



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

December 15, 2017

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SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 – STAFF ASSESSMENT OF  
FLOODING FOCUSED EVALUATION (CAC NOS. MF9916 AND MF9917; EPID  
L-2017-JLD-0046)

Dear Mr. Stoddard:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) 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 Licenses" (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807). Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). By letter dated March 1, 2013 (ADAMS Accession No. ML13318A090), Virginia Electric and Power Company (Dominion, the licensee) responded to this request for North Anna Power Station, Units 1 and 2 (North Anna).

After its review of the licensee's response, by letter dated September 25, 2015 (ADAMS Accession No. ML15238A844), the NRC issued the flood hazard reevaluation report (FHRR) staff assessment for North Anna. The FHRR staff assessment provided the reevaluated flood hazard mechanisms that exceeded the current licensing basis (CLB) for North Anna and parameters that would be suitable for other assessments associated with NTTF Recommendation 2.1 "Flooding". As stated in the letter, because the local intense precipitation (LIP), streams and rivers and dam failure flood-causing mechanisms at North Anna are not bounded by the plant's CLB, additional assessments of the flood hazard mechanisms are necessary.

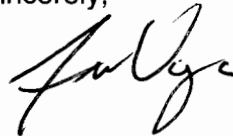
By letter dated June 29, 2017 (ADAMS Accession No. ML17186A084), the licensee submitted a focused evaluation (FE) for North Anna. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the FHRR staff assessment, that: 1) a flood mechanism is bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a

feasible response is provided if the unbounded mechanism is local intense precipitation. The purpose of this letter is to provide the NRC's assessment of the North Anna FE.

As set forth in the enclosed staff assessment, the NRC staff has concluded that the North Anna FE was performed consistent with the guidance described in Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). Guidance document NEI 16-05, Revision 1, has been endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). The NRC staff has further concluded that the licensee has demonstrated that effective flood protection exists for the LIP, streams and river flooding and dam failure flood mechanisms during a beyond-design-basis external flooding event at North Anna, assuming appropriate implementation of the regulatory commitments identified in the licensee's FE. This closes out the licensee's response for North Anna for the reevaluated flooding hazard portion of the 50.54(f) letter and the NRC's efforts associated with CAC Nos. MF9916 AND MF9917.

If you have any questions, please contact me at 301-415-1617 or via electronic mail at Frankie.Vega@nrc.gov.

Sincerely,



Frankie Vega, Project Manager  
Beyond-Design-Basis Management Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

Enclosure:  
Staff Assessment Related to the  
Flooding Focused Evaluation for North Anna

Docket Nos. 50-338 and 50-339

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE FOCUSED EVALUATION FOR

NORTH ANNA POWER STATION, UNITS 1 AND 2

AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE

RECOMMENDATION 2.1 - FLOODING

(CAC NOS. MF9916 AND MF9917; EPID L-2017-JLD-0046)

1.0 INTRODUCTION

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) 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) (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 of the 50.54(f) letter requested that licensees reevaluate flood hazards for their respective sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). If the reevaluated hazard for any flood-causing mechanism is not bounded by the plant's current design basis (CDB) flood hazard, an additional assessment of plant response would be necessary. Specifically, the 50.54(f) letter stated that an integrated assessment should be submitted, and described the information that the integrated assessment should contain. By letter dated November 30, 2012 (ADAMS Accession No. ML12311A214), the NRC staff issued Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding."

On June 30, 2015 (ADAMS Accession No. ML15153A104), the NRC staff issued COMSECY-15-0019, describing the closure plan for the reevaluation of flooding hazards for operating nuclear power plants. The Commission approved the closure plan on July 28, 2015 (ADAMS Accession No. ML15209A682). COMSECY-15-0019 outlines a revised process for addressing cases in which the reevaluated flood hazard is not bounded by the plant's CDB. The revised process describes a graded approach in which licensees with hazards exceeding their CDB flood will not be required to complete an integrated assessment, but instead will perform a focused evaluation (FE). As part of the FE, licensees will assess the impact of the hazard(s) on their site and then evaluate and implement any necessary programmatic, procedural, or plant modifications to address the hazard exceedance.

Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178), has been endorsed by the NRC as an appropriate methodology for licensees to perform the FE in response to the 50.54(f) letter. The NRC's endorsement of NEI 16-05, including exceptions, clarifications, and additions, is described in NRC JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force

Recommendation 2.1, Flood Hazard Reevaluation” (ADAMS Accession No. ML16162A301). Therefore, NEI 16-05, Revision 1, describes acceptable methods for demonstrating that North Anna Power Station, Units 1 and 2 (North Anna) has effective flood protection.

## 2.0 BACKGROUND

This provides the final NRC staff assessment associated with the information that the licensee provided in response to the reevaluated flooding hazard portion of the 50.54(f) letter. Therefore, this background section includes a summary description of the reevaluated flood information provided by the licensee and the associated assessments performed by the NRC staff. The reevaluated flood information includes: 1) the flood hazard reevaluation report (FHRR); 2) the mitigation strategies assessment (MSA); and 3) the focused evaluation.

### Flood Hazard Reevaluation Report

By letter dated March 11, 2013 (ADAMS Accession No. ML13318A090), Virginia Electric and Power Company (Dominion, the licensee) submitted the FHRR for North Anna. After reviewing the licensee’s response, by letter dated September 25, 2015 (ADAMS Accession No. ML15238A844), the NRC issued a staff assessment of the licensee’s FHRR. The FHRR staff assessment discusses the reevaluated flood hazard mechanisms that exceeded the CLB for North Anna and parameters that are a suitable input for the MSA and the FE. As stated in the staff assessment, because the local intense precipitation (LIP), stream and river flooding and dam failure flood-causing mechanisms at North Anna are not bounded by the plant’s CLB, additional assessments of the flood hazard mechanisms are necessary. The NRC staff’s overall conclusions regarding LIP, stream and river flooding and dam failure exceeding the North Anna CLB remained unchanged from the information provided in the FHRR and MSA staff assessment.

### Mitigation Strategies Assessment:

By letter dated December 16, 2016 (ADAMS Accession No. ML16357A405), the licensee submitted the MSA for North Anna for review by the NRC staff. The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigation strategies for beyond-design-basis external events. By letter dated June 29, 2017 (ADAMS Accession No. ML17156A311), the NRC issued its assessment of the North Anna MSA. The NRC staff concluded that the North Anna MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 12-06, Revision 2, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide” (ADAMS Accession No. ML16005A625). The NRC’s endorsement of NEI 12-06, Revision 2, is described in JLD-ISG-2012-01, Revision 1, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events” (ADAMS Accession No. ML15357A163). During the MSA review the licensee’s provided an analysis of the LIP event that resulted in slightly lower flooding elevations that were presented in the FHRR. The NRC staff concluded that the revised elevations were appropriate for use in the MSA and further concluded that the licensee has demonstrated that the mitigation strategies, if appropriately implemented, are reasonably protected from reevaluated flood hazard conditions for beyond-design-basis external events.

## Focused Evaluation

By letter dated June 29, 2017 (ADAMS Accession No. ML17186A084), the licensee submitted a FE for North Anna. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the FHRR staff assessment, that: 1) a flood mechanism is bounded based on further reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response is provided if the unbounded mechanism is local intense precipitation. These 3 options associated with performing an FE are referred to as Path 1, 2, or 3, as described in NEI 16-05, Revision 1. The purpose of this staff assessment is to provide the results of the NRC's evaluation of the North Anna FE.

### 3.0 TECHNICAL EVALUATION

The licensee stated that its FE followed Path 2 of NEI 16-05, Revision 1 and utilized Appendices B and C for guidance on evaluating the site strategy. The North Anna FE addresses the LIP, streams and rivers, and dam failure flooding mechanisms, which were found to exceed the plant's current licensing basis (CLB) as described in the FHRR and the FHRR staff assessment. This technical evaluation will address the following topics: characterization of flood parameters; evaluation of flood impact assessments; evaluation of available physical margin; reliability of flood protection features; and overall site response.

