October 27, 2008

MEMORANDUM TO: Allen L. Hiser, Jr., Chief
Steam Generator Tube Integrity and
Chemical Engineering Branch
Division of Component Integrity
Office of Nuclear Reactor Regulation

FROM: Emma L. Wong, Chemical Engineer **/RA/**
Steam Generator Tube Integrity and
Chemical Engineering Branch
Division of Component Integrity
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE OCTOBER 1 AND 2, 2008 CATEGORY 2 PUBLIC MEETING WITH THE NUCLEAR ENERGY INSTITUTE (NEI) AND INDUSTRY TO DISCUSS H*/B* ISSUES

The Nuclear Regulatory Commission's (NRC) staff met with the Nuclear Energy Institute and licensees on October 1 and 2, 2008 at Westinghouse's Waltz Mill Facility in Madison, Pennsylvania. The purpose of the meeting was to discuss with the industry the status of issues related to the technical basis for limiting the extent of inspections in the tubesheet region (H*/B*) in units with thermally treated Alloy 600 steam generator tubes. The Enclosure provides a list of those in attendance. This meeting was noticed as a public meeting and the meeting agenda is available in the NRC Agencywide Documents Access and Management System (ADAMS) under Accession Number ML082590607. Other than industry representatives, no members of the public were present.

Information presented by the industry during the meeting is available in ADAMS under Accession Numbers ML082810140, ML082810128, ML082810101, ML082810064, and ML082810025.

During the meeting, there were several comments and observations made. Some of the more noteworthy comments and observations were:

> The NRC staff questioned whether tube thickness should also be considered as a parameter for the residual contact pressure (RCP) variability study. The industry stated that they would look into this issue.
>
> Industry noted that there will be final reports on each model of steam generator (e.g., the Model F report).

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The industry surveyed affected plants about variability of the required engagement length and the bottom of the expansion transition (BET). In general, the BET was within three-tenths of an inch from the top of the tubesheet. The NRC staff suggested that modifications to the technical specifications may be needed to ensure H*/B* is only applied to those tubes where the BET is near the top of the tubesheet.

There appeared to be a lower coefficient of thermal expansion associated with the specimens that were strain hardened, and the Expert Panel (EP) indicated they would be evaluating the data once it was all obtained.

The NRC staff indicated that option D has the greatest likelihood of short term success. The NRC staff suggested a comparison be made of the results at 95% probability and 50% confidence with an analysis of the results at 95% probability and 95% confidence. In addition, the NRC staff suggested a comparison be made between a SG specific analysis (~5500 tubes) and a whole-plant analysis (~22,000 tubes, for a Model F) when assessing compliance with the performance criterion associated with normal operation.

The NRC has retained Argonne National Laboratory (ANL) to assess the tubesheet joint behavior under severe accident conditions. Since ANL is developing insights on the behavior of the joint under normal operating and design basis accident conditions during their severe accident program, the NRC staff suggested a technical exchange between Westinghouse and ANL to assure that differences between the modeling approaches and results are identified and resolved.

The industry indicated that the pullout force criterion would be based on the pullout test results. The instrumentation in these tests is designed to record the motion at both the top and bottom of the test specimens. The motion at the bottom (equivalent to the primary tubesheet face) will be considered by Westinghouse as the first slip condition. The NRC staff suggested in-service monitoring for tube slippage should be considered unless a solid argument can be made (e.g., through cyclic testing) that slippage cannot occur. The method for monitoring slippage could include a number of techniques.

The NRC staff indicated that a lot of good work has been done in regard to determining the mean and variance of the coefficient of thermal expansion (CTE). The NRC staff suggested that a final paper on CTE include the complete strain hardened specimen data and addresses the Precision Measurements and Instruments Corporation vacuum test data.

Non-uniform hole dilation may affect the leakage calculations and the contact pressure for pullout. These issues should be addressed in the final report(s).

The NRC staff questioned if the loading from pressurized tubes adjacent to the tube of interest would equilibrate at the center of the ligament between the holes in the 3-D analysis.

The NRC staff questioned whether a specific value for the CTE for the tubesheet material should be assumed rather than a separate value of the CTE of the tubesheet material surrounding each tube during each Monte Carlo simulation of the SG.

A tentative schedule for the completion of H*/B* was presented. Testing and technical work would be finished by the end of 2008. The first final report was scheduled to be complete by March 2009.

The industry discussed a tentative schedule for future meetings with the NRC. Future public meetings will be announced.

Following the meeting, the NRC staff visited the laboratory where the CTE testing was being performed. After this visit, the NRC staff asked the industry whether the CTE specimens were isotropic since the testing was measuring the axial expansion of the specimens rather than the radial expansion. The specimens were expanded (cold worked) in the radial direction prior to testing.

Project No. 689

Enclosure:
Attendance Lists

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NAME	EWong /RA/	KKarwoski /RA/	AHiser /RA/
DATE	10/20/2008	10/20/2008	10/27/2008

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ATTENDANCE LIST

October 1 and 2, 2008 Meeting with NEI, SGTF, and Industry to Discuss H*/B* Issues

SGTF/Industry

Steve Wideman, WCNOC
Jim Begley, AREVA (by phone)
Cheryl Hammer, Westinghouse
Chris Hoffman, Westinghouse
Gary L. Boyers, FPL
Mike Melton, NEI
H. Lagally, Westinghouse
Dan Mayes, Duke Energy
Pete Riccardella, Structural Integrity
Russ Cipolla, APTECH
Gary Whiteman, Westinghouse
Lisa Schofield, Exelon
Rick Mullins, Southern Co.

NRC

Emma Wong
Andrew Johnson
Allen Hiser
Emmett Murphy
Ken Karwoski
Charles Harris

ENCLOSURE