PMVictoriaESPPEm Resource

From: Govan, Tekia
Sent: Friday, May 20, 2011 2:09 PM
To: 'david.distel@exeloncorp.com'
Cc: VictoriaESP Resource
Subject: RAI letter number 10
Attachments: RAI 5526.doc; RAI 5509.doc; RAI 5698.doc; RAI 5697.doc

David:

Please find attached a courtesy copy of all the RAIs issued under RAI letter number 10. The official version will be processed and sent via US mail on Mon (5/23).

Thanks
Tekia

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From: Govan, Tekia

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Recipients:
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Files	Size	Date & Time
MESSAGE	433	5/20/2011 2:09:16 PM
RAI 5526.doc	37882	
RAI 5509.doc	44538	
RAI 5698.doc	30714	
RAI 5697.doc	30714	

Options
Priority: Standard
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Request for Additional Information No. 5526 Revision 0

5/20/2011

Victoria County Station ESP
Exelon Texas
Docket No. 52-042
SRP Section: 02.05.05 - Stability of Slopes
Application Section: 2.5.5

QUESTIONS for Geosciences and Geotechnical Engineering Branch 2 (RGS2)

02.05.05-1

SSAR Subsection 2.5.5.1.6 states that the exit gradient at the outboard toe of the embankments dams will approach or exceed critical values. To reduce the exit gradients to an acceptable value, a 10-ft deep trench at the toe of the embankment dam will be excavated. In accordance with 10 CFR 100.23(d)(4), please provide the critical exit gradient value and describe how a depth of 10-ft was determined for the trench. Also, indicate the percentage of each vertical soil layer will be penetrated by the 10 ft trench.

02.05.05-2

SSAR Subsection 2.5.5.1.9.1.1 states that the values of undrained shear strength obtained from the direct simple shear tests showed greater consistency than those obtained from the isotropically-consolidated undrained (CIU) saturated triaxial compression test. In accordance with 10 CFR 100.23(d)(4), please explain the possible reasons on why the CIU results were inconsistent.

02.05.05-3

SSAR Subsection 2.5.5.1.11 indicates that shallow investigations disclosed the presence of a surficial loose layer of sand to the east of the cooling basin along the side of Linn Lake. The applicant concluded that this sand is beyond the limits of the embankment dam. In accordance with 10 CFR 100.23(d)(4), please explain how far beyond the limit this loose layer is located. Also, explain if this loose layer was considered in the slope stability analysis along the east embankment of the cooling basin.

02.05.05-4

In SSAR Subsection 2.5.5.2.1.1, the applicant provided conclusions based on case histories from different references. In accordance with 10 CFR 100.23(d)(4), please clarify if these conclusions apply specifically to the VCS site or are conclusions made in general based on information presented in the references.

02.05.05-5

SSAR Subsection 2.5.5.2.3, last sentence, indicates that supplemental investigations will provide the means to analyze potential zones of high hydraulic gradient at distance away from the toe of the embankment. In accordance with 10 CFR 100.23(d)(4), please state in the SSAR if these investigations will be conducted at the COL stage.

02.05.05-6

In SSAR Subsection 2.5.5.2.5.2 the applicant indicated a berm is required along the east and south of the cooling basin embankment dams. In accordance with 10 CFR 100.23(d)(4), please indicate the source and material type that will be used for the construction of this berm.

02.05.05-7

SSAR Subsection 2.5.5.2.5.3 indicates that over-excavation of the foundation clay (Stratum Clay 1 (Top)) and the foundation sand (Stratum Sand 1) is required along the north cooling basin dam. In addition Subsection 2.5.4.5.1.1.2 states that Clay 1 and Sand 1 will be excavated. In accordance with 10 CFR 100.23(d)(4):

1) Please clarify which layers will be excavated in the cooling basin.

02.05.05-8

SSAR Subsection 2.5.5.2.5.4 describes the seismic stability and post-earthquake deformations of the slopes. Based on design criteria, the post-earthquake residual strength is equal to 0.8 times the static value. In accordance with 10 CFR 100.23(d)(4), please explain how this criterion is satisfied for the VCS site.

02.05.05-9

In SSAR Subsection 2.5.5.4.1.3.2, the applicant stated that two types of fill material to be used in the cooling basin area are Composite “A” and Composite “B.” These materials will be obtained from the excavated material in the footprint of the basin and from adjacent areas. The applicant also stated that the drainage materials to be used for the drainage blankets will be obtained from offsite sources. In accordance with 10 CFR 100.23(d)(4), please specify the location and properties of fill material located at “adjacent areas” and “offsite sources.”

