

Follow-up Actions from NRC Audit 1

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Issue Number and Origin ^{1, 2, 3}	Issue Description	Description of Follow-up Action
0910GEN01 NRC Action #1 09/10 Mtg General	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.	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).
0910GEN02 NRC Action #2 09/10 Mtg General	NRC will include spent fuel pool rack review in the audit plan for Audit-1. -Additional discussion on methodology. -Extent of FSAR markups.	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: -Describe in the fuel rack NA3 report the demonstration of the adequacy of the acceleration time histories. -Obtain plots of the response spectra 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). -Complete and document the NA3 seismic analysis report for the fuel stored in the racks and demonstrate structural adequacy.

¹ The first number for each issue (highlighted in bold) is based on the slide number of the 09/10/2015 meeting presentation. Each slide was created to address NRC Staff questions (1) from the 04/15/2015 meeting (Slides 6 – 58 in the 09/10 meeting presentation), (2) questions provided in advance of the 09/10 meeting (Slides 80 – 127 in the 09/10 presentation), or (3) from NRC comments on the RB/FB Complex Seismic Analysis Report (Slides 59 – 78 in the 09/10 presentation). “NRC Action #N” refers to the action item number in NRC’s list of items from the 09/10/2015 meeting. “NRC AI#N” refers to the action item number from the 04/15/2015 meeting.

² The GEN numbers are general issues.

³ Similar issues are grouped together in the table. For example, 091015S009A and 091015S009B are related issues.

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		-Update the NA3 seismic analysis technical reports for fuel racks and PCCS condenser. -Revise FSAR markups for the fuel racks and PCCS condenser with the correct report revision number.
0910GEN03 NRC Action #23 09/10 Mtg General	Although not specifically requested at the meeting, the staff requests Dominion to provide a list containing the transmittal schedule of the revised seismic demand related technical reports and the corresponding FSAR section update including the issues being addressed by the revisions.	None
091015S006 09/10/2015 Meeting Slides 6 – 8 NRC AI#1 from 4/15/2015 NRC Meeting 041501	The staff requested that GEH justify cases with lower passing frequencies (General). This was identified on slide 6 (33 Hz for Full Column LB) Action 1 Example: For Slide 6, the NRC asked for justification for the 83% 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.	None
091015S009A 09/10/2015 Meeting Slides 9 – 11 NRC AI#2 from 4/15/2015 NRC Meeting 041502	The staff questioned the ISRS results for CB basemat response because ZPA values appear to be less than the PGA.	None
091015S009B 09/10/2015 Meeting Slide 11 NRC Action #3	NRC Action #3, Slide 11 shows that spectral acceleration at 100 Hz at the basemat top is about 0.3g whereas that of the horizontal FIRS is approximately 0.78g. Staff considers that additional justification is needed for this significant reduction of the spectral acceleration at the basemat top for the CB. Since the justification on Slides 9 & 10 is generally also applicable to other buildings, the staff requested similar	None

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09/10 Mtg Slide 11 0910S11	comparisons for other buildings (such as RB/FB, FWSC FIRS at EI 220 ft.) to see whether similar reductions can be observed. The applicant should prepare an explanation for any differences observed for these buildings. Staff will review this issue at Audit-1.	
091015S012A 09/10/2015 Meeting Slides 12 – 20 and 21 - 24 NRC AI#3 from 4/15/2015 NRC Meeting 041503	The staff requested that DOM demonstrate that soil separation does not impact concrete fill below the FWSC. The staff also requested that DOM check whether the unreinforced concrete fill has sufficient capacity to resist the seismic shear stress, considering the vertical seismic load and buoyance force to reduce the shear capacity.	Refer to Issue 092815A1004 and 092815A1005.
091015S012B NRC AI#7 from 4/15/2015 NRC Meeting 041507	The staff questioned the details of anchorage of the FWSC to the concrete fill. The details will need to be evaluated.	Refer to Issues 092815A1004 and 092815A1005.
091015S012C NRC Action #4 09/10 Mtg Slide 12	NRC Action #4, Slide 12: The staff will review at Audit-1 the calculation method and results for determining the capacity of the concrete fill below the FWSC. The staff will also review whether the concrete fill below FWSC requires reinforcement.	Refer to Issue 092815A1004.
091015S012D 09/10 Slides 16 – 19	Evaluation of Concrete Fill: how was groundwater variation considered in the FWSC stability analysis	None
091015S012E 09/10 Slides 21 –24 NRC Action #5	Soil Separation Effects on FWSC Concrete Fill: were effects of concrete fill on structural responses such as ISRS considered NRC Item #5, Slide 21: The applicant is performing additional SSI/SSSI analysis to evaluate the effect of soil separation between concrete fill below FWSC and the surrounding soil. The staff will review these	Refer to Issue 092815A1005.

