UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 20, 2015

Mr. David A. Heacock
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SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 - STAFF ASSESSMENT OF INFORMATION PROVIDED PURSUANT TO TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* PART 50, SECTION 50.54(f), SEISMIC HAZARD REEVALUATIONS RELATING TO RECOMMENDATION 2.1 OF THE NEAR-TERM TASK FORCE REVIEW OF INSIGHTS FROM THE FUKUSHIMA DAI-ICHI ACCIDENT (TAC NOS. MF3797 AND MF3798)

Dear Mr. Heacock:

By letter dated March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.54(f) (hereafter referred to as the 50.54(f) letter). The purpose of that request was to gather information concerning, in part, seismic hazards at each operating reactor site and to enable the NRC staff, using present-day NRC requirements and guidance, to determine whether licenses should be modified, suspended, or revoked.

By letter dated March 31, 2014, Virginia Electric and Power Company (Dominion) responded to this request for North Anna Power Station, Units 1 and 2 (North Anna).

The NRC staff has reviewed the information provided related to the reevaluated seismic hazards for North Anna, Units 1 and 2 and, as documented in the enclosed staff assessment, determined that you provided sufficient information in response to Requested Information Items (1) – (3), (5), (7), and a partial response to Item (4), identified in Enclosure 1 of the 50.54(f) letter. Further, the staff concludes that Dominion's reevaluated seismic hazard for North Anna is suitable for other activities associated with the NRC Near-Term Task Force Recommendation 2.1, "Seismic."

Contingent upon the NRC's review and acceptance of Dominion's expedited seismic evaluation process, and seismic risk evaluation including the high frequency and spent fuel pool evaluations (i.e., Items (4), (6), (8), and (9)) for North Anna, the sesimc hazard evaluation identified in Enclosure 1 of the 50.54(f) letter will be complete.

If you have any questions, please contact me at (301) 415-6197 or via e-mail at Tekia.Govan@nrc.gov.

Sincerely,

Tekia Govan, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos. 50-338 and 50-339

Enclosure:
Staff Assessment of Seismic
Hazard Evaluation and Screening Report

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO SEISMIC HAZARD AND SCREENING REPORT

NORTH ANNA POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

By letter dated March 12, 2012 (NRC, 2012a), the U.S. Nuclear Regulatory Commission (NRC or Commission) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) "Conditions of license" (hereafter referred to as the "50.54(f) letter"). The request and other regulatory actions were issued in connection with implementing lessons-learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the "Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident" (NRC, 2011b).[1] In particular, the NRC Near-Term Task Force (NTTF) Recommendation 2.1, and subsequent Staff Requirements Memoranda (SRM) associated with Commission Papers SECY-11-0124 (NRC, 2011c) and SECY-11-0137 (NRC, 2011d), instructed the NRC staff to issue requests for information to licensees pursuant to 10 CFR 50.54(f).

Enclosure 1 to the 50.54(f) letter requests that addressees perform a reevaluation of the seismic hazards at their sites using present-day NRC requirements and guidance to develop a ground motion response spectrum (GMRS).

The required response section of Enclosure 1 requests that each addressee provide the following information:

(1) Site-specific hazard curves (common fractiles and mean) over a range of spectral frequencies and annual exceedance frequencies,

(2) Site-specific, performance-based GMRS developed from the new site-specific seismic hazard curves at the control point elevation,

(3) Safe Shutdown Earthquake (SSE) ground motion values including specification of the control point elevation,

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[1] Issued as an enclosure to Commission Paper SECY-11-0093 (NRC, 2011a).

(4) Comparison of the GMRS and SSE (If the GMRS is completely bounded by the SSE, an interim action plan or risk evaluation is not necessary. However if the GMRS exceeds the SSE only at higher frequencies, information related to the functionality of high-frequency sensitive SSCs is requested),

(5) Additional information such as insights from NTTF Recommendation 2.3 walkdown and estimates of plant seismic capacity developed from previous risk assessments to inform NRC screening and prioritization,

(6) Interim evaluation and actions taken or planned to address the higher seismic hazard relative to the design basis, as appropriate, prior to completion of the risk evaluation (if necessary),

(7) Statement if a seismic risk evaluation is necessary,

(8) Seismic risk evaluation (if necessary), and

(9) Spent fuel pool (SFP) evaluation (if necessary).

Present-day NRC requirements and guidance with respect to characterizing seismic hazards use a probabilistic approach in order to develop a risk-informed performance-based GMRS for the site. Regulatory Guide (RG) 1.208, "A Performance-based Approach to Define the Site-Specific Earthquake Ground Motion," describes this approach. As described in the 50.54(f) letter, if the reevaluated seismic hazard, as characterized by the GMRS, is not bounded by the current plant design-basis SSE, further seismic risk evaluation of the plant is merited.

