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

Serial No. NA3-11-038R
Docket No. 52-017
COL/MWH

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
SRP 03.08.05: RESPONSE TO RAI LETTER 75

On June 13, 2011, 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 five questions. The responses to the following four Request for Additional Information (RAI) Questions are provided in Enclosures 1 through 4:

- RAI 5605 Question 03.08.05-2 Allowable Bearing Capacities
- RAI 5605 Question 03.08.05-3 Sliding Factor of Safety
- RAI 5605 Question 03.08.05-4 Shear Reinforcement
- RAI 5605 Question 03.08.05-5 PS/B Reinforcement Spacing

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

The response to the remaining RAI 5605 question is dependent upon potential changes to seismic site response analyses and US-APWR seismic analysis modeling and will be provided in a future submittal following completion of the structural design re-evaluations.

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

Very truly yours,

Eugene S. Grecheck

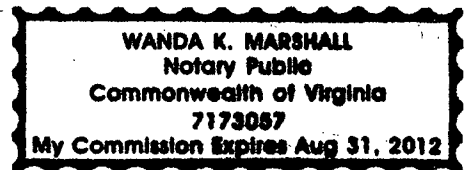
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COMMONWEALTH OF VIRGINIA

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 15th day of August, 2011
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
C. P. Patel, NRC
T. S. Dozier, NRC
J. T. Reece, NRC

Enclosures:

1. Response to NRC RAI Letter 75, RAI 5605 Question 03.08.05-2
2. Response to NRC RAI Letter 75, RAI 5605 Question 03.08.05-3
3. Response to NRC RAI Letter 75, RAI 5605 Question 03.08.05-4
4. Response to NRC RAI Letter 75, RAI 5605 Question 03.08.05-5

Commitments made by this letter:

1. Provide the response to RAI 5605, Question 03.08.05-1.
2. Revise COL application as described in the letter.

ENCLOSURE 1

Response to NRC RAI Letter 75

RAI 5605 Question 03.08.05-2

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

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

RAI NO.: 5605 (RAI Letter 75)

SRP SECTION: 03.08.05 – FOUNDATIONS

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Project) (SEB1)

DATE OF RAI ISSUE: 6/13/2011

QUESTION NO.: 03.08.05-2

NAPS COL 3.8(25), Table 3.8-202, "Summary of Bearing Pressures and Ratios of Allowable Bearing Capacity to Bearing Pressure," lists the allowable bearing capacity for the safety-related buildings. Describe how the allowable bearing capacities for static and seismic cases in Table 3.8-202 (page 3-126) were obtained.

Dominion Response

For each of the Seismic Category I structures listed in FSAR Table 3.8-202, the allowable bearing capacity was conservatively based on the minimum (lowest) allowable bearing capacity of any stratum underlying the structure as listed in FSAR Table 2.5-214. The type of material underlying each structure is described in FSAR Section 2.5.4.10. The derivation of the static and dynamic bearing capacity values in FSAR Table 2.5-214 is provided in FSAR Section 2.5.4.10.1.

For example, the Reactor Building (R/B) will rest on Zone III-IV, Zone IV, and fill concrete with allowable bearing capacities of 80 ksf, 160 ksf, and 214 ksf, respectively, per FSAR Table 2.5-214. The minimum of these three is 80 ksf. Thus, the R/B has an allowable static bearing capacity of 80,000 lb/ft² (80 ksf), as shown in both FSAR Table 3.8-202 and Table 2.5-215.

The allowable bearing capacities for the static and seismic cases of the Seismic Category I structures listed in FSAR Table 3.8-202 are taken directly from the "Applied Bearing Capacity (ABC) (ksf)" column of FSAR Table 2.5-215. A note will be added to FSAR Table 3.8-202 to indicate that Table 2.5-215 is the source of the allowable bearing capacity values.

Proposed COLA Revision

FSAR Table 3.8-202 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 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.

