VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

March 28, 2018

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

Serial No. 18-087
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License Nos. NPF-4/7

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
REEVALUATED SEISMIC HAZARD
MITIGATING STRATEGIES ASSESSMENT REPORT

References:

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012 [ADAMS Accession Nos. ML12056A046 and ML12053A340].
2. Virginia Electric and Power Company Letter, "North Anna Power Station Units 1 and 2 Response to March 12, 2012 Information Request – Seismic Hazard and Screening Report (CEUS Sites) for Recommendation 2.1," dated March 31, 2014 [ADAMS Accession No. ML14092A416].
3. NRC Letter, "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)," dated April 20, 2015 [ADAMS Accession No. ML15057A249].
4. NEI 12-06, Revision 4, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," December 2016 [ADAMS Accession Number ML16354B421].
5. JLD-ISG-2012-01, Revision 2, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events," February 2017 [ADAMS Accession Number ML17005A188].
6. Virginia Electric and Power Company Letter, "North Anna Power Station, Units 1 and 2 - Compliance Letter and Final Integrated Plan in Response to the March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated May 19, 2015 [ADAMS Accession Number ML15149A143].
7. NRC Letter, "North Anna Power Station, Units 1 and 2 – Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (TAC Nos. MF0998, MF0999, MF0986 and MF0987)," dated January 15, 2016 [ADAMS Accession Number ML15324A341].

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The purpose of this letter is to provide the results of the mitigating strategies assessment (MSA) that was performed for North Anna Power Station (NAPS) Units 1 and 2, which demonstrate the FLEX strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 can be implemented considering the impacts of the reevaluated seismic hazard.

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 1 of Reference 1 requested each addressee in the Central and Eastern United States (CEUS) submit a Seismic Hazard and Screening Report (SHSR). The SHSR submitted for NAPS Units 1 and 2 (Reference 2) provided the reevaluated seismic hazard information, including a performance-based Ground Motion Response Spectrum (GMRS). Reference 3 documents the NRC staff's conclusion that the GMRS submitted for NAPS adequately characterizes the reevaluated seismic hazard for the site.

The assessment of mitigating (FLEX) strategies for NAPS was performed in accordance with the guidance provided in Appendix H, Section H.4.5 of NEI 12-06, Revision 4 (Reference 4) which was endorsed by the NRC (Reference 5).

The results of the MSA are provided in the Attachment to this letter. Based on these results, the FLEX strategies for NAPS Units 1 and 2, as described in References 6 and 7, are acceptable considering the impacts of the reevaluated seismic hazard.

If you have any questions regarding this information, please contact Diane E. Aitken at (804) 273-2694.

Sincerely,

Dan Stoddard

Daniel G. Stoddard
Senior Vice President and Chief Nuclear Officer
Virginia Electric and Power Company

DIANE E. AITKEN
NOTARY PUBLIC
REG. #7763114
COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES MARCH 31, 2022

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Daniel G. Stoddard, who is Senior Vice President and Chief Nuclear Officer of Virginia Electric and Power Company. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 28 day of March, 2018.

My Commission Expires: March 31, 2022

Diane E Aitken
Notary Public

Commitments made in this letter: No new regulatory commitments.

Attachment: Mitigating Strategies Assessment for North Anna Units 1 and 2

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ATTACHMENT

MITIGATING STRATEGIES ASSESSMENT

FOR

NORTH ANNA UNITS 1 AND 2

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2

1.0 BACKGROUND

North Anna Power Station (NAPS) has completed a mitigating strategies assessment (MSA) which considered the impacts of the reevaluated seismic hazard to determine if the mitigating (FLEX) strategies developed, implemented and maintained in accordance with NRC Order EA-12-049 remain acceptable at the reevaluated seismic hazard levels. The MSA was performed in accordance with the guidance provided in Appendix H of NEI 12-06, Revision 4 (Reference 8) which was endorsed by the NRC (Reference 9).

