PMSTPCOL PEmails

From: Price, John E [jeprice@STPEGS.COM]
Sent: Thursday, May 12, 2011 3:57 PM
To: Tai, Tom
Cc: STPCOL
Subject: RE: STP - March 2011 Audit Summary
Attachments: 3.7 & 3.8 Action Item Completion for May Audit 051011.pdf

Tom,

Please find attached the latest NINA/S&L list of audit/action items that has been issued. If you have any questions please give me a call. Regards,

John E. Price
Licensing Engineer - STP Units 3 & 4
972.754.8221 (cell)

From: Tai, Tom [mailto:Tom.Tai@nrc.gov]
Sent: Thursday, May 12, 2011 2:51 PM
To: Price, John E
Cc: STPCOL
Subject: STP - March 2011 Audit Summary

John,

The March 14-18, 2011, audit report is being signed. If you want to access the document, it is in ADAMS, ML111320094.

In yesterday's telephone conversation, S&L (Bob Hook?) said S&L had updated the list of audit items. I believe it is up to item 12 but there are additional ones such as the nine we sent to you plus the Reviewer's Guide comments. Are you still planning to send them to me?

Regards

Tom Tai
DNRL/NRO
(301) 415-8484
Tom.Tai@NRC.GOV

Hearing Identifier: SouthTexas34Public_EX
Email Number: 2783

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Subject: RE: STP - March 2011 Audit Summary
Sent Date: 5/12/2011 3:56:32 PM
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From: Price, John E

Created By: jeprice@STPEGS.COM

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Tracking Status: None

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May 10, 2011

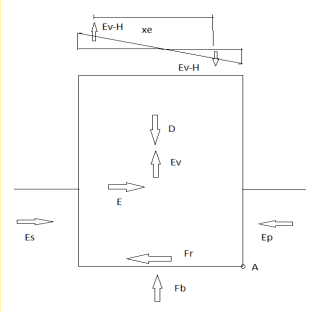
Schedule of RAIs Resulting from
Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
Post Audit Clarification Requests from NRC

Clarification	Status
Issue 1 [Received 04/04/2011] (Audit Action 3.7-7): Revise Appendix 3A and 3H.6 to reconcile ground water elevation with Chapter 2 Inconsistencies were noted among various Sections of the FSAR concerning the specified design ground water level and the ground water level used in the seismic analysis for Category I structures. For example in FSAR Section 2.4S.12.5, it is stated that *"In summary, based on measured groundwater levels in observation wells and modeled post-construction groundwater levels, the maximum post-construction groundwater elevation at the STP Units 3 and 4 site is estimated to be 28 ft MSL, as reflected in Table 2.0-2. The nominal finished plant grade in the power block area is approximately 34 ft MSL,* ***six feet*** *higher than the site characteristic maximum groundwater level."* Appendix 3H.6.4.2.2, Design Ground Water Level, also specified ground water level at 28 MSL establishing the depth of water table at **six feet** below the grade. However, in Section 3A.15, Site Conditions, it is stated that *"Based on the site groundwater conditions described in FSAR Subsection 2.4S.12, the groundwater elevation of approximately* ***eight feet*** *below grade was used in the analysis to determine the soil properties."* It is also noted that SSI model for the seismic analysis of Category I structures considered the ground water table to be approximately at **eight feet** below the grade elevation. As such, the applicant is requested to address these inconsistencies among various sections of the FSAR and the seismic analysis model and revise the applicable FSAR sections on groundwater level and structural design criteria. The applicant is specifically requested to demonstrate that the FIRS, GMRS, and the results of seismic analysis of the Category I structures including the results of stability calculations as currently established in the COLA are not adversely affected and include this justification in the applicable FSAR sections.	Will be answered with resolution of Action Item 3.7-7
Issue 2 [Received 04/04/2011] (Audit Action 3.7-6/3.7-8/3.7-36)**:** Why for SSSI of RSW Tunnel was UB in situ used vs. UB backfill soil? Review of responses to RAI 03.07.01-27, Supplements 1, Revision 1 indicates that two 2D SSSI models (East-West and North-South Sections) are analyzed to evaluate the effects of nearby structures on the three DGFOSVs and calculate the seismic soil pressures. In the East-West direction 2-D SSSI DGFOSV model (DGFOT 1C + DGFOSV 1A + CFRW), five cases of soil and backfill properties are considered to evaluate the effects of the soil and backfill properties variation. Also response to RAI 03.07.01-27, Supplement 2, Revision 2 indicates that in the East-West direction for DGFOT 1A (RB + DGFOT 1A + CFRW), five cases are run with various combinations of soil and backfill properties. However, in the North-South direction **(UHS/RSWPH + RSW Tunnel + DGFOSV 1B + DGFOSV 1C + RB),** only one case was Also as discussed in response to RAI 03.07.02-24, Supplement 1, Revision 1, in the East-West direction for dynamic soil pressure evaluation for RSW Tunnel and RWB walls, the 2 D SSSI model **(RB + RSW Tunnel + RWB)** included only the UB in situ soil without any evaluation for backfill properties. As such, the applicant is requested to demonstrate that consideration of only UB soil profile instead of using a combination of UB soil and backfill parameters for the cited cases will still be conservative for the wall design of all site specific Category I and RWB structures (UHS/RSWPH, DGFOSV, RSW Tunnel, UHS/and RWB). The applicant is also requested to include this evaluation in the applicable sections of the FSAR.	Will be answered with resolution of Action Items 3.7-6, -8 and -36.
Issue 3: [Received 04/04/2011; New Action Item] Clearly describing in the FSAR how seismic demand for non-seismic II/I structures for stability evaluation is It is not clear from the descriptions in the FSAR as to how the seismic demand is determined for the site-specific stability evaluation of the non-seismic II/I structures considering the influence of nearby heavy structures during SSE. As such, the applicant is requested to describe in sufficient detail in the FSAR the following information: 1. How the input motion at the foundation level of the non-seismic II/I structures are determined using the site specific SSE input spectra applied at the ground surface 2. How the effects of nearby heavy structures are included in the input response spectra for various soil and backfill conditions 3. Demonstrate that horizontal input response spectra at the foundation level of non-seismic II/I structures is broad band spectra with peak acceleration greater than 0.1g and envelops FIRS 4. Types of seismic analysis performed to determine seismic demand for stability evaluation (i.e., fixed base analysis, equivalent static or dynamic analysis, or SSI analysis) and how the input is specified in the analysis 5. Include 5% damped input response spectra (vertical and horizontal) as amplified by the presence of nearby heavy structures used in the seismic demand evaluation for site-specific stability analysis for non-seismic II/I structures Discuss or refer to appropriate FSAR section of any differences in the method of stability evaluation from that of Category 1 structures	**Provided draft of response in an e-mail on 4/19/11.** Response will be provided in RAI 03.08.04-18 S3 by May 17, 2011.

