

July 31, 2014

MEMORANDUM TO: Ronaldo V. Jenkins, Chief  
Licensing Branch 3  
Division of New Reactor Licensing  
Office of New Reactors

FROM: Chandu P. Patel, Senior Project Manager **/RA/**  
Licensing Branch 3  
Division of New Reactor Licensing  
Office of New Reactors

SUBJECT: AUDIT SUMMARY OF THE AUDIT CONDUCTED ON MAY 8, 2014,  
ASSOCIATED WITH NORTH ANNA POWER STATION, UNIT 3,  
COMBINED LICENSE APPLICATION – FINAL SAFETY ANALYSIS  
REPORT SECTION 2.5

By letter dated December 18, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML14007A541), Dominion Virginia Power submitted its revised application for North Anna Power Station Unit 3 Combined License Application referencing Economic Simplified Boiling-Water Reactor technology. The U.S. Nuclear Regulatory Commission staff is reviewing Chapter 2.5 of the Final Safety Analysis Report submitted in Part 2 of the application. The staff identified a need to conduct an audit of some of the information discussed in the application. The audit took place on May 8, 2014, at the North Anna Unit 3 site located in Louisa County, Virginia.

A copy of the audit summary report is provided in Enclosure 1. Enclosure 2 lists participants in the entrance meeting conducted on May 8, 2014, and attendants at the exit meeting conducted on the same day are listed in Enclosure 3.

Docket No.: 52-017

Enclosure:  
As stated

cc w/encl: See next page

CONTACT: Chandu P. Patel, NRO/DNRL  
301-415-3025

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**ADAMS Accession No: ML14203A179**

**NRO-002**

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**Audit Summary  
North Anna Power Station Unit 3  
Final Safety Analysis Report Section 2.5  
May 8, 2014**

## **1.0 Introduction**

On May 8, 2014, the U.S. Nuclear Regulatory Commission (NRC) conducted an audit at North Anna Unit 3 site located in Louisa County, Virginia to discuss issues identified by the NRC staff during its review of the revised North Anna Power Station (NAPS) Unit 3 Combined License Application (COLA) referencing Economic Simplified Boiling-Water Reactor technology. The audit was centered towards the discussion of issues related to the review of Section 2.5 of the Final Safety Analysis Report (FSAR) in North Anna COLA.

## **2.0 Audit Team**

Chandu Patel, Project Manager (NRO/DNRL/LB3)  
Weijun Wang, Team Leader (NRO/DSEA/RGS2)  
Vladimir Graizer (NRO/DSEA/RGS2)  
Alice Stieve (NRO/DSEA/RGS2)  
Lisa Walsh (NRO/DSEA/RGS1)  
David Heeszel (NRO/DSEA/RGS2)  
Joseph Giacinto (NRO/DSEA/RGS1)

## **3.0 Audit Results**

### Geotechnical Activities

#### Site Tour

Geotechnical staff toured the NAPS Unit 3 site, including a walking tour of planned nuclear island area and service water reservoir (SWR). The staff paid special attention to the topography around the SWR and examined the water flow paths around the embankment of the SWR and slopes close to NAPS Unit 3 site. During the tour, the staff talked with geotechnical engineer John David (Bechtel, Dominion contractor) and collected information on elevation of the SWR and surrounding areas, as well as the capacity of the SWR.

#### Review of Borings

The geotechnical staff examined core from several borings at the NAPS Unit 3 site focusing on borings W-1, W-4 and B-920. W-1 and W-4 borings are located along two sides of the footprint of the nuclear island and B-920 boring is located within the footprint of the service building. The staff examined the cores collected around and below the elevation of the bottom of planned foundations, and paid particular attention to the rock quality designation (RQD) values and shear wave velocities of those core that indicate the strength of the subsurface materials and the integrity of the rock mass.

### Request for Additional Information Discussion

The staff discussed the applicant's response to RAI 7468 with the applicant. A geotechnical engineer representing the applicant presented its response to the RAI regarding slope stability at the Unit 3 site. The staff gained better understanding of the RAI response from the applicant from the site tour and discussion of the RAI response.

No issue was identified by the geotechnical staff during this site audit.

### Geological Field Observations and Activities

#### Site Tour

Geology staff toured the NAPS Unit 3 site, including a walking tour of the planned nuclear island area. The geology staff focused on the previously mapped location of fault 'a' with respect to operating Units 1 and 2, abandoned Units 3 and 4, and the proposed new Unit 3. During the tour, the staff talked with geologists David Fenster (Bechtel, Dominion contractor) and Scott Lindvall (LCI, Dominion contractor) regarding the extent of fault 'a' across Lake Anna and further to the southeast with respect to the locations of the Dames and Moore exploratory trenches 1 through 3.