By letter dated November 27, 2012 (Keithline, 2012), the Nuclear Energy Institute (NEI) submitted Electric Power Research Institute (EPRI) report "Seismic Evaluation Guidance: Screening, Prioritization, and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1 Seismic" (EPRI, 2012), hereafter called the SPID. The SPID supplements the 50.54(f) letter with guidance necessary to perform seismic reevaluations and report the results to NRC in a manner that will address the Requested Information Items in Enclosure 1 of the 50.54(f) letter. By letter dated February 15, 2013 (NRC, 2013b), the staff endorsed the SPID.

The required response section of Enclosure 1 to the 50.54(f) letter specifies that Central and Eastern United States (CEUS) licensees provide their Seismic Hazard and Screening Report (SHSR) by 1.5 years after issuance of the 50.54(f) letter. However, in order to complete its update of the EPRI seismic ground motion models (GMM) for the CEUS (EPRI, 2013), industry proposed a six-month extension to March 31, 2014, for submitting the SHSR. Industry also proposed that licensees perform an expedited assessment, referred to as the Augmented Approach, for addressing the requested interim evaluation (Item 6 above), which would use a simplified assessment to demonstrate that certain key pieces of plant equipment for core cooling and containment functions, given a loss of all alternating current (AC) power, would be able to withstand a seismic hazard up to two times the design basis. Attachment 2 to the April 9, 2013, letter (Pietrangelo, 2013) provides a revised schedule for plants needing to perform (1) the

Augmented Approach by implementing the Expedited Seismic Evaluation Process (ESEP) and (2) a seismic risk evaluation. By letter dated May 7, 2013 (NRC, 2013a), the NRC determined that the modified schedule was acceptable and by letter dated August 28, 2013 (NRC, 2013c), the NRC determined that the updated GMM (EPRI, 2013) is an acceptable ground motion model for use by CEUS plants in developing a plant-specific GMRS.

By letter dated April 9, 2013 (Pietrangelo, 2013), industry agreed to follow the SPID to develop the SHSR for existing nuclear power plants. By letter dated September 12, 2013 (Grecheck, 2013), Virginia Electric and Power Company (Dominion, the licensee) submitted partial site response information for North Anna Power Station, Units 1 and 2 (North Anna, NAPS). By letter dated March 31, 2014 (Heacock, 2014), Dominion submitted its SHSR.

2.0 REGULATORY BACKGROUND

The structures, systems, and components (SSCs) important to safety in operating nuclear power plants are designed either in accordance with, or meet the intent of Appendix A to 10 CFR Part 50, General Design Criteria (GDC) 2: "Design Bases for Protection Against Natural Phenomena;" and Appendix A to 10 CFR Part 100, "Reactor Site Criteria." GDC 2 states that SSCs important to safety at nuclear power plants shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions. Generally plants with construction permits issued prior to May 21, 1971, were approved for construction based on the proposed General Design Criteria published by the Atomic Energy Commission (AEC). Accordingly, North Anna, Units 1 and 2 were granted a construction permit on February 19, 1971, to AEC criteria.

For initial licensing, each licensee was required to develop and maintain design bases that, as defined by 10 CFR 50.2, identify the specific functions that an SSC of a facility must perform, and the specific values or ranges of values chosen for controlling parameters as reference bounds for the design. The design bases for the SSCs reflect appropriate consideration of the most severe natural phenomena that had been historically reported for the site and surrounding area. The design bases also considered limited accuracy, quantity, and period of time in which the historical data have been accumulated.

The seismic design bases for currently operating nuclear power plants were either developed in accordance with, or to meet the intent of GDC 2 and 10 CFR Part 100, Appendix A. Although the regulatory requirements in Appendix A to 10 CFR Part 100 are fundamentally deterministic, the NRC process for determining the seismic design basis ground motions for new reactor applications after January 10, 1997, as described in 10 CFR 100.23, requires that uncertainties be addressed through an appropriate analysis such as a probabilistic seismic hazard analysis (PSHA).

Section 50.54(f) of 10 CFR states that a licensee shall at any time before expiration of its license, upon request of the Commission, submit written statements, signed under oath or affirmation, to enable the Commission to determine whether or not the license should be modified, suspended, or revoked. On March 12, 2012, the NRC staff issued requests for licensees to reevaluate the seismic hazards at their sites using present-day NRC requirements and guidance, and identify

actions planned to address plant-specific vulnerabilities associated with the updated seismic hazards.

Attachment 1 to Enclosure 1 of the 50.54(f) letter describes an acceptable approach for performing the seismic hazard reevaluation for plants located in the CEUS. Licensees are expected to use the CEUS Seismic Source Characterization (CEUS-SSC) model in NUREG-2115 (NRC, 2012b) along with the appropriate EPRI (2004, 2006) GMMs. The SPID provides further guidance regarding the appropriate use of GMMs for the CEUS. Specifically, Section 2.3 of the SPID recommends the use of the updated GMM (EPRI 2013) and, as such, licensees used the NRC-endorsed updated EPRI GMM instead of the older EPRI (2004, 2006) GMM to develop PSHA base rock hazard curves. Finally, Attachment 1 requested that licensees conduct an evaluation of the local site response in order to develop site-specific hazard curves and GMRS for comparison with the plant SSE.