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09/10 Mtg Slide 21 0910S21	calculations during Audit-1 to evaluate the impact of soil separation on site-specific demand for the FWSC (including on the demand on the concrete fill). These analyses cases should be reflected in the FSAR and the pertinent FSAR Tables.	
091015S025 09/10/2015 Meeting Slide 25 NRC AI#5 from 4/15/2015 NRC Meeting 041505	The staff cannot distinguish the DCD line from other lines in the graphs. Graphs should be revised to use different line style and/or thickness for the DCD line to facilitate NRC review.	None
091015S026A 09/10/2015 Meeting Slide 26 NRC AI#6 from 4/15/2015 NRC Meeting 041506	The staff questioned the conclusion that the peaks in the outcrop motion TFs are numerical. Since the SHAKE TFs are smooth as shown on Slide 77, this suggests that the peaks in the TFs may be from SASSI analysis. The staff requested that DOM improve the accuracy of the TFs or justify why those numerical peaks would not impact the responses. The TFs should be provided in the relevant technical report(s) for staff's review.	None
091015S026B NRC Action #6 09/10 Mtg Slide 26	NRC Action #6, Slide 26: Dominion has performed evaluations for the effects of spurious peaks in the transfer functions, and these evaluations were not documented in the submitted reports. Staff will review the documentation during Audit-1.	None
091015S027 09/10/2015 Meeting Slide 27	The staff observed that in Slide 89, the top two graphs show the UB curve going below the BE curve.	None

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NRC AI#8 from 4/15/2015 NRC Meeting 041508		
091015S028A 09/10/2015 Meeting Slide 28 NRC AI#9 from 4/15/2015 NRC Meeting 041509	NRC suggests that a summary table of cases, base cases, and sensitivity studies (similar to the table in the SCP) be added to the FSAR to facilitate staff review.	None
091015S028B NRC Action #7 09/10 Mtg Slide 28 0910S28	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.	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.
091015S029A 09/10/2015 Meeting Slide 29 NRC AI#10 from 4/15/2015 NRC Meeting 041510	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.	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.
091015S029B NRC Action #8 09/10 Mtg Slides 29 and 127	NRC Action #8, Slides 29 and 127: Dominion will revise the design commitments for considering SSSI effects on Cat I structures due to interaction of Cat II structures. Staff will review this issue at Audit-1.	See 091015S029A.
091015S030 09/10/2015 Meeting Slide 30	The staff recommended that an ITAAC may be required if the structural properties of the soil profiles is impacting the SSI/SSSI responses.	None

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NRC AI#11 from 4/15/2015 NRC Meeting 041511		
091015S031A 09/10/2015 Meeting Slide 31 NRC AI#13 from 4/15/2015 NRC Meeting 041513	The site specific conditions V&V questions related to whether or not the problems are representative of NA3 site and soil conditions. For example, the S and P wave velocities seem too high for the NA3 site. Look at these problems. Consider what S&L did for EF3 (took an average Shear Wave Velocity and extrapolated it for the V&V problem(s)). There were also questions regarding whether or not the Day solution could be used for a meaningful comparison or if the better approach is to refine the mesh. The staff particularly reviews those V&V problems that are applicable to the NA3 conditions; therefore, increasing the shear wave velocity or decreasing the mass density to increase the passing frequency may invalidate the affected V&V problems and new V&V would be needed.	None
091015S031B NRC Action #9 09/10 Mtg Slide 31	NRC Action #9, Slide 31: Staff will review the V&V report to determine that soil properties used for V&V problems are representative of the North Anna 3 site conditions.	None
091015S032A 09/10/2015 Meeting Slides 32 - 37 NRC AI#14 from 4/15/2015 NRC Meeting 041514	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.	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: <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.