#### 3.1 Characterization of Flood Parameters

The FE uses the water surface elevations for the flooding mechanisms which were stated in the FHRR staff assessment, with the exception of the LIP elevations. The LIP elevations were the same as those that were presented in the MSA. Associated effects (AE) and flood event duration (FED) parameters were assessed by the licensee in its MSA for flooding. These parameters have already been reviewed by the NRC, as summarized by the NRC assessment letter dated June 29, 2017 (ADAMS Accession No. ML17156A311). Dominion used the AE and FED parameters as input to the North Anna FE and concluded that the site's flood strategy is effective in protecting structures, systems, and components (SSCs) that support key safety functions (KSFs). Dominion supported its conclusion of adequate flood protection by presenting its assessment of adequate available physical margin (APM) and reliable flood protection features for LIP, stream and river flooding, and dam failure flooding mechanisms. In its FE, the licensee stated that in order to respond to a potential LIP event at North Anna, additional personnel will be assigned to monitor projected meteorological conditions and, as necessary, undertake preparation (e.g., installation of temporary flood barriers); therefore, an evaluation of the overall site response was included in the FE.

The North Anna plant grade elevation is at 271 feet (ft.) National Geodetic Vertical Datum of 1929 (NGVD29). Table 3.1 (below) provides the elevations for the reevaluated flood mechanisms not bounded by the CLB. For the LIP flooding mechanism, the maximum reevaluated flood elevations are 274.4 ft. and >257.0 ft. NGVD29, in the protected area (outside the West Basin) and the West Basin area, respectively. The licensee stated that it will rely on both permanent and temporary flood barriers to demonstrate that adequate protection is available for the LIP. For the streams and rivers flooding and dam failure flooding mechanisms, the maximum reevaluated flood hazard water levels of 267.4 ft. and 267.8 ft. NGVD29 respectively, are not bounded by the North Anna CLB; however, these levels do not exceed the plant grade. Therefore, according to the licensee, stream and river flooding and dam failure

flooding mechanisms will have no impact to the key SSCs based on the passive protection of the site topography and grading.

**Table 3.1 Summary of Reevaluated Flood Hazards Elevations Included in the FE.**

<b>Flood Causing Mechanism</b>	<b>Current Design Basis Flood Elevation</b>	<b>FHRR Evaluation</b>	<b>Difference FHRR from CLB</b>	<b>Site-Specific Evaluation</b>	<b>Difference Site-Specific from CLB</b>
<b>LIP (Protected Area)</b>	Ground level with no accum. <sup>1</sup>	Ranges from 271.3 ft to 274.5 ft NGVD29	Ranges from 0.3 ft to 2.9 ft	Ranges from 271.0 ft to 274.4 ft NGVD29 <sup>2</sup>	Ranges from 0.0 ft to 1.7 ft
<b>LIP (West Basin Area)</b>	256.1 ft NGVD29	>257.0 ft NGVD29	>0.9 ft	>257.0 ft NGVD29	>0.9 ft
<b>Flooding In Streams and Rivers</b>	267.3 ft NGVD29	267.4 ft NGVD29	0.1 ft	N/A	N/A
<b>Dam Failures</b>	No impact identified	No impact identified	N/A	N/A	N/A

<sup>1</sup> Grade varies; nominal Protected Area elevation is 271.0 ft.

<sup>2</sup>Site-specific evaluation maximum flood elevation of 274.4 ft NGVD is at a location where grade elevation is 274.0 ft NGVD

### 3.2 Evaluation of Flood Impact Assessment for LIP

#### 3.2.1 Description of Impact of Unbounded Hazard

The North Anna FE identified the potential impacts on key SSCs as a result of water ingress due to LIP. The LIP event leads to flood water surface elevations above the plant floor elevations at some locations. In order to assess the impacts of the unbounded flood levels, the licensee identified the maximum water surface elevations at the exterior door openings, maximum flood depths above the door threshold, and duration of when the flood levels are above the door threshold. With this information, the licensee assessed the impacts of water ingress and potential for accumulation into rooms housing key SSCs.