2.1 Screening Evaluation Results

By letter dated March 31, 2014 (Heacock, 2014), Dominion provided the SHSR for the NAPS. The licensee's SHSR indicates that the site GMRS exceeds the SSE for North Anna, Units 1 and 2 over the frequency range of 1 to 10 Hertz (Hz). Therefore, the licensee will perform a plant seismic risk evaluation. A SFP evaluation will also be performed. Further, the licensee indicated that since the SSE also exceeds the GMRS above 10 Hz, that a high frequency confirmation will be performed.

On May 9, 2014 (NRC, 2014), the staff issued a letter providing the outcome of its 30-day screening and prioritization evaluation. As indicated in the letter, the staff confirmed the licensee's screening results. The licensee's GMRS, as well as the staff's confirmatory GMRS, exceed the SSE for North Anna, Units 1 and 2 over the frequency range of approximately 5 to 100 Hz. Therefore, a plant seismic risk evaluation, SFP evaluation, and high frequency confirmation are merited.

3.0 TECHNICAL EVALUATION

The NRC staff evaluated the licensee's submittal to determine if the provided information responded appropriately to Enclosure 1 of the 50.54(f) letter with respect to characterizing the reevaluated seismic hazard.

3.1 Plant Seismic Design-Basis

Enclosure 1 of the 50.54(f) letter requests the licensee provide the SSE ground motion values, as well as the specification of the control point elevation(s) for comparison to the GMRS. For operating reactors licensed before 1997, the SSE is the plant licensing basis earthquake and is characterized by 1) a peak ground acceleration (PGA) value which anchors the response spectra at high frequencies (typically at 20 to 30 Hz for the existing fleet of nuclear power plants); 2) a response spectrum shape which depicts the amplified response at all frequencies below the PGA; and 3) a control point where the SSE is defined.

In Section 3.1 of the SHSR, the licensee described its seismic design bases for North Anna, Units 1 and 2 and stated that the rock SSE is defined in terms of a PGA and a design response spectrum. The response spectral shape is anchored at a PGA of 0.12 g (12 percent of the acceleration due to earth's gravity). The licensee stated that the original NAPS SSE is based on the Atomic Energy Commission (AEC, now NRC) criteria in effect at the time of the NAPS, Units 1 and 2 construction permits.

In Section 3.2 of the SHSR, the licensee specified that the SSE control point is defined as the foundation bearing elevation of the highest rock supported, safety-related structure, which, in the case of North Anna, is the base of the Casing Cooling Tank and Pumphouse foundation at El. 268 ft [81.7 m], or 3 ft below grade.

The staff reviewed the licensee's description of its SSE for North Anna Power Station, Units 1 and 2 in the SHSR. With regard to the SSE for North Anna Power Station, Units 1 and 2, based on its review of the SHSR and updated final safety analysis report (UFSAR) (Dominion, 2012), the staff confirms that the licensee's SSE, shown in SHSR Table 3.1-1 and Figure 3.1-1 in this assessment, is same as in UFSAR Figure 2.5-12. In addition, based on review of the SHSR and the UFSAR (Dominion, 2012), the staff confirms that the licensee's control point elevation for North Anna, Units 1 and 2 SSE is consistent with the guidance provided in the SPID.

3.2 Probabilistic Seismic Hazard Analysis

In Section 2.2 of the SHSR, the licensee stated that, in accordance with the 50.54(f) letter and the SPID, it performed a PSHA using the CEUS-SSC model and the updated EPRI GMM for the CEUS (EPRI, 2013). The licensee used a minimum magnitude (**M**) of 5.0, as specified in the 50.54(f) letter. The licensee further stated that it included the CEUS-SSC background sources out to a distance of 400 miles (640 km) around the site. The licensee included the following Repeated Large Magnitude Earthquakes (RLME) within 621 mi (1,000 km) of the site: Charleston, New Madrid Fault System, and Wabash Valley. The RLME sources are those source areas or faults for which more than one large magnitude (**M** ≥ 6.5) earthquake has occurred in the historical or paleoearthquake (geologic evidence for prehistoric seismicity) record. The licensee used the mid-continent version of the updated EPRI GMM (EPRI, 2013) for each of the CEUS-SSC sources. Consistent with the SPID, the licensee did not provide base rock seismic hazard curves because it performed a site response analysis to determine the control point seismic hazard curves. The licensee provides its control point seismic hazard curves in Section 2.3.7 of its SHSR. The staff's review of the licensee's control point seismic hazard curves is provided in Section 3.3 of this staff assessment.

As part of its confirmatory analysis of the licensee's GMRS, the staff performed PSHA calculations for base rock site conditions at the NAPS site. As input, the staff used the CEUS-SSC model as described in NUREG-2115 (NRC, 2012b) along with the EPRI GMM model (EPRI 2013). Consistent with the guidance provided in the SPID, the staff included all CEUS-SSC background seismic sources within a 310 mi (500 km) radius of the NAPS site. In addition, the staff included RLME sources which lie within 621 mi (1,000 km) of the site. For each of the CEUS-SSC sources used in the PSHA, the staff used the mid-continent version of the EPRI GMM (EPRI, 2013). The staff used the resulting base rock seismic hazard curves together with a

confirmatory site response analysis, described in the next section, to develop control point seismic hazard curves and a GMRS for comparison with the licensee's results.

