

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NEW REACTORS
WASHINGTON, DC 20555-0001

April 3, 2009

**NRC REGULATORY ISSUE SUMMARY 2009-04
STEAM GENERATOR TUBE INSPECTION REQUIREMENTS**

ADDRESSEES

All holders of operating licenses for pressurized-water reactors under the provisions of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All holders of and applicants for nuclear power plant construction permits, early site permits, and limited work authorizations for a pressurized-water reactor under the provisions of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

All holders of and applicants for a combined license, manufacturing license, standard design certification, or standard design approval for a pressurized-water reactor under the provisions of 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

INTENT

The Nuclear Regulatory Commission (NRC) is issuing this regulatory issue summary (RIS) to clarify the NRC's regulatory position on the implementation of the steam generator (SG) tube inspection requirements contained within the technical specifications (TS) of a plant. The NRC expects addressees to review this RIS for applicability to their facilities and to consider actions as appropriate. This RIS requires no action or written response from addressees.

BACKGROUND INFORMATION

After public discussions with the NRC staff, the Nuclear Energy Institute Technical Specification Task Force (TSTF) submitted a proposal containing performance-based programmatic requirements for addressing steam generator tube integrity in the Standard Technical Specifications (STS). They designated the proposed changes as TSTF-449, "Steam Generator Tube Integrity, Revision 0." The industry made several revisions to TSTF-449 because of public interactions with the NRC staff, including Revisions 1 and 2. On March 2, 2005, the NRC staff published a notice for comment (70 FR 10298) of a model no significant hazards consideration determination and a model safety evaluation for TSTF-449, Revision 3 to facilitate licensees adopting the NRC-staff accepted changes to the STS.

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After minor editorial changes based on stakeholder feedback, the NRC approved Revision 4 to TSTF-449 and on May 6, 2005, in accordance with the NRC consolidated line item improvement process, issued a notice of availability (70 FR 24126) of the model application, and referenced the previously (March 2, 2005) noticed no significant hazards consideration determination and model safety evaluation for the adoption of TSTF-449, Revision 4.

The revised, performance-based, generic TS focus on ensuring that SG tubes satisfy performance criteria commensurate with the assurance of adequate tube integrity. All currently operating pressurized-water reactor plants have adopted SG TS similar to those in TSTF-449, Revision 4. The NRC and the industry have interacted several times concerning proper implementation of the new SG tube inspection programmatic requirements, including public meetings on May 2, 2007 and November 29, 2007. This RIS clarifies the staff's position related to issues raised by the industry in implementing these inspection requirements.

The inspection requirements for SG tubes in TSTF-449 depend on the tube material and heat treatment these tubes received. The requirements are very similar for the three combinations of tube material and tube heat treatment process currently used in the United States. Although the following inspection requirements taken from TSTF-449 are directly applicable to units with thermally treated Alloy 600 tubes, the issues discussed in the subsequent section of this RIS (Summary of Issues) are generally applicable to all steam generators irrespective of the tube material and tube heat treatment process. The following is an excerpt from the "Steam Generator (SG) Program" section of the TS.

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.
2. Inspect 100% of the tubes at sequential periods of 120, 90, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 48 effective full power months or two refueling outages (whichever is less) without being inspected.

3. If crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

As the industry began to implement the new TS inspection requirements for SG tubes, several issues arose concerning acceptable approaches for implementing these new requirements. These issues were highlighted to the NRC in a letter from NEI dated September 13, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML072600574).

SUMMARY OF ISSUES

This RIS clarifies the NRC staff's position related to the implementation of the SG inspection requirements in TSTF-449.