The licensee's analysis of the reevaluated LIP flood hazard identified that flood water could enter several buildings including the Service, Fuel, Auxiliary, and Turbine Building basements. The NRC staff performed an audit of the licensee's supporting evaluations for the FE, in accordance with an NRC audit plan dated July 18, 2017 (ADAMS Accession No. ML17192A452). The staff reviewed the licensee's detailed flood protection evaluation which is contained in Attachment A of Engineering Technical Evaluation (ETE) ETE-NA-2015-0060, Revision 1, "North Anna Beyond Design Basis (BOB) Flooding Site-Specific Phase 2B Local Intense Precipitation (LIP) Assessment" dated April 28, 2016. This evaluation addressed

impacted locations, potential vulnerabilities (e.g., roof penetrations, exterior doors), and existing flood protection. It also identified additional flood protection measures potentially needed at key locations to eliminate or substantially reduce the entering flood water volumes and protect KSFs. The staff also reviewed Dominion ETE-NA-2017-0008, Revision 0, "Focused Evaluation of BDB External Flood Hazards at North Anna Power Station Units 1 and 2." Table 6.2-1 of this document provides a list of planned modifications needed to address the vulnerabilities that may result in compromise of one or more KSFs during the LIP event. Such planned modifications include the installation of permanent and temporary flood barriers and qualified seals in unprotected penetrations.

The licensee's assessments concluded that:

- During a LIP event water is expected to enter certain key buildings and potentially challenge KSFs;
- Where KSFs would be challenged, modifications were proposed involving the installation of flood protection measures at key locations;

During the audit process, the NRC staff reviewed the licensee's assessments in order to assure that adequate flood parameters were used for the calculations of water ingress and water accumulation. Specifically, the NRC staff verified that the assumed water surface elevations and duration of flooding above grade elevation were consistent with previous information reviewed by the staff for the North Anna FHRR and MSA.

### 3.2.2 Evaluation of Available Physical Margin and Reliability of Flood Protection Features

#### Evaluation of Available Physical Margin

The licensee relies on the use of passive flood protection features including both temporary and permanent barriers, in strategic locations throughout the plant to provide protection for flooding from LIP. During the audit process the staff reviewed ETE-NA-2014-0029, Revision 3, "Conduit / Piping Penetrations & Flood Protection Features Identification" which provides a detailed list of each flood protection feature including its type, physical location and elevation, associated safety related equipment, and maximum flood level by each feature. The evaluation also provides the relevant design documents associated with each feature and an evaluation of margin. The licensee's APM assessment showed that several features have negative or small margin levels. These features were listed in Attachment 22 of Dominion ETE-NA-2014-0029. The staff noted that most of the features with negative or small APMs were located in buildings that do not contain equipment required for safe shutdown. For those protection features with small or negative APM that were deemed unacceptable, the licensee provided recommendations and/or options to ensure protection against the LIP. The staff reviewed these APM results, the flood protection evaluation, and the regulatory commitments described in Section 6.2 of the FE and detailed in Table 6.2-1 of Dominion ETE-NA-2017-0008. If the modifications are completed as described by the licensee, the NRC staff concludes that the KSFs should have appropriate protection against flood waters as defined in Appendix B of NEI 16-05, Revision 1.

### Evaluation of Reliability of Protection Features

The licensee evaluated the ability of permanent and temporary passive flooding protection features to withstand the flood conditions through engineering evaluations. The staff reviewed these evaluations during the audit process. Specifically, the staff reviewed ETE-NA-2014-0029 "Conduit/Piping Penetrations & Flood Protection Features Identification" Revision 3, and ETE-NA-2015-0060.

External flood boundaries up to the CLB LIP flooding level are passive features. Since these features are already credited as part of the North Anna CLB flood protection, the NRC staff concludes that additional reliability analysis of these features is not necessary in accordance with the guidance found in NEI 16-05, Revision 1.