Schedule of RAIs Resulting from
Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
Post Audit Clarification Requests from NRC

Clarification	Status
Issue 4: [Received 04/04/2011] (Audit Action Item 3.8-8) Sliding Friction Coefficients reported in Table 3H.6-14 Designate whether the friction coefficients reported in Table 3H.6-14 are static or dynamic coefficient of friction values.	Will be answered in response to RAI 3.7.2-13 S1, along with resolution of Action Item 3.8-8, by 04/26/11
Issue 5: [Received 04/04/2011] (Audit Action Item 3.8-8) Referencing Table 3H.6-5 Section 3H.6.6.5 refers to Table 3H.6-5 for factors of safety against sliding and overturning for RSW piping tunnel. However, Table 3H.6-5 provides values for RSW pump house. Please verify the acceptability of this reference Table.	No further action required. This issue was previously addressed in letter U7-NINA-NRC-110042, March 7, 2011, that transmitted RAI Response 03.07.02-24 S1, R1.
Issue 6: [Received 04/04/2011] (Audit Action Item 3.7-28) SASSI2000 Subtraction Method Validation In reviewing the SGH SASSI2000 V&V of the subtraction method, it was found that the test problems (SAS-3C, SAS-4C and SAS-8) are not analyzed to sufficiently high enough frequencies that can validate the stability and accuracy of the subtraction method for passing frequency of $V_s/5h$, where V_s is the lowest shear wave velocity of the foundation media and h is the largest element size in the soil model. In the case of S&L SASSI2000 V&V Test problems 4 and 8 used in validation of the subtraction method, the analyses were carried out to sufficiently high frequencies to cover the passing frequency requirement of $V_s/5h$. However, the conclusion does not address the stability and accuracy of the subtraction method used in the context of the calculated results. In both cases, the applicant is requested to revisit the test problems and provide validation that adequately addresses the stability and accuracy of the subtraction method in relation to the acceptable passing frequency of $V_s/5h$ used in the STP 3&4 design.	Will be answered in response to RAI 3.7.2-29 S1, along with resolution of Action Item 3.7-28, by 05/10/11
Issue 7: [Received 04/04/2011; New Action Item] SAP2000 V&V The response to RAI.03.07.02-29, Rev. 1, documents additional validation problems for SAP 2000. The validations include: 1) Section cuts 2) Thick shell out-of-plane response 3) Time history modal superposition with shell elements 4) Spectra calculation using thick shell elements Validation of item "1" was done by hand calculation. For items "2", "3" and "4", the benchmark solutions for validation were developed with ANSYS utilizing "SHELL43 "element, which is well suited to model linear, warped, moderately-thick shell structures according to ANSYS User's Manual. For items "2", "3" and "4", the following acceptance criteria were used: 5% for frequencies, 10% for forces, and 15% for spectra. The 5% difference is considered acceptable within the engineering accuracy, while the 10% and 15% criteria may be excessive. The applicant is requested to assess the impact of the above acceptance criteria on the STP 3&4 design.	**Provided draft of response in an e-mail on 4/19/11.** Will be answered in response to RAI 3.7.2-29 S1 by 05/10/11

Schedule of RAIs Resulting from
Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
Post Audit Clarification Requests from NRC