Based on review of the SHSR, the staff concludes that the licensee followed guidance provided in the SPID for selecting PSHA input models and parameters for the site. This includes the licensee's use and implementation of the CEUS-SSC model and the updated EPRI GMM (EPRI, 2013).

3.3 Site Response Evaluation

After completing PSHA calculations for reference rock site conditions, Attachment 1 to Enclosure 1 of the 50.54(f) letter requests that licensees provide a GMRS developed from the site-specific seismic hazard curves at the control point elevation. In addition, the 50.54(f) letter specifies that the subsurface site response model, for both soil and rock sites, should extend to sufficient depth to reach the generic or base rock conditions as defined in the ground motion models used in the PSHA. To develop site-specific hazard curves at the control point elevation, Attachment 1 requests that licensees perform a site response analysis.

The purpose of the site response analysis is to determine the site amplification that will occur as a result of bedrock ground motions propagating upwards through the soil/rock column to the surface. The critical parameters that determine what frequencies of ground motion are affected by the upward propagation of bedrock motions are the layering of soil and/or soft rock, the thicknesses of these layers, the shear-wave velocities and low-strain damping of the layers, and the degree to which the shear modulus and damping change with increasing input bedrock amplitude.

3.3.1 Site Base Case Profile

The licensee provided a detailed site profile description in Sections 2.3.1 and 2.3.2 of its SHSR based on information provided in the NAPS, Units 1 and 2 UFSAR (Rev. 49), and the Safety Analysis Report for the proposed Unit 3 (North Anna Combined License Application, Revision 7, December 2013). The licensee stated that the site is underlain by approximately 100 ft [33 m] of weathered to slightly weathered rock consisting mainly of metamorphic gneiss and schist with extensive weathering of the rock into saprolitic soil near the ground surface.

Geophysical investigations for the NAPS site consisted of borehole geophysical measurements (P-S suspension logging) and cone penetrometers tests. Additionally, the combined operating license (COL) application for proposed Unit 3 determined shear modulus values and strain dependent damping values based on laboratory measurements of samples collected at the site. Seismic shear wave velocities, for the approximately 100 ft of weathered rock beneath the site, range from 3,115 feet per second (fps) [949 meters per second] to 7,700 fps [2345 meters per second].

The licensee stated in Section 2.3.2 that the shear-wave velocity data and rock quality designations from the rock borings from North Anna, Units 1 and 2 compare well with the more extensive North Anna, Unit 3 measurements. Based on the abundance of data and similarity of the data measured across the site, the licensee developed a single base case profile.

In Section 2.3.2.1, the licensee assumed that the uppermost weather rock behaves non-linearly, using the shear modulus and damping curves developed by the COL applicant for Unit 3. For the deeper less weathered rock layers, the licensee assumed the rock behaves linearly and assumed a damping ratio of one percent.

The licensee also considered the impact of kappa, or small strain damping, on site response. Kappa is measured in units of seconds (sec), and is the damping contributed by both intrinsic hysteretic damping, as well as scattering due to wave propagation in heterogeneous material. Based on having about 100 ft of very stiff rock material beneath the site, the licensee only accounted for the kappa contribution of 0.006 seconds from the deeper reference or base rock material.

To account for randomness in material properties across the plant site, the licensee stated that consistent with Appendix B of the SPID, it randomized the base case shear-wave velocity profiles. In addition, the licensee randomized the layer thicknesses for the entire base case profile, as well as the shear modulus and damping curves used for the uppermost weathered rock layers.

3.3.2 Site Response Method and Results

In Section 2.3.4 of its SHSR, the licensee stated that it followed the guidance in Appendix B of the SPID to develop input ground motions for the site response analysis and in Section 2.3.5; the licensee described its implementation of the random vibration theory (RVT) approach to perform its site response calculations. Finally, Section 2.3.6 of the SHSR shows the resulting amplification functions and associated uncertainties for the eleven input loading levels for the base case profile and for the single-corner and double-corner seismological models.

In order to develop probabilistic site-specific control point hazard curves, as requested in Requested Information Item 1 of the 50.54(f) letter, the licensee used Method 3, described in Section B-6.0 of the SPID. The licensee's use of Method 3 involved computing the site-specific control point elevation hazard curves for a broad range of spectral accelerations by combining the site-specific bedrock hazard curves, determined from the initial PSHA (Section 3.2 of this assessment), and the amplification functions and their associated uncertainties, determined from the site response analysis.