The licensee did not specifically address reliability for the temporary flood protection features referenced in the FE. However, the licensee stated in Dominion ETE-NA-2015-0060 that a program of procedures, training and maintenance would be developed and exercised periodically to ensure that temporary barrier installation can be performed reliably and efficiently. In NEI 16-05, Section B.2.3 states that standards, codes, guidance documents, and operating experience should be used in the configuration of the temporary features. Since the licensee's procedure for the temporary barrier installation is not yet fully developed, the staff concludes that an acceptable reliability determination is contingent upon completion of the licensee's regulatory commitments listed in the FE. Specifically, these commitments for procedure development, maintenance and testing must address the use of standards, codes, guidance documents, and operating experience in the final configuration of the temporary feature instructions, consistent with the provisions of NEI 16-05, Appendix B.

The licensee also identified penetrations that could provide a potential pathway for water at the reevaluated LIP elevation to possibly impact key SSCs. An activity to correct such penetrations, if necessary, has not yet been performed and thus the licensee's FE has identified a regulatory commitment to evaluate such penetrations. The staff views this commitment as a key activity that needs to be performed properly to support a reliability conclusion for the potentially affected key SSCs.

Because increased focus has been placed on flood protection since the accident at Fukushima, licensees and NRC inspectors have identified deficiencies with equipment, procedures, and analyses relied on to either prevent or mitigate the effects of external flooding at a number of licensed facilities. Recent examples include those found in Information Notice 2015-01, "Degraded Ability to Mitigate Flooding Events" (ADAMS Accession No. ML14279A268). In addition, the NRC is cooperatively performing research with the Electric Power Research Institute to develop flood protection systems guidance that focuses on flood protection feature descriptions, design criteria, inspections, and available testing methods in accordance with a memorandum of understanding dated September 28, 2016 (ADAMS Accession No. ML16223A495). The NRC staff expects that licensees will continue to maintain flood protection features in accordance with their CLB. The NRC staff further expects that continued research involving flood protection systems will be performed and shared with licensees in accordance with the guidance provided in Management Directive 8.7, "Reactor Operating Experience Program" (ADAMS Accession No. ML122750292), as appropriate.

The NRC staff concludes that, assuming successful completion of the licensee's regulatory commitments identified in the FE, the North Anna flood protection features described above



should be reliable and able to maintain key safety functions, as described in Appendix B of NEI 16-05, Revision 1.

### 3.2.3 Overall Site Response

The licensee plans to revise the following procedures: O-AP-41, "Severe Weather Conditions," and, CO-PROC-000-HRP-NUCLEAR, "Hurricane Response Plan (Nuclear)," (to include detailed descriptions of the site response to the LIP event. These planned revisions would be incorporated into the licensee's regulatory commitment described in Attachment 2 of the FE. According to the FE, the site response to the LIP event will include the assignment of additional personnel to monitor projected meteorological conditions and, as necessary, the installation of temporary flood barriers. The licensee's FE states that preparation activities will initiate 12 hours prior to the predicted onset of the LIP event and are expected to be completed within 6 hours, giving a margin of 6 hours. Additionally, the licensee stated that external environmental conditions will not have an adverse impact on the ability of the plant personnel to install barriers and protect the plant against the LIP. Finally, the licensee stated it will follow the guidance in Appendix E of NEI 12-06 to validate the flood protection installation and response margin. The licensee also stated that the site response to the LIP event is/will be performed consistent with the guidance in Appendix C of NEI 16-05.

The staff audited Dominion procedures: "Severe Weather Conditions" and "Hurricane Response Plan (Nuclear)" and concludes that, subject to completion of the procedure(s) developed in accordance with the licensee's regulatory commitments identified in the FE, as well as confirmation by the validation, the licensee should be able to place the temporary features into place consistent with the FE description.

## 3.3 Evaluation of Flood Impact Assessment for Stream and River Flooding

### 3.3.1 Description of Impact of Unbounded Hazard

As described in the FE, the maximum flood elevation from the stream and river flooding mechanism is 267.4 ft. NGVD29. Since the site plant elevation is 271 ft. NGVD29, no impacts were identified to key SSCs.

The staff confirmed that the licensee's parameters used as input to the FE are consistent with the parameters specified in the FHRR staff assessment dated September 25, 2015, which specified the parameters appropriate for further evaluation for this flood-causing mechanism.