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091015S032B 09/10 Slides 32 – 37 NRC Action #10 09/10 Mtg Slides 32 and 81	4/15 Meeting – Action 14 - Figures Showing NEI Check: the smoothing of the curves is not justified NRC Action #10, Slides 32 and 81: FSAR should include the comparison of envelope of the raw ARS with PBSRS for the NEI check and justifications for acceptability of any dips of surface ARS envelop below the PBSRS.	See 091015S032A.
091015S038A 09/10/2015 Meeting Slides 38 - 39 NRC AI#15 from 4/15/2015 NRC Meeting	Staff also noted that parameters were not included to show how they compared to the earthquake seed. Are they higher or lower? Why is that acceptable? Provide comparison of the characteristic values (V/A , AD/V^2) for the site-specific input time histories with those of the controlling earthquakes (see SRP 3.7.1) and provide justification of any inconsistencies.	None
091015S038B 09/10 Slide 38 NRC Action #11 09/10 Mtg Slide 38	4/15 Meeting Action 15 - Comparison of Parameters to Earthquake Seed: did the FSAR have a statement that this approach was conservative NRC Action #11, Slide 38: The staff will review in Audit-1 comparison of characteristic values for NA3 time histories and earthquake seed during the Audit-1.	None
091015S040A 09/10/2015 Meeting Slide 40 NRC AI#17 from 4/15/2015 NRC Meeting	Staff requests assurances that V&V are adequate for ACS-SASSI if using this for NA3 SSI results.	None
091015S040B	NRC Action #12, Slides 40 and 60: Staff will review V&V of ACS SASSI for application to North Anna 3 sensitivity analysis.	Revise FSAR to incorporate conclusions from the RB/FB SSI report, Appendix I.

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NRC Action #12 09/10 Mtg Slides 40 and 60		
091015S041 09/10/2015 Meeting Slide 41 NRC AI#18 from 4/15/2015 NRC Meeting	The NRC asked (as part of its summary of its understanding of the presentation of preliminary results) about RPV support brackets. <u>NOTE:</u> DOM pointed the NRC to DCD Figure 3G.1-57, "RPV Support Bracket and Vent Wall." [Audit 2 Item.]	None [Audit 2 item]
091015S042A 09/10/2015 Meeting Slides 42 - 43 NRC AI#19 from 4/15/2015 NRC Meeting	The presentation did not include any results showing the effect of stiffness variation on FWSC seismic demand and ISRS.	None
091015S042B NRC Action #13 09/10 Mtg Slide 43	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.	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.
091015S044 09/10/2015 Meeting Slide 44 NRC AI#20 from 4/15/2015 NRC Meeting	Because the SSSI results are found important in some cases, the response to RAI 3.7.1-7 should be updated with the SSSI results to address the effects of backfill on the seismic responses of the CB and the FWSC.	None
091015S045 09/10/2015 Meeting Slide 45	The staff has reviewed the Reference Letter NA3-14-044R and has the following comments: (1) In FSAR Section 3.7.1, the applicant referenced Figures 2.0-201 through 2.0-204 for the site-specific design ground motions. However,	None

