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December 9, 2009

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

Serial No. NA3-09-031R
Docket No. 52-017
COL/JPH

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 041
(FSAR CHAPTERS 3 AND 5)

On August 24, 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 eight RAIs. On November 20, 2009, an extension request was submitted stating responses would be provided by December 23, 2009. The responses to the 8 RAIs are provided in Enclosures 1 through 8:

RAI Question 03.02.01-7	SSCs Required Following an OBE
RAI Question 05.03.02-2	PTS Rule Applicability for ESBWR Design
RAI Question 05.03.02-3	PTLR Criterion 2
RAI Question 05.03.02-4	"Predicted Fluence" Methodology Reference
RAI Question 05.03.02-5	Table of Data Points for each P-T Curve
RAI Question 05.03.02-6	Minimum Bolt-up Temperature
RAI Question 05.03.02-7	Dual Temperature Units Added to ART Calculations
RAI Question 05.03.02-8	Chemical Compositions Used to Determine the ART

Enclosure 9 is a CD containing the GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor Pressure Vessel Pressure-Temperature Curves Licensing Topical Report, which is proprietary to GEH. Therefore, this information is supported by an affidavit signed by GEH, the owner of the information. The affidavit sets forth the basis in which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information, which is proprietary to GEH, be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. The affidavit is provided in Enclosure 11.

Correspondence with respect to the copyright or proprietary aspects of the GEH information noted above or the supporting GEH affidavit should be addressed to: David Hinds, Manager, New Units Engineering, GE Hitachi Nuclear Energy, 3901 Castle Hayne Road, Wilmington, NC 28401.

ENCLOSURE CONTAINS PROPRIETARY INFORMATION
Enclosure 9 contains information to be withheld from public disclosure in accordance with 10 CFR 2.390. Upon removal of Enclosure 9, this letter is decontrolled.

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Enclosure 10 is a CD containing the redacted, non-proprietary version of the GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor Pressure Vessel Pressure-Temperature Curves Licensing Topical Report.

Dominion has successfully performed the preflight checks and examined the PDF files contained on the CDs to ensure conformance with the NRC guidelines related to electronic submittals, Guidance for Electronic Submissions to the NRC, Revision 5, June, 2009. The PDF files meet NRC criteria.

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

Very truly yours,



Eugene S. Grecheck

COMMONWEALTH OF VIRGINIA

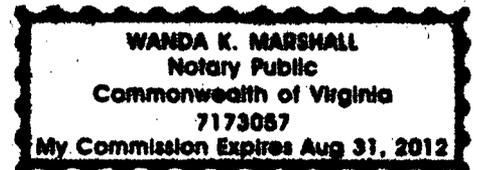
COUNTY OF HENRICO

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 9th day of December, 2009

My registration number is 7173057 and my

Commission expires: August 31, 2012


Notary Public

ENCLOSURE CONTAINS PROPRIETARY INFORMATION
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Enclosures:

1. Response to NRC RAI Letter No. 041, RAI Question No 03.02.01-7
2. Response to NRC RAI Letter No. 041, RAI Question No 05.03.02-2
3. Response to NRC RAI Letter No. 041, RAI Question No. 05.03.02-3
4. Response to NRC RAI Letter No. 041, RAI Question No. 05.03.02-4
5. Response to NRC RAI Letter No. 041, RAI Question No 05.03.02-5
6. Response to NRC RAI Letter No. 041, RAI Question No. 05.03.02-6
7. Response to NRC RAI Letter No. 041, RAI Question No. 05.03.02-7
8. Response to NRC RAI Letter No. 041, RAI Question No. 05.03.02-8
9. GEH Licensing Topical Report, NEDC-33441P, "GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor Pressure Vessel Pressure-Temperature Curves," Revision 3, **Proprietary** (CD)
10. GEH Licensing Topical Report, NEDC-33441, "GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor Pressure Vessel Pressure-Temperature Curves," Revision 3, **Non-Proprietary** (CD)
11. Affidavit for GEH Licensing Topical Report, NEDC-33441P, "GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor Pressure Vessel Pressure-Temperature Curves," Revision 3

Commitments made by this letter:

1. None

cc: (with enclosures 1 through 8 only)

