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

Serial No. NA3-09-021R  
Docket No. 52-017  
COL/JPH

**DOMINION VIRGINIA POWER**  
**NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION**  
**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER 037**  
**(FSAR Chapters 3, 5, and 12)**

On May 28, 2009, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The letter contained four RAIs. The responses to three of the RAIs are provided in Enclosures 1 through 3:

- RAI Question 03.07.01-2      Incorporation of SSE & OBE into FSAR
- RAI Question 05.03.02-1      NRC Notification for PTLR Update
- RAI Question 12.03-12.04-12      ALARA for Construction Workers

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the Enclosures. The response to RAI Question 03.10-1, Equipment Qualification Program Details, will be submitted by October 28, 2009.

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

DOB9  
NRO

Enclosures:

1. Response to RAI Letter Number 037, RAI Question 03.07.01-2
2. Response to RAI Letter Number 037, RAI Question 05.03.02-1
3. Response to RAI Letter Number 037, RAI Question 12.03-12.04-12

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.
2. The response to RAI Questions 03.10-1, Equipment Qualification Program Details, will be submitted by October 28, 2009.
3. Update NA Unit 1 & Unit 2 ALARA procedures prior to construction to include consideration of NA3 construction activities.

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

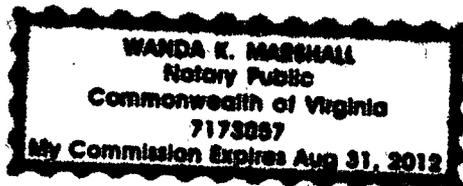
The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 24<sup>th</sup> day of August, 2009

My registration number is 7173057 and my

Commission expires: August 31, 2012

Wanda K. Marshall  
Notary Public



cc: U. S. Nuclear Regulatory Commission, Region II  
T. A. Kevern, NRC  
I. Berrios, NRC  
J. Jessie, NRC  
M. Eudy, NRC  
J. T. Reece, NRC

**ENCLOSURE 1**

**Response to NRC RAI Letter 037**

**RAI Question 03.07.01-2**

**NRC RAI 03.07.01-2**

*In 10 CFR 50 Appendix S specify that the Safe Shutdown Earthquake (SSE) Ground Motion for the site is characterized by both horizontal and vertical free-field ground motion response spectra at the free ground surface. For application to engineering design, site-specific GMRS determined at the foundation level of seismic category I structures are bounded by CSDRS. However, a site-specific SSE should be established as free-field ground motion response spectra that would be used to determine whether the plant shutdown would be required following a seismic event. The NRC staff requests that the applicant specify in FSAR Section 3.7.1 both the site-specific SSE and the corresponding OBE which would be required for operating the plant and setting up the seismic instrumentation as required in FSAR Section 3.7.4.*

**Dominion Response**

The North Anna Unit 3 site-specific Ground Motion Response Spectra (GMRS) for free-field ground motion at the top of competent rock are shown in FSAR, Revision 2, Figures 2.0-206 and 2.0-207, where they are referred to simply as the Unit 3 SSE Design Response Spectra. The site-specific Foundation Input Response Spectra (FIRS) for the Reactor Building / Fuel Building (RB/FB) and Control Building (CB) and for the Firewater Storage Complex (FWSC), shown in FSAR Revision 2, Figures 2.0-201 through 2.0-204, were generated consistent with the development of the GMRS. That is, these spectra are developed as free-field ground motions at the appropriate elevations.

North Anna Unit 3 is designed using two sets of Certified Seismic Design Response Spectra (CSDRS) which fully envelope the site-specific FIRS. ESBWR DCD Tier 2, Revision 5, Figures 2.0-1 and 2.0-2, where the design spectra are referred to as SSE Design Ground Spectra at Foundation Level, provide the CSDRS for the RB/FB and CB, which envelope the site-specific RB/FB and CB FIRS, as illustrated in FSAR Revision 2, Figures 2.0-201 and 2.0-202. Note 9 of Table 2.0-1 and the note on embedment depth in Table 3.7-2 in DCD, Revision 5, identify the CSDRS for the FWSC as 1.35 \* RB/FB and CB CSDRS, which envelope the site-specific FWSC FIRS, as illustrated in FSAR Revision 2, Figures 2.0-203 and 2.0-204.

