BellBendCOLPEm Resource

From: Canova, Michael
Sent: Monday, March 01, 2010 9:16 AM
To: 'Sgarro, Rocco R'; 'BBNPP@pplweb.com'; 'Freels, James'; 'melanie.Frailer@unistarnuclear.com'
Cc: BellBendCOL Resource; Colaccino, Joseph; Tatum, James; Segala, John; Hearn, Peter
Subject: RE: Bell Bend COLA - Draft Request for Information No. 90 (RAI No. 90)- SEB1 - 2508
Attachments: Draft RAI Letter 90 - SEB1 2508.doc

Attached is DRAFT RAI No. 90 for the Bell Bend COL Application. Based on our pre-issuance discussion, question 3.08.05-10 has been revised to more accurately reflect the staff's intention in writing this question. You have ten working days to review this request and to decide whether you need an additional conference call to discuss it. Please notify me of your decision in this regard.

After the call, or after ten days, the RAI will be finalized and sent to you. The schedule for submittal will be established prior to formalizing this RAI .

If you have any questions, please contact me.

Michael A. Canova
Project Manager - Bell Bend COL Application
Docket 52-039
EPR Project Branch
Division of New Reactor Licensing
Office of New Reactors
301-415-0737

Hearing Identifier: BellBend_COL_Public
Email Number: 528

Mail Envelope Properties (77BCCD26C6050B42A72FE3939CF492ED1C80CF9702)

Subject: RE: Bell Bend COLA - Draft Request for Information No. 90 (RAI No. 90)- SEB1 - 2508
Sent Date: 3/1/2010 9:16:07 AM
Received Date: 3/1/2010 9:16:09 AM
From: Canova, Michael

Created By: Michael.Canova@nrc.gov

Recipients:
"BellBendCOL Resource" <BellBendCOL.Resource@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"Tatum, James" <>
Tracking Status: None
"Segala, John" <John.Segala@nrc.gov>
Tracking Status: None
"Hearn, Peter" <Peter.Hearn@nrc.gov>
Tracking Status: None
"'Sgarro, Rocco R'" <rrsgarro@pplweb.com>
Tracking Status: None
"'BBNPP@pplweb.com'" <BBNPP@pplweb.com>
Tracking Status: None
"'Freels, James'" <James.Freels@unistarnuclear.com>
Tracking Status: None
"'melanie.Frailer@unistarnuclear.com'" <melanie.Frailer@unistarnuclear.com>
Tracking Status: None

Post Office: HQCLSTR01.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	811	3/1/2010 9:16:09 AM
Draft RAI Letter 90 - SEB1 2508.doc	52218	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Request for Additional Information No. 90
Application Revision 0

2/18/2010

Bell Bend
PPL Bell Bend LLC.
Docket No. 52-039
SRP Section: 03.08.05 - Foundations
Application Section: 3.8.5.3, 3.8.5.4.6, 3.8.5.5, 3.8.5.5.1, 3.8.5.5.2, 3.8.5.5.3, 3.8.5.6.1

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

03.08.05-1

For supplemental information item SUP 3.8 (7) in the Bell Bend Nuclear Power Plant (BBNPP) combined license (COL) Final Safety Analysis Report (FSAR), Subsection 3.8.5.3, “Loads and Load Combinations” (Standard Review Plan (SRP) Section 3.8.5), the applicant states (Page 3-188) that ”Additional loads and load combinations include those defined in Section 3.8.4.3.1 and 3.8.4.3.2 and Table 3E.4-1 and Table 3E.4-2.”

To what loads and loading combinations are the “additional loads and loading combinations” added?

03.08.05-2

For supplemental information item SUP 3.8 (8) in the BBNPP COL FSAR, Subsection 3.8.5.4.6,”[Essential Service Water Emergency Make-up System] ESWEMS Pumphouse Base Mat” (SRP Section 3.8.5), the applicant states in the first paragraph (Page 3-189) that “Although the dynamic response spectrum analysis for the ESWEMS Pumphouse envelops the (International Civil Engineering Consultants, Inc--System for the Analysis of Soil Structure Interaction) ICEC SASSI (V. 1.3) analysis results, the detail design of the base mat will be more refined and involve a three step analytical process:

1. Time history analysis by ICEC SASSI (V. 1.3) to determine in-structure seismic response spectra using a GT-STRUDL (Georgia Tech-Structural Design Language)finite element model of both base mat and the superstructure.
2. Static analysis via the GT-STRUDL (V. 29.1) finite element model for all applicable load cases and design load combinations, including static seismic loads of the SSE, hydrostatic and soil pressures.
3. Global design forces and moments are extracted from the GT-STRUDL (V. 29.1) static analysis for the design of the base mat in accordance with the provisions of ACI 349-01 ([American Concrete Institute] ACI, 2001a) (with supplemental guidance of Regulatory Guide 1.142 (NRC, 2001)).”

The NRC Staff requests that the applicant provide the following information:

(1) (a) Where are the dynamic spectrum analysis for the ESWEM Pumphouse and the ICEC SASSI analysis presented?
(b) Does the input for the dynamic spectrum analysis include the effect of SSI (soil structure interaction)?

