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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

January 20, 2006

NRC GENERIC LETTER 2006-01: STEAM GENERATOR TUBE INTEGRITY AND ASSOCIATED TECHNICAL SPECIFICATIONS

ADDRESSEES

All holders of operating licenses for pressurized-water reactors (PWRs), except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel. A response to this generic letter (GL) is not needed for the following units since they have revised their technical specifications (TS) to be conceptually similar to the TS discussed in this GL: Arkansas Nuclear One Unit 1, Callaway, Catawba Units 1 and 2, Farley Units 1 and 2, Salem Unit 1, and South Texas Project Units 1 and 2.

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is concerned that current TS requirements may not be sufficient to ensure that steam generator (SG) tube integrity can be maintained in accordance with current licensing and design basis. The NRC is, therefore, issuing this GL to request that addressees either submit a description of their program for ensuring SG tube integrity for the interval between inspections or adopt alternative TS requirements for ensuring SG tube integrity. Alternative TS requirements that address the staff's concerns with the existing TS were developed by the industry and found acceptable by the staff.

DISCUSSION

Steam generator tubes are an integral part of the reactor coolant pressure boundary (RCPB) and also serve to isolate radiological fission products in the primary coolant from the secondary coolant and the environment. For the purposes of this GL, tube integrity means that the tubes are capable of performing these functions in accordance with the plant design and licensing basis, including applicable regulatory requirements.

During operation licensees are required to monitor and maintain the condition of the SG tubes to ensure their continued integrity. Specifically, licensees are required by 10 CFR 50.55a(b)(2)(iii) and 10 CFR 50.55a(g) or by the plant TS to perform periodic inservice inspections and to repair (e.g., sleeve) or remove from service (by plugging the tube ends) all tubes found to have flaws exceeding the plugging limit (i.e. tube repair criterion).

The current TS requirements for inspection and repair of SG tubes were developed in the 1970s. These requirements are prescriptive. The licensees must inspect the tubes at specified intervals, implement specified tube inspection sampling plans, and repair or remove from

service by plugging all tubes found by inspection to have flaws in excess of specified flaw repair criteria. However, as shown by operating experience, the prescriptive approach in the TS may not ensure tube integrity. For example, in cases of low to moderate levels of degradation, the TS only require that 3 to 21 percent of the tubes be inspected, irrespective of whether the inspection indicates that additional tubes need to be inspected to reasonably ensure that tubes with flaws which may exceed the tube repair criteria or impair tube integrity are detected. In addition, the TS (and Section XI of the American Society of Mechanical Engineers [ASME] Boiler and Pressure Vessel Code) do not prescribe the inspection methods to be used for various tube degradation mechanisms at specific tube locations or define the specific objectives to be achieved by the selected methods. Also, flaws grow between inspections and can exceed the flaw size allowed for in the tube repair criteria. In such cases, the specified inspection frequencies may not ensure reinspection of a tube before its integrity is impaired. In short, current TS surveillance requirements may not require licensees to actively manage their SG programs so as to provide reasonable assurance of tube integrity. As a result, licensees have often found it necessary to implement measures beyond the TS requirements to ensure tube integrity. Licensees often interact with the NRC staff in an oversight or review capacity to ensure that tube integrity is being maintained.

The NRC staff, with external stakeholder involvement, began efforts to improve the SG tube integrity regulatory framework, as discussed in SECY-03-0800, "Steam Generator Tube Integrity (SGTI) - Plans for Revising the Associated Regulatory Framework." As a result of these efforts, the NRC and industry developed modified generic TS for addressing SG tube integrity. The generic changes to the Standard Technical Specifications (STS) were submitted by the Technical Specification Task Force (TSTF) and are designated TSTF-449, "Steam Generator Tube Integrity." The NRC reviewed and approved Revision 4 to TSTF-449, and applied the consolidated line item improvement process (CLIIP)[1] to provide an example application for adoption of TSTF-449 into a licensee's TS.[2] Several facilities have recently incorporated TSTF-449, Revision 4 (or something similar) into their TS. (Proposals to change the plant-specific TS are reviewed in accordance with the license amendment review process to confirm the acceptability of the changes.) The approach taken in TSTF-449, Revision 4, is generally consistent with Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines." The revised generic TS are performance-based in that they focus on ensuring the tubes satisfy performance criteria that are commensurate with assurance of adequate tube integrity. This approach can be readily adapted to new or unexpected degradation mechanisms and advances in nondestructive examination technology. This approach includes programmatic elements to ensure that tubes are adequately monitored and maintained relative to the structural and leakage performance criteria.

