PMComanchePeakPEm Resource

From: Monarque, Stephen
Sent: Friday, May 21, 2010 10:08 AM
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Cc: ComanchePeakCOL Resource; Ward, William
Subject: Comanche Peak RCOL Chapter 3 - RAI Number 167
Attachments: RAI 4542 (RAI 167).docx

The NRC staff has identified that additional information is needed to continue its review of the combined license application. The NRC staff's request for additional information (RAI) is contained in the attachment. Luminant is requested to inform the NRC staff if a conference call is needed.

The response to this RAI is due within **35** calendar days of May 21, 2010.

Note: If changes are needed to the safety analysis report, the NRC staff requests that the RAI response include the proposed changes.

thanks,

Stephen Monarque
U. S. Nuclear Regulatory Commission
NRO/DNRL/NMIP
301-415-1544

Hearing Identifier: ComanchePeak_COL_Public
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Request for Additional Information (RAI) No. 4542, COLA Revision 1

RAI Number 167

5/21/2010

Comanche Peak Units 3 and 4
Luminant Generation Company, LLC.
Docket No. 52-034 and 52-035
SRP Section: 03.08.04 - Other Seismic Category I Structures
Application Section: 3.8.4

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

03.08.04-61

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (#108), Question 03.08.04-2, Luminant stated that the material considered for the expansion/separation joints in the Ultimate Heat Sink Related Structures (UHSRS) in Comanche Peak Units 3 and 4 is ETHAFOAM 220, as manufactured by Sealed Air Corporation. The question of durability and expected lifetime performance of the expansion joint was not addressed explicitly; only that the procurement specification will address this concern. It is important to know what the experience has been for this referenced material, ETHAFOAM 220, (or any other candidate material) under conditions similar to that expected in the Comanche Peak plant, i.e., over a 60 year period. In addition, this material appears to be used frequently as a protective material in packaging in contrast to its use as an expansion joint in building construction.

The Applicant is requested to address the application of the selected material, ETHAFOAM 220, for use as expansion/separation joints for the UHSRS. This discussion should address the durability and performance of the material over the plant lifetime of 60 years, including its use in the planned exterior application.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-62

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (#108), Question 03.08.04-4, Luminant stated that the three fuel oil storage tanks were considered to be full, and that variations in the levels of fuel oil in the storage tanks were not considered in the seismic analysis because these tanks are normally kept full at all times. The staff found this answer to be acceptable. However, the Applicant also stated that these tanks were considered to be rigid in the seismic design, but did not provide any data to support this assumption. The Applicant stated

that 0.25g was used to obtain the tank seismic inertia forces applied to the base slab and argued that this force is conservative. Whether or not this force is conservative depends on the natural frequency of the tank-liquid system. Therefore, the Applicant is requested to provide the value of the fundamental frequency of the tank-liquid system without assuming the tank to be rigid, and to show that using that value the assumption of 0.25g is still conservative.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-63

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (#108), Question 03.08.04-5, Luminant provides information that is generally adequate to address the staff's concerns. However, the response to Part (b) of the question is quite general and more information is needed as to how the buried structures are analyzed in order to evaluate the response. The Applicant is requested to furnish additional and more detailed information that shows specifically how the buried structures are analyzed for the applied loads.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-64

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (#108), Question 03.08.04-6, Luminant provides answers in the same format as the question. In Part (a) of the response, the Applicant indicates that the Safe Shutdown Earthquake (SSE) is described in the Final Safety Analysis Report (FSAR), Subsection 3.7.1.1. The staff reviewed FSAR Subsection 3.7.1.1 and was unable to find this description of the SSE. The staff, however, did find the SSE response spectra in Figure 3.7.202 of FSAR which is the minimum Certified Seismic Design Response Spectra (CSDRS) anchored at 0.1g. Please clarify whether the SSE is defined at elevation 782 feet, which is the same elevation where the Ground Motion Response Spectra (GMRS) is defined, and describe the manner in which the required seismic monitoring instrumentation will be installed at elevation 782 feet, which elevation is 40 feet below the ground surface.

