PMNorthAnna3COLPEmails Resource

From: Patel, Chandu
Sent: Thursday, June 05, 2014 3:54 PM
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Cc: PMNorthAnna3COLPEmails Resource; Weisman, Robert; Carpentier, Marcia; Chakravorty, Manas; Xu, Jim; Buckberg, Perry
Subject: RAI Letter 125, RAI 7538, FSAR Section 3.8.5, North Anna COLA (52-017)
Attachments: RAI Letter 125 RAI_7538.docx

By letter dated November 26, 2007, Dominion Virginia Power (Dominion) submitted a Combined License Application for North Anna, Unit 3, pursuant to Title 10 of the *Code of Regulations,* Part 52. The U.S. Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this COLA.

The NRC staff has identified that additional information is needed to continue portions of the review and a Request for Additional Information (RAI), is enclosed. To support the review schedule, Dominion is requested to respond within 30 days of the date of this request. If the RAI response involves changes to the application documentation, Dominion is requested to include the associated revised documentation with the response.

Sincerely,
Chandu Patel
Lead Project Manager for NA3 COLA

Hearing Identifier: NorthAnna3_Public_EX
Email Number: 1175

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Subject: RAI Letter 125, RAI 7538, FSAR Section 3.8.5, North Anna COLA (52-017)
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Request for Additional Information 125

Issue Date: 06/05/2014
Application Title: North Anna, Unit 3 - Docket Number 52-017
Operating Company: Dominion
Docket No. 52-017
Review Section: 03.08.05 - Foundations
Application Section:

QUESTIONS

03.08.05-6

FSAR Section 3.8.5.5.1 indicates that, for evaluation of sliding stability, a 0.03 second moving average window is applied to obtain the lateral resisting forces for the RB/FB, CB, and FWSC foundations. FSAR Section 3.8.5.5.1 states that the moving average window "helps to filter out the spurious peak in the vertical reaction time history when the magnitude of the upward seismic force is near or exceeds the effective weight of the building." Similar statements are repeated in FSAR Section 3.8.5.5.2, in the context of the evaluation of dynamic bearing pressures for the CB foundation.

The staff could not identify in the FSAR a discussion regarding the technical basis for the above approach, which appears to deviate from the ESBWR DCD, or for the choice of the 0.03 second window. Therefore, the applicant is requested to address the following:

(a) Why the moving average window is physically needed and justify that the choice of 0.03 seconds is appropriate for that need. In particular, explain why it is considered spurious that the upward seismic force is near or exceeds the effective weight of the buildings. The staff notes that a 0.03 second moving average window applied in the time domain could filter out the energy content above approximately 17 Hz in the frequency domain. As such also discuss the potential impact of this filter on the results of the stability analysis.

In addition, FSAR Section 3.8.5.5.1 describes the site-specific stability evaluations against overturning and sliding for the RB/FB, CB, and FWSC, based on the results from the site-specific SSI analyses for the RB/FB, CB, and FWSC presented in FSAR Section 3.7.2.4.1. The FSAR indicates that stability evaluations for overturning and sliding follow the methodology in ESBWR DCD Section 3.8.5.5. The calculated site-specific factors of safety (FS) against sliding for the RB/FB, CB and FWSC are shown in Tables 3.8.5-201 through 3.8.5-203. However, the staff's review of these tables indicates that FS for sliding are not explicitly provided, it is only indicated that the FS are larger than 1.1. Therefore, to determine the adequacy of the applicant's implementation of the sliding stability evaluation methodology in ESBWR DCD Section 3.8.5.5, the applicant is requested to provide the following information:

(b) The FSAR is not clear on whether sliding stability is evaluated for the two horizontal directions separately, or using the maximum (combined) horizontal base shear. Explain which method is used.
(c) Provide the technical basis for the site-specific static coefficient of friction of 0.60 assumed at the critical sliding planes of the RB/FB, CB, and FWSC, for the underlying concrete fill or rock. In the case of concrete fill, explain whether shear-friction reinforcement within the concrete fill (e.g., at cold joints) is needed to achieve this value.
(d) To achieve a minimum FS of 1.1 for sliding stability, the lateral resisting forces required for RB/FB, CB, and FWSC include (i) static friction at the critical sliding planes, and (ii) lateral passive pressures on walls, sides of the basemats, and shear keys opposite to the direction of motion. Provide a detailed description and magnitude of each of the lateral resisting forces required for RB/FB, CB, and FWSC.
(e) The FSAR states that the required lateral passive pressures for the RB/FB and CB are "well within the allowable bearing pressure of the concrete fill, Zone III rock, and the lateral pressure capacity of the buildings' below-grade walls." The FSAR also states that the required lateral passive pressures for the FWSC are "well within the allowable bearing pressure of structural fill, Zone II rock and the lateral

pressure capacity of the shear key." Provide the technical basis for these statements. In particular, provide the allowable bearing pressures of the surrounding structural fill, concrete fill, and rock media that are appropriate for lateral loading conditions, as well as the magnitude of the lateral deformations that justify the static friction (as opposed to kinematic friction) assumption.
(f) Provide the results of a site-specific evaluation of the shear keys for the various structures, which demonstrates that these structural elements are able to resist the site-specific seismic demands, and are able to effectively lower the critical sliding planes.

03.08.05-7

The maximum dynamic bearing pressures for the RB/FB, CB, and FWSC basemats are reported in FSAR Tables 3.8.5-204 through 3.8.5-206 of the FSAR, for the BE, UB, and LB subsurface profiles. FSAR Table 3.8.5-204 further indicates that the maximum site-specific dynamic bearing pressure exerted by the RB/FB on the underlying rock is 1.13 MPa, which is slightly greater than the value of 1.10 MPa reported in ESWB DCD Tables 2.0-1 and 3G.1-58 for the "hard" site condition. Similarly, FSAR Table 3.8.5-205 indicates that the maximum site-specific dynamic bearing pressure exerted by the CB on the underlying concrete fill is 0.51 MPa, which is greater than the value of 0.42 MPa reported in ESWB DCD Tables 2.0-1 and 3G.2-27 for the "hard" site condition.

Since the site-specific maximum dynamic bearing pressures for the RB/FB and CB exceed the values reported in the DCD for the "hard" site condition, which is the DCD condition that most resembles the underlying rock or concrete fill materials at the NA3 site, the applicant is requested to evaluate whether the site-specific bending moments and shears induced in the RB/FB and CB basemats, due to load combinations that include seismic loads, are bounded by the bending moments and shears considered in the standard design. In addition confirm that the dynamic bearing pressures for the RB/FB, CB, and FWSC basemats are less than the allowable dynamic bearing capacities of the underlying rock or concrete fill material.