## PMSTPCOL NPEmails

**From:** Tai, Tom
**Sent:** Thursday, November 04, 2010 10:56 AM
**To:** Price, John E
**Cc:** STPCOL
**Subject:** STp - Prioprietary Review of 10-18 Audit Report
**Attachments:** October 18&19 2010 Audit Report.doc

John,

Attached is a draft of the audit report for the October 18&19, 2010 visit at the New Jersey CDI facility.

Please let me know if any information needs to be withheld and the accompanying affidavit.

Thanks

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**Hearing Identifier:** SouthTexas34NonPublic_EX
**Email Number:** 3485

**Mail Envelope Properties** (0A64B42AAA8FD4418CE1EB5240A6FED121A52A7EE7)

**Subject:** STp - Prioprietary Review of 10-18 Audit Report
**Sent Date:** 11/4/2010 10:56:18 AM
**Received Date:** 11/4/2010 10:56:19 AM
**From:** Tai, Tom

**Created By:** Tom.Tai@nrc.gov

**Recipients:**
"STPCOL" <STP.COL@nrc.gov>
Tracking Status: None
"Price, John E" <jeprice@STPEGS.COM>
Tracking Status: None

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# DETAILED AUDIT RESULTS FOR FLOW-INDUCED VIBRATION ANALYSES

## October 18 - 19, 2010

## 1. Introduction

On September 20, 2007, STP Nuclear Operating Company (STPNOC) 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. The NRC Office of New Reactors (NRO) is reviewing the South Texas Project COL application that incorporates by reference the ABWR Design Control Document (DCD). As part of this review, the NRO Engineering Mechanics Branch 2 (EMB2) conducted audits of the analyses and testing supporting the reactor internals comprehensive vibration assessment program (CVAP) referenced in Chapter 3.9.2 of the STP Final Safety Analysis Report (FSAR). The first audit was conducted during August 23 to 25, 2010, and the audit report was issued in Reference 1. The second audit was conducted at the Continuum Dynamics office in Ewing, New Jersey on October 18 and 19, 2010. The main objective of the audit is to review the steam dryer subscale test methodology to obtain the acoustic loads. 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 and STPNOC team participating in the October audit.

## 2. Audit Summary

During this audit, the applicant presented the steam dryer subscale test status, the approach to determine dryer load, RAI responses, and project schedule.

The applicant presented the steam dryer 1/8 scale tests conducted and the planned methodology to determine the dryer load. Previously, the applicant conducted steam dryer 1/8 scale tests to measure the pressure in the main steam lines and predict the acoustic loads on the subscale steam dryer. The subscale steam dryer acoustic loads could then be scaled up to the South Texas full scale steam dryer loads. After the scale model tests peer review, the approach was changed to measuring the acoustic load directly on the subscale steam dryer instead of indirectly from the pressure in the main steam lines per peer review comments. During the audit, the applicant presented the new test approach and stated that the subscale steam dryer acoustic loads will be compared to the Japanese ABWR K-6 data. The staff raised concern about the validating the steam dryer subscale model tests with only one meaningful pressure data point from the K-6 steam dryer dome region. The staff suggested that the dryer load determined from the subscale model tests be validated with sufficient actual plant steam dryer data. However, the applicant indicated that it is not commercially feasible to obtain other plant data beyond the K-6 plant data. The applicant believed that the test approach is appropriate based on the following:

- 1/8 scale model test has been used to scale steam dryer loads from current licensing thermal power to extended power.

- Five ABWR plants in Japan have 25 years combined operational experience. Inspection of K-6 steam dryer after 11 years of operation and H-5 steam dryer after three years of operation did not discover any cracking.
- STP Unit 3 steam dryer will be instrumented during initial startup testing.
- Safety relief valve stand pipe acoustic resonance will be eliminated by design.
- Steam dryer load definition will bound the K-6 data and include conservative estimates of bias and uncertainties.

The NRC staff agreed to evaluate the proposed new test approach and inform STPNOC the decision.

The draft RAI responses were discussed and the NRC commented that some RAI responses will need to be revised to include the impact of the changes on calculation results due to the NRC comments from the August audit. Examples include draft responses to RAI 03.09.02-24 and 25 which do not include the results of the sensitivity analysis of grid sizes. The applicant agreed to revise the responses to include the sensitivity analysis results. The draft responses to 03.09.02-26 only listed laminar flow and a backward facing step model to validate the computational fluid dynamics model, and the response should include systems similar to the turbulent flow and complex geometry of the reactor internals. The draft response to RAI 03.09.02-21 stated that the computer Code ACSTIC2 will not be listed in Section 3.9.1.2 of the STP FSAR because it is not a major computer code. The staff will evaluate the criteria on listing computer codes in the FSAR, and inform STPNOC whether the RAI response is adequate.

In the schedule discussion, the applicant anticipates that the dryer subscale test report will be available to the NRC by November 2, 2010 (The report will not include dryer load definition, and the load definition will be available on November 18). The original completion date of the dryer subscale test report was September 30, 2010. The reactor internals (except the stream dryer) components stress analyses will be available by November 10, 2010. The dryer stress analysis will be delayed to November 30, 2010. The measurement and inspection plan will be available by November 26, 2010 and the vibration assessment program report will be available by December 15, 2010, as originally scheduled.

## 3. Exit Meeting/Actions

In the exit meeting, the staff summarized the following actions:

a. The staff will inform the applicant the decision on the revised subscale test approach to predict the South Texas full scale dryer acoustic loads based on the dryer subscale test.
b. The staff will inform the applicant whether the computer Code ACSTIC2 should be included in South Texas FSAR Section 3.9.1.2.
c. The applicant will revise the RAI responses to include sensitivities study results. The applicant will also submit a summary of the calculation note changes to the NRC by November 15, 2010.

d. The applicant will inform the NRC of the approach to determine the factor of safety for the steam dryer design.

Reference:

1. NRC Audit Report, “REGULATORY AUDIT SUMMARY OF SOUTH TEXAS PROJECT, UNITS 3 AND 4 COMBINED LICENSE APPLICATION REVISION 3 – FLOW-INDUCED VIBRATION PROGRAM,” October 6, 2010 (ADAMS Accession Number ML1025605351)

**Audit Participants**
**October 18 - 19, 2010**

| Name | Organization |
|---|---|
| Brad Maurer | Westinghouse |
| Subhash Chandra | Westinghouse |
| Nirmal Jain | Westinghouse |
| Richard Schwirian | Westinghouse |
| Karen Fujikawa | Westinghouse |
| Jeff Bibby | Westinghouse |
| Kevin Ramsden | Westinghouse - Fauske |
| Tom Daly | STPNOC Engineering |
| Ken Uchida (Note 1) | Toshiba |
| Keiji Matsunaga | Toshiba |
| Dale Wuokko | TANE – Licensing |
| Alan Bilanin | Continuum Dynamics |
| Milt Teske | Continuum Dynamics |
| Alex Boschitsch | Continuum Dynamics |
| Tom Tai | NRC |
| Yuken Wong | NRC |
| Samir Ziada | McMaster University/Argonne |
| David Ma (Note 1) | Argonne National Laboratory |

Notes:

1. Participated by telephone

Enclosure 1