For Part (b) the Applicant provides the values for the wind speed, the snow load and roof load used in the design. However, for the SSE, the Applicant, again, refers to FSAR Subsection 3.7.1.1, the subsection where the staff was unable to find the description for the SSE. Address this inconsistency and provide a description of the type and location of the seismic monitoring instrumentation that needs to be installed at elevation 782 feet.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-65

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to Part (a) of RAI 2994 (#108), Question 03.08.04-8, Luminant did not provide any rationale or any technical basis for using springs, intended for application to surface supported structures, to a below grade structure. Provide the rationale and technical basis for using these springs which are placed at the base of Essential Water Supply Pipe Tunnel (ESWPT), an underground structure, using the methods for surface supported structures provided in American Society of Civil Engineers (ASCE) 4-98, Section 3.3.4.2, and show how the soil on the sides and on the top of ESWPT is considered. The Applicant is requested to provide this rationale and technical basis for the springs placed at the base of the EWSPT.

In response to Part (b) of RAI 2994 (#108), Question 03.08.04-8, explain why the statement “the support below the structure will not exhibit long-term settlement effects” is a prerequisite for using the formula given in ASCE 4-98, Section 3.3.4.2. In the Applicant’s previous response to this RAI, this question was not addressed. Please provide information that addresses this question.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-66

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to Part (b) of RAI 2994 (#108), Question 03.08.04-12, Luminant states that the soil-structure interaction (SSI) effects do not have a major impact on the design input, and that the fixed base analysis alone is justified as a means of analyzing the structure. However, the Applicant’s analysis of the structure on springs considering the best estimate properties of the soil was used to provide an additional bounding case and allow determination of foundation demands. The staff disagrees with this position. If a bounding case is needed, the lower bound of the soil properties should be used instead of using the best estimate one. The Applicant is requested to use the lower bound of the soil properties for a bounding analysis of the SSI effects, or provide additional information and analysis to demonstrate that the best estimate of the soil properties provides the bounding case.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-67

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (# 108), Question 03.08.04-13, Luminant describes how the seismic soil pressure is calculated. Please provide additional information regarding the seismic loads applied to above grade walls, and explain why the seismic soil pressure is applied to the above grade walls.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-68

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

(a) In its response to Part (a) of RAI 2994 (#108), Question 03.08.04-14, Luminant states that the embedment effect is accounted for in the SSI analyses that calculate the seismic loads for the ANSYS analyses, and that the embedment effect is not required to be considered in the ANSYS model. The staff disagrees with this position. The SASSI model and the ANSYS model the same structural system and should be consistent. The Applicant states that their method of analysis is “a two step analysis method defined in ASCE 4-98”. The staff is not able to find in ASCE 4-98 the definition of a “two step analysis method”. The Applicant is requested to provide the section number of ASCE 4-98 that defines this method of analysis. If this ‘two step analysis method” refers to the method of analysis described in Section 3.3.1.8 of ASCE 4-98, then the simplified model (SASSI model) has to be consistent with the detailed model (ANSYS model). In other words, the embedment effect needs to be included in the ANSYS model. The Applicant is requested to provide justifications for using two different models in the analysis.

(b) In Part (b) of the response, the Applicant states that the lower bound soil stiffness would produce higher demand in the base slab. If this is the case; then, the lower bound estimate of the soil properties should be used. However, in the FSAR, the best estimate of the soil properties is used. The Applicant is requested to use the lower bound soil stiffness for a bounding analysis, or provide additional information and analysis to demonstrate that the best estimate of the soil properties provides the bounding case.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-69

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 1, 2, 4, and 5.

In its response to RAI 2994 (#108), Question 03.08.04-15, Luminant states that soil spring constants given in ASCE 4-98 are used in their calculations. Three individual, uncoupled, uni-directional spring elements are attached to each node of the base mat. The sum of all nodal springs in each of the three orthogonal directional is equal to the corresponding generalized structure-foundation stiffness in the same direction calculated from ASCE 4-98. In order for the staff to evaluate this response, please provide additional information that describes how these three individual, uncoupled, uni-directional springs are determined, and explain whether they are determined according to the tributary area.

Reference: Luminant's response to request for additional information no. 2994; Log # TXNB-09078; dated December 10, 2009; ML093480149.

03.08.04-70

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

(a) In its response to Part (a) of RAI 3006 (#122), Question 03.08.04-18, Luminant states that the fine mesh design model is the ANSYS 3D design model. In the model, the impulsive and convective hydrodynamic fluid masses are also included. The SASSI SSI model used for soil structure interaction analyses has the same makeup of elements and masses. The Applicant is requested to provide information that explains how the fluid masses corresponding to the base rocking motion are calculated and included in the model. The base rocking motion is caused by the soil-structure interaction.

