

Patel, Pravin

From: Patel, Pravin *NRO*
Sent: Monday, April 26, 2010 9:42 AM
To: 'hou chunlin'
Subject: RE: Email address from Chunlin.Hou
Attachments: Copy of Westinghouse AP1000 TR3 Rev 4 issue table 4_21_10 Rev 2 (2).xlsx

Please see attached

From: hou chunlin (b)(6) *Ex. 6*
Sent: Monday, April 26, 2010 8:52 AM
To: Patel, Pravin
Subject: Email address from Chunlin.Hou

Hi, Pravin

This is my Email address, I need the TR-3 , Rev 4 Issues Feedback.

Thanks for your always help.

Regards

Chunlin

NRC/NRO/DE/SEB1
Tel : 301-415-5480
(North Bethesda, Maryland, US)
Email : (b)(6) *Ex. 6*

Siting and structure division
Nuclear and Radiation Safety Centre
Ministry of environment protection of the People's Republic of China.
Tel : +86 - 10 - 82212616
Fax : +86 - 10 - 62257804

J/S

TR-03, REV 4 ISSUES FEEDBACK

<u>RAI NO</u>	<u>RELEVANT SRP SECTION</u>	<u>ISSUE</u>	<u>Question</u>	<u>DISPOSITION</u>
Question 1	3.7.1.3.3- Percentage of Critical Damping Values	SRP 3.7.1 and Reg Guide 1.61, Rev 1 provides guidance based on 10 CFR Part 50 Appendix A, GDC 2 requirements. The Reg Guide provides guidance to address structural damping used for the analysis. The structural damping helps determine the design of the structure in order to damp the seismic vibration. DCD, Table 3.7.1-1 states that the percentage of critical damping for composite steel and concrete structures (SC) is 5%. Staff notes that the SB structural design has been revised from RC to SC.	In TR-03, provide the value and justification for the critical structural damping used in the SB seismic analysis.	New Issue. Discuss at 4/23/2010 telecon
Question 2	3.7.1 Design Time Histories	TR-03, Rev 4, (page 85), states that a deep soil site has been added with a "unique time history". However, WH did not provide any supporting information describing the details of the unique time history.	(1) What is the definition for the deep soil site? (2) Provide justification for using a unique time history and compare the unique time history response spectra with the AP1000 design response spectra (CSDRS).	New Issue. Discuss at 4/23/2010 telecon
RAI-SEB1-3.7.1-018	3.7.1.3.1	10 CFR Part 50, Appendix S requires that the horizontal component of the SSE ground motion in the free-field at the foundation elevation have a peak ground acceleration of at least 0.1g together with an appropriate response spectrum. AP1000 DCD, Revision 17, Section 3.7.1, "Design Response Spectra," states that the design response spectra are applied at the foundation level in the free field at hard rock sites and at the finished grade in the free field at firm rock and soil sites. NRC Regulation, 10 CFR Part 50, Appendix S, requires that the horizontal component of the SSE ground motion in the free-field at the foundation elevation (i.e., bottom of foundation) have a peak ground acceleration of at least 0.1g together with an appropriate response spectrum. WH did not address the free-field in-column response spectra and associated PGA generated for each of the generic site columns (firm rock and soil sites)	What is the free-field in-column response spectra and associated PGA generated for each of the generic site columns (firm rock and soil sites) considered.	Unresolved. New RAI sent to WH. WH accepted.
RAI-TR03-001	3.7.2.3.3- Procedures Used for Analytical Modeling	TR-03, Rev 4, Section 4.0, does not describe how the SB wall modules are represented in the NI10 and NI20 seismic analysis models. WH to provide additional information on how the SC modules are characterized in the AP1000 NI analyses.	In TR-03, provide a description of how the SC modules are characterized in the AP1000 NI analyses. (e.g., assumptions for "smearing" of SC element properties and for representing the SC/RC connection).	Unresolved.

TR-03, REV 4 ISSUES FEEDBACK

RAI-TR03-005	3.7.2.3.3- Procedures Used for Analytical Modeling	TR-03, Rev 4, Section 4.0, states that concrete structures are modeled with linear elastic uncracked properties and that the concrete modulus is reduced to 80% of it's value to reduce stiffness to reflect observed behavior of concrete when stresses do not result in significant cracking. Staff notes the SB analyses (Levels 2 &3) have not yet been submitted. The staff reviews procedures used for analytical modeling per the SRP 3.7.2 II 3 staff guidance. To be acceptable, the stiffness, mass, and damping characteristics of the structural systems should be adequately incorporated into the analytical models. The staff's concern is that if the SB has significant cracking, there could be a reduction of the fixed-based SB frequency response leading to an unconservative estimate SSC demands.	Based on the SB design changes, provide justification for the assumed 80% reduction in concrete modulus (to account for cracking) given the SB design changes and the more detailed calculations performed (e.g., Level 2 and Level 3 analyses).	Unresolved.
RAI-TR03-007	3.7.2.3.3- Procedures Used for Analytical Modeling	TR-03, Rev 4, Section 4.2.1, states that since the water in the PCS tank responds at a very low frequency (sloshing) and does not affect building response, the PCS tank water mass is reduced to exclude the low-frequency water sloshing mass.	Based on the revised SB design changes, provide justification for the exclusion of water sloshing mass in seismic analyses.	Unresolved.
RAI-TR03-032	3.7.2.3.4.1 - Soil Structure Interaction (CSDRS)	TR-03, Section 4.2.4, describes how the NI05 model was reviewed to identify flexible regions which may produce amplified response spectra. WH has concluded that the NI20 model is too coarse in some areas to pick up all local vibration modes up to 33 Hz, based on comparison to NI05 modal analysis results. Consequently, the seismic response in the middle of some wall, floor, and roof panels is under-estimated, leading to unconservative in-structure response spectra (ISRS) for sub-system design. WH has proposed a method of evaluating these areas, but the TR-03 description of the approach is brief.	Provide more detail information regarding how the comparison addresses flexible wall, floor, and roof panels and include an example case (including results) for staff review.	Unresolved