### 3.3.2 Evaluation of Available Physical Margin and Reliability of Flood Protection Features

North Anna relies on the passive protection of the natural topography around the site to provide protection from the stream and river conditions. The APM for the stream and river scenario is greater than 3.6 feet in relation to the plant grade of 271 ft. NGVD29. The staff concludes that this APM is acceptable because it meets the guidance found in NEI 16-05, Revision 1. Section B.1, which states that a standard used to support Federal Emergency Management Agency flood insurance studies can be used to define "adequate APM" for the river flood as 2.5 ft.

The staff further concludes that the reliability of the site passive protection of the natural topography for the stream and river flood are acceptable because the 267.4 ft. NGVD29 is below the site plant grade of 271 ft. NGVD29. The staff concludes that the site natural topography ensures sufficient reliability of flood protection as defined in Appendix B of NEI

16-05, Rev 1.

### 3.3.3 Overall Site Response

The licensee does not rely on any personnel actions or new modifications to the plant in order to respond to the streams and rivers flooding event. As described above, the licensee's evaluation relied on the site's natural topography to demonstrate adequate flood protection. Therefore, there is no need to review overall site response for this mechanism.

## 3.4 Evaluation of Flood Impact Assessment for Dam failure

### 3.4.1 Description of Impact of Unbounded Hazard

As described in the FE, the maximum flood elevation from the dam failure is 267.8 ft. NGVD29. Since the site plant elevation is 271 ft. NGVD29, no impacts were identified to key SSCs.

The staff confirmed that the licensee's parameters used as input to the FE are consistent with the parameters specified in the FHRR staff assessment dated September 25, 2015, which specified the parameters appropriate for further evaluation for this flood-causing mechanism.

### 3.4.2 Evaluation of Available Physical Margin and Reliability of Flood Protection Features

North Anna relies on the passive protection of the natural topography around the site to provide protection from the dam failure conditions. The APM for the dam failure scenario is greater than 3 ft. in relation to the plant grade of 271 ft. NGVD29. The staff concludes that this APM is acceptable because it meets the guidance found in NEI 16-05, Revision 1, Section B.1.

The staff further concludes that the reliability of the site provisions for the dam failure flood are acceptable because the 267.8 ft. NGVD29 is below the site plant grade of 271 ft. NGVD29. The staff concludes that the site topography ensures sufficient reliability of flood protection as defined in Appendix B of NEI 16-05, Rev 1.

### 3.4.3 Overall Site Response

The licensee does not rely on any personnel actions or new modifications to the plant in order to respond to the dam failure flooding event. As described above, the licensee's evaluation relied on the site's natural topography to demonstrate adequate flood protection. Therefore, there is no need to review overall site response for this mechanism.

## 4.0 AUDIT REPORT

The July 18, 2017, generic audit plan describes the NRC staff's intention to issue an audit report that summarizes and documents the NRC's regulatory audit of the licensee's FE. The NRC staff's North Anna audit was limited to the review of the calculations and procedures described above. Because this staff assessment appropriately summarizes the results of the audit, the NRC staff concludes a separate audit report is not necessary, and that this document serves as the audit report described in the staff's July 18, 2017, letter.

## 5.0 CONCLUSION

The NRC staff concludes that Dominion performed the North Anna FE in accordance with the guidance described in NEI 16-05, Revision 1, as endorsed by JLD-ISG-2016-01, and that the licensee has demonstrated that effective flood protection exists, assuming appropriate implementation of the licensee's regulatory commitments, from the reevaluated flood hazards. Furthermore, the NRC staff concludes that North Anna screens out of performing an integrated assessment based on the guidance found in JLD-ISG-2016-01. As such, in accordance with Phase 2 of the process outlined in the 50.54(f) letter, additional regulatory actions associated with the reevaluated flood hazard, beyond those associated with mitigation strategies assessment, are not warranted. The licensee has satisfactorily completed providing responses to the 50.54(f) activities associated with the reevaluated flood hazards.

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 – STAFF ASSESSMENT OF FLOODING FOCUSED EVALUATION DATED December 15, 2017

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