations is conservative based on the response of DCD RAI 3.8-13 and results from NA3 analyses results.</p>	Open with Dominion Audit 2	
030316001	Add a discussion in the FSAR regarding the performance of site-specific stress evaluations for NA3 selected elements (SER DMN-036).	FSAR 3.8 or 3G	<p>Discussed in a presentation made at the March 3, public meeting.</p> <p>Dominion will revise FSAR (3.8 or 3G) to include a</p>	Open with NRC	Draft FSAR changes provided to NRC on March 11, 2016

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	[from 3/3/16/ meeting]		discussion regarding the site-specific stress evaluations for NA3 selected elements.		
030916001A	<p>RAI 04.02-1; Q1.a</p> <p>The response to RAI 04.02-1 provides an evaluation to demonstrate that the site-specific fuel assembly and control blade assembly loads do not exceed the component capacity. IN 2012-09 notified the industry that the NRC became aware of operating experience which challenged existing NRC guidance regarding the impacts of end of life assembly characteristics on fuel assembly seismic response analyses. It is unclear from the response if end of life assembly characteristics were considered in the analysis which supported the response to RAI 04.02-1.</p> <p>Describe the effects of end of life conditions on the North Anna Unit 3 site-specific fuel seismic response analysis and demonstrate that the referenced site-specific fuel accelerations bound both beginning of life and end of life conditions for the load</p>	TBD	To be discussed March 16, 2016.	Open with Dominion	Discussed with NRC staff on March 10, 2016, clarification teleconference

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	analysis and capacity limits. [via email J. Shea March 9, 2016]				
030916001B	<p>RAI 04.02-1; Q1.b</p> <p>The response to RAI 04.02-1 includes a reference to WG3-002N9544, which is a North Anna Unit 3 site-specific analysis supplement to topical report NEDC-33240P-A, and a reference to 002N8005, which is the North Anna Unit 3 site-specific control rod seismic analysis. The staff noted that the site-specific analyses only describes SSE accelerations. In order to assure compliance with GDC 2 and evaluate adherence with the approved referenced methodology, the effects of normal and accident conditions should be appropriately combined with the effects of the natural phenomena.</p> <p>Clarify whether or not accident loads (e.g. LOCA or safety relief valve discharge loads, etc.) were considered in combination with SSE loads when calculating the maximum accelerations and displacements for the North Anna Unit 3 site-specific fuel assembly</p>	TBD	To be discussed 3/16/16.	Open with Dominion	Discussed with NRC staff on March 10, 2016, clarification teleconference

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	response and control rod insertability seismic analyses. [via email J. Shea March 9, 2016]				
030916001C	<p>RAI 04.02-1; Q1.c</p> <p>The response to RAI 04.02-1 includes a reference to WG3-002N9544, which is a North Anna Unit 3 site-specific analysis supplement to topical report NEDC-33240P-A. This supplement includes a reference to SER-DMN-019, Shimizu Engineering Report, "GE Hitachi Nuclear Energy, Dominion NA3 ESBWR Project, RB/FB Seismic Analyses Bounding Results and In-Structure Response Spectra". The staff reviewed this reference and noted that the finite element analysis model for the fuel assemblies differs from the model used in the referenced approved methodology as presented in NEDC-21175-3-P-A.</p> <p>Identify any differences between the finite element analysis model used in the North Anna Unit 3 site-specific analysis and the finite element analysis model used in the referenced methodology, NEDC-21175-3-P-A. Provide</p>	TBD	To be discussed March 16, 2016.	Open with Dominion	Discussed with NRC staff on March 10, 2016, clarification teleconference

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	justification for these deviations [via email J. Shea March 9, 2016]				
030916001D	<p>RAI 04.02-1; Q1.d</p> <p>The response to RAI 04.02-1 includes a reference to WG3-002N9544, which is a North Anna Unit 3 site-specific analysis supplement to topical report NEDC-33240P-A. It is unclear to the staff from the information provided how the site-specific conditions are incorporated into the finite element analysis input for the North Anna Unit 3 fuel assembly seismic analysis.</p> <p>Provide a plot of the lower core plate response spectra used in the North Anna Unit 3 site-specific fuel assembly response analysis and compare it with the similar lower core plate response spectra used in the ESBWR certified design.</p> <p>[via email J. Shea March 9, 2016]</p>	TBD	To be discussed March 16, 2016.	Open with Dominion	Discussed with NRC staff on March 10, 2016, clarification teleconference
030916001E	<p>RAI 04.02-1; Q1.e</p> <p>The response to RAI 04.02-1 includes a reference to 002N8005, "North Anna 3 Control Rod Seismic Analysis." In 002N8005,</p>	TBD	To be discussed March 16, 2016.	Open with Dominion	Discussed with NRC staff on March 10, 2016, clarification teleconference

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>the applicant states the site specific maximum fuel channel oscillation is [[]]; however, 002N8005 does not provide justification for this value. In a clarification phone call between the applicant and the NRC held on February 24, 2016, the applicant stated that the site-specific maximum fuel channel oscillation was calculated in SER-DMN-019. The staff reviewed SER-DMN-019 and could not determine if the results presented therein were calculated using a previously approved methodology. What methodology was used to calculate the North Anna Unit 3 maximum fuel channel oscillation of [[]]?</p> <p>[via email J. Shea March 9, 2016]</p>				
031016001	<p>The staff is seeking the underlying calculation note from which the results of SER-DMN-019 are calculated. Specifically, the staff wishes to see the documentation (preferably via electronic reading room) of the following inputs in order to determine if the referenced methodology was correctly followed:</p> <ol style="list-style-type: none"> 1. Initial conditions; 2. Boundary conditions; 	TBD	To be discussed March 16, 2016.	Open with Dominion	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	3. Seismic spectrum; 4. Loadings; 5. Model; and, 6. Model assumptions (including GE14E resonant frequencies). [via email J. Shea March 10, 2016]				
031016002	The underlying technical analysis submitted in support of the NA3 site-specific fuel assembly seismic response is contained in WG3- 002N9544, which is a supplement (number 3) to the approved topical report NEDC-33240P-A. The supplement is submitted under NA3, but the original topical report was submitted by GEH (or is it GNF) to support the ESBWR DCD. Does this supplement constitute a revision to the topical report or not? In essence, the technical staff is seeking this clarification so that we can determine if our safety evaluation write-up should be applied to the underlying topical report, or to the NA3 docket. [via email J. Shea March 10, 2016]	TBD	To be discussed March 16, 2016.	Open with Dominion	
031016003	In the COL Markups (Enclosure 10 of NA3-15-037), Section 4.2.7, Reference 4.2-201 is bracketed and italicized to	TBD	To be discussed March 16, 2016.	Open with Dominion	

**North Anna Unit 3 Seismic Audits 1 and 2
Action Item Tracking List**

AI Number from Source	AI/Question Description	Impacted Report	Follow-up Action	Status	Comments
	<p>indicate a Tier 2* reference (as it should be), but it is missing the asterisk normally included to identify Tier 2* references.</p> <p>[via email J. Shea March 10, 2016]</p>				

NOTES:

1. Remaining RAI responses were included in December 16, 2015, submittal NA3-15-037.
2. All action items are related to Audit 1 (Phase 1, seismic demand) unless otherwise specified as Audit 2.