NAPS COL 3.8(27)

Table 3.8-201 Environmental Temperature Gradients for the Exterior Walls and Roofs of UHSRS, PSFSV, and ESWPT

Normal air temperatures range from a maximum of 109°F to a minimum -21°F. The seasonal soil temperature gradient follows:

| | Winter (minimum °F) | Summer (maximum °F) |
|-------------|------------------------|------------------------|
| Plant Grade | 30 | 88 |
| -10 ft. | 38 | 80 |
| -20 ft. | 46 | 72 |
| -30 ft. | 54 | 64 |

NAPS COL 3.7(7)
NAPS COL 3.8(25)
NAPS DEP 3.7(1)

Table 3.8-202 Summary of Bearing Pressures and Ratios of Allowable Bearing Capacity to Bearing Pressure

| Building | Bearing Pressures ⁽⁶⁾ (lb/ft ²) | | Allowable Bearing Capacity ⁽⁷⁾ (lb/ft ²) | | Ratio of Allowable Bearing Capacity to Bearing Pressure | |
|----------|-----------------------------------------------------------|---------------------------------|-----------------------------------------------------------------|--------------|---------------------------------------------------------|--------------|
| | Static Case | Seismic Case ^{(1),(2)} | Static Case | Seismic Case | Static Case | Seismic Case |
| R/B | 13,050 | 30,120 | 80,000 | 214,000 | 6.1 | 7.1 |
| PS/Bs | 5,100 | 60,810 | 80,000 | 214,000 | 15.7 | 3.5 |
| PSFSVs | 5,110 ⁽³⁾ | 9,360 ⁽³⁾ | 80,000 | 214,000 | 15.7 | 22.9 |
| UHSRS | 7,270 ⁽⁴⁾ | 8,650 ⁽⁴⁾ | 20,000 | 29,000 | 2.8 | 3.4 |
| ESWPT | 3,170 ⁽⁵⁾ | 5,890 ^{*(5)} | 20,000 | 29,000 | 6.3 | 4.9 |

Notes:

- 1) All seismic case bearing pressures are based on the site-specific SSI input motion.
- 2) Seismic case bearing pressures shown above include static bearing pressures.
- 3) The pressure shown includes bearing pressure due to full fuel oil tanks.
- 4) The pressure shown includes bearing pressure due to full reservoirs. Maximum corner pressure is listed.
- 5) (*) denotes fully embedded sections at segments 1a and 1b.
- 6) Bearing pressures are based on site-specific groundwater levels.

7) Values obtained from Table 2.5-215.

ENCLOSURE 2

Response to NRC RAI Letter 75

RAI 5605 Question 03.08.05-3

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5605 (RAI Letter 75)

SRP SECTION: 03.08.05 – FOUNDATIONS

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Project) (SEB1)

DATE OF RAI ISSUE: 6/13/2011

QUESTION NO.: 03.08.05-3

NAPS COL 3.8(25), Table 3.8-203, "Load Combinations and Factor of Safety for Buildings and Structures," (page 3-127) the fourth column lists factor of safety against sliding for the safety-related buildings. The factor of safety against sliding for the PSFSVs is 1.1 and the footnote indicates that it's "Conservative since reinforcement dowels into underlying are used to prevent sliding of the PSFSV." Clarify whether the value of 1.1 was calculated with or without the reinforcement dowels.

Dominion Response

The factor of safety of 1.1 for sliding for the Power Source Fuel Storage Vaults was calculated with the reinforcement dowels. The wording in note 3 of FSAR Table 3.8-203 and note 2 of COLA Part 11 Table 4.0-10 will be revised for clarification.

Proposed COLA Revision

FSAR Table 3.8-203 and COLA Part 11 Table 4.0-10 will be revised as indicated on 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 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.

NAPS COL 3.8(25)
NAPS DEP 3.7(1)

Table 3.8-203 Load Combinations and Factor of Safety for Buildings and Structures

| Building/Structure ⁽¹⁾ | Load Combination (per SRP 3.8.5) | Overturning ⁽⁷⁾ (Fs _{ot}) | Sliding ⁽⁷⁾ (FS _{sl}) | Flotation (FS _{fl}) |
|-----------------------------------|---------------------------------------|------------------------------------------------|--------------------------------------------|-------------------------------|
| ESWPT | D + H + W | N/A | N/A | N/A |
| | D + H + E _s ⁽⁵⁾ | 1.1 | 1.18 | N/A |
| | D + H + W _t | N/A | N/A | N/A |
| | D + F _b ⁽⁶⁾ | N/A | N/A | 1.59 |

