10 CFR 50.90

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

August 22, 2019

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No.	18-360A
NRA/DEA	R3
Docket Nos.	50-338
	50-339
License Nos.	NPF-4
	NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION ENERGY VIRGINIA)
NORTH ANNA POWER STATION UNITS 1 AND 2
SUPPLEMENT TO PROPOSED LICENSE AMENDMENT REQUEST
FLOOD PROTECTION DIKE MODIFICATION
RESPONSE TO ONSITE AUDIT QUESTIONS

By letter dated November 19, 2018 (ADAMS Accession No. ML18334A106), Virginia Electric and Power Company (Dominion Energy Virginia) submitted a proposed license amendment request (LAR) to revise the North Anna Power Station (NAPS) current licensing basis (CLB) regarding a flood protection dike modification.

On July 15 – 17, 2019, the NRC conducted an on-site audit pertaining to a license amendment requesting the approval of a NAPS Flood Protection Dike Modification. Prior to and during the audit, the NRC asked 15 questions. Of those 15 questions, 6 were closed out to the audit. Attachment 1 to this letter provides the responses to the remaining 9 questions. Attachment 2 provides a supporting drawing from a field survey conducted during the on-site audit. A submittal date of August 16, 2019 was agreed upon for this LAR supplement.

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Attachments:

1. Supplement to Proposed License Amendment Request - Flood Protection Dike Modification – Response to On-Site Audit Questions

2. Drawing of Field Survey Conducted During the On-Site Audit

This letter contains no NRC commitments.

cc: U.S. Nuclear Regulatory Commission
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If you have any questions or require additional information, please contact Ms. Diane E. Aitken at (804) 273-2694.

Sincerely,

N. Larry Lane
Site Vice President – North Anna

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF LOUISA)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by N. Larry Lane who is Site Vice President – North Anna 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 21st day of August, 2019.

My Commission Expires: 06/30/2023.

Sandra Woolfolk
Notary Public

SANDRA H. WOOLFOLK NOTARY PUBLIC MY COMMISSION NUMBER 7387847 COMMONWEALTH OF VIRGINIA

ATTACHMENT 1

SUPPLEMENT TO

PROPOSED LICENSE AMENDMENT REQUEST
FLOOD PROTECTION DIKE MODIFICATION
RESPONSE TO ON-SITE AUDIT QUESTIONS

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

Supplement to Proposed License Amendment Request
Flood Protection Dike Modification
Response to On-Site Audit Questions

On July 15 – 17, 2019, the NRC conducted an on-site audit pertaining to a license amendment requesting the approval of a NAPS Flood Protection Dike Modification. Prior to and during the audit, the NRC asked 15 questions. Of those 15 questions, 6 were closed out to the audit and the responses to the remaining 9 questions are provided in this attachment.

NRC QUESTION NO. 2

Provide documentation of FPS and DWS pressure testing after installation (within the dike area), and if possible, indicate what was the approximate test pressures?

DOMINION ENERGY RESPONSE

Documentation of the test plan and completed test procedures were provided to the NRC audit personnel. Testing was performed in accordance with applicable design standards. The fire protection piping within the flood dike was hydrostatically tested at 235 psig, in accordance with NFPA 24, "Standard for the Installation of Private Fire Service Mains," and their Appurtenances, 2007 edition as referenced in Design Change Package (DCP) 07-016.

An in-service leak test was performed for the domestic water piping in accordance with Section 312.5 of the International Plumbing Code, 2006 edition, as described in DCP 07-016. The test pressure is estimated to have been pressure between 60 – 70 psig.

NRC QUESTION NO. 6

10 CFR 50.59 (page 15/17) states that a failure of the DWS line would be reported to the main control room (MCR) in a timely manner – did the low pressure alarm response get revised to state that a possible cause of low DWS pressure is that a buried line in the SR dike has failed. Are there any immediate actions to begin walkdowns of the SR dike area first or ASAP?

10 CFR 50.59/72.48 supplemental (page 5/7) –has good discussion of FPS/DWS of piping failures (double – ended breaks to small leaks.
- states that DWS piping would be identified quickly?
What directs operators to look in the area of the SR dike first?

Are isolation valves for the FPS and DWS indicated in any off normal instruction (ONI) for quick isolation to prevent damage to the SR dike?