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NRC AI#21 from 4/15/2015 NRC Meeting	since the FWSC is also designed for the control motion applied at Elevation 220 ft., it should also be referenced. (2) SSE design ground motions for plant design along with the OBE for plant shutdown have been defined in the FSAR Section 3.7.1. Section 3.7.4 also establishes the details of the plant shutdown OBE. However, Section 3.7.1.1.6 in the FSAR introduces another terminology "site-dependent at Grade SSE response spectra. Since the SSE ground motions for design purposes and shutdown OBE have already been defined in Section 3.7.1 and 3.7.4, the staff does not understand the purpose of this Section.	
091015S046A 09/10/2015 Meeting Slide 46 - 54 NRC AI#22 from 4/15/2015 NRC Meeting	In the 8 files for strata profiles contained in Enclosure 3 of the Dominion Transmittal Reference NA3-15-003, there are many NaN (Not A Number, for example IEEE defines 0/0=NaN) entries that appear to occur at the same elevations for certain simulated profiles. The staff requests that the applicant explain (1) how the NaN entries in the strata profiles were obtained from the simulated soil profiles that do not have any NaN entries, (2) whether the strata profiles have been used in any downstream analyses, and (3) how these NaN entries were treated if they were used.	None
091015S046B NRC Action #14 09/10 Mtg Slides 46 and 57	NRC Action #14, Slides 46 and 57: The staff will review in Audit-1 development of strain compatible soil profile.	None
091015S055 09/10/2015 Meeting Slide 55 - 56 NRC AI#23 from 4/15/2015 NRC Meeting	The staff can confirm how the median and LOG SD in the 8 soil profiles were calculated. However, the LF4, HF4, LF5, and HF5 data in the excel file, "RBFB_SC_ProifileData.xlsx" do not match the calculated values in the 8 soil profiles. Please explain how the median and log-SD columns in the excel file were calculated for the four cases (LF4, HF4, LF5, and HF5).	None
091015S057A 09/10/2015 Meeting Slides 57 - 58	The excel file "RBFB_SC_ProifileData.xlsx" has only 44 soil layers, but the individual 8 soil profile files have 49 layers	None

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NRC AI#24 from 4/15/2015 NRC Meeting		
091015S057B NRC Action #14 09/10 Mtg Slides 46 and 57	NRC Action #14, Slides 46 and 57: The staff will review in Audit-1 development of strain compatible soil profile.	None
091015S060A 09/10/2015 Meeting Slide 60 NRC Comment #1 on RB/FB SSI Report	It appears that all the stiffness variation sensitivity analyses for fully embedded (FE) cases were performed using the MSM method of ACS SASSI instead of SASSI2010. Please explain the reason for not using SASSI2010 in these cases.	None
091015S060B NRC Action #12 09/10 Mtg Slides 40 and 60	NRC Action #12, Slides 40 and 60: Staff will review V&V of ACS SASSI for application to North Anna 3 sensitivity analysis.	None
091015S061 09/10/2015 Meeting Slide 61 NRC Comment #2 on RB/FB SSI Report	For the MSM model, please identify the locations of the interaction planes and describe whether they are consistent with the identified interaction planes in the benchmarking study. Section 4.3 does not appear to include any description in this regard.	None
091015S062 09/10/2015 Meeting Slide 62 NRC Comment #3 on RB/FB SSI Report	Table 4.2.1 indicates the lowest cut off frequency is 32 Hz while the report (Page 17 of 602) identified the cut-off frequency of 33 Hz.	None

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091015S063 09/10/2015 Meeting Slide 63 NRC Comment #4 on RB/FB SSI Report	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.	CB-FWSC SSI report will 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.
091015S064 09/10/2015 Meeting Slide 64 NRC Comment #5 on RB/FB SSI Report	Page 26 of 602 indicates that differences in maximum responses obtained from PE and FE models are negligible. However, the figures cited (Figures 5.2-5) in the report indicate that the difference could be approximately 20 to 30%. Needs further clarification in this regard.	None
091015S065A 09/10/2015 Meeting Slide 65 NRC Comment #6 on RB/FB SSI Report	In Table 5.6-1 it appears that the partial column UB case yields the maximum eccentricity of 10.7m. However, the report in Page 32 of 602 (last sentence) indicates that the UB full column profile yields the maximum value. In addition, for the full column case while the BE governs, the UB case was identified as governing in Table 5.6-1. Please clarify these inconsistencies.	None
091015S065B NRC Action #15 09/10 Mtg Slide 65	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.	Revise the FWSC SSI report to correct the following errors: -Section 5.5, Item 1: Change to "The <u>FWSC</u> structure and model..." -Section 5.5, Item 7: Change to "(the <u>FWSC</u> seismic weight...)" Revise the FSAR to present a summary of the methodology to calculate foundation uplift as presented in the CB and FWSC Seismic Analysis Reports.
091015S066 09/10/2015 Meeting	In Section 5.3, the SRSS equations in Step 2 appear to be not consistent with the direction definitions presented in Step 1. The	None

