

August 11, 2011

Mr. Mark McBurnett, Senior Vice President
Oversight & Regulatory Affairs
Nuclear Innovation North America, LLC
4000 Avenue F
Bay City, TX 77414

SUBJECT: REGULATORY AUDIT SUMMARY OF SOUTH TEXAS PROJECT, UNITS 3
AND 4 COMBINED LICENSE APPLICATION – SASSI ANALYSES

Dear Mr. McBurnett:

By letter dated September 20, 2007, STP Nuclear Operating Company submitted to the U.S. Nuclear Regulatory Commission (NRC) a combined license (COL) application to construct and operate two reactor units (Units 3 and 4) based on the U.S. Advanced Boiling Water Reactor (ABWR) Design Certification at the South Texas Project Nuclear Power Plant. On January 24, 2011, Nuclear Innovation North America (NINA) became the primary applicant for the license for these two units.

The NRC Office of New Reactors (NRO) is reviewing the South Texas Project (STP) Units 3 and 4 COL application that incorporates by reference the ABWR Design Control Document. As part of this review, the NRO Structural Engineering Branch 2 conducted an audit of the documentation supporting the seismic design of the STP COL application in Chapters 3.7 and 3.8.

The audit was conducted at the Sargent & Lundy office in Chicago, Illinois, from July 27-28, 2011. The NRC staff followed the guidance in NRO Office Instruction NRO-REG-108, "Regulatory Audits," in performing this audit. Enclosure 1 is a list of the NRC staff and NINA team participating in the audit. Enclosure 2 is the detailed results of the audit.

Please contact Tom Tai at (301) 415-8484 or Tom.Tai@nrc.gov if you have any questions related to the audit.

Sincerely,

/RA George Wunder for:/

Mark Tonacci, Chief
BWR Projects Branch
Division of New Reactor Licensing
Office of New Reactors

Docket Nos.: 52-012
52-013

cc: See next page

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Docket Nos.: 52-012
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ADAMS ACCESSION NO.: ML112160142

NRO-002

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DATE	08/08/2011	08/08/2011 w/edits	08/09/2011	08/ /2011

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Letter to M. McBurnett from Mark Tonacci dated August 11, 2011

SUBJECT: REGULATORY AUDIT SUMMARY OF SOUTH TEXAS PROJECT,
UNITS 3 AND 4 COMBINED LICENSE APPLICATION – SASSI
ANALYSES

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ENCLOSURE 1

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REGULATORY AUDIT OF SOUTH TEXAS PROJECT, UNITS 3 AND 4 COMBINED
LICENSE APPLICATION – SASSI ANALYSES
JULY 27-28, 2011**

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George Wunder (by telephone)	NRC

DETAILED AUDIT RESULTS FOR SASSI ANALYSES
July 27-28, 2011

1. Introduction

On September 20, 2007, STP Nuclear Operating Company submitted to the U.S. Nuclear Regulatory Commission (NRC) a Combined License (COL) application to construct and operate two reactor units (Units 3 and 4) based on the U.S. Advanced Boiling Water Reactor (ABWR) Design Certification at the South Texas Project Nuclear Power Plant. On January 24, 2011, Nuclear Innovation North America (NINA) became the primary applicant for the license for these two units. The NRC Office of New Reactors (NRO) is reviewing the South Texas Project (STP) Units 3 and 4 COL application that incorporates by reference the ABWR Design Control Document. As part of this review, the NRO Structural Engineering Branch 2 conducted an audit of the documentation supporting the seismic design of the STP COL application in Chapters 3.7 and 3.8. The audit was conducted at the Sargent & Lundy office in Chicago, Illinois, from July 27, 2011 to July 28, 2011.

Representatives from the NRC, key technical personnel representing STP Units 3 and 4, Toshiba America Nuclear Energy, Sargent & Lundy (S&L), EXPONENT, Simpson, Gumpertz & Heger (SGH), Bechtel, and Morgan & Lewis were present during the audit.

The NRC staff followed the guidance in NRO Office Instruction NRO-REG-108, "Regulatory Audits," in performing this audit.

2. Objectives and Approach

In June, 2011, Department of Energy (DOE) issued a Soil-Structure-Interaction (SSI) Team Report, identifying potential technical issues (by the Defense Nuclear Facilities Safety Board (DNFSB)) associated with the use of Subtraction Method (SM) in SASSI. Consequently, the staff issued RAI 03.07.01-29 requesting NINA to investigate design and analyses completed using SASSI and to address the technical problems identified by DOE.

The purpose of this audit is to discuss the status and results of the analyses performed in support of responding to RAI 03.07.01-29.

3. Technical Review

Based on the preliminary analyses completed by S&L, the applicant has the following conclusions:

- To address Tier 1 departure STP DEP T1 5.0-1, SASSI Direct Method (DM) was used for Diesel Generator Fuel Oil Tunnel, Reactor Service Water (RSW) Piping Tunnel, and control building (CB)/reactor building (RB). As such, DNFSB issues are not applicable for these structures.
- Completed SSI analysis of Diesel Generator Fuel Oil Storage Vault using Modified Subtraction Method (MSM) and generated in-structure response spectra (ISRS) forces and accelerations. Structural design remains unchanged.

- For Ultimate Heat Sink (UHS)/RSW Pump house performed additional SSI analysis 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. SSI soil pressures obtained using both the SM and the MSM were in general comparable.
- For SSSI analysis (for soil pressure determination considering interaction of adjacent building) only one model (consisting of radwaste building (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 (upper-bound soil 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 time history (TH) analysis) due to soil pressure in general within 5 percent for all three methods. Based on this analysis, STP preliminarily concluded that the soil pressures obtained from SM are acceptable.
- For project specific validation of MSM, STP presented the comparison of results (transfer functions, ISRS, forces, and maximum accelerations) of CB SSI analysis using both the DM and MSM. STP based on this comparison concluded that the results from the DM and MSM are comparable, thereby confirming acceptability of the MSM method.

Staff Observations:

- 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.
- The results presented 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 structure-soil-structure interaction (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.
- Staff will further review the presentation material and discuss with STP any further clarifications needed during the scheduled weekly Wednesday calls.
- Since this involves significant changes in analysis methods, staff indicated that Final Safety Analysis Report (FSAR) update should clearly include all the bases of the acceptability of the seismic analysis and design of all category I structures described in the FSAR.

4. Conclusion

The July 27 to 28, 2011, audit provided the NRC staff an opportunity to review the technical approach and preliminary results of the analyses to address the technical issues in SASSI identified by the DOE team. There were no findings, but additional details will be needed from the applicant to address the NRC comments from this audit.

- The audit concluded with an exit meeting that summarized the discussions and the disposition of the issues raised during the audit. It was agreed in the exit meeting that because these analyses are work-in-progress, there will be follow-up actions when all the analyses are completed. Staff will decide whether further audit is necessary upon conclusion of all the analysis supporting the design basis and FSAR update.