3.3.3 Staff Confirmatory Analysis

To confirm the licensee's site response analysis, the staff performed site response calculations for the NAPS site. For the confirmatory analysis, the staff calculated the site response using most of the licensee's inputs because the site is well characterized and the licensee used information based on actual detailed site investigations. For its site response calculations, the staff employed the RVT approach and developed input ground motions in accordance with Appendix B of the SPID. Figure 3.3-1 of this assessment shows the best case shear wave velocity profile used by both the licensee and staff for the site response analysis.

To account for the potential non-linear behavior of the uppermost weathered rock, the staff used the shear modulus and damping curves developed for the NAPS, Unit 3 investigation. For deeper

layers with shear-wave velocities higher than 5000 fps [1524 meters per second] the staff used one percent damping ratio independent of shear strain. In addition, rather than randomize the thickness of each of the rock layers in the profile, the staff randomized the depth to bedrock by 30 percent, which corresponds to ±40 ft (±12.1 m).

Figure 3.3-2 shows a comparison of the staff's and licensee's median site amplification factors and uncertainties (±1 standard deviation) for two of the eleven input loading levels. The staff's median site amplification factors are very similar to the licensee's with values close to 1 and a modest peak of about 1.7 at 10 Hz. In addition, the staff's calculated amplification factor uncertainties are very similar to those of the licensee's.

Overall, the licensee's approach to modeling the subsurface rock properties and their uncertainty results in very similar site amplification factors relative to the staff's results. Consequently, as shown in Figure 3.3-3 of this assessment, the control point seismic hazard curves developed by the licensee and staff are also very similar. Appendix B of the SPID provides guidance for performing site response analyses, including capturing the uncertainty for sites with less subsurface data; however, abundant data exists for the NAPS site. As such, alternative approaches in performing site response analyses, including the modeling of uncertainty, are acceptable for the 50.54(f) response.

In summary, the staff concludes that the licensee's site response was conducted using present-day guidance and methodology, including the NRC-endorsed SPID. The staff performed independent calculations which confirmed that the licensee's amplification factors and control point hazard curves adequately characterize the site response, including the uncertainty associated with the subsurface material properties, for the NAPS site.

3.4 Ground Motion Response Spectra

In Section 2.4 of the SHSR, the licensee stated that it used the control point hazard curves, described in SHSR Section 2.3.7, to develop the 10^{-4} and 10^{-5} (mean annual frequency of exceedance) uniform hazard response spectra uniform hazard response spectra (UHRS) and then computed the GMRS using the criteria in RG 1.208.

The staff independently calculated the 10^{-4} and 10^{-5} UHRS using the results of its confirmatory PSHA and site response analyses, as described in Sections 3.2 and 3.3 of this staff assessment, respectively. Figure 3.4-1 of this assessment shows a comparison of the GMRS determined by the licensee to that determined by the staff.

As shown in Figure 3.4-1 of this assessment, the licensee's GMRS is very similar to the staff's confirmatory GMRS. The staff concludes that the small differences between the two GMRS are acceptable for this application because the licensee followed the guidance provided in the SPID with respect to both the PSHA and site response analysis for the NAPS site.

The staff confirms that the licensee used the present-day guidance and methodology outlined in RG 1.208 and the SPID to calculate the horizontal GMRS, as requested in the 50.54(f) letter. The staff performed both a PSHA and site response confirmatory analysis and achieved results consistent with the licensee's horizontal GMRS. As such, the staff concludes that the GMRS

determined by the licensee adequately characterizes the reevaluated hazard for the NAPS site. Therefore, this GMRS is suitable for use in subsequent evaluations and confirmations, as needed, for the response to the 50.54(f) letter, dated March 12, 2012.

4.0 CONCLUSION

The NRC staff reviewed the information provided by the licensee for the reevaluated seismic hazard for the NAPS site. Based on its review, the staff concludes that the licensee conducted the hazard reevaluation using present-day methodologies and regulatory guidance, it appropriately characterized the site given the information available, and met the intent of the guidance for determining the reevaluated seismic hazard. Based upon the preceding analysis, the NRC staff concludes that the licensee provided an acceptable response to Requested Information Items (1) – (3), (5), (7), and a partial response to Item (4), identified in Enclosure 1 of the 50.54(f) letter. Further, the staff concludes that Dominion's reevaluated seismic hazard for North Anna is suitable for other activities associated with the NTTF Recommendation 2.1, "Seismic."

In reaching this determination, staff confirms the licensee's conclusion that the licensee's GMRS exceeds the SSE for North Anna Power Station, Units 1 and 2 over the frequency range of 4 to 100 Hz. As such, the licensee will perform a plant seismic risk evaluation, which will include a high-frequency confirmation, and a SFP evaluation. NRC review and acceptance of Dominion's ESEP interim evaluation, and seismic risk evaluation including the high frequency and spent fuel pool evaluations (i.e., Items (4), (6), (8), and (9)) for the NAPS site will complete the Seismic Hazard Evaluation identified in Enclosure 1 of the 50.54(f) letter.

REFERENCES

Note: ADAMS Accession Nos. refers to documents available through NRC's Agencywide Document Access and Management System (ADAMS). Publicly-available ADAMS documents may be accessed through http://www.nrc.gov/reading-rm/adams.html.