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the reevaluated seismic hazard information at NAPS, developed using Probabilistic Seismic Hazard Analysis (PSHA). The MSSHI includes a performance-based Ground Motion Response Spectrum (GMRS), Uniform Hazard Response Spectra (UHRS) at various annual probabilities of exceedance, and a family of seismic hazard curves at various frequencies and fractiles developed at the NAPS control point elevation. NAPS submitted the reevaluated seismic hazard information including the UHRS, GMRS and the hazard curves to the NRC on March 31, 2014 (Reference 10). The NRC staff concluded that the GMRS that was submitted adequately characterizes the reevaluated seismic hazard for the NAPS site (Reference 11). Section 6.1.1 of Reference 9 identifies the method described in Section H.4.5 of NEI 12-06 (Reference 8) as applicable to NAPS.

2.0 ASSESSMENT TO MSSHI

Consistent with NEI 12-06, Section H.4.5 (Path 5), the NAPS GMRS has spectral accelerations greater than twice the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range. As described in the Final Integrated Plan (FIP) [Reference 12], the plant equipment relied on for FLEX strategies have previously been evaluated as seismically robust to the SSE levels. The basic elements of the deterministic MSA of Path 5 structures, systems, and components (SSCs) are described in NEI 12-06, Section H.4.5.2. These basic Path 5 deterministic elements are:

- Step 1: Determine Scope of Plant Equipment for the MSA
- Step 2: ESEP Review and Update
- Step 3: Qualitative Assessment for Inherently Rugged Items
- Step 4: Other Assessments Based on the Criteria Defined in Section H.5

- Step 5: High Frequency Evaluation

2.1 STEP 1 – DETERMINE SCOPE OF PLANT EQUIPMENT FOR THE MSA

The scope of SSCs considered for the MSA under NEI 12-06, Section H.4.5.2 was determined, in part, following the guidance used for the expedited seismic evaluation process (ESEP) defined in EPRI 3002000704 (Reference 13). The expedited seismic equipment list (ESEL), provided in the ESEP submittal report for NAPS (Reference 14), identifies the SSCs in the MSA equipment scope from the ESEP evaluation. Mitigating Strategies SSCs excluded from consideration in the ESEP were added to the MSA equipment scope. In addition, SSC failure modes not addressed in the ESEP that could potentially affect the FLEX strategies were added and evaluated.

The SSCs associated with the FLEX strategies that are inherently rugged are discussed in Section 2.3 below and identified in Section H.4.5.2 (Path 5) of Reference 8. These SSCs were not explicitly added to the scope of MSA plant equipment.

2.2 STEP 2 – ESEP EQUIPMENT

Equipment used in support of the FLEX strategies has been evaluated to 2xSSE in accordance with the guidance in EPRI 3002000704, and the results are documented in Reference 14. As noted above, the NAPS GMRS has spectral accelerations greater than twice the SSE in the 1 to 10 Hz frequency range and further evaluation is required to satisfy the MSA requirements. The MSA evaluation of SSCs within the ESEP scope is described in Section 2.4.

2.3 STEP 3 – INHERENTLY RUGGED EQUIPMENT

The qualitative assessment of certain SSCs not included in the ESEP was accomplished using a qualitative screening of "inherently rugged" SSCs. NEI 12-06 documents the process and the justification for this ruggedness assessment. SSCs that are inherently rugged are described in NEI 12-06, Section H.4.5.2 and no further evaluations for these rugged SSCs are required under the MSA.

2.4 STEP 4 – EVALUATIONS USING SECTION H.5 OF REFERENCE 1

Step four under NEI 12-06, Section H.4.5.2 includes the evaluations of:

1. SSCs identified in Step 1, but not addressed in Steps 2 or 3
2. FLEX equipment storage buildings and Non-Seismic Category I Structures that could impact FLEX strategies
3. Operator Pathways

4. Tie down of FLEX portable equipment
5. Seismic interactions that could potentially affect the mitigating strategies and were not previously reviewed as part of the ESEP program
6. Haul Path, including liquefaction, slope stability, and seismic interactions

The results of the reviews of each of these six areas are described in the sections below.

2.4.1 SSCs NOT ADDRESSED IN STEPS 2 OR 3

The scope of plant equipment to be reviewed for the MSA is described in Section 2.1.

The SSCs reviewed in this section consist of equipment listed on the ESEL that are not inherently rugged. Seismic Category I structures and nuclear steam supply system (NSSS) components are also included in the SSCs reviewed in this section. The results of the evaluation of these SSCs are described in the subsections below.

2.4.1.1 ESEL SSCs

As indicated in Section 2.1, the NAPS ESEL is documented in the ESEP submittal report (Reference 7).

