PMHarrisCOL PEmails

From: Wayne Bieganousky
Sent: Monday, August 04, 2008 11:22 AM
To: Alice Stieve; Bret Tegeler; Ricardo Rodriguez
Cc: Rebecca Karas; Clifford Munson; HarrisCOL Resource
Subject: Emailing: Revised Harris RAIs_rev1.doc
Attachments: Revised Harris RAIs_rev1.doc

Alice,

I am hoping that we are near the end of revisions on the RAI's. I had to add a backfill RAI (#13) since HARRIS COLA did not adequately address borrow source, borrow quantity, borrow exploration, test fills, or laboratory tests for static and dynamic properties of backfill. While I understand that some or all of this is an ITAAC requirement, it seemed necessary to add a RAI to reinforce the requirement. If it is determined that it is not necessary during review, it can be revised or removed.

Thanks,
Wayne

The message is ready to be sent with the following file or link attachments:

Revised Harris RAIs_rev1.doc

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Subject: Emailing: Revised Harris RAIs_rev1.doc
Sent Date: 8/4/2008 11:22:26 AM
Received Date: 8/4/2008 11:22:48 AM
From: Wayne Bieganousky

Created By: Wayne.Bieganousky@nrc.gov

Recipients:
"Rebecca Karas" <Rebecca.Karas@nrc.gov>
Tracking Status: None
"Clifford Munson" <Clifford.Munson@nrc.gov>
Tracking Status: None
"HarrisCOL Resource" <HarrisCOL.Resource@nrc.gov>
Tracking Status: None
"Alice Stieve" <Alice.Stieve@nrc.gov>
Tracking Status: None
"Bret Tegeler" <Bret.Tegeler@nrc.gov>
Tracking Status: None
"Ricardo Rodriguez" <Ricardo.Rodriguez@nrc.gov>
Tracking Status: None

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MESSAGE	858	8/4/2008 11:22:48 AM
Revised Harris RAIs_rev1.doc	37998	

Options
Priority: Standard
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Reply Requested: No
Sensitivity: Normal
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Harris RAI's for PSER

1. Regulatory Basis says…

   FSAR section 2.5.4.5.1, Excavation Events, states "Stability analyses were performed using the software package SLIDE Version 5.026." It also states "Results confirm that the excavation slopes shown will remain stable during construction without external support".

   Please indicate the slope stability program used, strength parameters for the various layers, and phreatic surface conditions that were assumed in the SLIDE analysis. Please indicate what cases were analyzed and the factors of safety obtained.

2. Regulatory Basis says…

   Technical Memorandum (NPD-NRC-2008-014), "Supplemental Liquefaction Evaluation – HAR Site Backfill and Native Soil"; Section 1.0 "Site Specific Ground Motion Parameters, CSR, and FS Criteria", states that a site factor of 1.2 was assigned to "convert the PGA at top of sound rock to a ground surface motion" based on IBC 2006.

   Please justify the use of IBC 2006 for this calculation rather than a site specific analysis. Also, though the report indicates a factor of 1.2 was applied, the value of the plant grade peak ground acceleration could not be found in the report. Please report the value of the peak ground acceleration at the surface used in the liquefaction analysis. Please provide a sample liquefaction calculation using SPT N-values or shear wave velocity. Justify the use of N equals 30 for the sand backfill compacted to 95% modified Proctor density.

3. Regulatory Basis says…

   The AP1000 DCD Tier 1 requirement for uniform sites requires a dip not greater than 20 degrees. The dip of strata identified under HAR 3 using the marker bed approach is nominally greater than 20 degrees.

   In the public meeting it was stated that Westinghouse was consulted regarding this issue and that they concurred that the site met the Tier 1 requirement for uniformity. Please provide the basis for their agreement that the Tier 1 requirement was met.

4. Regulatory Basis says…

   FSAR Section 2.5.4.4.2.1.1, "HAR 2" states "For dip-correlated strata below the nuclear island subgrade elevation of 67.1m (220 ft) amsl, Vs measured in the boreholes fall within 20 percent of the average among the three holes, except at a few isolated intervals (Figure 2.5.4-214B). The exceptions typically span only one or two suspension logging data points, representing up to approximately 1 m (3ft.) in thickness." This appears to be true except for immediately under the

HAR 3 basemat. Referencing the HAR 3 shear wave velocity profiles, it is observed that the measured shear wave velocities between El. 210 and El. 220 vary from approximately 3500 fps in BPA-49 to 5100 fps in BPA-50. While the average of the 3 shear wave velocities in the subject depth interval within or in close proximity to the NI footprint would approximately be within the plus or minus 20% criteria, the data also seem to indicate a softening of the rock on the Northeast side of the HAR 3. The lower average value of 3500 fps observed in Boring BPA-49 is 30% lower than the average value of 5100 fps observed for the same depth interval at boring BPA-50. Please clarify how it was determined that the variation observed at HAR 3 between El. 210 and El. 220 is within the criteria for a uniform site, and does not require additional site investigations on closer spacing.

5. Regulatory Basis says…

   The AP1000 DCD, Tier 2, Section 2.5.4.5.3, "Site Foundation Material Evaluation Criteria" states "The distribution of bearing reactions under the basemat is a function of the subgrade modulus, which in turn is a function of the shear wave velocity. The Combined License applicant shall demonstrate that the variation of subgrade modulus or shear wave velocity across the footprint is within the range considered for design of the nuclear island basemat."