(c) What is the input motion used for the ICEC SASSI analysis?
(d) Describe the structural model used in ICEC SASSI analysis.

(2) Explain the meaning of the sentence in Step 1 more clearly, and include a discussion of the use of the two computer codes and two models and how they interrelate.

(3) (a) Provide a description for “static seismic loads of SSE” in Step “2”.
(b) How were the “static seismic loads of SSE” in Step “2” computed and applied to the model?

(4) In the GT-STRUDL static analysis, what are the boundary conditions assumed for the model?

03.08.05-3

For COL information item COL 3.8 (13) in the BBNPP COL FSAR Subsection 3.8.5.5,”Structural Acceptance Criteria” (SRP Section 3.8.5) , in the last sentence (Page 3-190) the applicant states that “For the ESWEMS, the static and dynamic coefficient of friction between the concrete base mat, the concrete backfill and the underlying Mahantango formation is conservatively set at 0.6.”

The NRC Staff requests that the applicant provide the following information:

(1) Provide the range of coefficient of friction between concrete and soils normally used for these analyses, or obtained by measurements for both static and dynamic coefficient of friction.
(2) Demonstrate the conservatism of the value used by the applicant of 0.6 for both the static and dynamic coefficient of friction
(3) As stated in BBNPP FSAR Subsection 3.8.5.6.1, the ESWEMS Pumphouse is approximately 1 ft submerged in water. If the effect of the water on the coefficient of friction has been considered and analyzed, provide this information. If not, provide justification for omitting this analysis.

03.08.05-4

For COL information item COL 3.8 (13) in the BBNPP COL FSAR Subsection 3.8.5.5.1,”Nuclear Island Common Base Mat Structure Foundation Base Mat” (SRP Section 3.8.5), the applicant states in the second paragraph that “The amount of sliding of the BBNPP [Nuclear Island] NI, when subjected to a load combination with seismic loading, was evaluated and determined to be negligible. Additionally, a nonlinear time history analysis of the NI under seismic loads determined that the possible amount of uplift for the BBNPP site-specific parameters is negligible and is enveloped by the U.S. EPR design.”

The NRC Staff requests that the applicant provide the following information:

(1) (a) Where is the study of sliding and uplifting of the NI presented in the BBNPP COL FSAR?
(b) Is the effect of high water table on the sliding considered in the analysis?

(c) Provide the input motions used in the nonlinear time history analysis for the uplifting and explain how they are calculated.
(d) BBNPP COL FSAR Subsection 3.8.5.6.1 states that the NI foundation is submerged 30 ft. in water. The site-specific seismic motions developed in BBNPP Section 2.5 and 3.7 are based on the elastic wave theory, in which the effect of water is neglected. Provide the technical basis which shows that the same conclusions stated in the above quoted paragraph would be valid if the effect of the high water table is considered.

(2) In the BBNPP COL FSAR, Subsection 3.7.2, the applicant states that "The existing stick model of the NI Common Base Mat structures is used in the SASSI analysis to determine only the 6-DOF [degrees of freedom] SSI [soil-structure interaction] response motions at the NI base mat. The 6-DOF base mat motions from the SSI analysis of the NI are used as input motions to the modal superposition time history analysis of the fixed-base dynamic finite element model of the NI."

(a) Referring to the first sentence of the above quoted paragraph, does the SSI analysis using SASSI include only the stick model of the NI Common Base Mat structure? If so, provide justification for not including the superstructure model in this analysis, and provide data to show that the stick model is a good representation of its 3D counterpart.
(b) What is the maximum size of soil elements in the SSI analysis?
(c) BBNPP COL FSAR Table 2.5-51shows that the shear wave velocity for the top soil layer is 1150 ft/sec for the low-strain condition. What is the corresponding value for the high-strain condition during the safe-shutdown earthquake (SSE) event?
(d) Do the 6-DOF SSI response motions represent the motion at the mass center of the base mat, or at the bottom of the mat?
(e) Is the base mat in the fixed-base finite element model treated as a rigid body? If the base mat in the fixed-base finite element model is not treated as a rigid body, provide the method for using the 6-DOF SSI response motions from the SASSI analysis for the whole mat and explain the rationale for using that method.
(f)In the fixed-base finite element model, where are the 6-DOF SSI response motions applied?

03.08.05-5

For COL information item COL 3.8 (13) in the BBNPP COL FSAR, Subsection 3.8.5.5.2, "Emergency Power Generating Buildings Foundation Base Mats" (SRP Section 3.8.5), Page 3-190,the applicant states, in part: "The maximum bearing pressures under sliding and overturning for the EPGB [Emergency Power Generating Building] foundation mat were determined to be acceptable for the BBNPP site, and the applicable acceptance criteria are met."

The NRC Staff requests that the applicant provide the following information:
(1) Provide the actual value for the maximum bearing pressures under the EPGB foundation mat and a comparison of that value with the bearing capacity of the soil beneath the mat at the site.