The equipment listed on the ESEL was evaluated to demonstrate adequate seismic capacity with respect to the MSSHI using the guidance in NEI 12-06, Section H.5, Seismic Evaluation Criteria ($C_{10\%}$). The following steps were applied to evaluate the equipment:

1. Determine fragility parameters of the equipment
2. Based on the $C_{1\%}$ or $C_{50\%}$ capacity and variabilities, determine the $C_{10\%}$ capacity of the equipment and compare to the GMRS demand

For the majority of equipment items on the ESEL, fragility parameters were determined for the NAPS seismic probabilistic risk assessment (SPRA) (Reference 19) developed in response to the March 12, 2012 NRC 10CFR50.54(f) Information Request (Reference 15). Either the $C_{1\%}$ capacity, which is equivalent to the high confidence of low probability of failure (HCLPF) capacity, was calculated and variabilities per the SPID were assumed or the median acceleration capacity, A_m, ($C_{50\%}$) was directly calculated along with explicit variabilities. For items that were not within the scope of the SPRA, fragility parameters were calculated specifically to support the MSA evaluation. Based on the $C_{1\%}$ or $C_{50\%}$ capacity and associated variabilities, the $C_{10\%}$ capacity was calculated for each of the equipment items following the guidance in NEI 12-06, Section H.5. The $C_{10\%}$ capacity was then compared to the peak ground acceleration (PGA) of the GMRS (0.572g) to determine whether the equipment was seismically adequate for the MSSHI.

For each of the equipment items on the ESEL, the results of evaluation demonstrated adequate seismic capacity to the MSSHI.

2.4.1.2 SEISMIC CATEGORY I STRUCTURES

Seismic Category I structures relied upon for mitigating strategy implementation were not included in the ESEP evaluation per the guidance in EPRI 3002000704. NEI 12-06, Section H.4.5.2 requires evaluation of these structures for the MSA.

The following seismic Category I structures are relied upon for FLEX strategy implementation and are evaluated herein:

1. Containment Building
2. Auxiliary Building
3. Service Building
4. Main Steam Valve Houses / Quench Spray Pump Houses
5. Auxiliary Feedwater Pump Houses / Emergency Condensate Storage Tank Enclosures
6. Service Water Pump House
7. Fuel Building

The Seismic Category I structures relied upon for mitigating strategy implementation were evaluated to demonstrate adequate seismic capacity with respect to the MSSHI using the guidance in NEI 12-06, Section H.5 Seismic Evaluation Criteria ($C_{10\%}$) as described in Section 2.4.1.1. In some cases, the HCLPF capacity ($C_{1\%}$) was greater than the GMRS PGA and calculation of the $C_{10\%}$ capacity was not required.

For each of the structures listed, the results of the evaluation demonstrated adequate seismic capacity to the MSSHI.

2.4.1.3 NSSS COMPONENTS

NSSS components relied upon for mitigating strategy implementation were not included in the ESEP evaluation per the guidance in EPRI 3002000704. NEI 12-06, Section H.4.5.2 requires evaluation of the NSSS components for the MSA.

The NSSS components were evaluated to demonstrate adequate seismic capacity with respect to the MSSHI using the guidance in NEI 12-06, Section H.5 Seismic Evaluation Criteria ($C_{10\%}$) using the method described in Section 2.4.1.1. In some cases, the HCLPF capacity ($C_{1\%}$) was greater than the GMRS PGA and calculation of the $C_{10\%}$ capacity was not required.

The results of the evaluation demonstrated adequate seismic capacity to the MSSHI for the NSSS components.

2.4.2 FLEX EQUIPMENT STORAGE BUILDINGS AND NON-SEISMIC CATEGORY I STRUCTURES

The FLEX portable equipment and accessories within the scope of the MSA that support implementation of FLEX strategies for NAPS are stored in the BDB Storage Building.

Implementation of FLEX strategies do not rely on non-seismic category I structures. There are various non-seismic category I structures/equipment located along the equipment haul path that have been evaluated for interaction concerns.

2.4.2.1 BDB STORAGE BUILDING EVALUATION

The NAPS BDB Storage Building, which stores portable FLEX equipment and accessories, is a reinforced concrete dome-shaped structure. The structure is designed to meet the plant's design basis for earthquake ground motions, tornado missiles, and severe weather events.