U. S. Nuclear Regulatory Commission, Region II
T. A. Kevern, NRC
J. Jessie, NRC
J. T. Reece, NRC

The attached CDs (Optical Storage Media) contain the following files:

OSM#1:

NEDC-33441P R3 - Proprietary.pdf, 32,932,788 bytes, Proprietary

OSM#2:

NEDC-33441 R3 - Public.pdf, 47,349,434 bytes

ENCLOSURE CONTAINS PROPRIETARY INFORMATION

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ENCLOSURE 1

Response to NRC RAI Letter 041

RAI Question 03.02.01-7

NRC RAI 03.02.01-7

Consistent with the requirements and guidance of 10 CFR Part 50, Appendix S, IV(a)(2)(I) and (3), NUREG-0800, SRP 3.2.1, and RG 1.166, the staff requests the applicant to provide the list of SSCs necessary for continued safe operation that must remain functional without undue risk to the health and safety of the public and within applicable stress, strain, and deformation, during and following an OBE.

Dominion Response

The structures, systems, and components (SSCs) required to withstand the effects of the safe-shutdown earthquake (SSE) ground motion or surface deformation are defined in the ESBWR DCD as Seismic Category I or II.¹ These SSCs are listed in DCD Table 3.2-1. SSCs meeting Regulatory Treatment of Non-Safety Systems (RTNSS) Criterion B listed in DCD Tables 19A-2 and 19A-3 are also required to remain functional following a seismic event. These SSCs represent the list of SSCs necessary for continued safe operation without undue risk to the health and safety of the public.

The SSE is the only design earthquake considered for the ESBWR Standard Plant. As discussed in DCD Section 3.7, "The operating basis earthquake is a design requirement. For the ESBWR OBE, ground motion is chosen to be one-third of the SSE ground motion. Therefore, no explicit response or design analysis is required to show that OBE design requirements are met. This is consistent with Appendix S of 10 CFR 50."²

RG 1.166, *Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Postearthquake Actions*, provides guidance for evaluating data after an earthquake occurs. As described in ESBWR DCD Section 3.7.4.4, within eight hours after the earthquake, operator actions and operator walkdown inspections are performed in accordance with the guidelines described in EPRI NP-6695, *Guidelines for Nuclear Plant Response to an Earthquake*, as permitted by Regulatory Guide (RG) 1.166, to assess the severity of the earthquake. The DCD also specifies that following plant shutdown, post-shutdown inspections and tests are performed in accordance with EPRI NP-6695, as permitted by RG 1.167, *Restart of a Nuclear Power Plant Shut Down by a*

¹ Structures, systems and components that perform no safety-related function, but whose structural failure or interaction could degrade the functioning of a Seismic Category I item to an unacceptable level of safety or could result in incapacitating injury to occupants of the main control room, are designated Seismic Category II. These items are designed to structurally withstand the effects of an SSE.

² Specially, 10 CFR 50, Appendix S, IV(a)(2)(i)(A) states that if the OBE is set at one-third or less of the SSE ground motion design response spectra the requirements associated with this OBE in Appendix S, IV(a)(2)(i)(B)(I) can be satisfied without the applicant performing explicit response or design analyses. [Note: In a discussion with the NRC on December 4, 2009, Dominion noted that NUREG-0800, SRP 3.2.1, Section I.3, does not appear to be consistent with 10 CFR Part 50, Appendix S, IV(a)(2)(i)(A)]

Seismic Event, to determine the physical condition of the plant and its readiness to resume operation.

RG 1.166 and RG 1.167 endorse, with modification, the guidance in EPRI NP-6695 for selecting systems that should be inspected following an earthquake, thus satisfying the requirements of *10 CFR Part 50, Appendix S, IV(a)(2)(I) and (3)*. As discussed in EPRI NP-6695, the items selected for inspection should be representative of safety-related equipment and structures and should include equipment and structure types which experience has shown to most likely be damaged from an earthquake (safety-related systems are defined in DCD Table 3.2-1). EPRI NP-6695 also states that the items selected for inspection should also include typical nonsafety-related equipment which experience has shown to be of low seismic capacity to serve as earthquake damage indicators. Hence, the list of SSCs selected for inspection per these RGs would not be identical to the lists of SSCs that are designed to remain functional following an SSE that are described in the first paragraph of this response.