(b) In Part (b) of the response the Applicant provides a table listing the natural frequencies, modal participating factor, and the modal mass ratio for the first three modes in x, y, and z directions. The data for the modal mass ratio seems low for the three modes in the vertical direction, and for the second and third modes in the E-W and N-S direction, and the modes appear to be local vibration modes. The Applicant is requested to confirm that the data provided is for the major structural modes, and to provide information for the number of modes considered in the calculation of the forces and moments as well as the criterion for selecting those numbers.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-71

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to Part (c) of RAI 3006 (#122), Question 03.08.04-19, Luminant states that only the soil springs of ASCE 4 are included in the ANSYS model. The damping coefficients are not included. ANSYS analyses are performed based on two support conditions: (1) the mode with the soil springs and (2) the fixed base condition. The results from these two conditions are enveloped for the design. In general, the staff agrees to the approach used, but disagrees as to the model used in the analysis. The spring constants and damping constants listed in ASCE 4 are inseparable. Performing a SSI analysis without including the soil damping is tantamount to assuming the soil has no mass. The Applicant is requested to provide revised analyses that consider both the spring constants and damping constants.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-72

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

(a) In its response to Part 1 (a) of RAI 3006 (#122), Question 03.08.04-22, Luminant states that the answer to this part of the question is given in their response to Question 03.08.04-53 (also RAI 3006). The staff reviewed the answer to Question 03.08.04-53 and its evaluation of that question is presented in a later question in this RAI.

(b) In Part 2 (a) of this response, Luminant states that the calculations of Foundation Input Response Spectra (FIRS) were made at the seven spectral frequencies at which ground motions were available from the 2004 Electric Power Research Institute (EPRI) study. Revise the FSAR to demonstrate that FIRS is defined by at least 30 frequencies, or provide additional information and analysis to justify the approach taken, which is not consistent with the guidance in RG 1.208. In RG 1.208 Section 3.4, “Hazard Assessment” (Page 15), which states that a minimum of 30 frequencies approximately equally spaced on a logarithmic frequency axis between 100 and 0.1 Hz are required to determine the mean Uniform Hazard Response Spectra (UHRS). In its response, the Applicant states that GMRS is calculated at 39 frequencies. Explain why the FIRS are calculated differently from the GMRS.

(c) In Part 2 (c) of this response, Luminant states that FIRS1 and FIRS2 are applicable to the Comanche Peak Nuclear Power Plant (CPNPP) seismic Category 1 building structures. 10 CFR 50, Appendix S, requires the minimum peak ground acceleration for motion in the free-field at the foundation level to be at least 0.1g. Because both FIRS1 and FIRS2 are less than 0.1g, FIRS1 and FIRS2 are not “applicable” to the CPNPP seismic category 1 building structures.

The Applicant is requested to clarify the use of the word “applicable” in response to the RAI.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-73

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

(a) In Part (a) of its response to RAI 3006 (#122), Question 03.08.04-24, Luminant states that the analysis with lower bound soil properties and no backfill provides a bounding softest soil condition and analyses were performed with the best estimate soil condition for cases with soil separation and without separation. Further, Luminant stated that the results show that the soil separation case produced the larger soil pressure and response spectra; therefore, the lower bound (LB), upper bound (UB) and an additional high bound (HB) soil cases were performed for the soil separation case to produce the bounding maximum response. The staff reviewed this answer in conjunction with the Applicant’s answer to Part (d) of question 03.08.04-24 and has the following question: Why is the soil pressure larger in the soil separation case? After the separation, the soil pressure should be zero. Provide additional information and analysis to explain why soil pressure would be larger in the soil separation case

(b) In Part (b) of the answer, the Applicant states that the factor of 10 in shear wave reduction represents a factor of 100 in shear modulus reduction. Was a parametric study performed to determine this factor?