Clarification	Status
Issue 8: [Received 04/04/2011] (Audit Action Item 3.7-33 and 35) Stability Analysis Procedure A brief presentation of the stability analysis procedure was made by the applicant during the March 14, 2011 audit. The presentation included a rigid body diagram showing the forces acting on the structure for stability calculations. The applicant indicated that the total seismic demand is calculated by summing all the inertia forces and moments acting on the structure. These inertia forces are calculated by multiplying the mass of each node by the absolute value of the maximum acceleration response at that node obtained from the SSI analysis. The calculation of the seismic overturning moment is based on the horizontal seismic load E and vertical seismic load Ev about tipping point A, as shown in the figure below. The moment due to horizontal earthquake does not include Ev-H (vertical force due to horizontal input) which also produces overturning moment about A. The applicant is requested to provide justification for not including the vertical component of response due to horizontal seismic input in calculating the foundation overturning moment.  E – Horizontal seismic force E_v – Vertical seismic force E_s – Soil active force E_p – Soil passive resistance D – 0.9 of dead load F_b – Buoyancy force F_r – Frictional resistance	Will be answered with resolution of Action Items 3.7-33 and -35
Issue 9: [Received 04/13/2011; New Action Item] DGFOSV Calculation U7-YARD-C-CALC-DESN-6001, Rev. B In DGFOSV calcuation for SSI analysis, U7-YARD-C-CALC-DESN-6001, Rev. B, the refined model spectra values are 14.6% higher at 3.8 Hz. than those in the base model. The applicant is requested to provide justification for reconciling this difference.	**Provided draft of response in an e-mail on 4/19/11.** No further action required. This issue was previously addressed with NINA letter U7-C-NRC-NINA-110042 transmitting RAI Response 03.07.02-24 S1, R1.

Schedule of RAIs Resulting from
Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
Post Audit Clarification Requests from NRC

Clarification	Status
Issue 10: [Received 04/13/2011; New Action Item] (Issue 1 (New)): Calc Report, U7-YARD-S-CALC-DESN-6001, Rev. E: "Basic Structural Design of Diesel Generator Fuel Oil Storage Vaults" The seismic design of the DGFOSV is performed with equivalent static forces, whereby the inertial forces are computed as products of masses and accelerations. The accelerations are taken from the corresponding SSI analyses as to envelope all soil conditions, design parameters, and seismic input motions. The masses are determined form the building drawings and specific weights for concrete, oil, steel and soil. The SAP structural model is divided into regions, and constant average acceleration values are applied to each region, simulating the absolute acceleration distribution of the SSI model. These inertial forces are applied in global X, Y and Z direction as external static loading to the nodes and elements of the SAP model. The response quantities, i.e. internal forces, displacements, etc., resulting from each earthquake component are combined by the SRSS rule. As a verification of the equivalent static procedure, the resultant base shear, total vertical base force and overturning moments obtained from the SAP model are compared to the corresponding values of the SSI (SASSI) model. If required, adjustment factors are applied to the input acceleration components in SAP as to provide base forces and moments which envelope the corresponding SSI base values. The maximum resultant SSI absolute acceleration values are approximately: X=0.31g; Y=0.31g and Z=0.33g. The equivalent horizontal acceleration values obtained from the SAP analysis are: X=0.33g and Y=0.32g and therefore match closely the SSI accelerations. The equivalent vertical acceleration in the SAP analysis however, had to be amplified by a factor of about 1.27 to yield Z=0.42g, in order to meet the total base forces and moments from the SSI analysis. As both, the SASSI and the SAP models, should be based on the same geometry and total weight and are subject to the same absolute accelerations, it is not apparent why an additional, relatively large amplification would be needed in vertical direction to obtain comparable total base seismic loads. Therefore, the applicant is requested to provide a justification regarding the different behavior of both structural models.	Will be responded to in response to RAI 3.8.4-30 S2, by 05/17/2011.
Issue 11: [Received 04/13/2011; New Action Item] MACTEC Presentation on Friction and Cohesion Values used in Stability Evaluation of R/B Lateral sliding stability against seismic loads is based on soil resistance at the foundation-soil interface (friction/ cohesion), and on lateral earth pressures acting on the embedded basement walls. Based on analyses and testing, dynamic friction and cohesion values are typically lower than the corresponding static values. Thus, for the STP units, static cohesion values are reduced 20% to account for dynamic soil behavior. The applicant's justification for this reduction is based on a publication by Makdisi and Seed from July 1978, which states that in most cases cyclic yield strength of clayey material appears to be 80% of the static undrained strength for typical shear strains obtained from earthquake soil response analyses. According to the above reference, the dynamic reduction of cohesion strength is shown to be significantly affected by the strain level present in the soil layers during a seismic event. Therefore, the applicant is requested to provide a comparison between the strain ranges assumed in the above reference and the strain values expected beneath the foundation of Cat I buildings of Units	Will be responded to in response to RAI 3.8.4-28 S1, by 04/26/2011.
Issue 12: [Received 04/20/2011; New Action Item] (Action Item 3.8-24) RSW Tunnel Calculations Applicant is requested to explain the apparent discrepancy with the 3,000 ft/sec sheer wave velocity denoted in the COLA and a value of 6,600 ft/sec used for the wave propogation effect in the calculationscalculation.	The calculaions will be revised or the values used will be justified.