DOMINION ENERGY RESPONSE

The 50.59 for the modification states that a loss of pressure in the domestic water system would be readily identifiable (toilets, drinking fountains, etc.) and reported promptly. There is no low pressure alarm response procedure for domestic water. The associated well houses are inspected during daily Operator rounds (1-LOG-6E provided during the audit) for loss of level or pressure. 1-LOG-6E verifies level within associated DWS well house hydro-pneumatic tanks is visible within the gauge, and pressure is greater than 45 psig and less than 85 psig.

There have been no changes to annunciator response procedures or other procedures which direct inspections of the flood dike.

NRC QUESTION NO. 8A

From the LAR (break or leak timely identifications):

Security would notice significant differences (wetness or pooling) in the appearance of the flood protection dike during routine patrols performed several times each day.

How often are patrols directly over this FPS/DWS pipe, done with cameras, how close are the inspections done to the piping?

DOMINION ENERGY RESPONSE

Security patrols are performed in the vicinity of the dike several times a day. Weekly camera inspections are performed which provide an opportunity to observe the western slope of the dike. Security Officers are trained during their initial training to observe for potentially abnormal conditions, via Critical Task 08 – Conduct Security Patrols. Additionally, a note is being added to the North Anna specific Attachment of SY-AA-120, "Operability Testing," for Security Officers to note any erosion or moisture on the dike and to communicate to Operations if the moisture appears to be coming from underground. This attachment is used during the weekly camera inspections. Camera capabilities also exist that allow observation of the western slope of the dike.

NRC QUESTION NO. 8B

The flood protection dike is landscaped at least twice a year. Explain how is landscaping every 6 months considered here?

DOMINION ENERGY RESPONSE

Landscaping every 6 months helps to prevent excessive or extreme plant growth on the dike bank, increasing the ability to visually identify leaks. In addition, individuals in the area during landscaping activitities would be expected to identify abnormal conditions.

NRC QUESTION NO. 8C

Small leaks of both pipe sizes would be detected during the annual flood protection dike inspection. How is inspection every 365 days considered here?

DOMINION ENERGY RESPONSE

Small leaks would need to be present for an extended period of time before a large portion of the dike is washed out. The annual inspection provides an opportunity to identify an anomalous condition associated with the dike (such as water pooling) that might indicate the presence of small or slowly progressing leaks. Security patrols and cameras also provide opportunities to identify small leaks before becoming a significant issue as discussed above.

NRC QUESTION NO. 8D

A fire protection system piping leak or rupture would result in increased cycling of the fire protection hydropneumatic tank level and pressure, which are monitored daily by Operations. Furthermore, the pressure maintenance pump would be cycling to maintain the dropping tank pressure. Have alarm response procedures been revised to include looking in the SR dike area for leaks?

DOMINION ENERGY RESPONSE

No changes have been made to the annunciator response procedures. Operators monitor the fire protection hydropneumatic tank once per shift in accordance with 1-LOG-6E. Tank level is verified between 10 and 80 % in the level gauge, and pressure is verified between 104 psig and 120 psig.

NRC QUESTION NO. 8E

Significant leakage (>30 gpm) [gallons per minute] would auto start a main fire pump and alert the operators in the control room, triggering an investigation. Operators perform quarterly and annual periodic tests which cycle the fire protection system valves at the ends of the flood protection dike, which provides an additional opportunity to observe signs of leakage on the western bank of the flood dike. How is this considered?

DOMINION ENERGY RESPONSE

During the conduct of the quarterly and annual tests which cycle the fire protection system valve, operators are located in the vicinity of the valves at the end of the dike. The presence of operators in these areas provide operators additional opportunities to observe anomalous conditions associated with the dike that might indicate leakage.

NRC QUESTION NO. 8F

The domestic water system usage is monitored monthly under a chemistry procedure and is trended by a System Engineer. A leak investigation would commence if the usage exceeds 600,000 gallons monthly (estimated to be equivalent to a 14 gpm leak based on normal usage). How is this considered?

DOMINION ENERGY RESPONSE

This is another opportunity to identify leakage from the domestic water system. In addition to the monthly usage check, Operator rounds per 1-LOG-6E provide daily checks of well house tank level and pressure as described in the response to NRC Question 6.

Following the on-site audit, discussions with System Engineering determined that domestic water usage is not routinely trended by the System Engineer as indicated in the original LAR submittal (page 11 of 15) dated November 19, 2018 (ADAMS Accession No. ML18334A106). The remaining methods used to detect a pipe break, as indicated in the original LAR submittal continue to be performed.