The scope of inspections and the approach taken to perform these inspections will be defined in procedures developed during the detailed design phase. As required by the DCD, these procedures will follow the guidance in EPRI NP-6695, as modified and endorsed by the NRC in Regulatory Guides 1.166 and 1.167.

Proposed COLA Revision

None.

ENCLOSURE 2

Response to NRC RAI Letter 041

RAI Question 05.03.02-2

NRC RAI 05.03.02-2

In GEH Licensing Topical Report NEDC-33441P, Revision 2, Section 3.4.1, "Effect of Irradiation Temperature," the applicant referenced a Federal Register Notice entitled "Alternate Fracture Toughness Requirements for Protection Against Pressurized Thermal Shock (PTS) Events" (Federal Register, Vol 73, No. 155, August 11, 2008) when stating that a recently issued PTS rule can be used to determine the correction factor for the irradiation temperature. However, the staff notes that the referenced PTS rule is not applicable to the ESBWR design or to any new reactor. Therefore, the staff requests the applicant to provide a correction factor and justification that is applicable to the ESBWR design.

Dominion Response

The approach used in Section 3.4.1 of NEDC-33441P for correcting the P-T curves for irradiation temperatures below 520°F has been revised. Instead of using the PTS rule, a correction factor of 1°F increase in $\Delta RTNDT$ for each 1°F decrease in irradiation temperature is used. The justification for this approach is provided in NEDC-33441P.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been revised as discussed above.

ENCLOSURE 3

Response to NRC RAI Letter 041

RAI Question 05.03.02-3

NRC RAI 05.03.02-3

GEH Licensing Topical Report NEDC-33441P, Revision 2, does not address PTLR Criterion 2 (GL 96-03), which states that the PTLR should provide the reactor vessel (RV) surveillance capsule withdrawal schedule (or provide references, by title and number, for the documents containing the RV surveillance capsule withdrawal schedule) along with how the specimen examinations shall be used to update the PTLR curves. The criterion also states that the PTLR should reference, by title and number, any applicable surveillance capsule reports that have been placed on the docket by the licensee requesting approval of the PTLR for its units. Accordingly, the staff requests the applicant to address PTLR Criterion 2.

Dominion Response

Section 5.3.1.6 of the ESBWR DCD and Section 5.3.1.8 of the North Anna FSAR describe the reactor vessel material surveillance requirements, including the withdrawal schedule for the reactor vessel surveillance capsule and how the specimen's examinations will be used to update the PTLR. Section 2.0 of NEDC-33441P has been revised to reference Section 5.3.1.8 of the North Anna FSAR, which references Section 5.3.1.6 of the ESBWR DCD. No surveillance capsule reports have been prepared to date. Section 2.0 of NEDC-33441P has been revised to state that this LTR will be revised in the future, as appropriate, to list the surveillance capsule reports by title and number.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been revised as discussed above.

ENCLOSURE 4

Response to NRC RAI Letter 041

RAI Question 05.03.02-4

NRC RAI 05.03.02-4

GEH Licensing Topical Report NEDC-33441P, Revision 2, Section 3.3, "Predicted Fluence" states that the fluence analysis was performed using an NRC-approved methodology consistent with Regulatory Guide 1.190. However, the applicant did not provide a reference with respect to the NRC-approved fluence methodology used in developing the P-T limits. Accordingly, the staff requests the applicant to provide this reference.

Dominion Response

Section 3.3 has been revised to state that the fluence analysis for the ESBWR is documented in GE-NE-0000-0031-6244-R0 and is based on the methodology in NEDC-32983P-A. These documents have also been added to the reference list in NEDC-33441P.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been revised as discussed above.

ENCLOSURE 5

Response to NRC RAI Letter 041

RAI Question 05.03.02-5

NRC RAI 05.03.02-5

GEH Licensing Topical Report NEDC-33441P, Revision 2, does not include a table of data points (reactor coolant temperature vs. pressure) for each P-T curve consistent with the requirements and guidance of 10 CFR 50 Appendix G and PTLR Criterion 5 (GL 96-03). Accordingly, the staff requests the applicant to provide the table of data points for each P-T curve.