Schedule of RAIs Resulting from
Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
Post Audit Clarification Requests from NRC

Clarification	Status
Issue 13: [Received 05/04/2011; New Action Item] Comments on Response to RAI 03.08.04-18 R1 S2	
1. Design and Analysis (3H.3.5.1 & 2) These sections describe the seismic and structural analysis of the RW/B, whereby the seismic response accelerations are obtained from a fixed base stick model subjected to a 0.15 RG 1.60 input ground motion spectrum. These accelerations subsequently are applied to a refined 3D SAP FE model. The applicant is requested to explain why using a fixed base model was considered adequate. Furthermore, it is not clear what type of SAP analysis was performed and how the results from the seismic stick model analysis were applied to the 3D finite element model. Clarification should be given as to how local amplification effects, i.e. of slabs and walls are considered in the design. In a previous response the applicant stated that the influence of nearby heavy buildings, i.e. R/B, on the seismic input motion was considered. The applicant is requested to include in the FSAR how the effect of the adjacent R/B was considered in the input motion for the RW/B, and to include the input ground spectra for the appropriate damping used in design of the RW/B.	The following item was not completed during the March 2011 Audit. J. Site Specific Seismic Analyses of Radwaste Building • Amplified input motion considering the effect of nearby Reactor Building • Fixed base seismic analysis for determination of seismic SSE forces for II/I design
FSAR Table 3H.3-1 provides vertical accelerations for the RWB at three floor elevations. It is not clear why horizontal accelerations are not included in the FSAR. Please include the horizontal accelerations for the RWB in the FSAR.	This subject will be discussed at the May Audit.
2. II/I Analysis and design (3H.3.5.3) FSAR Section 3H.3.5.3 states that for II/I design, the structure is conservatively designed to remain elastic. The earthquake input used at the foundation level is the envelope of 0.3g RG 1.60 response spectrum and the induced acceleration response spectrum due to site-specific SSE. However, the FSAR does not describe how the seismic analysis and design is performed using the seismic input motion. Please describe in the FSAR how seismic analysis and design is performed for the RWB for II/I design.	This subject will be discussed at the May Audit.
3. Load Combination for Shear (Steel) (3H.3.4.3.4.2) FSAR Section 3H.3.4.3.4.2 provides load combinations for structural steel design for RWB. The sixth load combination has a stress coefficient of 1.6. According to ANSI/AISC N690-1994 (R2004), Supplement 2, Table Q1.5.7.1, Note g, the stress limit coefficient in shear shall not exceed 1.4 in members and bolts. The applicant is requested to note the above limitation in the FSAR.	This subject will be discussed at the May Audit.
4. Ultimate soil bearing capacity (3H.3.4.2.1) This section shows static and dynamic ultimate soil bearing capacities for the RW/B. The applicant is requested to state in the FSAR how these values were derived.	This subject will be discussed at the May Audit.
5. Tornado Parameters (3H.3.B & 3H.3.4.3.3.1) These sections show different parameters to define tornado loads which depend on the design goal. The Design Information Table provided at the Mar 2011 Audit Meeting differs from the definitions in the FSAR text and provides specific design parameters for three different situations: main design of the structure, stability analysis and II/I design. The applicant is requested to reconcile the information in the FSAR text with the contents of the Design Information Table, and to make reference to the table if it should be incorporated in the FSAR.	This subject will be discussed at the May Audit.
6. Flood Design (3H.3.4.2.3) This section defines the DBF as 33 ft MSL and is taken to correspond to the DCD design parameter for flooding (one ft below grade). The Design Information Table differs from the definitions in the FSAR text and provides specific design parameters for three different situations: main design of the structure, stability analysis and II/I design. The applicant is requested to reconcile the information in the FSAR text with the contents of the Design Information Table, and to make reference to the table if it should be incorporated in the FSAR.	This subject will be discussed at the May Audit.

Schedule of RAIs Resulting from
Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
Post Audit Clarification Requests from NRC