(c) In Part (c) of the answer Luminant states that the dynamic soil pressure was compared with the at-rest soil pressure to determine the separation. The staff notices that the SASSI was used to perform this analysis. SASSI code performs the calculations in the frequency domain. The Applicant is requested to provide information that shows how this nonlinear analysis was performed using the SASSI code in the frequency domain.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-74

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In Part (b) of its response to RAI 3006 (#122), Question 03.08.04-27, Luminant states that the impulsive mass is fixed with respect to the walls. Luminant further states that the fluid mass is not fixed with respect to the ground. Luminant stated that the impulsive

mass was calculated based on American Concrete Institute (ACI) 350.3-06. The staff notices that the hydrodynamic effects in ACI 350.3-06 are for the horizontal motion. The Applicant is requested to provide information that shows how the hydrodynamic effects for the base rocking motion were modeled. The base rocking motion will be generated as the results of soil-structure interaction.

In Part (c) of the response Luminant states that the inclusion of the sloshing modes is equivalent to considering the water separation. The staff disagrees with this assumption. The water separation is a nonlinear phenomena; whereas, the sloshing modes are linear responses. The Applicant is requested to provide additional information and analysis to justify and support the statement that the inclusion of the sloshing modes is equivalent to considering the water separation.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-75

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to Part (d) of RAI 3006 (#122), Question 03.08.04-28, Luminant states that the high stress of 23 ksf exists at the extremes of the model and represents only 0.2% of the total area. The Applicant, however, did not explain why this high stress occurs in only one element. The Applicant is requested to provide an explanation as to why there is a stress concentration.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-76

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

(a) In its response to Part (a) of RAI 3006 (#122), Question 03.08.04-32, Luminant states that “The spring stiffness calculated using ASCE 4 reflects the soil spring for a surface founded structure with rigid base slab, which is not required to be a massless slab.” The staff notices that the Applicant uses “rigid base slab” in the answer, but uses “flexible base slab” in the FSAR. Explain whether “rigid base slab” or “flexible base slab” was used in the spring stiffness calculation and, if necessary, revise the FSAR to correct this inconsistency.

(b) In Part (b) of the answer, the Applicant states that the ANSYS model includes only the soil stiffness per ASCE 4, and the corresponding soil damping is not included. The staff disagrees with this approach because the soil stiffness and damping are not separable. . ASCE 4 provides several methods to perform the dynamic analysis of a non-classical damped system. The Applicant is requested to revise the dynamic analysis to explain how both soil stiffness and soil damping

were included, or provide additional information and analysis to justify not including soil damping in the analysis.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-77

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to Part (b) of RAI 3006 (#122), Question 03.08.04-34, Luminant states that peak accelerations are calculated for all three directions of output motion. These peak accelerations represent the maximum absolute acceleration for all time steps. The co-directional accelerations from each direction of input are combined using SRSS and then enveloped over all soil cases. Maximum accelerations calculated in SASSI were enveloped for each region/component and applied to the ANSYS model.

The Applicant is requested to provide information for the following:

In the process of enveloping the maximum values for each node, was the information for the sign and time of the occurrence of the maximum value for each node maintained and used in the calculation? If not, how does the Applicant demonstrate that the results are conservative?

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-78

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to RAI 3006 (#122), Question 03.08.04-35, Luminant states that the effects of wave passage on the tunnel are not considered in the analyses because these effects are small. The staff disagrees with this assumption. Usually, the response of underground tunnels is primarily caused by the ground deformation under free-field condition. There is not much soil-structure interaction taking place because the density of the tunnel is much less than the surrounding soil. The Applicant is requested to provide numerical data to support its assumption that the effects of wave passage on the tunnel can be omitted from the analysis.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-79

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to RAI 3006 (#122), Question 03.08.04-37, Luminant states that the shell element used has five degrees of freedom without the drilling degree of freedom. The SASSI code uses LSST9 plate/shell elements from the Structural Analysis Program (SAP) IV computer code, and that element has six degrees of freedom. The Applicant is requested to:

(1) Provide documentation from the SASSI manual for the shell element used in its analyses;
(2) Explain whether, if the moments are released at the shell-brick interface (free boundary conditions for the moment), the displacements are continuous across the interface; and
(3) Explain whether the forces developed at the interface are used to check the sliding and uplifting of the ESWPT.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-80

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to Part (a) of RAI 3006 (#122), Question 03.08.04-40, Luminant states that by not including the surrounding soil on the south side of the tunnel results in a softening of the structural response and an increase in the seismic demands on the tunnel. While this assumption may, in principle, be acceptable, the Applicant did not provide any data to support it. The Applicant is requested to provide the response spectra used and the frequencies for including and not including the surrounding soil in the model.