Issue 1: *A licensee may identify a new potential degradation mechanism after the first inspection in a sequential period. If this occurs, what are the expectations concerning the scope of examinations for this new potential degradation mechanism for the remainder of the period (e.g., do 100 percent of the tubes have to be inspected by the end of the period or can the sample be prorated for the remaining part of the period)?*

The TS contain requirements that are a mixture of prescriptive and performance-based elements. Paragraph "d" of these requirements indicates that the inspection scope, inspection methods, and inspection intervals shall be sufficient to ensure that SG tube integrity is maintained until the next SG inspection. Paragraph "d" is a performance-based element because it describes the goal of the inspections but does not specify how to achieve the goal. However, paragraph "d.2" is a prescriptive element because it specifies that the licensee must inspect 100 percent of the tubes at specified periods.

If an assessment of degradation performed after the first inspection in a sequential period results in a licensee concluding that a new degradation mechanism (not anticipated during the prior inspections in that period) may potentially occur, the scope of inspections in the remaining portion of the period should be sufficient to ensure SG tube integrity for the period between inspections.

In addition, to satisfy the prescriptive requirements of paragraph "d.2" that the licensee must inspect 100 percent of the tubes within a specified period, a prorated sample for the remaining portion of the period is appropriate for this potentially new degradation mechanism. This prorated sample should be such that if the licensee had implemented it at the beginning of the period, the TS requirement for the 100 percent inspection in the entire period (for this degradation mechanism) would have been met. A prorated sample is appropriate because (1) the licensee would have performed the prior inspections in this sequential period consistently with the requirements, and (2) the scope of inspections must be sufficient to ensure that the licensee maintains SG tube integrity for the period between inspections.

Issue 2: *The TS clearly specify the starting point for the first sequential period. What is the starting point for the second and subsequent periods (i.e., after the accumulation of the effective full-power months listed in the TS or at the end of the last inspection in the previous period)?*

The TS specify that the first sequential period begin after the first inservice inspection of the SGs. The starting point for the first sequential period is after the first inservice inspection of the SGs because the TS specify that the scope of the first inservice inspection is 100 percent of the tubes. The starting point for the second and subsequent periods shall be after the accumulation of the effective full-power months listed in the TS (e.g., the starting point for the 90 effective full power month period is 120 effective full power months after the completion of the first inservice inspection.

Issue 3: *Can the refueling outage that is nearest to the midpoint of the period occur after the midpoint of the period? Similarly, can the refueling outage nearest the endpoint of the period occur after the endpoint of the period?*

The inspection nearest the midpoint of the period can be on either side of the midpoint; however, the inspection at the end of the period must take place during an outage before the end of the period because the TS clearly indicate the scope of the examinations that must be performed within the specified periods.

BACKFIT DISCUSSION

This RIS provides regulatory clarification and does not represent a new or different staff position about the implementation of 10 CFR 50.36, "Technical Specifications." This RIS clarifies the staff's position related to issues raised by the industry in implementing inspection requirements. It requires no action or written response beyond what is required in 10 CFR 50.36. Any action that addressees take to implement changes to their TS in accordance with the clarifications in this RIS is strictly voluntary, ensures compliance with current regulations, and therefore is not a backfit under 10 CFR 50.109, "Backfitting." Consequently, the NRC staff did not perform a backfit analysis.

FEDERAL REGISTER NOTIFICATION

A notice of opportunity for public comment on this RIS was not published in the *Federal Register* because the RIS is informational and does not represent a departure from current regulatory requirements. However, the NRC held two public meetings on May 2, 2007, and November 29, 2007 (ML071830174 and ML073470523). These meetings included discussions of steam generator inspection methodologies.

CONGRESSIONAL REVIEW ACT

The NRC has determined that this RIS is not a rule under the Congressional Review Act (5 U.S.C. §§ 801–808) and, therefore, is not subject to the Act.

PAPERWORK REDUCTION ACT STATEMENT

This RIS does not contain any information collections and, therefore, is not subject to the requirements of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.).

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CONTACT

Please direct any questions about this matter to the technical contact listed below.

Theodore R. Quay for

Timothy J. McGinty, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Technical Contact: Kenneth J. Karwoski
(301) 415-2752
kenneth.karwoski@nrc.gov

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