Clarification	Status
Issue 14: [Received 05/04/2011; New Action Item] Comments on Response to RAI 03.08.04-30 S1 **7. Extreme wind and tornado loading (3H.6.4.3.2)** In its response to this RAI the applicant uses Criterion 4 of SRP 3.3.1 to justify 50 year wind velocity in the wind pressure equation. However the staff notes that Criterion 4 just means that using table C6-7 of ASCE 7 is acceptable to convert 50 year into 100 year MRI and does not refer to the importance factor, and that therefore the procedure is not consistent with SRP 3.3.1, which requires a 100 year wind in addition to the importance factor of 1.15. This approach was also confirmed during the review of FSAR section 3.3.1. In light of recorded hurricane velocities exceeding 134 mph at the site, the staff needs to further evaluate this deviation from the SRP requirements. The staff also noted that the SRP 3.3.2 design requirements are met for tornado loadings (including the importance factor of 1.15), and that the tornado design thus follows the SRP recommendations.	This subject will be discussed at the May Audit.
Issue 15: [Received 05/04/2011; New Action Item] Comments on Response to RAI 03.08.04-35 **8. Foundation bearing pressures reconciliation** In its response to this RAI the applicant states that the slab edges have to be fixed in order to perform the verification analysis. The applicant is requested to explain this approach, especially if boundary conditions which do not reflect real conditions are going to be introduced in the analysis. All possible load eccentricities (plus / minus components) need to be verified. Justification is needed to base the verification on only one load combination (with the lowest safety factor)	This subject will be discussed at the May Audit.
Issue 16: [Received 05/09/2011; New Action Item] Comments on Response to RAI 03.08.04-19, Supplement 1 **9. Coefficient of Friction** In its response RAI 03.08.04-19, Supplement 1, dated April 25, 2011, the applicant addressed the issue of coefficient of friction raised in audit item 3.8-8. The applicant revised the site-specific ITAAC to require the waterproofing membrane to have a minimum static coefficient of friction of 0.75, and also provided a Table that specifies that the concrete to concrete interface joints will be intentionally roughened to have a minimum static coefficient of friction of 0.75. However, the applicant did not explain how the specified minimum static coefficient of friction at the various interfaces, specifically at the waterproofing membrane, was compared with the dynamic coefficient of friction of 0.47 assumed for soil, and considered acceptable. Also, the requirement of intentionally roughening the concrete surface should be included in the FSAR.	This subject will be discussed at the May Audit.
Issue 17 [Received 05/09/2011; New Action Item] Miscellaneous Questions from Audit and Reviewers Guide 1. FSAR Section 3H.6.4.3.3.3 refers to Figure 3H.6-44 and Figures 3H.6-245 through 3H.6-247 for lateral soil pressure for design of RSW Piping Tunnels. It is not clear why Figures 3H.6-212 through 3H.6-217, which provides lateral soil pressure on RSW Tunnels considering effects from adjacent RB and RWB, are not included here. 2. Figure 3H.6-44 in the Reviewer's Guide did not include the coordinate axes. 3. Figures 3H.6-138 and 139 are not clear, and, at least, the ZPA values should be annotated in the Figures. 4. Please describe if static surcharge pressures from adjacent buildings were considered in design. 5. For clarity, Figure 3H.6-137 should be appropriately annotated regarding its applicability. 6. Please clarify if the design table provided to us is going to be included in the FSAR. Because of the complexity of the various loadings used for the same building for various types of analysis, it is strongly recommended that this table be included in the FSAR.	1. TBD 2. TBD 3. TBD 4. TBD 5. TBD 6. TBD

Schedule of RAIs Resulting from
March 14-18, 2011
Section 3.7

Ready for Audit by May 23, 2011
Ready for Audit After May 23, 2011

No.	Subject	AI No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Status/Further Action	Status / Notes	RAI	Letter to NRC	Ready for Audit
0A	**Mesh Sensitivity** Refer to Action Item 3.7-18								**Reviewed during March Audit**	**03.07.02-25, R1 03.07.02-29, R1**	**3/15/11**	**3/15/11**
0B									**Reviewed during March Audit**	**03.07.02-22**	**3/15/11**	**3/15/11**
0C	**Hydrodynamic Mass** Refer to Action Item 3.7-15								**Reviewed during March Audit**	**03.07.02-28**	**3/15/11**	**3/15/11**
1	**Part 21**	N/A	Provide ITAAC to close 10CFR21 issue related to dynamic analysis of the Turbine Building		S&L	Agrawal	CLOSED	Will provide an ITAAC		**03.07.02-31**	**3/28/11**	**3/28/11**
2	**Specification Update**	3.7-26	Confirm that DGFO tank rigidty requirement is included in the procurement specification	Chakravorty	S&L	Agrawal	CLOSED	Will add requirement to spec.		**N/A**	**Complete**	**4/8/11**
3	**RWB Seismic Calculation**		Site Specific Seismic Analyses of Radwaste Building • Amplified input motion considering the effect of nearby Reactor Building • Fixed base seismic analysis for determination of seismic SSE forces for II/I design					Not Audited by NRC		**N/A**	**Complete**	**4/8/11**
4	**ITAAC for II/I**	3.7-1	NRC would like to have an ITAAC for II/I design in addition to the current discussions in COLA, RAI 03.07.02-20	Chakravorty	S&L	Agrawal	CLOSED	Will provide an ITAAC		**03.07.02-20 S1**	**4/13/11**	**4/13/11**
5	**V&V**	3.7-2	Determine if FSAR (Appendix 3C) revision is required for the use of computer programs used by Westinghouse	Sumodobila	S&L	Agrawal	CLOSED	Will provide information in COLA		**03.07.01-2 S2**	**4/13/11**	**4/13/11**
6	**Time History**	3.7-11	Include in FSAR the following information for the time histories developed for 0.3g, 1.60 Reg. Guide spectrum: 1) Development method by reference to DCD; 2) Plots of three acceleration time histories; 3) Comparison of 5% response spectra	Chakravorty	S&L	Agrawal	CLOSED	Will provide information in COLA				
7A	**V&V**		Justify comparison of SAP2000 to ANSYS		S&L	Moslemian		**New Action Item as of 4/5/11**	**Clarification Issue 7**	**03.07.02-29 S1**	**5/10/11**	**5/10/11**
7		3.7-28	SASSI Validation - Run aspect ratio problem with reduced shear wave velocity in vertical direction and get transfer function at the center of the slab	Tabatabaie	S&L	Singh	CLOSED	S&L to revise the SASSI2000 test problem for two way slab action to match that by SGH. Add a cautionary note to SASSI2000 release memo for users to examine transfer functions for any sign of instability	**Clarification Issue 6**			

