

October 6, 2009

MEMORANDUM TO: Mirela Gavrilas, Acting Chief  
Steam Generator Tube Integrity and  
Chemical Engineering Branch  
Division of Component Integrity  
Office of Nuclear Reactor Regulation

FROM: Thomas P. Morgan, Materials Engineer */RA/*  
Steam Generator Tube Integrity and  
Chemical Engineering Branch  
Division of Component Integrity  
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE SEPTEMBER 16, 2009, CATEGORY 2 PUBLIC  
MEETING WITH THE NUCLEAR ENERGY INSTITUTE AND  
INDUSTRY TO DISCUSS STEAM GENERATOR ISSUES

The Nuclear Energy Institute (NEI) Steam Generator Task Force met with U.S. Nuclear Regulatory Commission (NRC) staff on September 16, 2009, at NEI offices in Washington, DC. The purpose of the meeting was to discuss a variety of steam generator issues. 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 ML092440244. Other than industry representatives, no members of the public were present.

Information presented by industry during the meeting is available in ADAMS under Accession Numbers ML092600076.

During the meeting there was discussion on a number of issues. These discussions are summarized below:

Cracking, initiating from both the inside and outside diameter of the tube, has been observed in thermally treated Alloy 600 tubes whose fabrication/processing was not optimal. For the non-stress relieved tubes in steam generators with thermally treated Alloy 600 tubing, a statistical approach is used to identify the lack of an offset in the eddy current data potentially indicating that the stresses in the straight portion of the tube may be higher than normal. Given that flaws continue to be identified in this subset of the tubes (i.e., tubes with non-optimal processing), the staff asked whether the industry had evaluated whether the statistical threshold was being challenged (i.e., the flaws are being identified in tubes near the statistical screening criteria) such that the screening criteria may need to be re-evaluated. The industry indicated it would evaluate this issue.

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At Surry 1, an axial indication initiating from the tube's inside diameter was discovered in a row 9 tube. This tube was not stress-relieved in the U-bend area and had exhibited non-optimal tube processing. The staff questioned whether additional guidance was needed to ensure that all high stressed regions (e.g., expansion transitions, dents, dings) in tubes with non-optimal processing are being routinely inspected since the past focus has been performing bobbin inspections to detect axial indications at the tube support plate elevations. The industry indicated it would evaluate the issue.

A flaw was discovered in the divider plate-to-channel head weld during fabrication of a replacement steam generator. An assessment of the root cause of this flaw was recently completed. The NRC staff indicated it was considering an information notice since the manufacturing technique which contributed to the development of this flaw may have been used in other replacement steam generators or in the fabrication/repair of other components. The industry indicated that it would evaluate this operating experience.

The NRC staff questioned whether the pulled tube at Vogtle contained a through-wall crack. Since a through-wall crack could potentially leak during normal operation and postulated accidents, the NRC staff questioned whether this indication would have been identified as a potential leaker and/or flagged for in-situ pressure testing. The NRC also questioned whether this tube had any eddy current indication associated with non-optimal tube processing. The industry indicated that they did not have the destructive examination results from the pulled tubes, but will review this issue

The NRC staff highlighted that the operating experience in France was indicating that tubes with high level of deposits may change the flow characteristics in the steam generator enough to result in excessive tube vibration leading to cracking of the tube as a result of fatigue. Since NRC Bulletin 88-02 was focused on units with drilled hole tube support plates, the staff questioned whether additional guidance was needed to ensure that plants with other tube support configurations should evaluate their support conditions in the U-bends to ensure they have adequate support. The industry indicated that it would review this issue. The staff also encouraged the industry to develop guidance on an acceptable level of deposits in the steam generator. This resulted in a discussion that any guidance would have to be mainly qualitative since the deposit loading can vary considerably throughout the steam generator making it difficult to evaluate all of the potential conditions that could exist. There was also some discussion on whether and how plants monitor the amount of deposits in the steam generator and the accuracy of these estimates.

Regarding the use of a probability and confidence level of 95/50 or 95/95, the NRC staff indicated that it would further discuss the issue, but indicated that it may be useful for the industry to develop limits on when the arithmetic and simplified statistical methods can be used rather than the full Monte Carlo approach for assessing tube integrity. This may address the staff's concern with using the 95/50 rather than the 95/95. The industry indicated that it had developed some qualitative guidance, which is to be included in the next revision of the Steam Generator Integrity Assessment Guidelines which is scheduled for publication later this year, on the limitations of the arithmetic and simplified statistical methods. The industry indicated that the Electric Power Research Institute report No. 1012984 has some additional discussion on this issue and it was addressed previously as Item 16 on the industry's tracking system for NRC comments on the guidelines.

The NRC staff indicated that it would check on the status of Technical Specification Task Force (TSTF) traveler 510 which deals primarily with steam generator tube inspections. The industry indicated that plants may want to apply the new requirements in the TSTF during the Spring 2011 outage season and would like to know the NRC staff's opinion on this proposal prior to this since they would factor the results into outage planning. Subsequent to the meeting, the NRC staff determined that the technical branches would be receiving the TSTF for scheduling and review in late September.

The NRC staff questioned whether the operating experience at a foreign reactor related to intergranular attack had any implications to plants in the United States. Both the NRC staff and industry indicated that additional information is needed to perform this assessment. The NRC staff is pursuing obtaining additional information.

The industry asked whether there was an NRC project manager associated with the steam generator management program. This information is needed to ensure that any deviations taken from the industry guidelines under the industry's material initiative (referred to as Nuclear Energy Institute's (NEI) 03-08). The NRC staff indicated that it would follow-up on this issue.