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[1]See 70 FR 24126 or ADAMS Accession No. ML051160106 for the availability of the CLIIPed TSTF-449 Revision 4.

[2]See http://www.nrc.gov/reactors/operating/licensing/techspecs.html. Follow the CLIIP links to the table of CLIIP STS Changes Issued for Adoption.

The requirements for SG tube integrity are given in Title 10 of the Code of Federal Regulations (10 CFR). Specifically, the general design criteria (GDC)[1] in Appendix A to 10 CFR Part 50 contain requirements related to the RCPB (GDC 2, GDC 14, GDC 30, and GDC 32), and 10 CFR 50.55a states that components that are part of the RCPB must meet the requirements for Class 1 components in Sections III and XI of the ASME Boiler and Pressure Vessel Code. If the TS of a nuclear power plant include surveillance requirements for SGs different from those in Section XI of the ASME Boiler and Pressure Vessel Code, the inservice inspection program for SG tubing is governed by the requirements in the TS (10 CFR 50.55a(b)(2)(iii)).

The requirements for the content of a plant's TS are given in 10 CFR 50.36, "Technical specifications." All currently operating PWR licensees have TS for SG tube surveillance. These TS include operational leakage limits so that if significant leakage develops, the plant is shut down. The plugging limits in the TS were developed to ensure that degraded tubes maintain factors of safety against gross rupture consistent with the plant design basis (i.e., consistent with the stress limits of Section III of the ASME Code), and maintain leakage integrity consistent with the plant licensing basis while allowing for potential flaw size measurement error and flaw growth between inservice inspections.

As part of the plant licensing basis, applicants for PWR licenses are also required to analyze the consequences of postulated design basis accidents. Typical accidents analyzed are SG tube rupture, locked rotor, control rod ejection, and a main steamline break. These analyses consider the potential primary-to-secondary leakage through the tubes during these events and must show that the offsite radiological doses do not exceed 10 CFR Part 100 limits (or some fraction thereof) and GDC 19 of 10 CFR Part 50, Appendix A.

In addition to inspecting and repairing SG tubes, licensees are required by 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," to ensure that conditions adverse to quality are promptly identified and corrected. If the conditions are significantly adverse to quality, the measures must assure that the cause of the condition is determined and corrective action taken to preclude repetition.

The staff is requesting information about (1) actions licensees are taking or will take to ensure tube integrity is being maintained and (2) contemplated changes to the TS to reflect these actions. The staff requests this information because the surveillance requirements in the current TS may not ensure that the SG tubes are within safety limits. The staff will use the information to verify that the surveillance requirements implemented at the plant provide reasonable assurance that the safety limits will be satisfied for the operating interval between inspections and that the safety limits are consistent with the plant's design and licensing basis.

APPLICABLE REGULATORY REQUIREMENTS

The applicable 10 CFR Part 50 and plant TS requirements are discussed in the Discussion section.

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[1]Or similar requirements in the plant-specific principal design criteria for PWR facilities licensed before the issuance of 10 CFR Part 50, Appendix A.

REQUESTED ACTION

This GL asks addressees to submit information.

REQUESTED INFORMATION

All addressees are requested to provide a response to this GL that contains either the information requested in Option 1 or Option 2:

Option 1: Within 30 days of the date of this GL, either confirm that you have submitted a request to modify the SG portion of your TS that is consistent with TSTF-449, Revision 4, or provide a regulatory commitment detailing your plans and schedule for submitting such a request (refer to Regulatory Issue Summary 2000-17, "Managing Regulatory Commitments Made by Power Reactor Licensees to the NRC Staff"). If you modify your commitment so that the request will not be submitted by May 31, 2006, provide the information requested in Option 2 within 60 days of changing your commitment.

