

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

December 14, 2017

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

Serial No. 17-461  
NRA/DEA R0  
Docket Nos. 50-338/339  
License Nos. NPF-4/7

**VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION ENERGY VIRGINIA)**  
**NORTH ANNA POWER STATION UNITS 1 AND 2**  
**RESPONSE TO MARCH 12, 2012 INFORMATION REQUEST**  
**SPENT FUEL POOL SEISMIC EVALUATION FOR RECOMMENDATION 2.1**

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. NRC Letter, "Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated October 27, 2015 [ADAMS Accession No. ML15194A015].
3. EPRI Report 3002009564, *Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation*, January 2017.
4. 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].
5. 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].
6. EPRI Report 1025287, *Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic*, February 2013 [ADAMS Accession No. ML12333A170].

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, Item (9), of Reference 1 requested each addressee provide spent fuel pool (SFP) seismic evaluations. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic information request tables, which identified that North

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Anna Units 1 and 2 needed to conduct a limited scope SFP seismic evaluation.

Electric Power Research Institute (EPRI) Report 3002009564, *Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation* (Reference 3), provides criteria for evaluating the seismic adequacy of a SFP to the reevaluated ground motion response spectrum (GMRS) hazard levels. Section 4.3 of EPRI Report 3002009564 lists the parameters to be verified to confirm the results of the report are applicable to North Anna Units 1 and 2, and that the North Anna SFP is seismically adequate in accordance with Near-Term Task Force (NTTF) Recommendation 2.1: Seismic evaluation criteria.

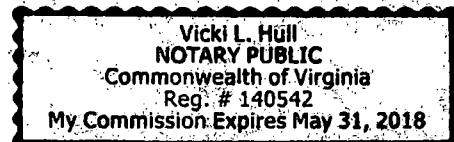
The Attachment to this letter provides the data for North Anna Units 1 and 2 that confirms the applicability of the criteria in EPRI Report 3002009564 and verifies that the SFP is seismically adequate in accordance with NTTF Recommendation 2.1: Seismic evaluation criteria. The information requested in response to Enclosure 1, Item (9) of Reference 1 for North Anna Units 1 and 2 is also included in the Attachment.

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



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 14<sup>TH</sup> day of December, 2017.

My Commission Expires: MAY 31, 2018

*Vicki L. Hull*  
Notary Public

Commitments made in this letter: No new regulatory commitments.

Attachment: Spent Fuel Pool Data for North Anna Units 1 and 2

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**ATTACHMENT**

**SPENT FUEL POOL DATA FOR NORTH ANNA UNITS 1 AND 2**

**VIRGINIA ELECTRIC AND POWER COMPANY  
(DOMINION ENERGY VIRGINIA)  
NORTH ANNA POWER STATION UNITS 1 AND 2**

## **Spent Fuel Pool Data for North Anna Units 1 and 2**

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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 (Reference 1), Enclosure 1, Item (9), requested each addressee, for which the ground motion response spectrum (GMRS) exceeds the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range, to provide a spent fuel pool (SFP) seismic evaluation in response to NTTF Recommendation 2.1: Seismic. Specifically, plants were requested to consider "all seismically induced failures that can lead to draining of the SFP."

EPRI Report 3002009564 (Reference 2) provides guidance for the limited scope SFP seismic evaluation. The North Anna Units 1 and 2 SFP has been evaluated consistent with the guidance provided in Reference 2. The table below lists the criteria from Section 4.3 of Reference 2 along with data for North Anna Power Station that confirms applicability of the EPRI Report 3002009564 criteria. The table confirms that the SFP is seismically adequate and can retain adequate water inventory for 72 hours in accordance with NTTF Recommendation 2.1: Seismic evaluation criteria.

### 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
2. EPRI Report 3002009564, *Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation*, January 2017.
3. 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].
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SFP Criteria from EPRI Report 3002009564	Site-Specific Data
<b>Site Parameters</b>	
1. The site-specific GMRS should be the same as that submitted to the NRC between March 2014 and July 2015, which the NRC has found acceptable for responding to the NRC 50.54(f) letter (Reference 1).	The site-specific GMRS used for the SFP evaluation herein is the same as that submitted to the NRC on March 31, 2014 (Reference 3) and found acceptable by NRC in Reference 4.
<b>Structural Parameters</b>	
2. Site-specific calculations, performed in accordance with Section 4.1 of EPRI 3002009564 should demonstrate that the limiting SFP HCLPF is greater than the site-specific GMRS in the frequency range of interest (e.g., 10-20 Hz).	Site-specific calculations, performed in accordance with Section 4.1 of EPRI 3002009564, demonstrate that the limiting SFP HCLPF (normalized to the GMRS PGA) is 1.037g, which exceeds the GMRS PGA [0.57g]. Therefore, this criterion is met.
3. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.	The Fuel Building, which contains the SFP, is included in the Monitoring of Structures Program (Civil Inspection Program) performed in accordance with 10 CFR 50.65, Maintenance Rule. Inspections of the structure are intended to ensure long term functionality. Therefore, this criterion is met.
<b>Non-Structural Parameters</b>	
4. To confirm applicability of the piping evaluation in Section 4.2 of EPRI 3002009564, piping attached to the SFP should have penetrations no more than 6 ft below the water surface.	Normal SFP water level is elevation 289'-10". The bottom of pipe elevation of the lowest piping penetration through the SFP liner is approximately 285'-9". There are no penetrations more than 6 ft below the normal level water surface. Therefore, this criterion is met.
5. To confirm ductile behavior under increased seismic demands, SFP gates should be constructed from either aluminum or stainless steel alloys.	The SFP gates are constructed of Type 304 stainless steel material. Therefore, this criterion is met.

SFP Criteria from EPRI Report 3002009564	Site-Specific Data
<p>6. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p>	<p>Siphoning of significant amounts of water from the SFP is prevented by either passive anti-siphoning devices or the elevation of the piping open ends within the pool.</p> <p>Additionally, there are no anti-siphoning devices with extremely large extended operators attached to 2-inch or smaller piping.</p> <p>Therefore, this criterion is met.</p>
<p>7. To confirm applicability of the sloshing evaluation in Section 4.2 of EPRI 3002009564, the maximum SFP horizontal dimension (length or width) should be less than 125 ft and the SFP depth should be greater than 36 ft.</p>	<p>The SFP has a length of approximately 60 feet, a width of approximately 29 feet and a depth of approximately 42 feet with a normal water depth of approximately 40ft-6in. Therefore, this criterion is met.</p>
<p>8. To confirm applicability of the evaporation loss evaluation in Section 4.2 of EPRI 3002009564, the SFP surface area should be greater than 500 ft<sup>2</sup> and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>	<p>The surface area of the SFP is approximately 1740 ft<sup>2</sup>, which is greater than 500 ft<sup>2</sup>. The licensed reactor core thermal power for each North Anna reactor unit is 2940MWt, which is less than 4000MWt per unit. Therefore, these criteria are met.</p>