Schedule of RAIs Resulting from
March 14-18, 2011
Section 3.7

Ready for Audit by May 23, 2011
Ready for Audit After May 23, 2011

No.	Subject	AI No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Status/Further Action	Status / Notes	RAI	Letter to NRC	Ready for Audit
8	COLA Update Only	3.7-3	Check RSW Piping Tunnel SSI analysis description to see if it fully describes how the motion at various points of tunnel were addressed/amplified	Tabatabaie	S&L	Moslemian	CLOSED	Provide additional description in COLA, as needed. See Item 3.7-22		03.07.01-27 S3	5/17/11	5/17/11
9		3.7-4	Check DGFOS VAULT SSI analysis description to see if it fully describes how the motion at various points of vault were addressed/amplified	Tabatabaie	S&L	Moslemian	CLOSED	Provide additional description in COLA, as needed. See Item 3.7-22				
			In DGFOSV calcuation for SSI analysis, U7-CALC-DSN-6001, Rev. B, the refined model spectra values are 14.6% higher at 3.8 Hz. than those in the base model. The applicant is requested to provide justification for reconciling this difference.					**New Action Item as of 4/13/11**	**Clarification Issue 9** No further action, answered on a previous RAI	**N/A**		
10		3.7-5	Check DGFOS TUNNEL SSI analysis description to see if it fully describes how the motion at various points of tunnel were addressed/amplified	Tabatabaie	S&L	Moslemian	CLOSED	Provide additional description in COLA, as needed. See Item 3.7-22		03.07.01-27 S3		
11		3.7-19	Provide a figure in COLA showing 0.3g Reg. Guide 1.60 spectra envelopes amplified motions for all three storage vaults	Chakravorty	S&L	Moslemian	CLOSED	Provide a figure in COLA showing 0.3g Reg. Guide 1.60 spectra envelopes amplified motions for all three storage vaults				
12		3.7-22	Include amplified site-specific spectra for RSW Piping Tunnel, DGFOSV, and DGFO Tunnel in FSAR	Chakravorty	S&L	Moslemian	CLOSED	Include amplified site-specific spectra for RSW Piping Tunnel, DGFOSV, and DGFO Tunnel in FSAR				
13	Cracked Concrete	3.7-27	Consolidate all 03.07.01-27 responses. Also include the spectra comparisons for what was done in the audit for cracked concrete cases.	Tai	S&L	Agrawal	CLOSED	Consolidate all 03.07.01-27 responses. Also include the spectra comparisons for what was done in the audit for cracked concrete cases.	**With reader's guide provided, there is no need to consolidate 3.7.1-27. Spectra comparisons will be provided.**			
14	Upperbound (UB) Soil Case	3.7-36	As a minimum for All SSSI anlaysis upperbound and upperbound backfill should be considered	Chakravorty	S&L	Moslemian	CLOSED	Confirm that as a minimum for All SSSI anlaysis upperbound in-situ and upperbound backfill should be considered. Provide additional information in RAI response as appropriate	**Clarification Issue 2**			
15		3.7-6	Identify soil cases used for all SSSI analysis, and provide basis.	Tabatabaie	SGH/S&L	Singh	CLOSED	As a minimum for All SSSI anlaysis upperbound and upperbound backfill should be considered. Review COLA markup for consistency with soil cases analyzed				
17		3.7-8	Why for SSSI of RSW Tunnel was UB in situ used vs UB backfill soil	Chakravorty	SGH/S&L	Bolourchi	CLOSED	As a minimum for All SSSI anlaysis upperbound and upperbound backfill should be considered. Review COLA markup for consistency with soil cases analyzed				
18	COLA Update Only	3.7-10	Clarify SSSI soil pressures in COLA figures to indicate that they represent envelope of all soil cases analyzed	Chakravorty	S&L	Moslemian	CLOSED	Clarify SSSI soil pressures in COLA figures to indicate that they represent envelope of all soil cases analyzed				
	Groundwater			N/A			N/A	Demonstrate that soil springs values due to groundwater elevation reconciliation do not affect foundation design				
								Demonstrate that calculated gap values are not affected by due to groundwater elevation reconciliation for settlement analysis				
16		3.7-7	Revise Appendix 3A and 3H.6 to reconcile ground water elevation with Chapter 2	Chakravorty	NINA/Bechtel/S&L	Agrawal	CLOSED	Revise Appendix 3A and 3H.6 to reconcile ground water elevation with Chapter 2				

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No.	Subject	AI No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Status/Further Action	Status / Notes	RAI	Letter to NRC	Ready for Audit
	COLA Update Only		Clearly describing in the FSAR how seismic demand for non-seismic II/I structures for stability evaluation is determined		S&L	Moslemian		**New Action Item as of 4/5/11**	**Clarification Issue 3**	**03.07.01-27 S4**	**6/15/11**	**6/15/11**
19	**Hydrodynamic Mass**	3.7-15	Frequency/acceleration evaluation for UHS columns with and without hydrodynamic mass	Chakravorty	S&L	Moslemian	CLOSED	Determine column accelerations for column mass and hydrodynamic mass based on column frequency and spectra at top and bottom of the columns and revise RAI 03.08.04-30 supplement 1 to report new information				
20	**Mesh Sensitivity**	3.7-18	Effect of structural mesh refinement on maximum acceleration for design	Tabatabaie	S&L	Moslemian	CLOSED	In the manual calculation for design of PH Roof slab, increase the vertical seismc load for PH Roof based on examination of structural mesh sensitivity results				
21	**Stability**	3.7-33	For Es use the SSSI pressure diagram as the driving force in the stability evaluation and using passive on the resisting side for FOS Vault, RSW Piping Tunnel, FOS Tunnel	Hawkins	S&L	Moslemian	CLOSED	Provide requested information in RAI response	**Clarification Issue 8**	**03.08.04-30 S3** **03.07.02-24 S3**	**6/28/11**	**6/28/11**
22		3.7-35	Confirm for FOS Vault that E' is more than the inertial force for amplified site-specific SSI analysis in the stability evaluation	Chakravorty	S&L	Moslemian	CLOSED	Provide requested information in RAI response				
23	**Poisson's Ratio**		Perform sensitivity analysis related to Poisson's Ratio		NRC							

