

## PMSTPCOL PEmails

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**From:** Tai, Tom  
**Sent:** Thursday, August 18, 2011 11:15 AM  
**To:** Price, John E  
**Cc:** STPCOL; Chakravorty, Manas  
**Subject:** RE: STP - 7/27 Audit Feedback (Preliminary)

John,

The last line of the e-mail below has an incomplete sentence, it should read:

For the model discussed in item 2 above, comparison of soil pressure distribution obtained from the three methods at the corresponding time **at which the maximum total pressure had occurred.**

Regards

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**From:** Tai, Tom  
**Sent:** Thursday, August 18, 2011 9:18 AM  
**To:** 'Price, John E'  
**Cc:** STPCOL; Chakravorty, Manas  
**Subject:** STP - 7/27 Audit Feedback (Preliminary)

John,

From information audited on July 27, 2011 in S&L's Chicago office, below for your information is a summary of the issues we identified that need further consideration to resolve DOE SASSI issues, followed by a more detailed description. This list is preliminary and is by no means complete nor in its final form and contents. To support the paper trail in preparing the SER, we are considering capturing these issues in a new RAI.

### **Brief Summary of STP Issues:**

- Confirm that RB/CB departure evaluation using the SM for **inter structure soil pressure verification is acceptable.** (Issue 1) – This is not an issue since DCD structures are designed for higher level of 0.3g. However, the bases need to be documented in the FSAR.
- Demonstrate that the **amplified input spectra** used in the analysis for DGFOT, RSWPT, and DGFOSV is not affected when MSM is used for reassessment of the effect of heavy structures on the nearby lighter structures. Alternatively, use modified amplified spectra derived from the use of MSM. (Issue 2, 3, and 6)
- NRC to assess STP's **use of margin analysis instead of direct assessment** considering the equivalent accelerations obtained from the UHS/RSWPH seismic analysis using the MSM. (Issue 4)
- STP did not fully demonstrate **acceptability of the soil pressure obtained from either the MSM or SM in comparison to results obtained from the DM.** This issue needs further discussion. (Issue 5, 7)
- Ensure that **stability evaluation of category I structures** incorporate the impact of DNFSB issues. (Issue 8)

- **Confirm that amplified seismic input for II/I design and stability evaluation of RWB, CBA, SB, TB, and RW Tunnel (if applicable) is not affected.** (Issue 8)
- **Ensure that pressure obtained from the current 2D SSSI model consisting of RSWPH, RSWPT, DGFOSVs, and RB is conservative for RSWPH North wall, and RSWPT south wall.** (Issue 10)
- **Review Punch List, RAI responses, and FSAR and revise them as appropriate in light of addressing DNFSB issues.** (Issue 9)

#### **Detailed description of Issues:**

1. CB/RB departure assessment used Direct Method (DM). What was the method of analysis for RB/CB SSSI departure assessment (SM or DM)? If SM was used, **need some justification that use of SM for the SSSI departure assessment is acceptable.**
2. SSI analysis of DGFOT used SASSI DM. DGFOT analysis is being repeated using DM to extract seismic SSI soil pressure. This is acceptable for determination of SSI pressure, structural response quantities, and ISRS. However, the applicant should demonstrate that the **seismic input (i.e., amplified input spectra due to presence of the nearby heavy structures) used for SSI analysis of DGFOT is not affected** when modified subtraction method (MSM) is used for the reanalysis (to address DNFSB issues) of the nearby heavy structures.
3. SSI analysis for the RSWPT used DM. This is acceptable for determination of SSI pressure (need to verify whether SSI soil pressure was extracted from the DM), structural response quantities, and ISRS. However, the applicant should demonstrate that the **seismic input (i.e., amplified input spectra due to presence of the nearby heavy structure) used for SSI analysis of RSWPT is not affected** when MSM is used for the reanalysis (to address DNFSB issues) of the nearby heavy structures.
4. For UHS/RSWPH, SSI analysis is being repeated using MSM. ISRS based on SM will be modified as a result of the new analysis results based on MSM. Structural design based on SM remains unchanged. Assessment of the **Impact of MSM on the design of beams and column within the basin is not complete.** STP did not perform a direct evaluation of the design of the selected panels of UHS/RSW Pump House using the modified average accelerations obtained from the MSM. Instead, **STP used a margin analysis based on the SSI TH analysis and the equivalent static method used in the design.** Staff indicated that while equivalent static analysis generally yields conservative results, it will further assess the use of this approach from design standpoint for acceptability.
5. While SSI soil pressures obtained using both the SM and the MSM were in general comparable (See Figure 4.13 of July 27 presentation), the results, presented at July 27, audit, **did not fully demonstrate acceptability of the soil pressure obtained from either the MSM or SM in comparison to results obtained from the DM.** STP's project specific confirmation of the MSM method (using CB SSI analysis) or the SSSI analysis performed for one model (consisting of RWB, RSW Tunnel, and RB) did not include any comparison of the transfer functions of the soil pressure parameter at the interaction nodes at the exterior walls and the interacting adjacent building walls. STP indicated that potential **impact on design of any changes in soil distribution due to method of analysis will be demonstrated** by engineering judgment. The staff will further review and discuss this issue with STP.
6. DGFOSV SSI analysis is being revised using MSM. Forces and accelerations and ISRS were generated. Design is not expected to change. This is acceptable to the staff. However, the applicant