If your commitment is to submit a request after May 31, 2006, provide the information requested in Option 2. If you or the NRC staff determine that your submittal is not consistent with TSTF-449, Revision 4, provide the information requested in Option 2 within 60 days of this determination.

Option 2: Within 60 days of the date of this GL, provide a description of the actions being taken or that will be taken to ensure tube integrity is being maintained (i.e., provide a detailed description of your tube integrity program).

REQUIRED RESPONSE

In accordance with 10 CFR 50.54(f), addressees are required to submit written responses to this GL. There are two options:

(a) Addressees may submit written responses providing the information requested above within the requested time period.

(b) Addressees who cannot meet the requested completion date or who choose an alternate course of action are required to so notify the NRC in writing as soon as possible but no later than 30 days from the date of this GL. The response must address any alternative course of action proposed, including the basis for the acceptability of the proposed alternative course of action, and the schedule for completing the alternative course of action.

The required written response should be addressed to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, 11555 Rockville Pike, Rockville, Maryland 20852, under oath or affirmation under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). In addition, a copy of the response should be sent to the appropriate regional administrator.

REASONS FOR REQUESTED INFORMATION

This GL asks addressees to submit information. The requested information will enable the NRC staff to determine whether addressees' SG tube integrity programs provide reasonable assurance of tube integrity consistent with the design and licensing basis and applicable regulatory requirements (e.g., 10 CFR Part 50, Appendix A Criteria 2, 14, 15, 19, 30, 31, and 32; 10 CFR Part 50, Appendix B, Criterion XVI).

The NRC staff will review the responses to this GL to determine whether additional actions are necessary.

RELATED GENERIC COMMUNICATIONS

The related generic communications are listed below:

NRC Information Notice 2005-09, "Indications in Thermally Treated Alloy 600 Steam Generator Tubes and Tube-to-Tubesheet Welds," April 7, 2005 (ML050530400).

NRC Information Notice 2004-17, "Loose Part Detection and Computerized Eddy Current Data Analysis in Steam Generators," August 25, 2004 (ML042180094).

NRC Information Notice 2004-16, "Tube Leakage due to a Fabrication Flaw in a Replacement Steam Generator," August 3, 2004 (ML041460357).

NRC Information Notice 2004-10, "Loose Parts in Steam Generators," May 4, 2004 (ML041170480).

NRC Generic Letter 2004-01, "Requirements for Steam Generator Tube Inspections," August 30, 2004 (ML042370766).

BACKFIT DISCUSSION

Under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), this GL transmits an information request for the purpose of verifying compliance with applicable existing requirements. The information will enable the NRC staff to determine whether the applicable requirements discussed above are being met. No backfit is either intended or approved in issuing this GL. Therefore, the staff has not performed a backfit analysis.

FEDERAL REGISTER NOTIFICATION

A notice of opportunity for public comment was published in the *Federal Register* on October 7, 2004 (69 FR 60193). Five sets of comments were received, all from the nuclear industry. The staff considered all the comments received. The staff's evaluation of the comments is publicly available through the NRC's Agencywide Document Access and Management System (ADAMS) under Accession No. ML053110454.

SMALL BUSINESS REGULATORY ENFORCEMENT FAIRNESS ACT

The NRC has determined that this action is not subject to the Small Business Regulatory Enforcement Fairness Act of 1996.

PAPERWORK REDUCTION ACT STATEMENT

This GL contains information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (in approval no. 3150-0011, which expires on February 28, 2007).

The burden to the public for these mandatory information collections is estimated to average 200 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collected. Send comments regarding this burden estimate or any other aspect of these information collections, including suggestions for reducing the burden, to the Records and FOIA/Privacy Services Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail to INFOCOLLECTS@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0011), Office of Management and Budget, Washington, DC 20503.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.

CONTACT

Please direct any questions about this matter to the contacts listed below or to the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

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Note: NRC generic communications may be found on the NRC public Web site, http://www.nrc.gov, under Electronic Reading Room/Document Collections.

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