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Action Item Matrix from NRC Audit of South Texas Project Units 3 & 4
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Section 3.8
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Ready for Audit After May 23, 2011

No.	Subject	AI No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Response/Status	Further Action Required	RAI	Letter to NRC	Ready for Audit
0A	**II/I Parameters for RWB**								Reviewed during March Audit	**3.8.4-18**	3/15/11	3/15/11
0B	**RWB Bearing Capacity**								Reviewed during March Audit	**3.8.4-18 R1 S2**	3/15/11	3/15/11
	RWB							**New Action Item as of 5/4/11; Text revised 5/9/11**	**Clarification Issue 13** **For the Radwaste Building, provide additional information and/or justification for the following:** **1. Design and Analysis (3H.3.5.1 & 2)** **2. II/I Analysis and design (3H.3.5.3)** **3. Load Combination for Shear (Steel) (3H.3.4.3.4.2)** **4. Ultimate soil bearing capacity (3H.3.4.2.1)** **5. Tornado Parameters (3H.3.B & 3H.3.4.3.3.1)** **6. Flood Design (3H.3.4.2.3)**	**TBD**	TBD	TBD
1	**DGFOT**		Design of DGFOT including design considerations for seismic wave propagation • Design inputs • Structural analysis model • Design of walls, floors, foundations, and other structural components • Stability evaluation					Not Audited by NRC	Calculation available for Audit	**3.8.4-30 S1**	3/15/11	3/15/11
2	**UHS**		Design of UHS/RSW Pumphouse • Design inputs • Structural analysis model • Design of walls, floors, foundations, and other structural components • Stability evaluation					Not Audited by NRC	Calculation available for Audit			
	Site-Specific Category I Structures							**New Action Item as of 5/4/11**	**Clarification Issue 14** **7. For all Site-Specific Category I Structures, provide additional information and/or justification for extreme wind and tornado loading (3H.6.4.3.2)**	**TBD**	TBD	TBD

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3	**Design Parameters Table**	3.8-7	Docket the design parameters table (Agenda Item A)	---	---	J. Price	CLOSED	Check that only Licensing information is reported in table prior to docketing		**N/A**	**4/6/11**	**4/6/11**
4		3.8-15	DGFOSV design calculation: Confirm the tornado wind load used in design, pg. 26	Arnold	S&L	L. Zavadsky	CLOSED	A conservative value is used.	Revise design parameters table (See Item 3.8-7).			
5	**Reviewer's Guide**	3.8-12	Discuss with John Price delivery of the Reviewer's Guide to NRC		NINA	J. Price	CLOSED		Will provide Reviewer's Guide by 3/31/11	**N/A**	**4/8/11**	**4/8/11**
								New Action Item as of 5/9/11	**Clarification Issue 17** **Miscellaneous Questions from Audit and Reviewers Guide**	**TBD**		
6	**DGFOSV Design**	3.8-16	DGFOSV design calculation: Verify acceleration values on pg. 113 with Attachment B	Arnold	S&L	L. Zavadsky	CLOSED	Determine the latest revision of the SSI calculation. Ref. 7.19 (design) vs 7.30 (stability).	B is the correct revision; reference in stability calculation will be revised in the calculation. (PIP 2011-0365)	**N/A**	**N/A**	**4/8/11**
			As both, the SASSI and the SAP models, should be based on the same geometry and total weight and are subject to the same absolute accelerations, it is not apparent why an additional, relatively large amplification would be needed in vertical direction to obtain comparable total base seismic loads. Therefore, the applicant is requested to provide a justification regarding the different behavior of both structural models.					**New Action Item as of 4/13/11**	**Clarification Issue 10**	**3.8.4-30 S2**	**5/17/11**	**5/17/11**
7	**V&V**	3.8-22	Attach Supplement to the release memo for SAFE (regarding shear)	Chakrabarti	S&L	Ruth	CLOSED		Supplement will be attached to V&V documentation	**N/A**	**N/A**	**4/8/11**
9	**Control Building Annex**	3.8-25	Revise Control Building Annex stability calculation to eliminate statement regarding design being applicable to DCD Standard Plant	Chakrabarti	S&L	Moslemian	CLOSED		Calculation will be revised	**N/A**	**N/A**	**4/8/11**