Dominion Response

NEDC-33441P has been revised to include tables of pressure and temperature values for the P-T curves in the report.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been revised as discussed above.

ENCLOSURE 6

Response to NRC RAI Letter 041

RAI Question 05.03.02-6

NRC RAI 05.03.02-6

In GEH Licensing Topical Report NEDC-33441P, to address PTLR Criterion 6 (GL 96-03), the staff requests the applicant to clearly identify the minimum boltup temperature and hydrotest temperature on the P-T limit curves.

Dominion Response

Section 6.0 of NEDC-33441P has been added to provide the requirement for minimum bolt-up temperature. Section 6.0 also provides the minimum temperature for the initial ASME code hydrostatic test case based on the beltline P-T curve, which is limiting.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been updated as described above.

ENCLOSURE 7

Response to NRC RAI Letter 041

RAI Question 05.03.02-7

NRC RAI 05.03.02-7

In GEH Licensing Topical Report NEDC-33441P, Revision 2, to address the requirements and guidance of 10 CFR 50 Appendix G and RG 1.99, Rev. 2, the staff requests the applicant to provide all ART calculations using consistent temperature units. For example, identify all temperature values in degrees Celsius (°C) with the corresponding values in degrees Fahrenheit using parenthesis.

Dominion Response

The ART calculations have been revised to use consistent units. In addition, dual units have been added to all applicable sections of NEDC-33441P.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been updated as described above.

ENCLOSURE 8

Response to NRC RAI Letter 041

RAI Question 05.03.02-8

NRC RAI 05.03.02-8

GEH Licensing Topical Report NEDC-33441P, Revision 2, Section 3.2, "Material Composition," does not provide the nickel composition for the base material. To address RG 1.99, Rev. 2, 10 CFR Part 50, Appendix G, and PTLR Criterion 4(describe how ART is calculated) the staff requests the applicant to provide all chemical compositions used in determining the ART.

Dominion Response

Section 3.2 of NEDC-33441P has been revised to add the required nickel composition for the base material. As a result, all chemical compositions used to determine ART are now provided in Section 3.2 of NEDC-33441P.

Proposed COLA Revision

There are no changes to the COLA in response to this RAI. NEDC-33441P has been updated as described above.

ENCLOSURE 9

Response to NRC RAI Letter 041

One CD labeled:

GEH Licensing Topical Report, NEDC-33441P (Proprietary)

**GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor
Pressure Vessel Pressure-Temperature Curves, Revision 3**

ENCLOSURE CONTAINS PROPRIETARY INFORMATION

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ENCLOSURE 10

Response to NRC RAI Letter 041

One CD labeled:

GEH Licensing Topical Report, NEDC-33441 (Non-Proprietary)

**GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor
Pressure Vessel Pressure-Temperature Curves, Revision 3**

ENCLOSURE 11

Response to NRC RAI Letter 041

Affidavit for

GEH Licensing Topical Report, NEDC-33441P

**GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor
Pressure Vessel Pressure-Temperature Curves, Revision 3**

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, David H. Hinds, state as follows:

- (1) I am the Manager, New Units Engineering, GE Hitachi Nuclear Energy ("GEH"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in NEDC-33441P Revision 3 provided to Dominion by Stephen Atherton in GEH's letter, GEDO-WG3-2009-0108, dated October 16, 2009. The proprietary information in NEDC 33441P, which is entitled "GEH Proprietary Information – Licensing Topical Report – GE Hitachi Nuclear Energy Methodology for the Development of ESBWR Reactor Pressure Vessel Pressure-Temperature Curves." is indicated as the content contained between opening double brackets ([[) and closing double brackets (]]), [[This sentence is an example.⁽³⁾]]. Figures and large equation objects containing GEH proprietary information are identified with double square brackets before and after the object. In each case, the superscript notation ⁽³⁾ refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.
- (3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
 - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

- b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
- c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;
- d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

- (5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.
- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.
- (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
- (8) The information identified in paragraph (2) above is classified as proprietary because it contains details of GEH's design and licensing methodology. The development of the methods used in these analyses, along with the testing,

development and approval of the supporting methodology was achieved at a significant cost to GEH.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 15 day of October 2009.



David H. Hinds
GE-Hitachi Nuclear Energy Americas LLC