For North Anna Unit 3, because two sets of CSDRS are used to design the plant, the set with the lower CSDRS is specified as the site-specific SSE in the context of 10 CFR 50 Appendix S, and these are shown in COLA FSAR Revision 2, Figures 2.0-201 and 2.0-202.

Therefore, the site-specific SSE applicable for plant shut down purposes is as follows:

SSE = CSDRS (COLA FSAR Revision 2, Figures 2.0-201 and 2.0-202)

In accordance with ESBWR DCD, Tier 2, Revision 5, Section 3.7, the OBE will be one third of the SSE ground motion. Therefore, the OBE seismic levels that would be used to determine if a plant shutdown is required are determined as follows:

$$\text{OBE} = \text{CSDRS (COLA FSAR Revision 2, Figures 2.0-201 and 2.0-202)} * 1/3$$

It is noted that the above SSE and OBE definitions will be used in conjunction with the criteria specified in DCD, Tier 2, Revision 5, Section 3.7.4.4, to determine whether a plant shutdown is required following a seismic event.

### **Proposed COLA Revision**

FSAR Sections 2.5.2.7 and 3.7.1.1 will be revised as shown in the attached markups.

### **Markup of North Anna COLA**

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

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SSAR Reference 171. The selected horizontal and vertical spectra for the ground surface at the location of the FWSC are plotted in Figure 2.5-208.

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#### 2.5.2.6.8 Additional Sensitivity Studies

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The last paragraph of this SSAR section is supplemented with a new paragraph on sensitivity studies.

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**NAPS COL 2.0-27-A**

The SSAR sensitivity analyses for the reference probability and performance-based approaches were not re-performed for the FSAR.

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#### 2.5.2.6.9 Additional Modification of the Selected Spectrum

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The last paragraph of this SSAR section is supplemented as follows with information explaining why additional modification of the selected spectrum is unnecessary for Unit 3.

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**NAPS COL 2.0-27-A**

The potential modifications to the selected spectrum were not performed for Unit 3 because, as shown in Table 2.0-201, the certified seismic design response spectra (CSDRS) for Seismic Category I structures bound the high-frequency content in the foundation input response spectra (FIRS).

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#### 2.5.2.6.10 Approach to Develop the EDS

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The last paragraph of this SSAR section is supplemented as follows with information explaining why additional modification of the selected spectrum is unnecessary for Unit 3.

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**NAPS COL 2.0-27-A**

The potential modifications to the selected spectrum described in SSAR Section 2.5.2.6.9 were not performed for Unit 3 because, as shown in Table 2.0-201, the CSDRS for Seismic Category I structures bound the high-frequency content in the FIRS.

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#### 2.5.2.7 Operating Basis Earthquake

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This SSAR section is supplemented as follows with information regarding the operating basis earthquake.

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**NAPS COL 2.0-27-A**

~~The comparison of CSDRS and FIRS for Seismic Category I structures is provided in Section 2.0. The DCD OBE ground motion is chosen to be one third of the CSDRS per DCD Section 3.7.1. Consistent with SSAR Section 2.5.2.7, the Unit 3 OBE ground motion would be one third~~

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~~of the FIRS. Because one third of the CSDRS exceeds one third of the FIRS, the DCD OBE bounds the site OBE. The OBE is specified in Section 3.7.1.1.~~

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### 2.5.3 Surface Faulting

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**NAPS COL 2.0-28-A** The information needed to address DCD COL Item 2.0-28-A is included in SSAR Section 2.5.3, which is incorporated by reference with the following supplements.

