



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

August 12, 2016

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Virginia Electric and Power Company  
5000 Dominion Blvd.  
Glen Allen, VA 23060-6711

**SUBJECT: NUCLEAR REGULATORY COMMISSION REPORT FOR THE AUDIT OF VIRGINIA ELECTRIC AND POWER COMPANY'S FLOOD HAZARD REEVALUATION REPORT SUBMITTAL RELATING TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-FLOODING FOR SURRY POWER STATION, UNIT NOS. 1 AND 2 (CAC NOS. MF6103 AND MF6102)**

Dear Mr. Heacock:

By letter dated June 11, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15153A160), the U.S. Nuclear Regulatory Commission (NRC) informed you of the staff's plan to conduct a regulatory audit of Virginia Electric and Power Company's (the licensee's) supporting calculations of the Flood Hazard Reevaluation Report (FHRR) submittal related to the Near-Term Task Force Recommendation 2.1, Flooding for Surry Power Station, Unit Nos. 1 and 2. The audit was intended to support the NRC staff review of the licensee's FHRR and the subsequent issuance of a staff assessment.

The NRC conducted the audits via webinars and teleconferencing on December 3, 2015, December 9, 2015, February 9, 2016, and March 17, 2016. The audits were performed consistent with NRC Office of Nuclear Reactor Regulation, Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008, (ADAMS Accession No. ML082900195). The purpose of this letter is to provide you with the final audit report which summarizes and documents the NRC's regulatory audit of the licensee's FHRR submittal.

D. Heacock

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If you have any questions, please contact me at (301) 415-1056 or by e-mail at  
Lauren.Gibson@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Lauren Kate Gibson". The signature is written in a cursive style with a large initial 'L' and 'K'.

Lauren K. Gibson, Project Manager  
Office of Nuclear Reactor Regulation  
Japan Lessons-Learned Division  
Hazards Management Branch

Docket Nos.: 50-280 and 50-281

Enclosure:  
Audit Report

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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NUCLEAR REGULATORY COMMISSION REPORT

FOR THE AUDIT OF VIRGINIA ELECTRIC AND POWER COMPANY'S

FLOOD HAZARD REEVALUATION REPORT SUBMITTAL

RELATING TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-FLOODING FOR

SURRY POWER STATION, UNIT NOS. 1 AND 2

BACKGROUND AND AUDIT BASIS

By letter dated March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all operating power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of license" (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons-learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident. Recommendation 2.1 in that document recommended that the NRC staff issue orders to all licensees to reevaluate seismic and flooding hazards for their sites against current NRC requirements and guidance. Subsequent staff requirements memoranda associated with SECY 11-0124 and SECY-11-0137, instructed the NRC staff to issue requests for information to licensees under 10 CFR 50.54(f).

By letter dated March 12, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15078A291), Virginia Electric and Power Company (Dominion, the licensee) submitted its Flood Hazard Reevaluation Report (FHRR) for Surry Power Station, Unit Nos. 1 and 2 (Surry). The NRC has completed its regulatory audit of the licensee to better understand the development of the submittal, identify any similarities/differences with past work completed and ultimately aid in its review of the licensee's FHRR. This audit summary is being completed using the guidance in NRC Office of Nuclear Reactor Regulation, Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195).

ENCLOSURE

**AUDIT LOCATION AND DATES**

The audit was completed by document review with the use of the licensee’s established electronic reading room (ERR) in conjunction with webinars and teleconferences on December 3, 2015, December 9, 2015, February 9, 2016, and March 17, 2016.

**DOCUMENTS AUDITED**

The documents reviewed by the NRC staff were located in an ERR during the NRC staff’s review or were submitted on an external hard drive (by letter dated June 15, 2015 ((ADAMS Accession No. ML15167A281, non-public, official-use-only security-related information). Documents used by the NRC staff to support the technical analysis will be referenced in the staff assessment. Table 1 at the end of this report provides a list of specific references reviewed by the staff.