The structure is located on the plant site south of the protected area of the station, and founded on an approximately 100 foot thick soil overburden at elevation 309 feet. The structure is 120 feet in diameter and 38 feet tall with 24 inch shell thickness, and includes two large equipment entries and two personnel entries. Equipment entry doors are constructed of steel plate and designed to withstand all design basis loads, including the design basis tornado missiles. Personnel entries are protected by reinforced concrete labyrinth structures. The BDB Storage Building foundation is a cast-in-place reinforced concrete ring-beam foundation, five feet wide and a minimum depth of 3 feet. The floor slab is an 8 inch thick reinforced concrete slab-on-grade designed to support the FLEX equipment loading.

The seismic design of the BDB Storage Building was based on the NAPS SSE response spectra for soil-founded structures. The as-designed structure was also evaluated for the seismic loads associated with the 2011 Mineral earthquake ground motions recorded at the Containment basemat, amplified to represent the ground motion input at the building foundation elevation due to the soil profile at the building location.

The BDB Storage Building was evaluated using the GMRS-based inputs to develop a fragility input for the NAPS seismic probabilistic risk assessment (SPRA) developed in response to the March 12, 2012 NRC 10CFR50.54(f) Information Request (Reference 15). The HCLPF capacity was determined to be greater than 1g. The governing failure mode for the BDB Storage Building is tensile yielding of the reinforcing steel under diaphragm action of the tied slab.

The results of the evaluation of the BDB Storage Building demonstrate that the structure has adequate seismic capacity with respect to the MSSHI.

2.4.2.2 NON-SEISMIC CATEGORY I STRUCTURES

As described in the FIP, FLEX mechanical and electrical connections, and access to the connections and other areas requiring operator action, are located in seismically designed structures / areas of the plant. These structures have adequate seismic capacity with respect to the MSSHI as described in Section 2.4.1.2.

There are various non-Seismic Category I structures/equipment located along the FLEX equipment deployment haul paths, such as miscellaneous plant support buildings, light poles, electrical transmission poles and towers, fencing, security towers, etc. The failure of these non-seismically designed SSCs along the haul route was assessed. As a result, the preferred haul paths minimize travel through areas with trees, power lines, narrow passages, etc., to the extent practical. The FIP includes multiple haul path routings and other pre-planned options, including assessment of de-energization of downed power lines and clearing of debris using FLEX-dedicated heavy equipment stored in the BDB Storage Building, to ensure success of FLEX strategy implementation. Therefore, no further evaluation of non-Seismic Category I structures and equipment along the haul paths is necessary to support the MSA.

2.4.3 OPERATOR PATHWAYS

As described in the FIP, operator pathways to access FLEX mechanical and electrical connections, and to perform required local operator actions, do not require access through non-seismically designed structures. In addition, multiple pathways are available to accomplish required actions. In the event of an inaccessible pathway, sufficient response time is normally available to allow for limited debris removal to provide necessary access, if required.

Operator pathways were further reviewed during plant walkdowns to assess seismic interactions associated with a GMRS-level seismic event for the SPRA and no spatial interaction concerns were identified that could prevent implementation of the FLEX strategies or other credited operator actions.

2.4.4 TIE DOWN OF FLEX PORTABLE EQUIPMENT

FLEX portable equipment and associated accessories are stored in the BDB Storage Building described in Section 2.4.2.1. The stored portable equipment and accessories are described in the FIP. The stability of the stored equipment has been evaluated considering the MSSHI.

The stored FLEX portable equipment, including miscellaneous support equipment stored on shelving units within the BDB Storage Building, was evaluated using a static coefficient analysis. The equipment was evaluated for stability against overturning, resistance to sliding, and the potential for adverse interaction. The control point horizontal and vertical GMRS accelerations, amplified through the soil column at the BDB Storage Building location using the methods described in EPRI TR-102293 (Reference 16), were used as input to the evaluation.