#### Examination of Selected Portions of Site Borings

Geology staff focused on portions of several borings (i.e., W-1, -3, -4, -5, -6, -7; M-1, M-27, B-905, B-920) to directly examine examples of severely weathered and jointed intervals within more competent crystalline rock, as reported in the FSAR. Staff also examined the microshear zone in W-1 to clearly understand the characteristics and extent of the zone with respect to what was described in the FSAR.

#### Field Trip

Geology staff took a tour of the site vicinity to examine the geomorphological and geologic characteristics of the site vicinity especially with respect to possible surface deformation related to neotectonism in the site vicinity. Staff examined upland surfaces near the possible extension of fault 'a' and observed no evidence of anomalous deformation. Staff visited exposures of crystalline rock near the Chopawamsic fault and the Ellisville pluton neck; the possible exposure of the southeastward extension of the Long Branch fault; and the location of the small, limited liquefaction related to the Mineral Virginia, earthquake.

#### Seismology Activities

Staff discussed the applicant's approach to RAI responses with seismologist James Marrone (Bechtel, Dominion contractor) (via phone) and geotechnical engineer Alidad Hashemi (Bechtel, Dominion contractor).

In response to RAI 7472, which is related to the site response analysis, the applicant provided schematic locations of the 5 boreholes with shear-wave velocity measurements relative to the footprints of the Category 1 structures.

Staff reviewed changes made by the applicant to the Ground Motion Response Spectra (GMRS) calculation by including the third S-wave velocity profile from borehole B-907 and enveloping ground motions from all three response spectra instead of the two response spectra (RS) for which GMRS was originally presented in the FSAR.

Staff reviewed detailed tables provided by the applicant that show specific profiles used for calculation of the GMRS, including maximum and minimum S-wave velocities in each layer, variations in layer thicknesses and on modulus reductions curves and densities used for the analysis.

In response to RAI 7473, which is related to earthquake recurrence rate assessment , based on the updated earthquake catalog and the Mineral Virginia earthquake, the applicant demonstrated quantitatively that the rate increase and changes in b-values for cells in the vicinity of the site resulted in a relatively low increase in seismic hazard calculation for the North Anna, Unit 3 site as compared to the original CEUS-SSC values presented in NUREG-2115.

In response to RAI 7473, which is related to defining two plant-shutdown operating basis earthquake (OBE) spectra, the applicant provided a detailed explanation of its position and agreed to a need to make changes to the OBE definition presented in FSAR consistent with Interim Staff Guidance (ISG)-1.

In response to a staff question about calculations of the vertical RS based on the horizontal RS, the applicant demonstrated that its approach is consistent with NUREG-6728.

No issue was identified by the seismology staff during this site audit.

**North Anna Power Station Unit 3 Site Audit  
Entrance Meeting Participants  
May 8, 2014**

<b>NAME</b>	<b>ORGANIZATION</b>
<b>Weijun Wang</b>	NRC
<b>Alice Stieve</b>	NRC
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<b>Lisa Walsh</b>	NRC
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<b>Regina Borsh</b>	Dominion
<b>John Waddill</b>	Dominion
<b>Tony Banks</b>	Dominion
<b>Raj Harnal</b>	Dominion
<b>John Lee</b>	Dominion
<b>Richard Baker</b>	Dominion
<b>Ross Milliken</b>	Dominion
<b>Keith Miller</b>	Dominion
<b>Doug Kemp</b>	Bechtel
<b>Alidad Hashemi</b>	Bechtel
<b>Mark Loeffler</b>	Bechtel
<b>John Davie</b>	Bechtel
<b>David Fenster</b>	Bechtel
<b>Scott Lindvall</b>	LCI

**North Anna Power Station Unit 3 Site Audit  
Exit Meeting Participants  
May 8, 2014**

NAME	ORGANIZATION
Weijun Wang	NRC
Alice Stieve	NRC
Vladimir Graizer	NRC
David Heeszal	NRC
Lisa Walsh	NRC
Chandu Patel	NRC
John Waddill	Dominion
Tony Banks	Dominion
Raj Harnal	Dominion
John Lee	Dominion
Richard Baker	Dominion
Ross Milliken	Dominion
Keith Miller	Dominion
Mark Loeffler	Bechtel
John Davie	Bechtel
David Fenster	Bechtel
Scott Lindvall	LCI

Enclosure 3

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(Revised 07/17/2014)

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