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Figure 3.3-1: Plot of Staff's and Licensee's Base Case Shear-Wave Velocity Profile for the NAPS site

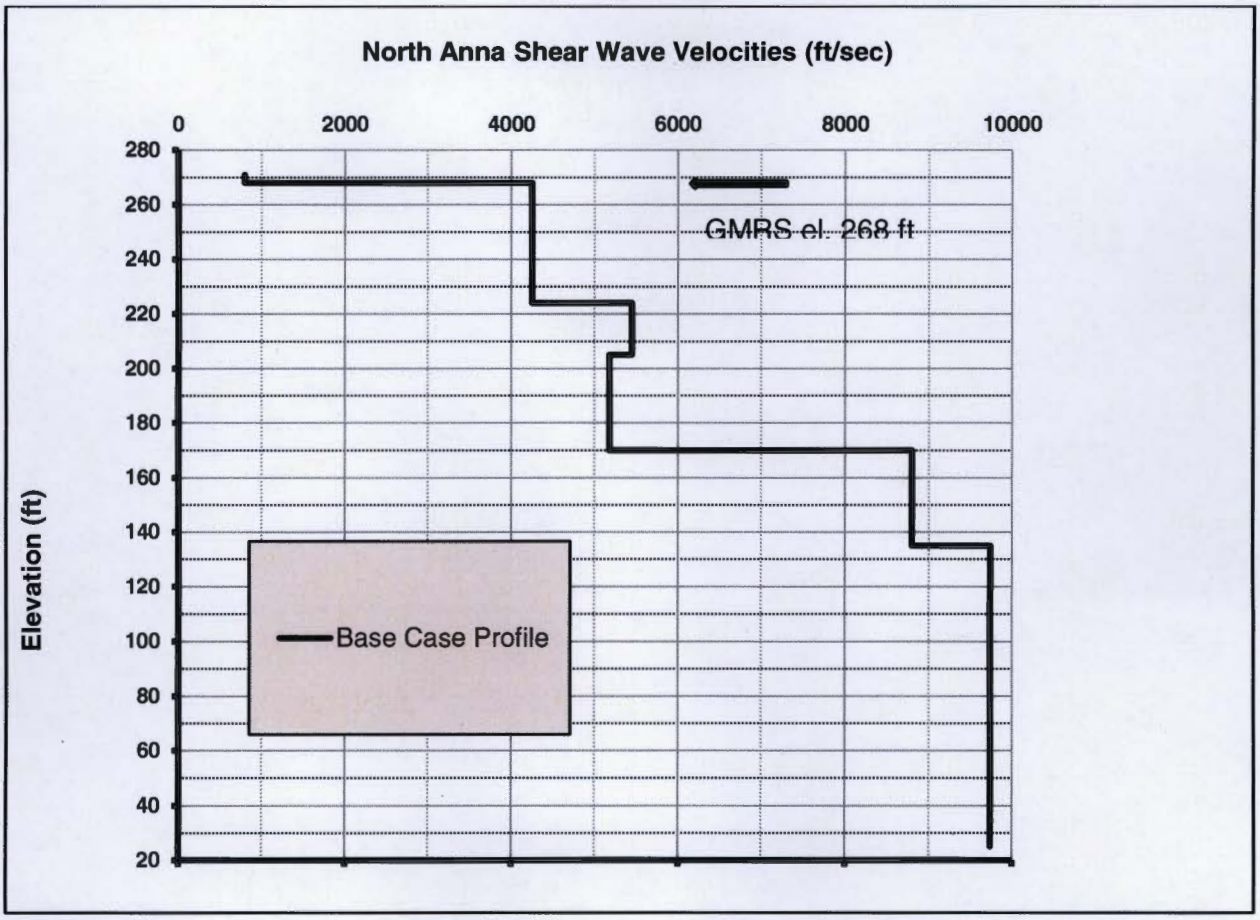


Figure 3.3-2 Plot Comparing the Staff's and the License's Median Amplification Functions and Uncertainties for two input loading levels for the NAPS site