(2) Provide the frictional force at the bottom of the EPGB foundation mat and a comparison of that value with the maximum shear forces in both N-S and E-W directions resulting from the SSE.

03.08.05-6

For COL information item COL 3.8 (13) in the BBNPP COL FSAR, Subsection 3.8.5.5.2,"Emergency Power Generating Buildings Foundation Base Mats," Page 3-190 (SRP Section 3.8.5), the last sentence of the paragraph states that "The allowable bearing capacity is specified in Section 2.5.4.10."

The equation for calculating the ultimate bearing capacity given in BBNPP FSAR Section 2.5.4.10, Eq. 2.5.4-13, has three terms. The second term of the equation considers the effect of water, but the third term does not.

(1) Is the effect of water considered in the first term? If so, explain this analysis. If not, provide justification for excluding this analysis
(2) Does the third term consider the effect of water? If so, explain this analysis. If not, provide justification for excluding this analysis.

03.08.05-7

For COL information item COL 3.8 (13) in the BBNPP COL FSAR, Subsection 3.8.5.5.3,"Essential Service Water Buildings Foundation Base Mats," Page 3-190 (SRP Section 3.8.5), the applicant states in the last sentence of the paragraph that "The allowable bearing capacity for the ESWB foundation base mat is enveloped by the U.S. EPR design."

Provide a table listing the bearing pressure requirements for various BBNPP structures and the corresponding allowable bearing capacity. Also, state how the allowable bearing capacity is established.

03.08.05-8

For COL information item COL 3.8 (14) in the BBNPP COL FSAR, Subsection 3.8.5.6.1, "Materials," Page 3-191 (SRP Section 3.8.5), the applicant states in the 5th paragraph that "The maximum sulfate content for groundwater tested at the BBNPP site is 29 mg/L (ppm). Because this falls between 0 and 1500 ppm, the sulfate exposure in the groundwater is considered to be nonaggressive (NRC, 2007)."

Please revise the BBNPP COL FSAR to address the specific sub-section within SRP 3.8.5 that covers the limits on sulfates. Additionally, please provide information on the chlorides content in the groundwater and provide a comparison of the amount of chlorides in the groundwater at BBNPP to the allowable limits for chlorides.
.

03.08.05-9

For COL information item COL 3.8 (16) in the BBNPP COL FSAR, Subsection 3.8.5.7, "Testing and Inservice Inspection Requirements," Page 3-192 (SRP Section 3.8.5), the applicant states in the 4th paragraph that "The settlement monitoring program employs conventional monitoring methods using standard surveying equipment and concrete embedded survey markers. Survey markers are embedded in the concrete structures during construction and located in conspicuous locations above grade for measurement purposes throughout the service life of the plant as necessary. Actual field settlement is determined by measuring the elevation of the marker relative to a reference elevation datum. The reference datum selected is located away from areas susceptible to vertical ground movement and loads. If field measured settlements are found to be trending greater than expected values, an evaluation will be conducted."

(1) (a) Provide the installation procedures that will be utilized to properly set the "survey markers" to assure that the bench mark elevation value will remain stable over the 60 year service life of the plant.

(b) Provide a comparison of these proposed procedures with those in the Installation of survey Bench Marks as provided in NOAA (National Oceanic and Atmospheric Administration) Manual NOS NGS 1 Geodetic Bench Marks (U.S. DEPARTMENT OF COMMERCE, National Oceanic and Atmospheric Administration, National Ocean Survey, Rockville Md.)

(2) (a) Describe how the reference datum markers are installed and supported.

(b) If the trend of the actual field measured settlements exceeds expected values what are the possible corrective actions that might be indicated, and how would they be implemented?

03.08.05-10

For supplemental information item SUP 3.8 (9) in the BBNPP COL FSAR, Subsection 4.5.5.4, "ESWEMS Pumphouse Base Mat," Page 3-190, (SRP Section 3.8.5), the staff requests that the applicant provide an explanation for the data in Table 3.8-1 on Page 3-195, ESWEMS Pumphouse Base Mat & Pump Well Foundation, Summary Table On the Building Stability.

(1) In the top three rows, the data identified as "allowable" safety margin should be values determined to be the minimum safety margin required by a specific design code or standard. Please amplify the meaning of these table values.
(2) Please explain why there are several "N/A" for the allowable values, and provide justification for excluding this information from the table.

03.08.05-11

BBNPP COL, Table 3E.4-3 (SRP Section 3.8.5), states in the 4th row:"Average values for dynamic condition, including SSE loading."

(1) Please explain the meaning of "average values" in Table 3E.4-3,Table 3E.4-4, and Table 3E.4-5, of the BBNPP COL FSAR.

(2) The last sentence in the notes below the Table 3E.4-3 incorrectly states: “Refer to Figure 3E.4-2 for GT Strudl Finite Element Planar Reference System for Plate Forces and Moments.” Please revise this subsection of the FSAR to include the correct reference, which should be to Figure 3E.4-3. (Note that Figure 3E.4-4 is correctly cited in Table 3E4.-4 and Table 3E.4-5.)