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**NAPS COL 2.0-28-A** **2.5.3.2.5 Unit 3 Subsurface Investigation**

Borehole data, from the supplemental subsurface investigation described in Section 2.5.4.3, were reviewed for evidence of Quaternary fault movement. No such evidence was exhibited by the borehole data.

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### 2.5.4 Stability of Subsurface Materials and Foundations

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**NAPS COL 2.0-29-A** The information needed to address DCD COL Item 2.0-29-A is included in SSAR Section 2.5.4, which is incorporated by reference with the following supplements.

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SSAR Section 2.5.4 has been supplemented by integrating information on the additional Unit 3 borings into a single section with the same numbering as the SSAR.

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#### 2.5.4.1 Geologic Features

SSAR Section 2.5.1.1 describes the regional geology, including regional physiography and geomorphology, regional geologic history, regional stratigraphy, and the regional tectonic setting. SSAR Section 2.5.1.2 addresses site-specific geology and structural geology, including site physiography and geomorphology, site geologic history, site stratigraphy, site structural geology, and a site geologic hazard evaluation.

#### 2.5.4.2 Properties of Subsurface Materials

##### 2.5.4.2.1 Introduction

This section describes the static and dynamic engineering properties of the Unit 3 site subsurface materials. An overview of the subsurface profile and materials is given in Section 2.5.4.2.2. The field investigations are described in Section 2.5.4.2.3. The laboratory tests on soil and rock samples from the investigation and their results are presented in

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**3.5.1.6 Aircraft Hazards**

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Add the following at the end of the first paragraph.

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**STD SUP 3.5-2**

Site-specific aircraft hazard analysis and the site-specific critical areas are addressed in Section 2.2.

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**3.6 Protection Against Dynamic Effects Associated with the Postulated Rupture of Piping**

This section of the referenced DCD is incorporated by reference with no departures or supplements.

**3.7 Seismic Design**

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

**3.7.1.1 Design Ground Motion**

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Add the following at the end of this section.

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**NAPS SUP 3.7-7**

Figures 2.0-201 and 2.0-202 provide the CSDRS, which envelope the site-specific design ground motions (the FIRS) for the RB/FB and CB. Figures 2.0-203 and 2.0-204 also provide the CSDRS, which envelope the site-specific design ground motions (the FIRS) for the FWSC. Therefore, the site-specific SSE applicable for plant shut down purposes is the CSDRS as shown in Figures 2.0-201 and 2.0-202.

The operating basis earthquake (OBE) is one-third of the lower of these two sets of design ground motion response spectra. That is, the OBE for the site is one-third of the CSDRS as shown in Figures 2.0-201 and 2.0-202. These SSE and OBE definitions are used in conjunction with the criteria specified in DCD Section 3.7.4.4 to determine whether a plant shutdown is required following a seismic event.

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**NAPS SUP 3.7-1**

**3.7.1.1.4 Site-Specific Design Ground Motion Response Spectra**

The site-specific design Ground Motion Response Spectra (GMRS) and the FIRS are described in Section 2.5.2. The CSDRS are compared with the FIRS in Table 2.0-201.

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**NAPS SUP 3.7-2**

**3.7.1.1.5 Site-Specific Design Ground Motion Time History**

The site-specific earthquake ground motion time history is described in Section 2.5.4.

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**ENCLOSURE 2**

**Response to NRC RAI Letter 037**

**RAI Question 05.03.02-1**

### **NRC RAI 05.03.02-1**

*In reference to FSAR Section 5.3.1.5, it is the staffs understanding that the applicant will submit a generic pressure and temperature limits report (PTLR) using the bounding material properties and projected fluence as part of the North Anna 3 COL application. On this basis, the staff requests that FSAR Section 5.3.1.5 be revised to add a statement that addresses the submittal of pressure-temperature limits using plant-specific material properties. For example, Section 5.3.1.5 should include a commitment that pressure-temperature limits will be updated prior to fuel loading, if required, using the plant-specific material properties and that the NRC will be informed of the updated limits.*

*The staff notes that this approach is consistent with NRC Generic Letter 96-03 which provides a method for the licensee to inform the NRC of any subsequent change in P-T limits without a requirement for NRC approval if there are no changes to the approved PTLR methodology.*

### **Dominion Response**

On June 17, 2009, Dominion submitted the generic ESBWR reactor vessel pressure and temperature limits report (PTLR) to the NRC (Letter Serial No. NA3-09-023). This report used bounding material properties and projected fluence.