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10	**Shear Averaging**	3.8-21	Beam shear discussion	RAI	S&L	Moslemian	CLOSED	NRC has provided feedback. NINA will review and confirm actions.	Commitment to incorporate NRC feedback will be provided in an RAI Response	**3.8.4-34**	**4/11/11**	**4/11/11**
									Calculations will be revised and FSAR tables will be updated as a Confirmatory Action	**TBD**	**8/17/11**	**N/A**
11	**Bearing Pressure**	3.8-9	S&L to evaluate method of reconciliation for soil pressure from equivalent pressure method for bearing pressure evaluation and soil pressure from finite element analysis	Chakrabarti	S&L	J. Moslemian	CLOSED	NRC confirmed acceptability of the proposed reconciliation method	Formally provide the proposed reconciliation method in response to RAI 3.8.4-35	**3.8.4-35**	**4/11/11**	**4/11/11**
								New Action Item as of 5/4/11	**Clarification Issue 15** **8. Provide additional information and/or justification for foundation bearing pressures reconciliation.**	**TBD**	**TBD**	**TBD**
								NRC confirmed acceptability of the proposed reconciliation method	S&L to perform the reconciliation evaluation	**3.8.4-35 S1**	**6/15/11**	**6/15/11**
12	**ACI-349 & ASME Section III, Division 2 Codes**	3.8-20	Use of newer version of ACI-349 & ASME Section III, Division 2 Codes	RAI	S&L	McLean	CLOSED	The proposed RAI response is acceptable to NRC	Respond to RAI 03.08.04-36	**3.8.4-36**	**4/11/11**	**4/11/11**
13	**COLA Update Only**	3.8-6	**RAI 03.08.01-7, Rev. 2** Review response - should the pressure loading be based on a flood height of 8' vs. 7'?	Chakrabarti	S&L	J. McLean	CLOSED	The pressure loading should be based on a height of 8', but this does not change the result.	Revise response to RAI 03.08.01-7 and related responses to clarify this.	**3.8.1-7 S1**	**4/13/11**	**4/13/11**
14		3.8-1	**RAI 03.08.01-9** +/- 25% of the gap: How does this compare to long term settlement values? Clarify if 25% movement envelopes long term settlement.	Chakrabarti	S&L	J. McLean	CLOSED	The 25% movement envelops the expected long term settlement at the RB/CB interface, below flood level	Revise response to RAI 03.04.02-6 & 03.08.01-9 to require the testing to be the maximum of +/- 25% or long term settlement.	**3.8.1-9 S1**	**4/13/11**	**4/13/11**

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No.	Subject	AI No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Response/Status	Further Action Required	RAI	Letter to NRC	Ready for Audit
15	COLA Update Only	3.8-8	Concrete and concrete to waterproofing friction coefficient of 0.6 is based on static, but soil coefficient of 0.47 is based on dynamic.	Chakrabarti	S&L	J. Moslemian	CLOSED	Increase required static coefficient of friction of concrete and membrane to ≥ 0.75	Revise RAI 03.08.04-28 or 03.08.04-19 to show revised coefficient of friction **Clarification Issue 4** Designate whether the friction coefficients reported in Table 3H.6-14 are static or dynamic coefficient of friction values. (Revise response to RAI 3.7.2-13 S1) **Clarification Issue 5 (No action required)**	**3.8.4-19 S1** **3.7.2-13 S2**	**4/26/11**	**4/26/11**
								New Action Item as of 5/9/11	**Clarification Issue 16** **9. Provide additional information and/or justification for specified minimum static coefficient of friction at the various interfaces, specifically at the waterproofing membrane. Also, the requirement of intentionally roughening the concrete surface should be included in the FSAR.**	**TBD**		
16		3.8-3	**RAI 03.08.04-28** Bullet 4: Show the basis for reductions in the dynamic resistance coefficients (Part C of question). **Applicant is requested to provide a comparison between the strain ranges assumed in the above reference and the strain values expected beneath the foundation of Cat I buildings of Units 3&4.**	Arnold	MACTEC	R. Smith	CLOSED	Explain in RAI response how values were determined (from MACTEC calculation) **New Action Item as of 04/13/11**	Revise response to RAI 03.08.04-28 **Clarification Issue 11 - Received 04/13/2011**	**3.8.4-28 S1**	**4/26/11**	**4/26/11**
17		3.8-2	For Section 3H.6-7 in **RAI 03.08.04-17, Supplement 1**, provide clarification for last line of the first paragraph. (*Clarify that envelop of SSSI pressure and ASCE 4-98 is used.)*	Chakrabarti	S&L	J. Moslemian	CLOSED	Agree that clarification is required.	Revise response to RAI 03.08.04-17 Supplement 1 to clarify that the envelop is used.	**3.8.4-17 S1**	**4/26/11**	**4/26/11**
8	**RSW Tunnel**	3.8-24	RSW Tunnel: Confirm that soil pressures consider additional wave propagation effect	Chakrabarti	S&L	Mathien	CLOSED		Calculation will be revised	**N/A**	**N/A**	**4/26/11**
18	**SIT**	3.8-5	**RAI 03.08.04-32** NRC to compare response to other applicant responses.	---	NRC	---	CLOSED		NRC to complete review			
19	**Wind Loading**	3.8-11	Review the wind loading used for design and stabilty calculations for the vault	Chakrabarti	S&L	L. Zavadsky	CLOSED	NRC to review the justification for the importance factor for wind pressure calculation provided in response to RAI 03.08.04-30 Supplement 1	NRC to complete review			