



U.S. NUCLEAR REGULATORY COMMISSION  
**STANDARD REVIEW PLAN**  
OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 5.4.2.2 STEAM GENERATOR TUBE INSERVICE INSPECTION

REVIEW RESPONSIBILITIES

Primary - Materials Engineering Branch (MTEB)

Secondary - None

I. AREAS OF REVIEW

General Design Criterion 32 of Appendix A of 10 CFR Part 50 requires, in part, that components which are part of the reactor coolant pressure boundary (RCPB) or other components important to safety be designed to permit periodic inspection and testing of critical areas for structural and leaktight integrity. The inservice inspection program for steam generator tubes, which constitute part of the reactor coolant pressure boundary, is based on the detailed positions of Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes," and the applicable Standard Technical Specifications for each nuclear steam system supplier (NUREG-0103, 0212, or 0452). The design of the steam generators as described in the preliminary safety analysis report (PSAR) is reviewed to establish that use of the specified inspection techniques is feasible. The provisions made for baseline inspection prior to startup, the methods to be used for the inspections, and the inservice inspection program are reviewed in the final safety analysis report (FSAR) and plant Technical Specifications.

The requirement of General Design Criterion 32 concerning the reactor vessel material surveillance program is reviewed by MTEB in Standard Review Plan Section 5.3.3, "Reactor Vessel Integrity." The inservice inspection of other areas of the reactor coolant pressure boundary and steam generator are also reviewed by MTEB in Standard Review Plan Sections 5.2.4 and 6.6.

II. ACCEPTANCE CRITERIA

The guidelines for periodic inspection and testing of the steam generator tube portion of the reactor coolant pressure boundary are specified in Regulatory Guide 1.83 and the applicable Standard Technical Specifications, NUREG-0103, 0212, or 0452.

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USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

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Compliance with the guidelines for inservice inspection in Regulatory Guide 1.83 and the applicable Standard Technical Specification NUREG constitutes an acceptable basis for meeting, in part, the inservice inspection requirements of General Design Criterion 32. Specific acceptance criteria for meeting the inservice inspection requirements of General Design Criterion 32 are listed below.

The design of the steam generators to provide access for an inservice inspection (ISI) program, and the proposed ISI program should follow the recommendations given in Regulatory Guide 1.83. The steam generators should be designed to permit inspection of every tube. The tube examination equipment and procedures should be capable of detecting and locating defects with a penetration of 20% or more of the wall thickness. A permanent record of test data should be provided. A baseline tube inspection should be scheduled prior to startup. The sample selection and testing of tubes, the inspection intervals, the actions to be taken if defects are identified, and reporting requirements should follow the recommendations in the applicable Standard Technical Specifications.

### III. REVIEW PROCEDURES

The reviewer will select and emphasize material from the procedures described below, as may be appropriate for a particular case. He determines that the design of the steam generators, as described in the PSAR, will permit access for the specified inspection techniques. He also evaluates the design of the steam generator as described in the FSAR and the Technical Specification inservice inspection program to determine the degree to which the recommendations of Regulatory Guide 1.83 have been followed. He determines that the inspection techniques for the tubes, the selected number of tube samples, the inspection intervals, and the actions to be taken in the event defects are observed are in accordance with the positions stated in the regulatory guide and applicable NUREG. He determines that a baseline inspection will be made prior to startup of the plant.

### IV. EVALUATION FINDINGS

The reviewer verifies that sufficient information has been provided in accordance with the requirements of this SRP section, and that his evaluation supports conclusions of the following type, to be included in the staff's safety evaluation report:

To ensure that no deleterious defects develop during service, steam generator tubes will be inspected prior to plant startup and periodically throughout the life of the plant. The applicant (licensee) has stated that his inservice inspection program will comply (complies) with the recommendations in Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes," and the applicable Standard Technical Specifications, NUREG ( ), concerning the inspection methods to be used, access for inservice inspection, provisions for a baseline inspection, selection and sampling of tubes, inspection intervals, actions to be taken in the event defects are identified, and reporting requirements.

The staff concludes that the inservice inspection program of steam generator tubes is acceptable and meets the inspection and testing

requirements of General Design Criterion 32. This conclusion is based on the applicant's (licensee's) following the recommendations in Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes," and the Standard Technical Specifications, NUREG ( ), as reviewed by the staff and determined to be appropriate for this application.

#### V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the NRC staff's plans for using this SRP section.

Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides, NUREGs, and in 10 CFR Part 50, §50.36.

#### VI. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 32, "Inspection of Reactor Coolant Pressure Boundary."
2. Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes."
3. NUREG-0103, "Standard Technical Specifications for Babcock and Wilcox Pressurized Water Reactors."
4. NUREG-0212, "Standard Technical Specifications for Combustion Engineering Pressurized Water Reactors."
5. NUREG-0452, "Standard Technical Specifications for Westinghouse Pressurized Water Reactors."