02.05.05-10

SSAR Figures 2.5.4-80 through 2.5.4-85 show the general extent of the excavation and the fill for embankment and interior dikes. In accordance with 10 CFR 100.23(d)(4), provide a detailed description of the area of extent of the embankments and dikes.

02.05.05-11

In accordance with 10 CFR 100.23(d)(4), provide the input files for the SLOPE/W software.

02.05.05-12

SSAR Subsection 2.5.5.1.6 discusses the groundwater and seepage conditions. In accordance with 10 CFR 100.23(d)(4), indicate how piping conditions were considered and addressed in the analysis.

02.05.05-13

In accordance with 10 CFR 100.23(d)(4), please explain how the potential for uplift due to blocked exits caused by a meandering stream was considered in the seepage and slope stability analysis

02.05.05-14

SSAR Subsection 2.5.5.2.5 indicates that the Bishop method was used for the slope stability analysis. In accordance with 10 CFR 100.23 (d)(4), justify the selection of Bishop Method for slope stabilization and explain if a block analysis was conducted to estimate the FOS against sliding, particularly where the shear strength of the embankment fill is greater that the foundation of soils.

02.05.05-15

SSAR Subsection 2.5.5.1.6 indicates that the ratio of horizontal to vertical conductivity was set to five. In accordance with 10 CFR 100.23(d)(4), explain how this values was determined and describe any sensitivity analyses that were performed on the permeability values used in the seepage and slope stability analyses.

02.05.05-16

In accordance with 10 CFR 100.23(d)(4), indicate if the soils located in the embankment zone contains dispersible soils and explain how the dispersible soils will be treated to prevent seepage or migration of materials.

02.05.05-17

From SSAR Figure 2.5.1-41 and 2.5.1-49 the staff infer that growth faults D and E potentially underlying the cooling basin. In accordance with 10 CFR 100.23(d)(4), discuss the consideration of the growth faults D and E in the slope stabilization analysis for the cooling basin and the potential for embankment failure.

Request for Additional Information No. 5509 Revision 0

5/20/2011

Victoria County Station ESP
Exelon Texas
Docket No. 52-042
SRP Section: 02.05.04 - Stability of Subsurface Materials and Foundations
Application Section: 2.5.4

QUESTIONS for Geosciences and Geotechnical Engineering Branch 2 (RGS2)

02.05.04-1

SSAR Subsection 2.5.4.2.1.3.2.3 states that the maximum, minimum, and average corrected N-values are listed in Table 2.5.4-8. In accordance with 10 CFR 100.23(d)(4), explain how the average values shown in the table were calculated. In addition provide a sample calculation for the Sand 4 layer.

02.05.04-2

In accordance with 10 CFR 100.23(d)(4), staff requests that the applicant provide the following:
a) SSAR Table 2.5.4-32 presents the design values for several geotechnical parameters including friction angle. Table 2.5.4-18 shows measured values recorded from direct shear testing and these values do not match the design values in Table 2.5.4-32. Please provide the basis for the friction angle values presented in Table 2.5.4-32 for each of the soil layers.
b) SSAR Table 2.5.4-32 presents an estimated SPT $(N_1)_{60}$ value of 30 for structural fill. Please explain how this value was developed.
c) SSAR Subsection 2.5.4.2.1.3.11 states that the friction angle for all clay strata is 20°. Please explain the basis for this value and why this value was not included in Table 2.5.4-32.

02.05.04-3

SSAR Table 2.5.4-20 presents a summary of the undrained shear strength (Su) values obtained from various methods. In accordance with 10 CFR 100.23(d)(4), explain the bases for selecting Su=6 ksf for Clay 7 if this layer was not reached with the CPT, was not tested in laboratory, and a value of Su=5 ksf was determined from the SPT results.

02.05.04-4

SSAR Figures 2.5.4-56 through 2.5.4-59 plot OCRs estimated from CPT results and laboratory testing using Equation 2.5.4-7, which applies to a plastic limit (PI) of 40%. However, none of the PI values presented in Tables 2.5.4-16 and 2.5.4-17 are equal to 40% except for Clays 5, 13, and 15. In accordance with 10 CFR

100.23(d)(4), explain the appropriateness of Equation 2.5.4-7, as several of the PI values are less than 40%.

02.05.04-5

SSAR Section 2.5.4.5 provides three potential structural fill types, but does not specify a source for the backfill nor the DOT requirements. In addition, the applicant states that "structural fill below and/or surrounding major power block area structures alternatively consists of lean concrete fill, or concrete fill. The selection of structural fill, lean concrete fill, and/or concrete fill is determined during detailed design." In order for the staff to evaluate the suitability of the foundation design, additional specificity is required on the source type and location, properties of the fill, and placement of the various fill types (structural fill, lean concrete, and/or concrete fill).