NRC QUESTION NO. 9

LAR Att.1, Sec. 2.2:
The attachment says that the dike slope stability analysis performed with the probable maximum flood (PMF) lake level of 264.2 ft mean sea level (MSL) shows adequate factors of safety. Generally, the dike slope stability analysis must also consider the effects of wave run-up which are persistent during the lake flooding as the period of wave is much shorter than the period of flood (i.e., few seconds versus several hours). Therefore the NRC staff requests the following two items: (i) Present the dike slope stability modeling, including discussion of model setup, assumptions, and model input/output; (ii) discuss the effects of the increased flood level due to the estimated wave run-up of 3.1 ft (as reported in the UFSAR) on the dike stability analysis, or justify why the effects of wave run-up is not applicable here.

DOMINION ENERGY RESPONSE

As discussed in the original slope stability calculation, CE-0638, the top elevation of the dike (271') was chosen to provide adequate freeboard above the PMF water elevation plus the wave run-up associated with the 2 year windspeed. However, the wave run-up was not considered critical with respect to the slope stability analysis and therefore was not considered. The excerpt from the UFSAR, section 2A.2.7, indicates that the intake structure for NAPS Units 3 and 4 is protected by a point of land, making wind effects non-critical. As noted on the site drawings, the flood dike is actually located behind the Unit 3 and 4 intake structure/screen well (i.e. farther back from the lake), which would logically render wind effects moot.

NRC QUESTION NO. 10A

LAR Att. 1, Sec. 3.0:
For PRA analysis on page 8, the applicant assumed that a failure of the fire protection pipe occurs within seven days of a significant rainfall event and that at least 15-inches of rain falls in less than 72 hours. However, the duration of design basis rainfall for the Lake Anna PMF outlined in the UFSAR is 9 days: 3 days for 40% probable maximum precipitation (PMP) as a pre-storm, 3 days for no-rain, and then 3 days for PMP. Also, the 3-day PMP depth at the Lake Anna basin reported in the UFSAR is 30.65 inches. Address how this design basis PMP rainfall scenario changes the result of the PRA analyses.

DOMINION ENERGY RESPONSE

In the risk assessment, the consequence of dike failure due to rainfall is assumed to be the same regardless of the severity of the rainfall event. Of interest to the risk assessment is the frequency of rainfall events and ultimately the frequency of dike failures. It would be non-conservative to the risk assessment to assume that a PMP event (exceptionally rare occurrence) would have to occur before fire protection pipe ruptures constitute a vulnerability to the dike.

For additional clarification, the phrase "within seven days of a significant rainfall" means "within seven days **following** a significant rainfall."

NRC QUESTION NO. 10B

Risk Analysis, page 8: The leak condition could lead to a subsidence of the dike and in turn could create a rupture of 12 inches fire protection pipe and dike. In this case, rainfall and pipe failure events are dependent and the failure probability of this scenario would be increased compared to the applicant's estimate under an independent assumption as described on page 10. Please address the potential failure of the dike

rupture followed by a failure of drainpipe and fire protection pipe in a dependent manner during an extreme rainfall event, or justify why this type of combined failures is not plausible.

DOMINION ENERGY RESPONSE

A potential small leak condition where the FP pipe leaks down to the drainage pipe, causing subsidence/voiding around the drainage pipe and leading to a dike failure during a flooding event was considered. This event was excluded from the analysis because the FP pipe leakage could be detected in multiple ways, including the following:

-Dampening on the western face of dike due to homogeneity of the soil.

-The slope of the drainage pipe falls to the west (confirmed by walkdown, and from interpretation of 11715-FY-4J and 4K), causing water around the pipe to drain around the exit line of the pipe.

-This event would require a large amount of water to occur. This much water leakage, over time, would be detected by FP tank cycling, as noted during the performance of 1-LOG-6E.

NRC QUESTION NO. 11

Provide any documentation that the licensee has met: (1) Section 3.4 "Fill Placement and Compaction Requirements" and (2) Section 4.0, "Quality Assurance and Testing Requirements" of Specification No. NAI-003, Revision 1 dated September 21, 1989. As indicated in the Calculation package 25161-G-060, dated May 6, 2011, for 2011 modification works.