- 1) The value shown is based on the conservative assumption that all three oil tanks are empty.
- 2) The value shown is based on the conservative assumption that the UHS basins are completely emptied of water.
- 3) ~~Conservative since reinforcement dowels into underlying are used to prevent sliding of the PSFSV.~~ Reinforcement dowels into underlying concrete fill are used to prevent sliding of the PSFSVs. Factor of safety for sliding of the PSFSVs is based on doweled condition.
- 4) Reinforcement dowels into underlying concrete fill are used to prevent overturning and sliding of the PSB's (East and West). Factors of Safety for Overturning and Sliding of the PSB's are based on doweled condition.
- 5) The factor of safety is governed by ESWPT Segment 1.
- 6) The factor of safety is governed by ESWPT Segment 2.
- 7) Overturning and Sliding factors of safety are based on site-specific groundwater levels.

Table 4.0-10 Load Combinations and Factor of Safety for PSFSVs

| Building/Structure ⁽¹⁾ | Load Combination (per SRP 3.8.5) | Overturning ⁽³⁾ ($F_{s_{ot}}$) | Sliding ⁽³⁾ ($F_{S_{fl}}$) | Flotation ($F_{S_{fl}}$) |
|-----------------------------------|-------------------------------------|------------------------------------------------|--------------------------------------------|-------------------------------|
| PSFSVs | D + H + W | 10.7 ⁽¹⁾ | 17.9 ⁽¹⁾ | N/A |
| | D + H + E _s | 1.6 | 1.1 ⁽²⁾ | N/A |
| | D + H + W _t | 9.3 ⁽¹⁾ | 15.6 ⁽¹⁾ | N/A |
| | D + F _b | N/A | N/A | 2.5 ⁽¹⁾ |

Notes:

- The value shown is based on the conservative assumption that all three oil tanks are empty.
- ~~Conservative since reinforcement dowels into underlying are used to prevent sliding of the PSFSV.~~
Reinforcement dowels into underlying concrete fill are used to prevent sliding of the PSFSVs. Factor of safety for sliding of the PSFSVs is based on doweled condition.
- Overturning and Sliding factors of safety are based on site-specific groundwater levels.

ENCLOSURE 3

Response to NRC RAI Letter 75

RAI 5605 Question 03.08.05-4

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5605 (RAI Letter 75)

SRP SECTION: 03.08.05 – FOUNDATIONS

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Project) (SEB1)

DATE OF RAI ISSUE: 6/13/2011

QUESTION NO.: 03.08.05-4

NAPS DEP 3.7(1), Figure 3.8.5-13R, "Typical Reinforcement in PS/B Basemats," (page 3-129) shows the detail of the reinforcement in the PS/B basemats. The shear reinforcement (stirrup) is labeled as "SHEAR #9@24" + @24" in Figure 3.8.5-13R, BASEMAT SECTION N-S. Explain the meaning of SHEAR #9@24" + @24".

Dominion Response

The notation "SHEAR #9@24" + @24" means that the shear reinforcement (stirrup) is No. 9 rebar placed in two directions (north-south and east-west) with 24" spacing.

Proposed COLA Revision

None

ENCLOSURE 4

Response to NRC RAI Letter 75

RAI 5605 Question 03.08.05-5

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

North Anna Unit 3

Dominion

Docket No. 52-017

RAI NO.: 5605 (RAI Letter 75)

SRP SECTION: 03.08.05 – FOUNDATIONS

QUESTIONS for Structural Engineering Branch 1 (AP1000/EPR Project) (SEB1)

DATE OF RAI ISSUE: 6/13/2011

QUESTION NO.: 03.08.05-5

NAPS DEP 3.7(1), Figure 3.8.5-13R, "Typical Reinforcement in PS/B Basemats," (page 3-129) shows the detail of the reinforcement in the PS/B basemats. Provide spacing requirements for #11 rebar for shear transfer from the basemat into the fill concrete.

Dominion Response

For the Power Source Building, the spacing of the #11 shear rebar dowels, which are provided to transfer the building lateral loads into the fill concrete and maintain sliding stability, is shown in FSAR Table 3.8.5-5R. The dowels are designed in accordance with American Concrete Institute ACI 349-01, "Code Requirements for Nuclear Safety-Related Concrete Structures" with supplemental guidance contained in Regulatory Guide 1.142, Rev. 2, "Safety-Related Concrete Structures for Nuclear Power Plants (Other Than Reactor Vessels and Containments)."

Proposed COLA Revision

None