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Slide 66 NRC Comment #7 on RB/FB SSI Report	definitions in Step 1 should be revised. Same problem with Section 5.4 in calculating relative floor displacements.	
091015S067A 09/10/2015 Meeting Slides 67 - 68 NRC Comment #8 on RB/FB SSI Report	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%, not much higher than the 80% criterion.	Revise the RB/FB & CB SSI reports to include the results and methodology used for alternative rigid foundation uplift calculations. Consider adding a summary statement to the FSAR.
091015S067B NRC Action #16 09/10 Mtg Slide 67	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.	Revise the RB/FB & CB SSI reports to include the results and methodology used for alternative rigid foundation uplift calculations. Consider adding a summary statement to the FSAR.
091015S069 09/10/2015 Meeting Slide 69 NRC Comment #9 on RB/FB SSI Report	Table 5.4-1, row at Node 9103 shows NA3 exceeding the standard design for maximum vertical displacement, but is not identified as such in the text and the table. In addition, Section 6.2 states that "The comparisons of the site-specific enveloping displacements with the corresponding standard design values show that the NA3 high frequency design motion results in displacements that are enveloped by the standard design." This inconsistency needs to be addressed.	None
091015S070A 09/10/2015 Meeting Slides 70 - 73	Table 6.1-2e, "Enveloping Maximum Accelerations for Fuel," there are large differences between the two horizontal directions for NA3 but not so much so for the standard design. Also, Table 6.1-5 shows similar	None

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NRC Comment #10 on RB/FB SSI Report	discrepancy to those above for maximum spring forces and displacements. Provide an explanation on these differences.	
091015S070B 09/10 Slide 72	Fuel Racks Analysis – What is the basis for the inputs to the fuel racks analysis?	None
091015S074A 09/10/2015 Meeting Slide 74 NRC Comment #11 on RB/FB SSI Report	RB/FB SSI Report, 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 RB/FB SSI report, Section 6.2, “Enveloping Maximum Displacements.”	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. Also 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)
091015S074B 09/10 Slide 74 NRC Action #17 09/10 Mtg Slide 74	RB/FB SSI Report: Some site-specific relative displacements exceed the standard design values NRC Action #17, Slide 74, DOM will explain the exceedances of the maximum relative displacements in the FSAR	None
091015S075A 09/10/2015 Meeting Slide 75 NRC Comment #12 on RB/FB SSI Report	Section 6.3 provides site specific design envelope ISRS which represent the envelope of ISRS results from site specific SSI analysis using LB, BE, and UB soil profile of RB/FB model with upper bound stiffness properties. The site-specific evaluation of the effect of structural stiffness variation is described in Appendix B. According to Appendix B, it appears that for design and qualification of the equipment, ISRS provided in Section 6.3 will be enhanced only if there is a peak exceedance as a result of the sensitivity analysis of greater than 10%. Staff needs further justification of the 10% criteria. In staff’s opinion for equipment and systems seismic qualification, for all	Refer to Issue 092815A1003.