02.05.04-6

SSAR Subsection 2.5.4.2.1.4.1 presents the lateral earth-pressure coefficients. In accordance with 10 CFR 100.23 (d)(4), explain why Ko=1-sin (φ') equation was used since Das (2010)* only recommends use of this equation for coarse-grained soils. Please justify why this equation for Ko is representative for the site.

*Das, Braja M. (2010). Principles of Geotechnical Engineering, Seventh Edition, Cengage Learning.

02.05.04-7

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding soil sampling and borings:
a) SSAR Subsection 2.5.4.2.2.1 states that the sampling intervals for the subsurface investingation borings vary from guidance provided in RG 1.132. Please quantify and explain these variations.
b) The staff was not able to locate C-2106, C-2204SA, and C-2206, B-2162A, B-2176A, B-2182A, and B-2282A in Figure 2.5.4-1. Please clarify where these borings are located.

02.05.04-8

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding shear wave velocity:
a) SSAR Subsection 2.5.4.4.5 provides equivalent shear wave (Veq) velocities using the equation from ESBWR DCD Rev 4. Justify use of this equation in this application.
b) SSAR Table 2.5.4-51 presents shear wave velocities. Please explain how the minimum, maximum, and average velocities were determined, and provide an example for Sand 4.

02.05.04-9

SSAR Subsection 2.5.4.5.1.1.1 states that the upper soils of Clay 1 through Clay 3 will be excavated. Figure 2.5.4-131 shows Clay 3 under structural fill. In accordance with 10 CFR 100.23(d)(4), explain this discrepancy.

02.05.04-10

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding liquefaction potential:

a) The staff noted that the liquefaction analysis discussion presented in SSAR Subsection 2.5.4.8.2 only pertained to those data points that exhibited a factor of safety (FS) of less than 1.1. RG 1.198 recommends values that are equal to 1.1 should also be considered as liquefiable and should be evaluated. Please verify that you considered FS values equal to 1.1 as well as those less than 1.1.

b) For FS values between 1.1 and 1.4, stability and deformation analyses should be performed with reduced strength values. Please provide the recommended evaluation for zones with FS values between 1.1 and 1.4 at the site.

02.05.04-11

SSAR Subsection 2.5.4.10.1 presents a table containing foundation dimensions referred to as “typical LWR.” Provide an explanation regarding why footnote b references the ESBWR DCD.

02.05.04-12

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding bearing capacity:

a) SSAR Table 2.0-1 lists a Dynamic Bearing Capacity of 56.4 ksf and minimum Static Bearing Capacity of 15.0 ksf. Provide the basis for these selected values and provide sample calculations, including all assumptions and a profile of the layers used in the calculations. This table also lists the ESBWR DCD as a reference for the dynamic bearing capacity. Please justify your reference to only this reactor design and not a bounded PPE value.

b) SSAR Subsection 2.5.4.10.2 states that the allowable and ultimate bearing capacities are higher than the required static design loads and dynamic design loads. SSAR Table 2.0-1 presents a minimum bearing capacity value of 15ksf. However, in Table 2.5.4-88 the allowable and ultimate bearing capacities for the FWSC structure are less than the design load values. Please explain how the values presented in Table 2.5.4-88 satisfy the minimum criteria presented in Table 2.0-1.

02.05.04-13

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding settlement:

a) SSAR Table 2.5.4-89 presents the calculated and allowable settlements. This table states that settlement is 'N/A.' However, the calculated settlements at the center of the reactor/fuel building are on the order of 5 inches. Explain how settlement will be addressed, and the allowable bearing capacities that were assumed. Please discuss the underlying assumptions associated with estimating settlement and provide a sample calculation including the layer profile, elastic moduli, and the assumed depth used in the analysis.

b) SSAR Subsection 2.5.4.10.3 states that the estimated settlement caused by the placement of the fill is approximately 0.8 inches and should occur relatively rapidly. This settlement was not included in the settlement calculations for Category I structures. Justify why this settlement was not taken into consideration knowing that it will affect the preconsolidation pressure for settlement calculations of the Category 1 structures. Also, describe how this settlement is included in the rebound/heave estimate for excavation of major power block area structures and how the 0.7 inch value was computed.

02.05.04-14

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding lateral earth pressure evaluations:

a) SSAR Subsection 2.5.4.10.4 states that "vertical ground accelerations are considered negligible." Please explain this statement.

b) SSAR Subsection 2.5.4.10.4.2 states that: "Since the VCS site employs highly compacted granular structural fill with relatively low permeability, seismic groundwater pressure need not be considered. Therefore, only the static water level is considered in calculating the hydrostatic groundwater pressure, as given in Equation 2.5.4-36. Note that seismic groundwater thrust greater than 35 percent of hydrostatic thrust can develop for cases when kh >0.30g (Reference 2.5.4-66). Given the relatively low seismicity of the VCS site (i.e., kh <0.30g), seismic considerations related to groundwater can similarly be disregarded." Please justify this assumption the seismic considerations can be disregarded for all designs considered in the PPE and provide sample calculations, including the hydrodynamic thrust.

