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January 29, 2015

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

Serial No. NA3-14-065R  
Docket No. 52-017  
COL/BCB

**DOMINION VIRGINIA POWER**  
**NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION**  
**SRP 02.04.13: RESPONSE TO RAI LETTER 153**

On December 19, 2014, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA), which consisted of one question. The response to the following Request for Additional Information (RAI) question is provided in Enclosures 1 and 2:

- RAI 7774, Question 02.04.13-5                      LADTAP II Design Parameters and Values

Computer code data files are provided on compact disc (CD) in Enclosure 2. The computer code files are submitted in the native format required by the software in which they may be used to support the staff's analysis. Therefore, the files on the enclosed CD are not considered documents as defined in Section 2 of the NRC's "Guidance for Electronic Submissions to the NRC," Revision 6.1, dated May 27, 2011.

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

Very truly yours,

Mark D. Mitchell

DOB9  
NRO

Enclosures:

1. Response to NRC RAI Letter No. 153, RAI 7774, Question 02.04.13-5
2. CD-ROM Containing LADTAP II Code Input and Output Files

Commitments made by this letter:

None.

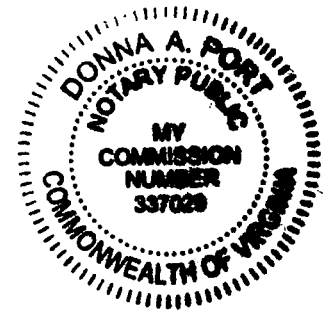
COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Mark D. Mitchell, who is Vice President—Generation Construction 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 29 day of January, 2015  
My registration number is 337029 and my  
Commission expires: January 31, 2015

  
\_\_\_\_\_  
Notary Public



cc with all Enclosures:  
P. H. Buckberg, NRC

Embossed Hereon Is My  
Commonwealth Of Virginia Notary Public Seal  
My Commission Expires January 31, 2015  
DONNA A. PORT

cc without Enclosure 2:  
U. S. Nuclear Regulatory Commission, Region II  
T. S. Dozier, NRC  
G. J. Kolcum, NRC  
D. Paylor, VDEQ  
W. T. Lough, SCC  
P. W. Smith, DTE  
M. K. Brandon, DTE  
R. J. Bell, NEI

**ENCLOSURE 1**

**Response to NRC RAI Letter No. 153**

**RAI 7774, Question 02.04.13-5**

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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**North Anna Unit 3  
Dominion  
Docket No. 52-017**

**RAI NO.: 7774 (RAI LETTER NO. 153)**

**SRP SECTION: 02.04.13 – ACCIDENTAL RELEASES OF RADIOACTIVE LIQUID  
EFFLUENTS IN GROUND AND SURFACE WATERS**

**DATE OF RAI ISSUE: 12/19/2014**

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**QUESTION NO.: 02.04.13-5**

Regulatory basis, 10 CFR 20.1301 with guidance provided by BTP 11-6 and ISG -013.

NA3 FSAR Tier 2 (Rev 7), Section 2.4.13.3.5, Table 12.2-20aR and Table 2.4-214 present some input design parameters and values used in the NA3 LADTAP II computer code run and resulting individual pathway doses (mrem/yr) from liquid radioactive effluents in this same section. Staff review indicates insufficient information is provided in the NA3 FSAR to independently confirm the calculated individual dose from the NA3 CST release.

Please specifically address the following items and provide the following information:

1. Provide the basis for all NA3 design parameters and values used in the LADTAP II code calculation. Include values used and their derivations and references used (e.g., pointer to FSAR section or table, RG 1.109 table, etc.)
  2. Please provide the input and output files for the NA3 LADTAP II liquid effluent dose calculated.
  3. If changes are made to the NA3 LADTAP II code input/output files provided in NA3 FSAR Rev. 8 used to calculate the liquid effluent dose in FSAR section 2.4.13.3.5, please provide the latest files.
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**Dominion Response**