**AUDIT TEAM**

The NRC audit team, and audit participants were as follows:

<b>NRC AUDIT TEAM</b>	<b>Organization</b>
Victor Hall, Team Leader	NRR
Nebiyu Tiruneh, Technical Lead	NRO
Andy Campbell	NRO
Chris Cook	NRO
Aida Rivera-Varona	NRO
Mohamed Shams	NRR
Michelle Bensi	NRO
Peter Chaput	NRO
Brad Harvey	NRO
Lyle Hibler	NRO
Anthony Minarik	NRR
Richard Rivera-Lugo	NRO
Scott DeNeale	Oak Ridge National Laboratory (ORNL)
David Watson	ORNL
Ellen Smith	ORNL
Chris Bender	Taylor Engineering

<b>AUDIT PARTICIPANTS</b>	<b>Organization</b>
Diane Aitken	Dominion
Christopher Burks	Dominion
Wanda Craft	Dominion
Timothy Olsowy	Dominion
Paul Phelps	Dominion
Dean Price	Dominion

Craig Sly	Dominion
Michael Whitlock	Dominion
Paul Young	Dominion
David Leone	GZA
Michael Mobile	GZA
Dan Stapleton	GZA

AUDIT ACTIVITIES

In general, the audit activities consisted mainly of reviewing the submitted licensee calculations provided via external hard drive. In addition, the staff reviewed the deterministic and probabilistic storm surge analysis as a basis for their conclusions with respect to storm surge.

In its discussions with the NRC regarding probabilistic storm surge analysis, the licensee presented deterministic results for storm surge analysis that more closely aligned with the NRC's expectations for flooding due to storm surge at Surry. Because of this, the licensee decided to use a deterministic methodology for its re-evaluation of storm surge flooding required to assess the capabilities of its mitigating strategies for beyond design basis events. However, the licensee still plans to present a probabilistic storm surge analysis in its submittal of an integrated assessment or focused evaluation.

The staff also discussed the vertical datum conversions used in the FHRR. The staff completed an independent review of local datums at the Sewells Point, VA NOAA station. The NOAA data indicate a 0.26 ft difference between NAVD88 and MSL while the FHRR described a 1.44 ft difference. This difference was discussed during the audit. The staff found that the MSL to NAVD conversion value difference (FHRR vs staff's independently determined value) does not appear to be of primary concern as application of the staff conversion would decrease surge flood hazard elevations relative to those in the FHRR.

EXIT MEETING/BRIEFING

By letter dated February 29, 2016 (ADAMS Accession No. ML16041A332), the NRC staff issued a summary of the reevaluated flood-causing mechanisms. That letter concluded that the licensee's reevaluated flooding hazard information is a suitable input for assessments associated with Near-Term Task Force Recommendation 2.1 "Flooding," thus closing out the discussion of the technical topics described above.

Table 1: List of References Reviewed by the NRC

<b>FHRR References</b>
Zachry (Zachry Nuclear Engineering, Inc.), 2015a, "Probable Maximum Precipitation (PMP) at Surry Power Station," Zachry Calculation 13-009, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015b, "Probable Maximum Flood (PMF) at Surry Power Station," Zachry Calculation 13-011, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015c, "Evaluation of Dam Failures for Surry Power Station," Zachry Calculation 13-143, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015d, "Local Intense Precipitation Flooding Using Site Specific Precipitation Information – Surry Power Station," Zachry Calculation 14-221, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015e, "Combined Effect Flood Analysis at Surry Power Station," Zachry Calculation 14-224, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015a, "Probable Maximum Precipitation (PMP) at Surry Power Station," Zachry Calculation 13-009, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015b, "Probable Maximum Flood (PMF) at Surry Power Station," Zachry Calculation 13-011, Rev. 0, Zachry Nuclear Engineering, February 2015.
Zachry (Zachry Nuclear Engineering, Inc.), 2015c, "Evaluation of Dam Failures for Surry Power Station," Zachry Calculation 13-143, Rev. 0, Zachry Nuclear Engineering, February 2015.
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D. Heacock

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If you have any questions, please contact me at (301) 415-1056 or by e-mail at Lauren.Gibson@nrc.gov.

Sincerely,

*/RA/*

Lauren K. Gibson, Project Manager  
Office of Nuclear Reactor Regulation  
Japan Lessons-Learned Division  
Hazards Management Branch

Docket Nos.: 50-280 and 50-281

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Audit Report

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**ADAMS Accession No.: ML16183A021**

**\*via email**

<b>OFFICE</b>	NRR/JLD/JHMB/PM	NRR/JLD/JHMB/LA	NRO/DSEA/RHM2/TR*
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<b>DATE</b>	08/02/2016	08/10/2016	08/12/2016

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