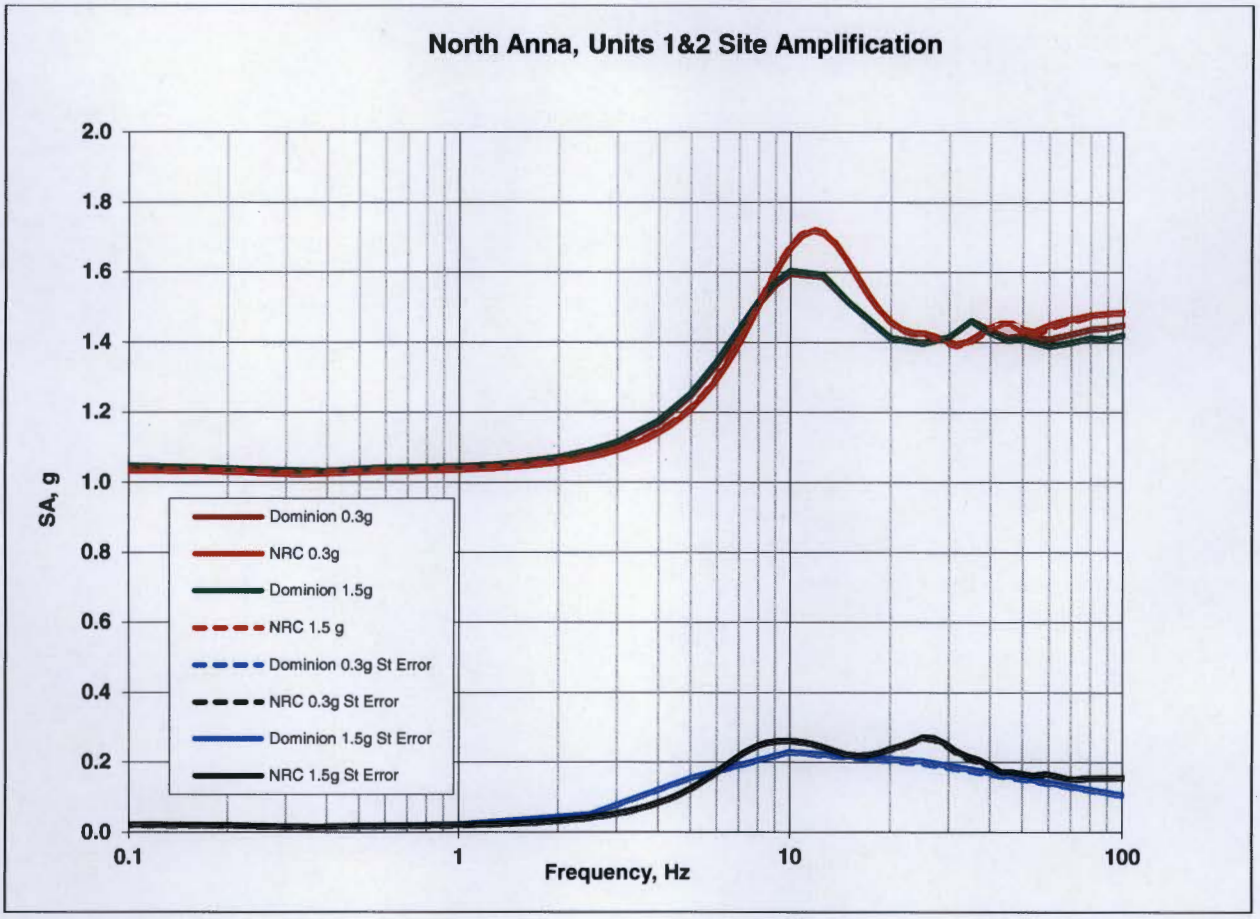


Figure 3.3-3 Plot Comparing the Staff's and the Licensee's Mean Control Point Hazard Curves at a Variety of Frequencies for the NAPS site