As requested in this RAI, Dominion will revise FSAR Section 5.3.1.5 to add a commitment to update, prior to fuel load, the pressure-temperature limit curves to reflect plant-specific material properties, if required.

This RAI also requests that Dominion add a commitment to the FSAR to ensure that the NRC be informed of the updated limits. Technical Specification 5.6.4 already requires, in part, that the PTLR shall be provided to the NRC upon issuance for any revision or supplement thereto. This requirement will ensure that the NRC is informed of the updated limits. No additional commitment needs to be added to the FSAR.

### **Proposed COLA Revision**

FSAR Section 5.3.1.5 will be revised as shown in the attached markup.

### **Markup of North Anna COLA**

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

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potential corrective action plans to prevent the plant from exceeding a Technical Specifications limit.

An unidentified leakage rate-of-change alarm provides an early alert to the operators to initiate corrective actions prior to reaching a Technical Specifications limit.

A description of the plant procedures program and implementation milestones are provided in Section 13.5.

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#### 5.2.6 COL Information

**5.2-1-A Preservice and Inservice Inspection Program Description**  
**STD COL 5.2-1-A** This COL Item is addressed in Sections 5.2.4, 5.2.4.3.4, 5.2.4.6, 5.2.4.11, and 6.6.

**5.2-2-H Leak Detection Monitoring**  
**STD COL 5.2-2-H** This COL Item is addressed in Sections 5.2.5 and 5.2.5.9.

**5.2-3-A Preservice and Inservice Inspection NDE Accessibility Plan Description**  
**STD COL 5.2-3-A** This COL Item is addressed in Section 5.2.4 and 5.2.4.2.

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### 5.3 Reactor Vessel

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

#### 5.3.1.5 Fracture Toughness Compliance with 10 CFR 50, Appendix G

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**STD COL 16.0-2-H**  
**5.6.4-1** Replace the last sentence in the first paragraph with the following.

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The pressure-temperature limit curves are developed in accordance with the Pressure and Temperature Limits Report, as discussed in the Technical Specifications Section 5.6.4. Prior to fuel load, the pressure-temperature limit curves will be updated to reflect plant-specific material properties, if required.

**ENCLOSURE 3**

**Response to NRC RAI Letter 037**

**RAI Question 12.03-12.04-12**

**NRC RAI 12.03-12.04-12**

*Section 5.4 of Part 3, Environmental Report, of the North Anna COL application provides an analysis of the expected average annual dose that will be received by a construction worker at North Anna 3 during the construction period. The applicant states that approximately 96% of the estimated annual dose to the construction worker of 24 mrem will be from direct radiation (from the operating North Anna Units 1 & 2 and from the ISFSI). The balance of this estimated annual dose will be from liquid and gaseous effluents from Units 1 & 2. How will the requirements of 10 CFR Part 20.1101 (b) be met for construction workers?*

**Dominion Response**

10 CFR 20.1101(b) states:

The licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).

Direct and indirect radiation doses to construction workers for Unit 3, regarded as members of the public, would be from Units 1 and 2 and the ISFSI. Doses to these workers will be maintained ALARA in accordance with the existing units radiation protection ALARA program and utilizing the existing units environmental monitoring program to ensure compliance with 10 CFR 20.1101(b) and 20.1302(a). Before construction begins, North Anna Units 1 & 2 procedures associated with the ALARA program will be revised to acknowledge Unit 3 construction personnel in ALARA considerations.

**Proposed COLA Revision**

None.