May 1973

U.S. ATOMIC ENERGY COMMISSION

REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

Kathleen 7/15/75

FR Vol 40, # 140 7/21/75

REGULATORY GUIDE 1.51

INSERVICE INSPECTION OF ASME CODE CLASS 2 AND 3 NUCLEAR POWER PLANT COMPONENTS

A. INTRODUCTION

General Design Criteria 36, "Inspection of Emergency Core Cooling System," 39, "Inspection of Containment Heat Removal System," 42, "Inspection of Containment Atmosphere Cleanup Systems," and 45, "Inspection of Cooling Water System," of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," require that the subject systems be designed to permit appropriate periodic inspection of important component parts of the systems to assure system integrity and capability. Regulatory Guide 1.26 (Safety Guide 26), "Quality Group Classification and Standards," in conjunction with § 50.55a of 10 CFR Part 50 describes a quality classification system related to specified industry codes that may be used to determine quality standards for water- and steam-containing components important to the safety of water-cooled nuclear power plants. This guide describes acceptable methods of implementing the periodic inservice inspection requirements for American Society of Mechanical Engineers (ASME) Code Class 2 and 3 components. This guide applies to light-water-cooled reactors. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

B. DISCUSSION

The ASME Boiler and Pressure Vessel Code (ASME B&PV Code), Section XI, "Rules for Inservice Inspection of Nuclear Reactor Systems,"[1] specifies requirements for inservice inspection of Code Class 1[2] components. In the Winter 1972 Addenda to Section XI,[3] acceptable inservice inspection requirements are specified for Code Class 2[2] components. Code Class 3[2] components are not presently included in Section XI requirements, but they should also be part of the scheduled inservice inspection program. The inspection requirements need not be as extensive as those required for Code Class 2 components but should, as a minimum, include visual inspection of Code Class 3 components and their supports. For such inspections to be effective, they should be performed at periods when the components are under pressure of sufficient magnitude to properly represent the intended service condition. This may require that the inspections of Code Class 3 components be scheduled to coincide with system performance tests, component functional tests, and system pressure tests in order to benefit from the pressure levels established for these tests. Section XI defines an inspection interval for Code Class 1 and 2 components as 10 years, and the inservice inspection program for Code Class 3 components should be based on the same time interval.

Code Class 3 components required to function during normal reactor operation would generally be accessible during reactor downtime, and they should be inspected at least once toward the end of each inspection interval. Components in systems or portions of systems which are not required to function during reactor operation can be inspected independently of reactor downtime.

The visual inspection of Code Class 3 components should be conducted for signs or evidence of leakage caused by structural distress or corrosion effects on the components. In addition, supports and hangers for piping and Code Class 3 components over 4 inches in diameter should be inspected for evidence of inadequate support, unintended restraint, or structural distress.

[1] Copies may be obtained from American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

[2] Components classified as AEC Quality Group A, B, and C should conform to the requirements of the ASME Boiler and Pressure Vessel Code for Class 1, 2, and 3 components, respectively.

[3] ASME B&PV Code, Section XI, Winter 1972 Addenda.

USAEC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the AEC Regulatory staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

Published guides will be revised periodically, as appropriate, to accommodate comments and to reflect new information or experience.

Copies of published guides may be obtained by request indicating the divisions desired to the U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Director of Regulatory Standards. Comments and suggestions for improvements in these guides are encouraged and should be sent to the Secretary of the Commission, U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Chief, Public Proceedings Staff.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
3. Fuels and Materials Facilities
4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
8. Occupational Health
9. Antitrust Review
10. General

The pressure developed in components during a system performance test, a component performance test, or a system pressure test should be representative of conditions under which the systems should be leaktight during operation. The test pressure should be at least 110 percent of the system design pressure. However, the pressure developed during the conduct of a periodic system performance test would be acceptable during inspections conducted in periods between the pressure tests. Certain components, such as open storage tanks including piping to the first shutoff valve, cannot readily be pressure tested. The hydrostatic pressure developed with tanks filled to their design capacity would be an acceptable test pressure for such tanks and connected piping.

C. REGULATORY POSITION

1. Inservice inspection requirements for ASME Code Class 2[2] components should comply with the ASME B&PV Code, Section XI and the Winter 1972 Addenda[3] for Class 2 components except that subparagraph ISC-261(a) should be changed to read as follows:

> "Components in systems or portions of systems which recirculate reactor coolant during normal reactor operation, and are designed for pressure and temperature in excess of *either 275 psig or 200°F* shall be examined in accordance with the requirements specified in Table ISC-261."

2. Inspection programs for ASME Code Class 3[2] components should be performed according to the following schedules:

a. All of the components should be pressure tested and inspected at least once during each 10-year inspection interval.

b. In addition, all components should be inspected during periods of normal reactor operation or during system performance testing at least once during every one-third of each inspection interval.

3. Inspection requirements for ASME Code Class 3 components should include the following:

a. System pressure tests should be performed to the extent necessary to perform the component examination. Test pressure should be at least:

(1) For closed systems, 110 percent of the design pressure.

(2) For open storage tanks, the nominal hydrostatic pressure developed with the tanks filled to design capacity.

(3) Open-ended portions of systems may be exempted from pressure testing.

b. Visual inspections for evidence of unanticipated component leakage, structural distress, or corrosion.

c. Inspection of supports and hangers for piping and components over 4 inches in diameter for evidence of inadequate support, unintended restraint, or structural distress.

4. Records of the inservice inspection should be established and maintained for the life of the plant and should include:

a. Identification of systems components inspected;

b. Date of inspection;

c. Repair or replacement; and

d. Signature of employee certifying the inspection was made.