The NRC staff encouraged the industry to continue to monitor noise in the steam generator tubes and to develop guidance on what the appropriate actions should be when high noise levels are observed.

The industry's program for detecting and sizing wear due to loose parts and for detecting loose parts is a long-term project. As a result, the industry proposed that this issue be removed from the list of items discussed. The NRC staff indicated that it did not want to remove this item from the topics of discussion, but would reconsider removing this item after the results from the assessment of the ability of the bobbin coil to detect indications and loose parts near the top of support structures (e.g., tubesheet) were discussed.

The NRC staff agreed that the industry could remove the topic on steam generator management program web-site access from the list of discussion topics.

The NRC staff highlighted some issues related to two recent license renewal audits. During these audits several discrepancies were identified between the plant's procedures, the industry guidelines, the plant technical specifications, and among the plant procedures. These issues have made the NRC staff question the adequacy of the assessments performed at the plant (self and external assessments). In addition, during at least one of the audits the plant had not updated their procedures to the latest steam generator guidance and it appeared that some procedures may not have been updated following the adoption of TSTF-449. On this last issue, the industry indicated that some plants may not update their procedures until right before the next scheduled steam generator tube inspection. In these cases, some plants may indicate that a specific procedure can no longer be used until it is updated. The NRC staff raised a question on whether this was consistent with the requirement to establish and implement a steam generator program.

As a result of these audits and other operating experience, the following issues were discussed.

NEI 97-06 defines accident induced leakage, in part, as the primary-to-secondary leakage that occurs during postulated accidents when tube structural integrity is assumed. The NRC staff indicated it does not appear appropriate to limit the definition to “when structural integrity is assumed.”

NEI 97-06 indicates that condition monitoring is performed at the conclusion of each operating cycle. The NRC staff indicated that this may not be consistent with the technical specifications which require condition monitoring to be performed when a tube is inspected or plugged.

The NRC staff indicated that the guidance in the Steam Generator Integrity Assessment Guidelines to assess changes in design parameters in the assessment of structural limits if they result in a primary-to-secondary differential pressure that is greater than the established value for normal operation by more than 50 pounds per square inch may not be consistent with the technical specifications. The industry indicated that they were processing a change in the guidelines to address the issue.

The NRC asked whether any guidance was needed with respect to the rigor of the comparison of the previous operational assessment to the present condition monitoring. The comparison is required by the Steam Generator Integrity Assessment Guidelines. The NRC staff indicated that this comparison is important for ensuring the adequacy of the operational assessment methodology. The NRC staff indicated that even if the results of the current inspection are bounded by projections, it may still indicate a potential issue with the assumptions and methodology of the operational assessment if the projections were near the actual results since the projections are intended to be very conservative. There was extensive discussion on this issue including the extent of documentation supporting this comparison and whether this comparison could be as simple as stating that the projections indicated the results should be within the performance criteria and the actual results were within the performance criteria.

The NRC staff indicated that the Steam Generator Integrity Assessment Guidelines require the repair limit to be developed prior to the inspection. Although the NRC staff indicated that this is prudent, it would also appear that the repair limit should be revisited near the end of the inspection to confirm its adequacy (i.e., the growth rates used in developing the repair limit bounded the actual inspection results). The NRC staff indicated that if this confirmation is not performed, it could result in an unplanned inspection.

The NRC staff indicated that during a future meeting it would be beneficial to discuss whether plants are assuming a loss of structural integrity (i.e., burst) if a wear scar is of sufficient size that a significant opening would occur. That is, are plants assuming that no burst can occur at wear scars due to their limited length and width?

The NRC staff questioned whether there was a need for guidance on performing condition monitoring on tubes that can not be fully inspected (e.g., as a result of obstructions). The staff indicated that condition monitoring is required when tubes are plugged.

There was some discussion on whether there was adequate guidance on the appropriate non-destructive examination uncertainty to use when performing tube integrity assessments. Since tube integrity assessments are performed using a variety of different inspection parameters (e.g., structurally significant length), it would seem appropriate to use the sizing uncertainty associated with the specific inspection parameter used in the assessment. The industry indicated that this was part of their "tools" program.

In general, the industry agreed to look into the issues discussed at the meeting and the NRC staff indicated it would also investigate a few issues as discussed above.

The NRC staff and industry tentatively agreed that the next meeting, if warranted, would be on January 21, 2010. A phone conference will be held in mid-December 2009 to ascertain whether a meeting is warranted or whether the topics could be discussed during a conference call or a series of conference calls.

Enclosure:  
Attendance List

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NAME	TMorgan	KKarwoski	MGavrilas	TMorgan
DATE	10/06/2009	10/06/2009	10/08/2009	10/06/2009

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Attendance List  
September 16, 2009, Meeting with the NEI SGTF and Industry

SGTF/Industry

Helen Cothron, EPRI  
Scott A. Redner, XCEL  
Robert Cullen, Entergy  
Jim Riley, NEI  
Gary L. Boyers, FPL  
Herm Lagally, Westinghouse  
Dan Mayes, Duke Energy  
Steve Swilley, EPRI  
Don Gerber, Dominion  
Forrest Hundley, SNC  
Jay Smith, Exelon  
Russ Cipolla, Intertek-APTECH  
Nick Idvorian, Babcock and Wilcox  
Kevin Sweeney, Arizona Public Service  
Jim Begley, AREVA  
Jim Benson, EPRI

Phone Participants

Jeff Fleck, AREVA  
John Arhar, PG&E

NRC

Charles Harris  
Ken Karwoski  
Thomas Morgan  
Aloysius Obodoako  
Rachel Vaucher (Foreign Assignee)

ENCLOSURE