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	identified exceedances due to stiffness variations, the NA3 site specific design ISRS should be enhanced.	
091015S075B 09/10 Slide 75	RB/FB SSI Report: NRC Comment 12 [10% criteria in sensitivity analysis]: why is the 10% criteria for evaluating exceedances acceptable	Refer to 092815A1003.
091015S076 09/10/2015 Meeting Slide 76 NRC Comment #13 on RB/FB SSI Report	Appendix D (page 381) states that, "RCCVA and RBFBW are the maximum acceleration and vertical rigid mode mass of the RCCV LMSM." It should be corrected as "RCCVA and RCCVW are the maximum acceleration and vertical rigid mode mass of the RCCV LMSM."	None
091015S077 09/10/2015 Meeting Slide 77 NRC Comment #14 on RB/FB SSI Report	As shown in Table D.3-3, there is no rigid mass for D/F. Why is that?	None
091015S078A 09/10/2015 Meeting Slide 78 NRC Comment #15 on RB/FB SSI Report	It seems the second peak in the Appendix I, Figure I-1 is a numerical anomaly in both ACS SASSI and SASSI 2010. Please explain how the results of the analysis would be affected.	None
091015S078B 09/10 Slide 78	RB/FB SSI Report: NRC Comment 15 [Apparent numeric anomalies in ACS SASSI and SASSI 2010]	None
091015S 080A 09/10/2015 Presentation Slides 80 - 106	In response to Action Item Number 14 of Dominion NA3 COLA update meeting with NRC 4/15/2015 in the FSAR Markup on pages 3-21 and 3-25, it was indicated that the NEI check is based on comparison between PBSRS and the ± 20 % smoothed envelope of surface ARS obtained from the three SSI analysis soil profiles (LB, BE, and UB). The basis of smoothening the spectra appears to be that the PBSRS are smooth	See 091015S032A.

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NRC Staff Question #1 for 9/10 public meeting	spectra obtained from the RVT approach and therefore, for comparison purposes, smoothing of the raw ARS obtained from the individual surface time histories is acceptable. However, it appears that irrespective of the method used (i.e., RVT or time domain approach) the PBSRS would be a smooth curve since 60 random profiles are used to generate the PBSRS. However, the deterministic SSI analysis is performed for only three profiles. The objective of the NEI approach is to ensure that the three SSI deterministic seismic input used for the SSI analysis would be sufficient to envelope the PBSRS. NEI guidance did not specify smoothing the individual ARS in making the NEI check. Instead of modifying the input time histories, another acceptable approach per the NEI guidance is to select additional soil columns (in addition to the three soil columns already developed for SSI analysis) from the set of soil columns used to generate the FIRS so that the envelope ARS with the additional soil columns will bound the surface PBSRS. As such for the RB/FB, CB, and the FWSC, the applicant is requested to provide comparisons of the envelope of the raw ARS (obtained from the three SSI profiles) with the PBSRS and provide justification of acceptability of the instances where PBSRS exceeded the envelope ARS. The applicant is also requested to describe how the RVT method is used to perform the NEI check.	
091015S080B 09/10 Slides 32 – 37 NRC Action #10 09/10 Mtg Slides 32 and 81	4/15 Meeting – Action 14 - Figures Showing NEI Check: the smoothing of the curves is not justified NRC Action #10, Slides 32 and 81: FSAR should include the comparison of envelope of the raw ARS with PBSRS for the NEI check and justifications for acceptability of any dips of surface ARS envelop below the PBSRS.	See 091015S032A.
091015S080C 09/10 Slides 82 - 106	NRC 8/31 Question 1 – regarding July 2015 letter and markups [Confirmatory NEI Check]: why is smoothing of the curves acceptable	See 091015S032A.
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 base mat	Revise FSAR Section 3.7.1 to describe comparison presented in response to RAI 03.07.02-11 that

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09/10/2015 Presentation Slide 107 NRC Staff Question #2 for 9/10 public meeting	instead of the bottom of the concrete fill below the CB basemat. This basis should be included in the FSAR Section 3.7.1.	demonstrates why SSI analysis at CB basemat Elevation 241 ft is acceptable. Refer to CCR package NA3-15-7012.
091015S107B NRC Action #18 09/10 Mtg Slide 107	NRC Action #18, Slide 107: Dominion will include in FSAR the basis of defining CB control motion at CB basemat instead of bottom of concrete fill.	Refer to 091015S107A.
091015S108A 09/10/2015 Presentation Slides 108 - 115 NRC Staff Question #3 for 9/10 public meeting	<p>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.</p> <p>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 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.</p> <p>NRC Action #19, Slide 109: The staff will discuss with Dominion on the OBE definition for plant shutdown in September 23, 2015 phone call.</p>	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.
091015S108B	NRC 8/31 Question 3 - regarding July 2015 letter and markups [Use of Site-Dependent SSE at-Grade for OBE Definition]. NRC requested that the definition of OBE be moved to Section 3.7.4	None