should demonstrate that **the seismic input (i.e., amplified input spectra due to presence of the nearby heavy structure) used for SSI analysis of DGFOVS is not affected** when MSM is used for the reanalysis (to address DNFSB issues) of the nearby heavy structures.

7. For SSSI analysis (for soil pressure determination considering interaction of adjacent building) only one model (consisting of RWB, RSW Tunnel, and RB) was evaluated using the DM, SM, and MSM. STP has completed the analysis only for the lower bound soil case (UB case using backfill will also be performed). Preliminary results indicate that absolute soil pressure profile obtained from SM and MSM in some instances (particularly for exterior walls) did not compare well with those obtained from the DM. However, maximum total wall force (obtained from the TH analysis) due to soil pressure in general is within 5% for all three methods. Based on this analysis, STP preliminarily concluded that the soil pressure obtained from SM is acceptable. Further clarifications regarding the entries (including how they were computed) presented in Table 5.1 provided by STP at July 27 Audit are needed. **The potential impact on design of any changes in soil pressure distribution due to method of analysis will be addressed** in item 5 above.
8. STP should reevaluate Clarification Issue 3 for **establishing seismic demand of II/I and applicable Category I structures in light of DNFSB issue** and initiate appropriate actions including any revision of the amplified input spectra for stability evaluation and FSAR.
9. STP should review **all the Punch List Items and any applicable RAI responses to determine if any of the responses previously provided should be revised** as a result of the assessment performed for addressing DNFSB issues.
10. The issue of zero SSSI pressure on portions of the RSWPH North wall (Figure 3H.6-219, letter NRC-110096) was further discussed with STP at July 27, 2011 meeting. It was indicated that there is a gap at these locations between the RSWPT south wall and the RSWPH north wall filled by the compressible material. However, for better clarity and understanding of the analysis model, STP is requested to provide an engineering sketch showing typical sections between the RSWPT and RSWPH including the tunnel entries to the RSWPH.

In addition it was noted that Section 7 of Figure 1 (see seismic soil pressure handout of July 27 meeting) was cut through RSWPH north wall, inter space between the tunnel entries to the RSWPH north wall, RSW tunnel cross section, and other buildings. However Figure 3H.6-211 (see letter NRC-110042 - 2D SSSI model of RSWPH, RSWPT, DGFOVSs, and RB) indicates that the actual SSSI model section has been cut through the tunnel entries to the RSWPH instead of the inter space between the tunnel entries as depicted in Section 7. While the SSSI model analyzed appears to be consistent with the soil pressure shown in Figure 3H.6-219, the resulting SSSI pressure may not conservatively represent the interaction pressure that could develop on RSWPH North wall and RSWPT south wall through interaction of soil in the space enclosed by the tunnel entries, RSWPH North wall, and RSWPT south wall. The applicant is requested to address this issue and demonstrate that **SSSI interaction pressure used for design is still conservative**.

11. Tentative. For UHS/RSWPH, RSW Tunnel (SSSI pressure), and DGFOVS, need **further demonstration of soil pressure comparability at the interaction nodes at the exterior and interior wall between DM and SM/MSM for justifying the basis of SSI/SSSI soil pressure**. Following or other options may be considered:
  1. Comparison of SSI soil pressure transfer function obtained from CB analysis by DM and SM/MSM at selected exterior wall nodes as part of project specific confirmation (Poisson's ratio 0.495)

2. *Comparison of soil pressure transfer functions (for the SSSI model consisting of RWB, RSW Tunnel, and RB) at representative interaction nodes for both exterior and interior walls for the three methods*

*For the model discussed in item 2 above, comparison of soil pressure distribution obtained from the three methods at the corresponding time at*

Regards

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**From:** Tai, Tom

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