In the Part (a) response, the Applicant states that for tunnel Segment 2, a response spectra analysis was performed. Generally, because the tunnel is an underground structure, which due to the high degree of constraint will experience very low inertial forces, the response spectra analysis should not be used. Also, the underground tunnel does not possess classical modes of vibration. The Applicant is requested to provide the rationale that supports its approach to the analysis for tunnel Segment 2.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-81

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to RAI 3006 (#122), Question 03.08.04-47, Luminant states that the power source fuel storage vaults are supposed to be kept full prior to an emergency or other critical event such as an SSE; therefore, full tanks are the normal operating condition for the tanks. The staff agrees with this position. The Applicant further states, however, that the tank is modeled as a rigid beam in the SASSI dynamic analysis. The Applicant is requested to provide data for the fundamental frequency of the tank filled with fuel to confirm that the assumption of a rigid tank in the SASSI dynamic analysis is acceptable.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-82

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

(a) In its response to Part (a) of 3006 (#122), Question 03.08.04-48, Luminant states that the factor of 10 on shear wave velocity represents a factor of 100 on soil shear modulus and Young's modulus. Therefore, Luminant states that this value is considered adequate to reduce soil pressure sufficiently to represent soil separation. Additional information is needed to confirm that this reduction factor is justified. The Applicant is requested to provide a parametric study to support the factor of 10 used.

(b) In Part (b) of its answer, the Applicant states that since SASSI is a linear code, the shear wave velocity reduction is applicable for the entire analysis. The results are enveloped for the non-separated and separated soil cases, bounding the potential peak response. In its review of this part of the answer the staff notices that for the separated soil case only the best-estimate for the soil property was considered. The staff questions why the best estimate soil property provides the bounding case. The Applicant is requested to provide additional information to support their position that the best-estimate for the soil property, rather than the lower-bound estimate of the soil property, is the bounding case.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-83

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to Part (b) of RAI 3006 (#122), Question 03.08.04-51, Luminant describes several precautions that will be specified for the construction of the concrete foundations to account for the large amounts of heat generated in these massive concrete foundations. While these statements are generally acceptable, the staff notes that in its review of the standard plant (US-APWR DCD), the staff requested (RAI 497-3734, question 03.08.04-41) that the DCD applicant, Mitsubishi Heavy Industries, Ltd. (MHI), consider adding these precautions in the section in the DCD covering "special construction techniques". Therefore, it is requested that Luminant also add these precautions in the appropriate section of the FSAR, and further to identify them as special construction techniques.

References:
Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

MHI's Responses to US-APWR DCD RAI No. 497-3734; MHI Ref: UAP-HF-10047; Dated February 19, 2010; ML100550204.

03.08.04-84

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to Part (b) of RAI 3006 (#122), Question 03.08.04-53, Luminant states that the equivalent arrival time methodology is based on the premise that the time required for the seismic wave to travel through the soil column remains unaffected by the changes made in the layer thickness to match the meshing of the structural model. The staff notes that in the theory of elasticity, the S-wave velocity is related to the P-wave velocity by the Poisson's ratio. The Applicant is requested to explain whether its methodology modifies the Poisson's ratio and the shear modulus of the elasticity, or provide justifications for not modifying these parameters.

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.

03.08.04-85

This Request for Additional Information (RAI) is necessary for the staff to determine if the application meets the requirements of 10 CFR 50.55a, and General Design Criteria (GDC) 2.

In its response to RAI 3006 (#122), Question 03.08.04-55, Luminant states that the cutoff frequency for SASSI analysis is between 29 and 51 Hz for the UHSRS, ESWPT, and the power source fuel storage vault (PSFSV). The Applicant states further that the

cutoff frequency for the SASSI analyses is 50 Hz for the Reactor Building (R/B)-PCCV-Containment Internal Structure complex. However, the Applicant did not provide any rationale supporting the selection of the cutoff frequencies between 29 and 51 for the UHSRS, ESWPT, and the PSFSV structures. The staff notices that the input response spectrum for the UHSRS, ESWPT, and PSFSV is the minimum CSDRS response spectrum. This spectrum returns to PGA at 50 Hz. Therefore, the Applicant is requested to provide the rationale for not choosing 50 Hz as the cutoff frequency....

Reference: Luminant's response to request for additional information no. 3006; Log # TXNB-09085; dated December 14, 2009; ML093500123.