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09/10 Slides 109 – 115 NRC Action #19 09/10 Mtg Slide 109		
091015S116A 09/10/2015 Presentation Slide 116 NRC Staff Question #4 for 9/10 public meeting	FSAR markup Table 3A.13.2-201 on page 249 of 623, Damping Values for Dynamic Analysis, identifies the SSE and OBE damping values for various structural and mechanical components. For some of the components in this table, there are no corresponding damping values in the ESBWR DCD Table 3.7-1 or in RG 1.61 (e.g., fuel assemblies for horizontal and vertical directions applicable to OBE, and vent wall/diaphragm floor with 50% concrete stiffness contribution applicable to SSE). Therefore, provide the basis for the damping values presented in the FSAR Table 3A.13.2-201, for those components which are not identified in ESBWR DCD Table 3.7-1 or in RG 1.61.	Refer to 091015S116B.
091015S116B 09/10 Slide 116 NRC Action #20 09/10 Mtg Slide 116	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.	Revise FSAR Section 3A.13.2 as follows: “Table 3A.13.2-201 provides the damping values used for the site-specific SSI analyses. <u>The damping values are based on RG 1.61, DCD Table 3.7-1, and the DCD model.</u> ” Refer to CCR package NA3-15-7012.
091015S117A 09/10/2015 Presentation Slides 117 – 122 NRC Staff Question #5 for 9/10 public meeting	Describe the NA3 approach and the criteria for enhancing the site-specific seismic demand (e.g., structural load, wall pressures, ISRS, etc.) calculated based on the envelope of the stand-alone SSI analyses to bound any potential effect of the stiffness variation and the SSSI sensitivity analyses.	Refer to Issue 092815A1003.
091015S117B 09/10 Slide 120	Question 5 regarding July 2015 letter and markups: use of scaling if SSSI analyses of CB-RB/FB yields results that exceed ISRS from CB SSI analyses	Refer to Issue 092815A1003.

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091015S117C 09/10 Slides 118-122	NRC 8/31 - Question 5 regarding July 2015 letter and markups [Approach and criteria for enhancing site-specific seismic demand]: justify the approach used to envelope seismic loads	Refer to Issue 092815A1003.
091015S 117D 09/10 Slides 118-122	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	<p>As described below: revise the RB/FB, CB & FWSC technical reports on stability to provide references to the updated SSI/SSSI reports justifying the consideration of licensing basis demands for stability and 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 & FWSC stability reports, as required): "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 <u>and bound the effects of concrete cracking as described in Appendix B of Reference 2-i and SSSI as described in Reference 2-k.</u>"</p> <p>Make sure that design basis in FSAR Section 2.5.4 and 3.7- 3.8 regarding soil bearing pressures are consistent.</p>
091015S123A 09/10/2015 Presentation Slide 123 NRC Staff Question #6 for 9/10 public meeting	The last sentence on Page 31 second paragraph of the CB/FWSC SSSI report (WG3-U73-ERD-S-0002, rev.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.	Revise FSAR to describe changes similar to those described in the bullets below. <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 6.4-1 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

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091015S123B 09/10 Slide 123	NRC 8/31 Question 5 regarding July 2015 letter and markups: SSSI effects on FWS roof out-of-plane loads exceed standard design	Refer to 091015S123A.
091015S124A 09/10/2015 Presentation Slide 124 NRC Staff Question #7 for 9/10 public meeting	<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 effects are being addressed in the site-specific seismic demand evaluation.</p>	<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>
091015S124B 09/10 Slides 124-125 NRC Action #21 09/10 Mtg Slide 124	<p>NRC 8/31 Questions 7 & 8 regarding July 2015 letter and markups [SSSI exceedances for CB and RB/FB reports]: explain basis for exceedances</p> <p>NRC Action #21, Slide 124: Dominion will include in the FSAR consideration of any exceedances in the CB due to site-specific CB-RB/FB SSSI analysis.</p>	Refer to 091015S124A.
091015S125 09/10/2015 Presentation Slide 125	<p>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% at a frequency of 25 Hz and by 25% 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</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.