1. The liquid effluent doses presented in FSAR Subsection 2.4.13.3.5 are based on the following LADTAP II input parameters, as specified in the program manual [Reference 1]:
  - a. Site Water Type (Freshwater) – Lake Anna contains fresh water.
  - b. Liquid Effluent Discharge to Impoundment (223 cfs) – The doses in FSAR Section 2.4.13 correspond to those that are incurred by an individual maximally exposed to the concentrations in the Unit 3 intake channel, as shown in FSAR Table 2.4-214. However, LADTAP II does not accept radionuclide concentrations as input, but instead requires the source isotopic activity to be specified as a radionuclide release rate in units of Ci/yr. The intake channel concentrations are converted into these release rates (Ci/yr) by multiplying the intake channel concentrations by an arbitrary effluent discharge rate of 223 cfs or 1.99E14 cc/yr, as shown in Item 1.d below. The value of this effluent discharge rate does not matter as LADTAP II divides the radionuclide release rate (Ci/yr) in Item 1.d by the same effluent discharge rate (cc/yr) to yield concentrations (Ci/cc) at the discharge point that are the same as in FSAR Table 2.4-214, causing the discharge rate to cancel out. For H-3, for example, the concentration of 3.64E-10 Ci/cc is multiplied by 1.99E14 cc/yr to yield the Item 1.d radionuclide release rate of 7.25E4 Ci/yr. LADTAP II divides the input of 7.25E4 Ci/yr by the effluent discharge rate input of 1.99E14 cc/yr to obtain a concentration of 3.64E-10 Ci/cc at the dose receptor.
  - c. Population within 50 Miles – Not used. To demonstrate compliance with 10 CFR 20.1301, only the dose to the maximally exposed individual is calculated.
  - d. Radionuclide Release Rate – The intake channel radionuclide activity concentrations ( $\mu\text{Ci/cc}$ ) in FSAR Table 2.4-214 are multiplied by the effluent discharge rate of 1.99E14 cc/yr from Item 1.b above and divided by 1.0E+06  $\mu\text{Ci/Ci}$  to yield the following release rates:

Radionuclide	Concentration ( $\mu\text{Ci/cc}$ )	Release Rate (Ci/yr)
H-3	3.64E-04	7.25E+04
Co-60	4.25E-12	8.47E-04
Sr-90	1.30E-08	2.59E+00
Y-90	1.30E-08	2.59E+00
Te-129m	1.54E-11	3.07E-03
Cs-137	2.06E-11	4.11E-03
Pu-239	1.18E-13	2.35E-05

- e. Impoundment Reconcentration Model (No Model) – This model may be used in LADTAP II to account for dilution that takes place in the impoundment system as well as the buildup of activity due to a recirculation system. This does not apply to the accident release scenario.
  - f. Shore-width Factor (0.3) – Shoreline exposure is evaluated at Lake Anna. The LADTAP II manual suggests a shore-width factor of 0.3 for a lake [Reference 1, Table 2.7].
  - g. Dilution Factor (1 for all receptors) – No credit is taken for dilution downstream of the intake channel concentrations shown in FSAR Table 2.4-214.
  - h. Transit Time to Exposure Location (0 hr for all receptors) – This is conservative, as no credit is taken for decay during transit.
  - i. Fish Consumption for Individual (21 kg/yr for adult, 16 kg/yr for teen, 6.9 kg/yr for child) – These are the default values for the maximally exposed individual from Regulatory Guide (RG) 1.109, Table E-5.
  - j. Invertebrate Consumption for Individual (5 kg/yr for adult, 3.8 kg/yr for teen, 1.7 kg/yr for child) – These are the default values for “other seafood” for the maximally exposed individual from RG 1.109, Table E-5.
  - k. Drinking Water Consumption for Individual (730 L/yr for adult, 510 L/yr for teen and child, 330 L/yr for infant) – These are the default values for the maximally exposed individual from RG 1.109, Table E-5.
  - l. Shoreline Usage for Individual (300 hr/yr for all ages) – This is obtained from the North Anna Units 1 and 2 UFSAR [Reference 2, Section 11.2.8].
  - m. Swimming Exposure for Individual (200 hr/yr for all ages) – This is obtained from the North Anna Units 1 and 2 UFSAR [Reference 2, Section 11.2.8].
  - n. Boating Usage for Individual (500 hr/yr for all ages) – This is obtained from the North Anna Units 1 and 2 UFSAR [Reference 2, Section 11.2.8].
2. LADTAP II input (CST\_in.dat) and output (CST\_out.txt) files are provided in Enclosure 2.
3. No changes have been made to the LADTAP II input and output files used to calculate liquid effluent doses in FSAR Section 2.4.13.3.5 since FSAR Revision 7.

References:

1. NUREG/CR-4013, LADTAP II – Technical Reference and User Guide, 1986.
2. North Anna Power Station Updated Final Safety Analysis Report, Revision 45.

**Proposed COLA Revision**

None.

**ENCLOSURE 2**

**CD-ROM Containing LADTAP II Code Input and Output Files**