

## ENCLOSURE 3 - NRC Audit of South Texas Project Units 3 &amp; 4

March 14-18, 2011

No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Status/Further Action	Status / Notes	RAI	NRC Submittal
3.7-1	NRC would like to have an ITAAC for III/I design in addition to the current discussions in COLA, RAI 03.07.02-20	Chakravorty	S&L	Agrawal	CLOSED	Will provide an ITAAC		<b>3.7.2-20</b>	
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		<b>3.7.1-2</b>	
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		<b>3.7.2-24</b>	
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		<b>3.7.1-27</b>	
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		<b>3.7.1-27</b> <b>3.8.4-30</b>	
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 analysis upperbound and upperbound backfill should be considered. Review COLA markup for consistency with soil cases analyzed		<b>Will be part of responses to Action Items 3.7-3, 4, and 5</b>	
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		<b>Will be part of responses to Action Items 3.7-3, 4, and 5</b>	
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 analysis upperbound and upperbound backfill should be considered. Review COLA markup for consistency with soil cases analyzed		<b>Will be part of responses to Action Items 3.7-3, 4, and 5</b>	
3.7-9	Enhance the V&V of software used for time history generation	Sumodobila	Toshiba/Rizzo/S&L	Moslemian	CLOSED	Enhance the V&V of software used for spectra generation; COMPLETED on 3/16/11 per email from Nish Vaidya to PK Agrawal			

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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		<b>Will be part of responses to Action Items 3.7-3, 4, and 5</b>	
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			<b>Will be part of responses to Action Item 3.7-2</b>
3.7-12	Provide spectra comparison for UHS for all soil cases analyzed vs. cracked case for full and empty basin	Tabatabaie	SGH	Bolourchi	CLOSED	Provided comparison plots			
3.7-13	Provide spectra comparison for DGFOVS for all soil cases analyzed vs cracked case	Tabatabaie	S&L	Singh	CLOSED	Provided comparison plots, refer to item 3.7-17			
3.7-14	NRC to verify data provided for confirmatory analysis is complete	Moslemian	NRC	Sumodobila	CLOSED	Verified			
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		<b>3.8.4-30</b>	
3.7-16	NRC 3.7 and 3.8 groups, further discussion of lateral stability		NRC		CLOSED	See action items 3.7-32, 3.7-33, and 3.7-34			
3.7-17	Verify vertical spectra for roof slab at elevation 30 ft. in DGFOVS	Chakravorty	S&L	Singh	CLOSED	Verified that spectra trend is reasonable			
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 seismic load for PH Roof based on examination of structural mesh sensitivity results		<b>3.8.4-30</b>	

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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		<b>It will be part of response to Action Item 3.7-4</b>	
3.7-20	Provide spectra comparison for all soil cases analyzed for FO Tunnel and RSW Piping Tunnel, including envelope spectra	Tabatabaie	S&L	Moslemian	CLOSED	Spectra provided			
3.7-21	Check significance of cross terms for amplified motions for RSW Piping Tunnel, DGFO SV, and DGFO T	Tabatabaie	SGH	Bolourchi	CLOSED	Effect is insignificant. No further action required.			
3.7-22	Include amplified site-specific spectra for RSW Piping Tunnel, DGFO SV, and DGFO Tunnel in FSAR	Chakravorty	S&L	Moslemian	CLOSED	Include amplified site-specific spectra for RSW Piping Tunnel, DGFO SV, and DGFO Tunnel in FSAR		<b>It will be part of responses to Action Items 3.7-3, 4, and 5</b>	
3.7-23	Discuss with NRC what additional clarification is required for stability section of FSAR and provide revised description	Chakrabarti	NRC	Chakrabarti	CLOSED	See action items 3.7-32, 3.7-33, and 3.7-34			
3.7-24	Check the compression wave velocity calculation of the soil layers below water table in Vault SSI calc.	Chakravorty	S&L	Singh	CLOSED	NRC confirmed acceptability of calculation			
3.7-25	Provide further discussion of DGFO SV stability	Chakravorty	S&L	Moslemian	CLOSED	See action items 3.7-32, 3.7-33, and 3.7-34			
3.7-26	Confirm that DGFO tank rigidity requirement is included in the procurement specification	Chakravorty	S&L	Agrawal	CLOSED	Will add requirement to spec.		<b>Revised specification will be available for the Next Audit</b>	
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.		<b>With reader's guide provided, there is no need to consolidate 3.7.1-27. Spectra comparisons will be part of responses to Action Items 3.7.</b>	
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		<b>3.7.2-29</b>	
3.7-29	SSI analysis of additional cracked concrete or separation cases	Chakravorty	S&L	Moslemian	CLOSED	Issue resolved. No action required.	None		