The evaluation was performed by identifying the dimensions, weight, and location of the center of gravity for each stored piece of portable equipment and for the shelving units. Each item was evaluated for overturning using a factor of safety (FS) criterion of 1.0, which is appropriate based on the low probability of a GMRS magnitude seismic event. Also, significant additional input energy is required to actually overturn the equipment, since FS=1.0 simply indicates the initiation of uplift. Similarly, since the initiation of sliding results in significant energy dissipation in friction, sliding was evaluated for equipment and shelving using an FS of 1.0. For equipment or shelving that was determined to have an overturning FS</=1.0, factors of safety for overturning and sliding were compared to determine if sliding occurred first, thereby limiting overturning. If sliding was predicted, the potential for interaction with nearby equipment was evaluated.

The evaluation concluded that the following portable equipment stored in the BDB Storage Building was potentially subject to overturning for a GMRS magnitude seismic event:

- Communications-on-Wheels (COW) Trailer
- 120/240V Generators (3)
- Technical Support Center (TSC) Generator

The evaluation concluded that other portable equipment and shelving in the

BDB Storage Building would displace laterally (slide) but were stable against overturning.

For the equipment with the potential to overturn during a seismic event, anchorage and restraints were designed and installed to prevent instability. For equipment and shelving subject to sliding, the potential for adverse interaction with adjacent equipment was evaluated. It was determined that no adverse interaction (i.e. interaction that renders the equipment inoperable) was feasible, based on the minimal expected lateral displacements, the typical separation distance between stored items necessary to allow for access to the equipment, and the contact between adjacent equipment occurring between rugged components.

2.4.5 ADDITIONAL SEISMIC INTERACTIONS

Although the ESEP guidance in EPRI 3002000704 required consideration of only interactions related to nearby block walls and piping attached to tanks, the Seismic Review Team (SRT) evaluated any identified potential spatial interactions during the seismic walkdowns performed for the NAPS ESEP. Additionally, extensive seismic walkdowns were performed as part of the development of the NAPS SPRA, which encompassed the scope of equipment relied on for FLEX strategy implementation, and included evaluation of the potential for seismic interactions.

As a result, no credible seismic interactions with FLEX equipment that would affect the implementation of NAPS FLEX strategies were identified considering the MSSHI.

2.4.6 HAUL PATH

The deployment of FLEX equipment from the BDB Storage Building (described in Section 2.4.2.1) to staging locations on the plant site requires availability of equipment haul routes / paths. NAPS has evaluated the haul path to ensure accessibility following extreme external events, including earthquakes. The haul path and evaluation are described in the FIP (Reference 12). The haul path was evaluated for seismic induced liquefaction and interaction issues (failure of non-seismic SSCs along the haul route) considering the SSE and the results of the evaluation are summarized in the FIP. The conclusions of the FIP evaluation related to interactions of non-seismic SSCs impact on haul path availability remain valid for the MSSHI since the GMRS is greater than the SSE, and non-seismic items along the path were already assumed to fail at the SSE ground motions. The potential for liquefaction along the haul path was reevaluated considering the MSSHI to support the MSA.

The potential for liquefaction of the subgrade soils supporting the haul path was evaluated with respect to the increased seismic demand of the updated GMRS (MSSHI). Soil borings obtained at discrete locations on the haul path encountered residual soils ranging from disintegrated saprolitic silty sand to cohesive plastic clay and elastic silt below fill including aggregate base, sand and clayey sand, and plastic clay. The liquefaction study evaluated the factor of safety against liquefaction for these soils using SPT tests (N-values) in these soil borings. A groundwater table, which is required to initiate liquefaction, was not encountered in the haul path soil borings.

The liquefaction study used the hard rock GMRS-equivalent PGA amplified through the soils to the ground surface of the haul paths as the seismic source and determined the FS against liquefaction for each sample interval where a Standard Penetration Test value (N-value) was recorded. For all sample intervals, the FS was much greater than 1.1, which was used as the minimum allowable factor of safety against liquefaction (Reference 18).

Therefore, NAPS has reviewed the haul paths and verified that the haul paths are not adversely impacted by the MSSHI.

3.0 HIGH FREQUENCY REVIEW

As indicated in Reference 14, no devices whose chatter could have adverse consequences on mitigating strategies were identified for inclusion on the ESEL. Therefore, a high frequency review is not applicable to the MSA.

4.0 SPENT FUEL POOL COOLING EVALUATION

The FLEX mitigation strategy for maintaining the spent fuel pool (SFP) cooling function is described in the FIP (Reference 12) and consists of actions to maintain normal SFP water level to keep the stored spent fuel adequately cooled following an ELAP causing loss of the normal SFP cooling system.