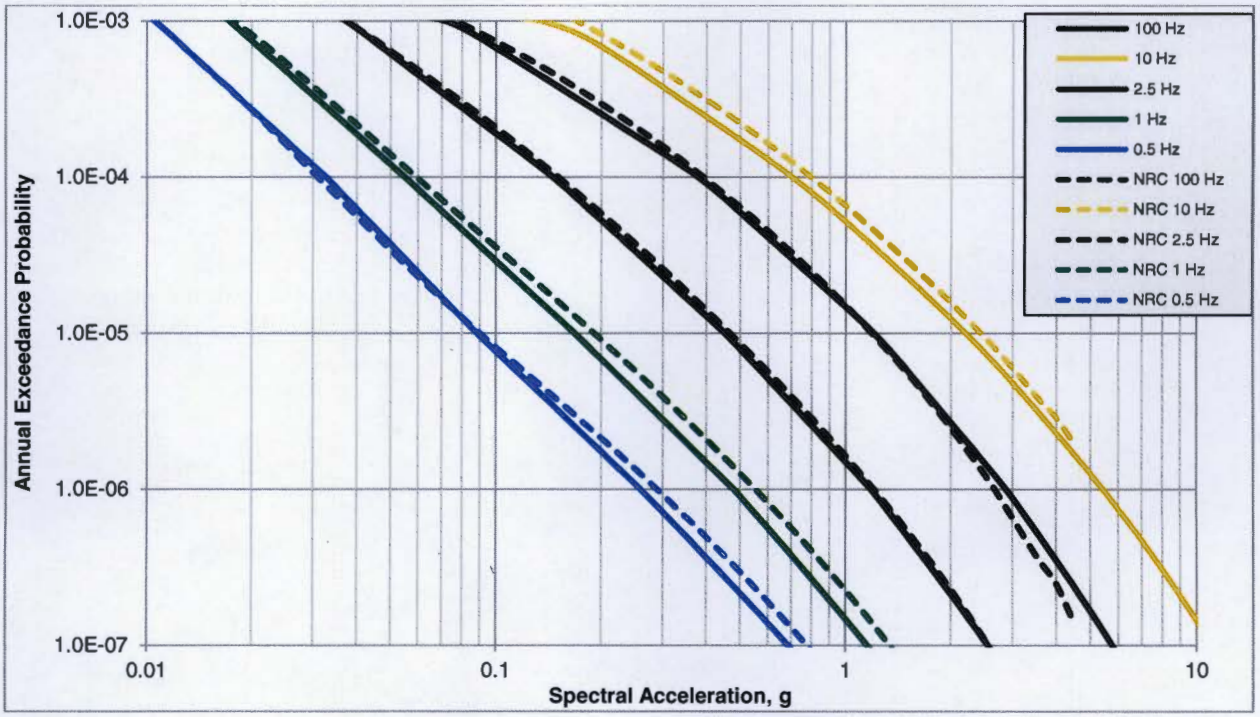
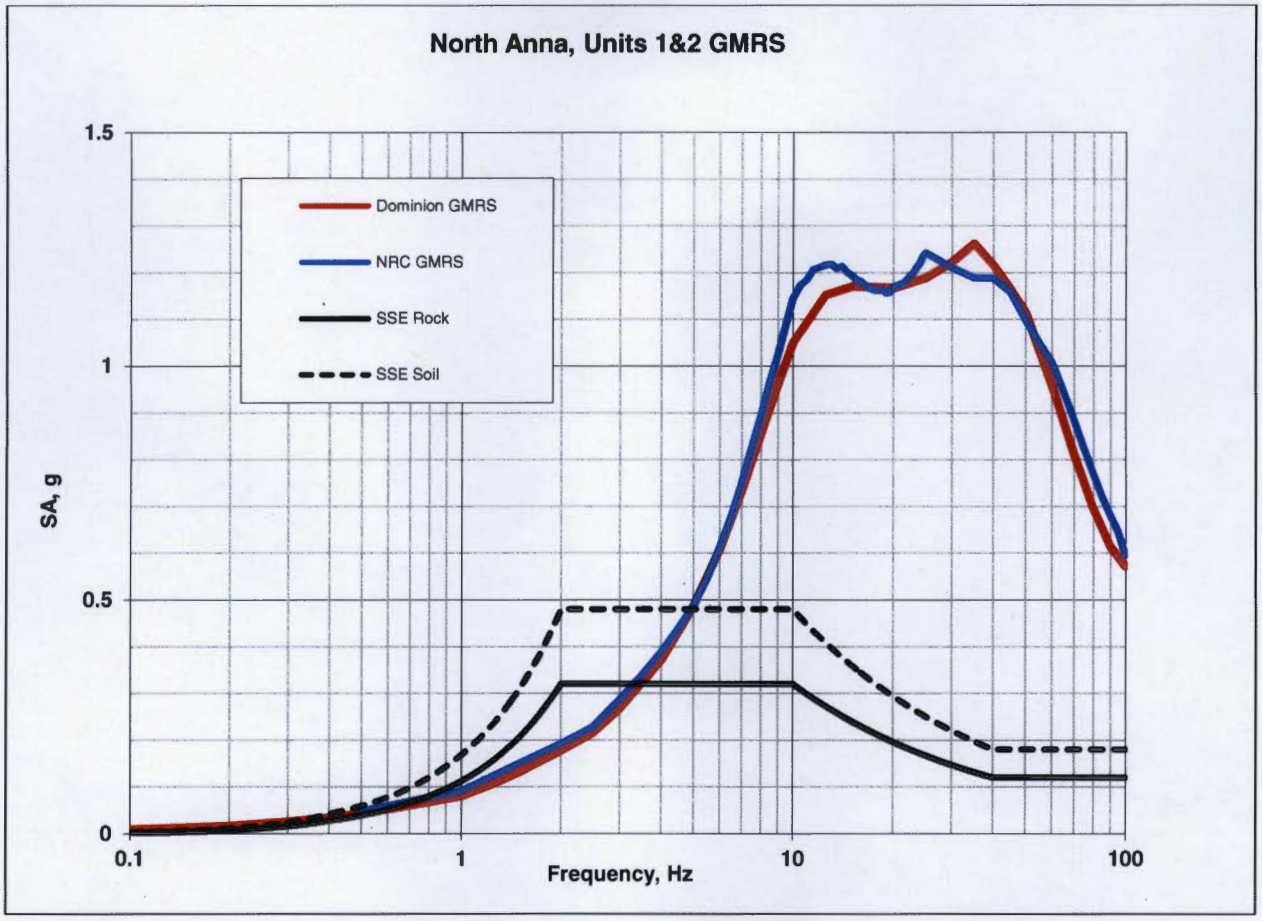


Figure 3.4-1 Comparison of the Staff's GMRS, Licensee's GMRS, and the NAPS SSE



If you have any questions, please contact me at (301) 415-6197 or via e-mail at Tekia.Govan@nrc.gov.

Sincerely,

/RA/

Tekia Govan, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos. 50-338 and 50-339

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Hazard Evaluation and Screening Report

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