

PMSTPCOL PEmails

From: Tai, Tom
Sent: Thursday, May 19, 2011 3:30 PM
To: Price, John E
Cc: STPCOL
Attachments: STP Requests for Clarifications on New RAI Responses.docx

John,

Enclosed are some additional clarification requests on three recently submitted RAI responses which included the SASSI2000 subtraction method V&V. Most, if not all of these, will be part of the plan to discuss during next week's audit.

During the audit, as part of SASSI2000 subtraction method V&V discussion, we would like to discuss the recent issues discussed by the Defense Nuclear facilities Safety Board (DNFSB) in a letter dated April 8, 2011, regarding the technical adequacy of subtraction method for analysis of embedded structures. The purpose of this discussion is to ensure that NINA/S&L is aware of these concerns raised by the DNFSB and how these concerns do not affect the results of STP SSI analysis performed for embedded structures. If S&L is trying to re-organize the audit agenda, we'd like to discuss this item as the first topic of Section 3.7 agenda.

Regards

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"STPCOL" <STP.COL@nrc.gov>
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REQUEST FOR ADDITIONAL CLARIFICATIONS ON RAI RESPONSES

RAI 03.07.02-22 (STP Letter U7-C-NINA-NRC-110043)

COLA Markup, Section 3H.6.6.2.1 UHS basin, UHS Cooling Tower Enclosure, and RSW Pump House

The calculated seismic soil pressures on the RSW Pump House North Wall shown in Figure 3H.6-219 from 2D SSSI analysis with other buildings show a significant spike at depths of about 10 to 13 ft below grade with the pressures falling to zero from about 13 to 44 ft below grade corresponding to the bottom of RSW piping tunnel. Please provide explanation for this pressure distribution.

RAI 03.07.02-24, Supplement 1, Revision 1 (STP Letter U7-C-NINA-NRC-110042)

COLA Markup, Section 3H.6.5.3 Seismic Analysis of RSW Piping Tunnel

In the 4th bullet on the following page (Page 11 of 27), please clarify for which soil case the cracked concrete and soil separation analysis was performed. This information is not provided in the COLA markup.

RAI 03.07.01-27, Supplement 1, Revision 1 (STP Letter U7-C-NINA-NRC-110042)

COLA Markup, Section 3H.6.7 Diesel Generator Fuel Oil Storage Vault (DGFOSV)

The second and third paragraphs (Page 38 of 54) discuss two different types of input motions being developed for the seismic analysis and design of DGFOSV. Please provide further clarifications why two different input motions are developed and used in separate SSI analyses of DGFOSV, as discussed in the first paragraph on the following page (Page 39 of 54).

RAI 03.07.02-29, Supplement 1 (STP Letter U7-C-NINA-NRC-110075)

Post Audit Clarification Issue # 6

In response to Post Audit Clarification Issue #6 submitted as part of the response to RAI 03.07.02-29, Supplement 1 (submitted with letter U7-C-NINA-NRC-110075), the applicant has provided comparisons of the response transfer functions of a circular embedded foundation over elastic half space to theoretical solutions to validate the accuracy and stability of the SASSI2000 subtraction method. The response comparisons cover a frequency range corresponding to a_0 values less than 3, where a_0 is a dimensionless parameter equal to $2\pi fr/V_s$, f is the frequency of analysis, r is the radius of foundation and V_s is the shear wave velocity of foundation media. The applicant has stated that comparisons of the response transfer functions for $a_0 > 3$ is not performed because theoretical solutions obtained for similar problems by Apsel & Luco, 1986 are in agreement with the results of Day, 1978 for a_0 less than about 3, but the results start deviating at a_0 of higher than 3.

The site-specific Seismic Category I structures at the STP 3 and 4 sites, such as UHS Basin/RSW Pump House, are generally large structures with significant foundation footprint. For example, UHS Basin has a foundation footprint of approximately 275 ft x 140 ft. With an

equivalent foundation radius of 110 ft, and assuming an average shear wave velocity of about 1000 ft/sec and a cut-off frequency of about 22Hz used in the SSI analysis, the corresponding a_0 value for this structure is calculated to be on the order of about 15 while the test problems are carried out to a_0 values less than 3. Because the shape of the response transfer functions are strongly dependent on the a_0 value (e.g. as shown in Fig. 03.07.02-29 S1.6 provided with this response), the applicant is requested to extend the results of the above test problems in terms of the foundation response transfer functions (including both compliance and scattering functions) calculated using the subtraction method to a_0 values up to at least 8. The inspection of the results is necessary to ensure the accuracy and stability of the subtraction method used for analysis of large embedded structures. Theoretical closed-form solutions are available for comparison to a_0 values of 6 to 8.

DNFSB Issues Related to the SASSI Subtraction Method

The Defense Nuclear Facilities Safety Board (DNFSB) issued a letter on April 8th, 2011 requesting the Department of Energy (DOE) to address technical and software quality assurance issues related to potentially erroneous seismic analyses performed using the SASSI Subtraction method. SASSI subtraction method has been used for STP application for embedded structures. As such, the applicant is requested to review these concerns and assess the potential impact on STP's seismic analysis.