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No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Status/Further Action	Status / Notes	RAI	NRC Submittal
3.7-30	Use of 7% damping for cracked concrete SSI analysis for RSW Piping Tunnel	Chakravorty	S&L	Moslemian	CLOSED	NRC confirmed acceptability of calculation			
3.7-31	Provide project design criteria for active dynamic soil pressure	Chakravorty	S&L	Singh	CLOSED	Design criteria provided			
3.7-32	For stability evaluation show that E' in the diagram is higher than the E' from the SSI analysis for FOS Vault, RSW Piping Tunnel, FOS Tunnel, UHS (compare total shear force from SSI time history analysis by summing the forces at all boundary nodes below grade).	Chakravorty	S&L	Moslemian	CLOSED	No action, refer to item 3.7-35			
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		<b>3.8.4-30 3.7.2-24</b>	
3.7-34	For stability evaluation show that E' in the diagram is higher than the E' from the SSI analysis for FOS Vault (compare total vertical force from SSI time history analysis by summing the forces at all boundary nodes below grade).	Chakravorty	S&L	Moslemian	CLOSED	No action, refer to item 3.7-35			
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		<b>It will be part of response to Action Items 3.7-33</b>	
3.7-36	As a minimum for All SSSI analysis upperbound and upperbound backfill should be considered	Chakravorty	S&L	Moslemian	CLOSED	Confirm that as a minimum for All SSSI analysis upperbound and upperbound backfill should be considered. Provide additional information in RAI response as appropriate		<b>It will be part of responses to Action Items 3.7-3, 4, and 5</b>	

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No.	Action Item Description	Requestor	Responsible Organization	Responsible Person	Due Date	Response/Status	Further Action Required	RAI	NRC Submittal
3.8-1	<b>RAI 03.08.01-9</b> +/- 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 envelopes 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.	<b>3.4.2-6</b> <b>3.8.1-9</b>	
3.8-2	For Section 3H.6-7 in <b>RAI 03.08.04-17, Supplement 1</b> , provide clarification for last line of the first paragraph. <i>(Clarify that envelop of SSSI pressure and ASCE 4-98 is used.)</i>	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.	<b>3.8.4-17</b>	
3.8-3	<b>RAI 03.08.04-28</b> Bullet 4: Show the basis for reductions in the dynamic resistance coefficients (Part C of question).	Arnold	MACTEC	R. Smith	CLOSED	Explain in RAI response how values were determined (from MACTEC calculation)	Revise response to RAI 03.08.04-28	<b>3.8.4-28</b>	
3.8-4	<b>RAI 03.08.04-28</b> Bullet 4: Discuss details of response and review entire stability for Reactor Building.	Arnold	S&L	J. Moslemian	CLOSED		None		
3.8-5	<b>RAI 03.08.04-32</b> NRC to compare response to other applicant responses.	---	NRC	---	CLOSED		NRC to complete review		
3.8-6	<b>RAI 03.08.01-7, Rev. 2</b> 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.	<b>3.8.1-7</b>	
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	Will provide table by 3/25/11	<b>Table for docketing by 3/24/11</b>	
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 $\geq 0.75$	Revise RAI 03.08.04-28 or 03.08.04-19 to show revised coefficient of friction	<b>3.8.4-28</b> <b>or</b> <b>3.8.4-19</b>	
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	S&L to perform the reconciliation evaluation	<b>3.8.4-35</b>	

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3.8-10	S&L to provide seismic gap and movement calculation to NRC	Chakrabarti	S&L	J. Moslemian	CLOSED	Calculation was provided. NRC to provide feedback.	None		
3.8-11	Review the wind loading used for design and stability 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		
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		
3.8-13	Section 4.1.1.14, sub-item 2. Look and confirm that wet concrete load was used for steel beam design.	Chakrabarti	S&L	L. Zavadsky	CLOSED	Wet concrete is included as part of dead load in the calculation.	None		
3.8-14	DGFOSV design calculation: pg. 274, verify use of ACI 318-63	Arnold	S&L	L. Zavadsky	CLOSED	ACI 318-63 was used for two-way slab coefficients (not in newer code editions).	None		
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).	<b>See Item 3.8-7</b>	
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. (PIP 2011-0365)	<b>Revised calculation will be available for Next Audit</b>	
3.8-17	Provide example of variation in out of plane shear (vertical and horizontal strips) for a wall of the DGFOSV	Chakrabarti	S&L	Mathien/Perros	CLOSED	Example was provided			
3.8-18	Provide information on refinement of mesh for DGFOSV SAP model	Chakrabarti	S&L	Mathien/Perros	CLOSED		None		
3.8-19	Provide copies of certification pages for V&V of all software reviewed (including Supplements for SAP2000)	Arnold	S&L	Ruth	CLOSED	Certification pages were provided	None		

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3.8-20	Use of newer version of ACI-349 ASME Section 3, Division 2 codes	RAI	S&L	McLean	CLOSED	The proposed RAI response is acceptable to NRC	Respond to RAI 03.08.04-36	<b>3.8.4-36</b>	
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	<b>3.8.4-34</b>	
							Calculations will be revised and FSAR tables will be updated as a Confirmatory Action	<b>NA</b>	
3.8-22	Attach Supplement to the release memo for SAFE (regarding shear)	Chakrabarti	S&L	Ruth	CLOSED		Supplement will be attached	<b>Revised release memo for SAFE will be available for Next Audit</b>	
3.8-23	Verify that 0.21 g used in the basic design of RSW Tunnel envelopes the seismic accelerations	Chakrabarti	S&L	Mathien	CLOSED	Provided SGH calculation showing where the enveloping accelerations came from	None		
3.8-24	RSW Tunnel: Confirm that soil pressures consider additional wave propagation effect	Chakrabarti	S&L	Mathien	CLOSED		Calculation will be revised	<b>Revised calculation will be available for Next Audit</b>	
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	<b>Revised calculation will be available for Next Audit</b>	