DOMINION ENERGY RESPONSE

The fill placement and compaction was performed per Specification 25161-009-3PS-CE02-Q0001 (Technical Specification for Excavation, Backfill and Compaction of Trenches for Pipe and Conduit Installation Across Flood Protection Dike for North Anna Power Station Unit 3 Site Separation Activities). The requirements for loose lift thickness and required compaction in Section 3.4 of 25161-009-3PS-CE02-Q0001 are identical to those in NAI-003. The testing frequency specified in Section 3.6.2 of 25161-009-3PS-CE02-Q0001 is equivalent to the testing frequency specified in Section 4.0 of NAI-0003. The fill placement activities were performed per procedure FA001-WP-012-00 (Faulconer Vendor Procedure for Fire Protection and Domestic Water System Modifications FP-3, Safety Berm Fire Line Replacement). The results of the soil prequalification testing and soil placement testing are documented in the AMEC

Compilation Testing Report for Utility Backfill Testing Flood Protection Dike. The AMEC report documents that the fill placement met the requirements of specification 25161-009-3PS-CE02-Q0001 (provided during the on-site audit).

NRC QUESTION NO. 12

In the AMEC Report (dated 2/1/2013):
There are 7 tests that appear to be missing in the report (28 –32, and 56 – 57). Please provide the missing test data. There are 29 results that were "outside" of the test specified range – Please provide the corrective action, if any, that had been taken by Dominion. Please provide mapped out the test locations that were address in the report.

DOMINION ENERGY RESPONSE

Soil compaction specifications are established based on the type of soil, proposed use, and the moisture-density relationship developed with either the Standard Proctor (ASTM D698) or Modified Proctor (ASTM D1557) test. These tests differ by the amount of compaction energy applied to a specified soil volume, with the higher compaction energy test (Modified) resulting in a higher dry density in the compacted specimen. The optimum moisture content is the water weight to dry soil weight ratio (%) at which the compacted soil specimen achieves its maximum dry density relative to the compaction energy input of the specific test. The important factor to note is "relative to the compaction energy", because a properly placed fill can experience higher compaction energy during construction than in the lab. Typically, the compaction specification indicates a moisture content range around the optimum point for the given material so the contractor has an idea of what soil conditions will provide the best compaction/construction behavior. When the material is tested, typically with a nuclear density gauge, the in-situ moisture content and density is measured, and the dry-density is computed. Meeting the specified in-situ dry density is the primary objective and as long as that is achieved, the construction is acceptable. The specification for the Flood Dike construction, NAI-0003 (filed as NA-SPEC-000-NAI-0003) acknowledges this in section 3.4.2, "Compaction Requirements", subsection 3.4.2.3 that states, "The moisture content in itself is not considered most critical to the performance of the completed dike. The compaction percentage is the critical item and the specified moisture range is only intended as a guideline to achieve adequate compaction." A table listed in this section indicates that when the percent compaction is 95% or greater and falls outside the listed moisture content range, the testing agency representative is to notify Virginia Power Engineering. The testing agency noted on the inspection reports that it provided to the owner (Virginia Power Engineering) notification of when the moisture was "outside the specified range". No corrective measures would be necessary as long as the measured dry-density in the field met the specifications.

With respect to the "missing" tests, there were not any missing tests or missing pages from the AMEC test report that was provided during the audit. It is unclear why the test numbering sequence did not include the seven tests identified in the question and there is no indication that any of the test reports are missing.

NRC QUESTION NO. 13

Please provide the dimension from the center line of the 12" FP piping to the Westside of the dike.

DOMINION ENERGY RESPONSE

A field survey on July 17, 2019 identified the fire protection piping has approximately 6 to 7 feet of cover, and is located vertically below the dike crest, approximately 2 to 6 feet east of the western edge of the crest. A field survey drawing is included in Attachment 2.

NRC QUESTION NO. 15B

The LAR, page 6 states that the fire line has at least 5 feet of soil above it for tornado missile and freeze protection. Does this fire line meet this required depth, knowing the slope of the safety related dike?