The Phase 1 coping strategy is to monitor SFP level using instrumentation installed as required by NRC Order EA-12-051. The Phase 2 strategy is to initiate SFP makeup within 24 hours using a portable FLEX pump discharging through flexible hose to the FLEX SFP makeup connection located on the outside wall of the Fuel Building. This strategy provides sufficient makeup water to the SFP to maintain the normal SFP level. The FLEX SFP makeup connection piping is seismically designed in accordance with the plant design basis. The SFP makeup connection piping ties into an existing SFP makeup line, which discharges directly into the SFP. Makeup water is provided from the Service Water Reservoir.

The SFP level instrumentation relied upon for the FLEX strategy is designed and installed to the SSE loading conditions. The instrumentation was evaluated for the MSA to demonstrate adequate seismic capacity using the approach from NEI 12-06, Section H.5 using the method described in Section 2.4.1. Consistent with the discussion in Section 2.4.1, the $C_{10\%}$ capacity for the instrumentation was determined to exceed the GMRS demand, and adequate seismic capacity was demonstrated.

The piping associated with the FLEX SFP makeup connection and makeup flowpath is welded / bolted piping and therefore inherently rugged as discussed in Section 2.3. The portable FLEX equipment relied upon for the SFP cooling strategy is stored in the BDB Storage Building, which was evaluated considering the MSSHI and found acceptable in Sections 2.4.2.1 and 2.4.4, and is deployed along the haul paths evaluated in Section 2.4.6.

The SFP integrity evaluation described in Reference 17 demonstrated inherent margins of the SFP structure and interfacing plant equipment to the MSSHI.

Therefore, the NAPS FLEX strategy to provide SFP cooling has been evaluated considering the MSSHI and demonstrated to be acceptable.

5.0 RESULTS OF THE MITIGATING STRATEGIES ASSESSMENT

A MSA evaluation has been performed in accordance with H.4.5.2 of Reference 1 to assess the ability of the FLEX strategies SSCs to meet the GMRS at $C_{10\%}$ capacity. The evaluation demonstrated that the $C_{10\%}$ capacity criterion is met for the NAPS FLEX strategies SSCs.

6.0 SUMMARY OF MODIFICATIONS

As identified in Section 5.0, the MSA evaluation demonstrated that the $C_{10\%}$ capacity criterion is met for the NAPS FLEX strategies SSCs. Therefore, no further action is required to improve the $C_{10\%}$ capacity.

7.0 REFERENCES

8. NEI 12-06, Revision 4, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, December 2016.
9. JLD-ISG-2012-01, Revision 2, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events.
10. Virginia Electric and Power Company Letter, "North Anna Power Station Units 1 and 2 Response to March 12, 2012 Information Request – Seismic Hazard and Screening Report (CEUS Sites) for Recommendation 2.1," dated March 31, 2014.
11. NRC Letter, "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)," dated April 20, 2015.
12. Virginia Electric and Power Company Letter, "North Anna Power Station, Units 1 and 2 - Compliance Letter and Final Integrated Plan in Response to the March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated May 19, 2015.
13. EPRI, "Seismic Evaluation Guidance: Augmented Approach for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic", Report Number 3002000704, Palo Alto, CA, April, 2013.
14. Virginia Electric and Power Company Letter, "North Anna Power Station Units 1 and 2 Response to March 12, 2012 Information Request – Expedited Seismic Evaluation Process Report for Recommendation 2.1," dated December 17, 2014.
15. NRC letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012
16. EPRI, "Guidelines for Determining Design Basis Ground Motions," Report Number TR-102293, Volume 1, Palo Alto, CA, November, 1993.
17. Virginia Electric and Power Company Letter, "North Anna Power Station Units 1 and 2 Response to March 12, 2012 Information Request – Spent Fuel Pool Seismic Evaluation for Recommendation 2.1," dated December 14, 2017.

18. Regulatory Guide 1.198, "Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites," U.S. Nuclear Regulatory Commission, November 2003.
19. Virginia Electric and Power Company Letter, "North Anna Power Station Units 1 and 2 Response to March 12, 2012 Information Request – Seismic Probabilistic Risk Assessment for Recommendation 2.1," dated March 28, 2018.