02.05.04-15

In accordance with 10 CFR 100.23(d)(4), the staff request that the applicant provide the following information regarding Appendix 2.5.4-A:

a) Many tables in this appendix are labeled "Not Used." Please explain why this appendix was included in the SSAR.

b) Appendix 2.5.4-ATables 2.5.4-A-5, 2.5.4-A-8 and 2.5.4-A-10 present N values for the layers Clay 7 through Sand 18 that are lower than those presented in tables 2.5.4-5, 2.5.4-8 and 2.5.4-10. Explain if the values presented in Appendix 2.5.4-A

were considered when determining the design parameters presented in Table 2.5.4-32.

c) Appendix 2.5.4-A Table 2.5.4-A-20 present the shear strength value for Clay 7. Was this new value considered in your analyses?

d) Appendix 2.5.4-A Table 2.5.4-A-26 present the overconsolidation ratios. The staff noticed that the “values for use” presented in this table are lower than those presented in Table 2.5.4-26. Please explain if the values presented in Appendix 2.5.4-A were considered in your design.

e) Appendix 2.5.4-ATables 2.5.4-A-28 and 2.5.4-A-30 present the Elastic Moduli and Shear Moduli values respectively based on the subsurface data obtained in the additional soil exploration conducted by the applicant at the VCS site in 2009. Some of the values presented are lower than those listed in Tables 2.5.4-28 and 2.5.4-30. Please explain if the values presented in Appendix 2.5.4-A were considered in your design.

02.05.04-16

The staff noted that many tables in the SSAR were updated by removing any reference to an specific reactor design and referring instead to a “Typical LWR with and independent UHS” design. However, the numbers in these tables were not changed. Please explain if the values presented still represent the PPE bounding values.

02.05.04-17

SSAR Tables 2.5.4-36 and Table 2.5.4-37 summarizes borings location for the power block area and cooling basin respectively. Following the Northing and Easting provided, these borings appear to be located in Oklahoma instead of Texas. In accordance with 10 CFR 100.23(d)(4), the staff request the boring locations in latitude and longitude coordinates and clarification of the horizontal datum.

Request for Additional Information No. 5698 Revision 0

5/20/2011

Victoria County Station ESP
Exelon Texas
Docket No. 52-042
SRP Section: 11.03 - Gaseous Waste Management System
Application Section: 11.3

QUESTIONS for Health Physics Branch (CHPB)

11.03-2

Please provide detailed information to enable the NRC staff to validate and verify the estimated gaseous effluent doses discussed in the applicant's ESP, Section 11.3.3.2. Gaseous Pathway Doses, with respect to the dose objectives of Appendix I to 10 CFR 50, and the dose limits in 10 CFR 20.1301(e).
The information should include the following:
1.) A complete description of how the applicant derived all the values, including all assumptions made;
2.) Citations to any reference material used (for documents not publicly available, please provide a copy at an audit location for the NRC staff's review).
3.) A detailed breakdown of individual doses and the maximally exposed individual (MEI) doses by pathway and organ; and
4.) A detailed breakdown of population doses by pathway and organ.
5.) Provide the basis for parameters and values used in the GASPAR code or equivalent calculation.
6.) Provide the GASPAR code input/output files used to calculate the gaseous effluent doses.

Request for Additional Information No. 5697 Revision 0

5/20/2011

Victoria County Station ESP
Exelon Texas
Docket No. 52-042
SRP Section: 11.02 - Liquid Waste Management System
Application Section: 11.2

QUESTIONS for Health Physics Branch (CHPB)

11.02-5

Please provide detailed information to enable the NRC staff to validate and verify the estimated liquid effluent doses discussed in the applicant's ESP, Section 11.2.3.2. Liquid Pathway Doses, with respect to the dose objectives of Appendix I to 10 CFR 50, and the dose limits in 10 CFR 20.1301(e).
The information should include the following:
1.) A complete description of how the applicant derived all the values, including all assumptions made;
2.) Citations to any reference material used (for documents not publicly available, please provide a copy at a audit location for the NRC staff's review).
3.) A detailed breakdown of individual doses and maximally exposed individual (MEI) doses by pathway and organ; and
4.) A detailed breakdown of population doses by pathway and organ.
5.) Provide the basis for parameters and values used in the LADTAP II code or equivalent calculation.
6.) Provide the LADTAP II code input/output files used to calculate the liquid effluent doses.