DOMINION ENERGY RESPONSE

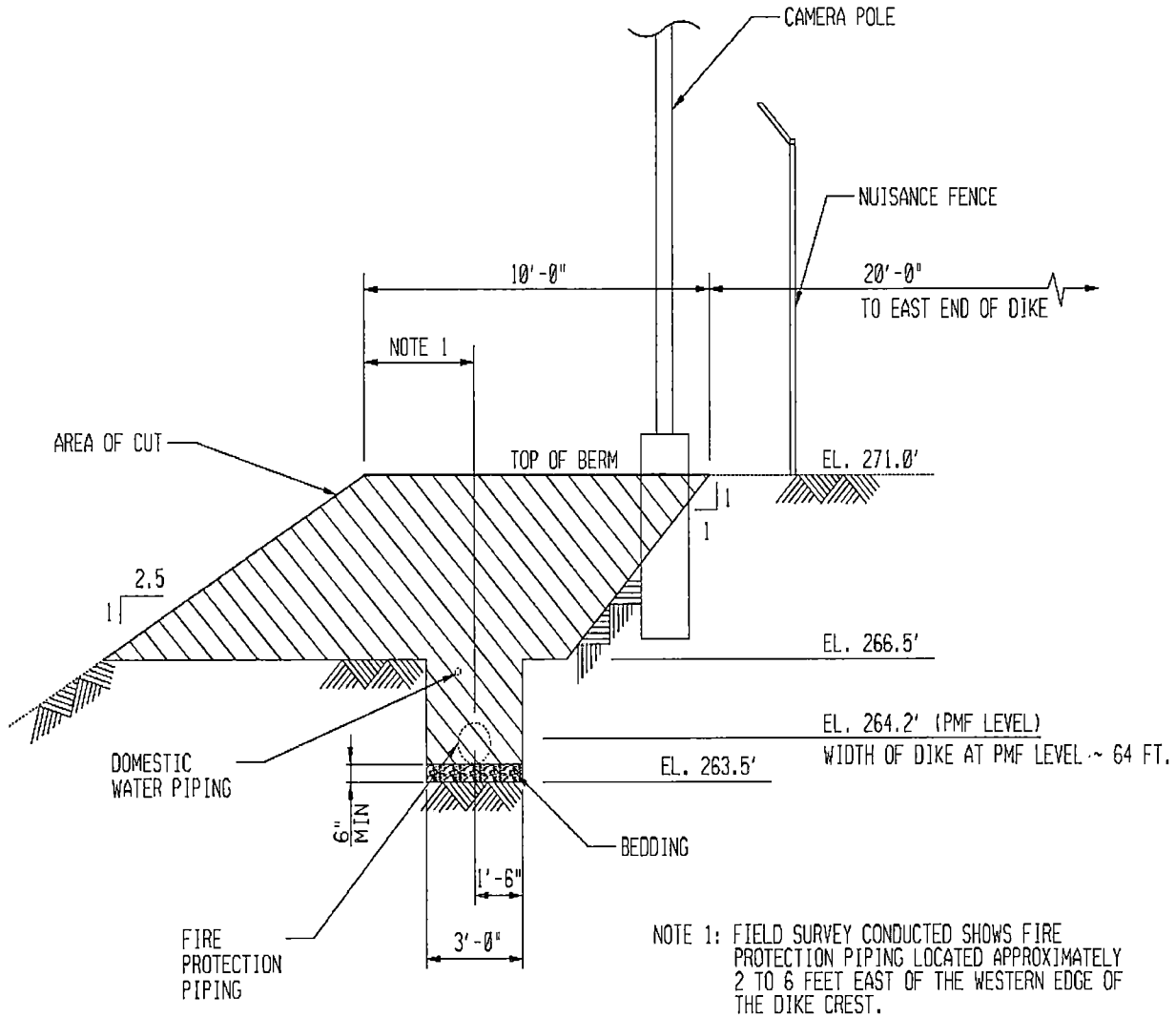
UFSAR Table 3.2-1, "Structures, Systems, and Components that are Designed to Seismic and Tornado Criteria," lists the Fire Protection System Yard Hydrant Piping System as designed to survive a design basis tornado. UFSAR section 9.5.1, "Fire Protection System," states that the fire protection 12-inch yard loop has a minimum cover of 5 feet for missile protection. Copies of the UFSAR descriptions were provided during the audit.

A field survey on July 17, 2019 confirmed that the fire protection piping has approximately 6 to 7 feet of cover, and is located vertically below the dike crest, approximately 2 to 6 feet east of the western edge.

ATTACHMENT 2

DRAWING OF FIELD SURVEY CONDUCTED DURING THE AUDIT

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



NOTE 1: FIELD SURVEY CONDUCTED SHOWS FIRE PROTECTION PIPING LOCATED APPROXIMATELY 2 TO 6 FEET EAST OF THE WESTERN EDGE OF THE DIKE CREST.