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NRC Staff Question #8 for 9/10 public meeting	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.	Revise FSAR 3A.17.11, to note that ISRS exceedances due to RB/FB SSSI effects are included in CB site-specific ISRS. Similar to above (091015S124B).
091015S126 09/10/2015 Presentation Slide 126 NRC Staff Question #9 for 9/10 public meeting	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 Rev 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, how the design commitments for this tunnel are to be tracked.	Add ITAAC to COLA for design of SC II Access Tunnel.
091015S127A 09/10/2015 Presentation Slide 127 NRC Staff Question #10 for 9/10 public meeting	The applicant has included the ITAAC Tables 2.4.15-1, 2.4.16-1, 2.4.17-1, and 2.4.18-1 for performing the site-specific SSI and SSSI analyses to address the NAPS DEP 3.7-1. The design commitment states that the design of the Non-Category I structure precludes any adverse interaction with Seismic Category I structures. However, the design commitment should be more specific, to indicate that seismic SSSI interaction of the "Non-category I structure" with the "adjacent seismic Category I structure" will not impair the ability of Seismic Category I structures to perform their safety-related functions.	Refer to 091015S029A
091015S127B NRC Action #8 09/10 Mtg Slides 29 and 127	NRC Action #8, Slides 29 and 127: Dominion will revise the design commitments for considering SSSI effects on Cat I structures due to interaction of Cat II structures. Staff will review this issue at Audit-1.	Refer to 091015S029A
091015S127C 09/10 Slides 126-127 NRC Action #22 09/10 Mtg	NRC 8/31 Question 9 NRC Action #22, Slide 126: Staff requested DOM to provide site-specific ITAAC for the access tunnel	Refer to 091015S126

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Slide 126		
092815A1001	Provide the technical basis for not including ASCE-4-98 loadings in the analysis of lateral earth pressure in accordance with SRP 3.8.4 acceptance criteria II.4.H.	None
092815A1002	The SSE definition (for Tier 1) in Part 10 of the COLA should reflect the SSI Input Response Spectra at the 220' elevation in addition to FIRS at the 282' elevation. The July markups of FSAR 3.7.1 captured both FIRS at elev. 282' and SSI Input Response Spectra at elev. 220'. The same language can be added to the Tier 1 definition of SSE.	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.
092815A1003	09/29/2015: Revise FSAR to describe the methodology used to address exceedances in sensitivity studies, including acceptance criteria. These sensitivity studies refer to stiffness variations and SSSI analyses. Also describe use of scaling if SSSI analyses of CB-RB/FB yields results that exceed ISRS from CB SSI analyses.	Revise the FSAR as described in the issue description. Note: The following issues were closed to this issue: 091015S075A, 091015S117A, 091015S117B, 091015S117C, 091015S124A, 091015S124B, and 091015S125.
092815A1004	Technical Report SER-DMN-034: Shear capacity of concrete fill under FWSC: NRC requested technical basis for using ACI-207.1R-18 versus ACI-318.	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).
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.	Revise SER-DMN-034 to state that the exceedances due to concrete fill soil separation will be addressed. 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..
092815A1006	CB-FWSC SSSI Report and CB-RB/FB SSSI Report editorial changes.	Revise the CB-FWSC SSSI Report:

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		<p>-On page 18, 2nd to last paragraph (starting with "the max aspect ratio"), add a reference to App. 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 Fig. 5.2-1 and Torsion in Fig 5.2-2. Revise the FSAR to address these inconsistencies.</p>