   Considering the variation in shear wave velocity profiles at HAR 3, there appears to be softer conditions on the northwest side of the NI. The lower average shear wave velocity (3500 fps) observed in Boring BPA-49 is 30% lower than the 5100 fps observed for the same depth interval at boring BPA-50. Please demonstrate that the variation of shear wave velocity (and therefore subgrade modulus) across the HAR 3 footprint is within the range considered for design of the nuclear island basemat.

6. Regulatory basis says…

   FSAR 2.5.4.2.4.3, "Elastic Modulus" states "If a lower reduction factor than 0.5 were used, the depth-weighted Young's modulus values would be correspondingly higher."

   Please provide a more detailed discussion on the basis of selection of the reduction factor.

7. Regulatory basis says…

   FSAR 2.5.4.10.4, "Lateral Earth Pressures", states "The resulting at-rest lateral earth pressure profiles for the two soil backfill types are presented for representative sidewall elevations in Table 2.5.4-217."

   Please provide all the lateral earth pressures required by AP1000 DCD, Tier 2, and Section 2.5.4.6.7. Describe how the dynamic active and passive lateral earth pressures were calculated.

8. Regulatory basis says…

FSAR 2.5.4.10.3.1 Elastic Settlement under Foundation Loads states “The small-strain constrained modulus was conservatively degraded by 50 percent to model larger strain effects.”

Please indicate the basis for choosing 50%.

9. Regulatory basis says…

   FSAR 2.5.4.10.3.3, “Total Settlement” states that the HNP settlements were within tolerable limits.

   What are the magnitudes of total and differential settlements that have been measured at HNP? Do clay seams similar to what was encountered at HAR 2 and HAR 3 exist in the soil profile at HNP?

10. Regulatory basis says…

    FSAR 2.5.4.10.4 Lateral Earth Pressures states “Surface surcharge from structures adjacent to the nuclear islands could potentially increase the lateral earth pressures that develop against the nuclear island sidewalls. However, these adjacent structures will likely be founded on sound rock, which is stiffer than the soil backfill adjacent to nuclear islands. Due to this difference in rock and backfill stiffness, it is anticipated that these adjacent structure foundation loads will not be transferred to the soil backfill. Therefore, loads from structures adjacent to nuclear islands (Ps) were considered insignificant in calculation of the at-rest pressure distributions.”

    Please clarify what structures this paragraph refers to since it appears that the radwaste building and turbine building appear to be founded on engineered backfill. Only the Annex building is founded on concrete on rock.

11. Regulatory basis says… **Sent to DE.**

    FSAR 2.5.4.10.2, “Resistance to Sliding” states “The nuclear island has been designed such that passive resistance from this backfill is not necessary to prevent sliding.” This appears to be contrary to the criteria for sliding found in AP1000 DCD, Tier 2, Section 2.5.4.6.2 “Properties of Materials Adjacent to Nuclear Island Exterior Walls” where it states “A determination of the static and dynamic engineering properties of the surrounding soil will be made to demonstrate they are competent and provide passive earth pressures greater than or equal to those used in the seismic stability evaluation for sliding of the nuclear island.” The DCD goes on to state “Seismic stability requirements are satisfied if the soil layers below and adjacent to the nuclear island foundation are composed predominantly of rock, or sand and rock (gravel), or sands that can be classified as medium to dense (standard penetration test having greater than 10 blows per foot). If the soil below and adjacent to the exterior walls is made up of clay, sand and clay, or other types of soil other than those classified above as competent, then the Combined License applicant will evaluate the seismic stability against sliding as described in subsection 3.8.5.5.3 using the site-specific soil properties.”

The backfill alternatives that are indicated in the FSAR include cohesive soils as stated in Section 2.5.4.5.3 “Properties of Backfill Adjacent to Nuclear Islands”. Please provide the results of analyses that ensure that the materials selected for backfill are adequate to prevent sliding.

12. Regulatory basis says…

    FSAR Section 2.5.4.10.1.2, “Rock Mass Strength Parameters for Bearing Capacity Analyses” provides the rationale and general procedures used to obtain Mohr–Coulomb strength parameters using the Hoek-Brown criteria for use in determining bearing capacity. However, the rock strength tables do not provide all the Hoek-Brown classification data needed as input to confirm the Mohr-Coulomb strength parameters presented for the various cases analyzed.

    Please provide all the assumptions, input data, and a sample calculation showing how those input parameters were derived for the lower bound bearing capacity determination at HAR 3.

13. Regulatory basis says…

    FSAR Section 2.5.4.5.3, “Properties of Backfill Adjacent to Nuclear Islands states “Backfill materials will be placed adjacent to the sidewalls of the nuclear islands. The backfill material adjacent to the nuclear island sidewalls is nonsafety-related; the nuclear islands are designed for safe performance independent of the sidewall backfill type. This appears to be contrary to the criteria for sliding found in AP1000 DCD, Tier 2, Section 2.5.4.6.2 “Properties of Materials Adjacent to Nuclear Island Exterior Walls” where it states “A determination of the static and dynamic engineering properties of the surrounding soil will be made to demonstrate they are competent and provide passive earth pressures greater than or equal to those used in the seismic stability evaluation for sliding of the nuclear island.”

    The staff believes that the applicant needs to include engineering data on the backfill that will be used adjacent to nuclear islands. The borrow exploration program, test fill program, laboratory testing program for the determination of static and dynamic soil properties, and other pertinent data required for engineering evaluation need to be included in the COLA.