UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF SPECIAL PROJECTS

RELATING TO RELIEF FROM THE BOILER AND PRESSURE VESSEL CODE,

SECTION XI, "RULES FOR INSERVICE INSPECTION OF

NUCLEAR POWER PLANT COMPONENTS - DIVISION 1"

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY PLANT, UNITS 1, 2, AND 3

DOCKET NOS. 50-259, 50-260, AND 50-296

1.0 INTRODUCTION

Section 50.55a, "Codes and Standards," of 10 CFR Part 50 requires, in part, that certain safety-related pumps and valves meet the requirements of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (hereafter "the Code"). In order to meet the requirements of this regulation, the Tennessee Valley Authority (TVA) has submitted to the NRC its first ten year interval inservice System Pressure Test (SPT) program.

Regulation 10 CFR 50.55a(g)(6)(i) authorizes the Commission to grant relief from these requirements upon making the necessary findings and the Commission may authorize alternatives to the Code requirements. This SE contains the NRC staff's findings with respect to granting or not granting relief request H-3 submitted as part of the licensee's inservice SPT program.

1.1 Relief Request

Relief from the hydrostatic test pressure requirements for certain ASME Code Class 2 or equivalent piping and components of the 1974 Edition, Summer 1975 Addenda of Section XI is requested.

1.2 Code Requirement

a. IWC-5220 Pressure

1. The system hydrostatic test pressure shall be at least 1.25 times the system design pressure (P_D) and conducted at a test temperature not less than 100°F except as may be required to meet the test temperature requirements of IWA-5230.

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2. The test temperature may be reduced in accordance with the following table when system hydrostatic testing is required to be conducted at temperatures above 100°F in order to meet the fracture toughness criteria applicable to ferritic materials of which the system components are constructed.

Test Temperature	Test Pressure
100°F	1.25 P_D
200°F	1.20 P_D
300°F	1.15 P_D
400°F	1.10 P_D
500°F	1.05 P_D

b. IWA-5230 Temperature

The system leakage test and system hydrostatic pressure test shall be conducted at a test temperature that will satisfy the following requirements:

1. The test temperature for the initial preservice system pressure test shall satisfy the requirements specified in Section III.

2. The test temperature of IWA-5230(a) shall be modified for inservice system leakage tests and system hydrostatic pressure tests (1) as necessary during the service lifetime of the nuclear power system, following the results obtained from each set of tests of the material specimens withdrawn from the reactor vessel in accordance with the reactor material surveillance program, and (2) as required, to meet the fracture toughness criteria applicable to ferritic materials of system components as specified by the enforcement authorities having jurisdiction at the plant site.

3. The examinations may be performed after the system pressure has been reduced to a level coincident with a temperature of 200°F.

1.3 Licensee's Basis for Requesting Relief

In the main steam system, the outboard main steam isolation valves (MSIV) serve as the boundary between ASME Code Class 1 and Class 2 piping. Testing the Class 2 piping, as required by paragraph IWC-5220(a), would require pressurizing the MSIVs in the reverse direction from their design. Pressurizing the valves in this direction will cause the valves to unseat and leak. The valve manufacturer has stated that mechanically restraining the valve could damage the valve stem.

In the high-pressure coolant injection (HPCI) system, check valve FCV-73-45 is designed to prevent flow from Class 1 to Class 2 piping, and is the boundary between Class 1 and Class 2 piping. This valve cannot hold pressure from the Class 2 direction.

In the reactor core isolation cooling (RCIC) system, check valve FCV-71-40 is designed to prevent flow from Class 1 to Class 2 piping and is the boundary between Class 1 and Class 2 piping. This valve cannot hold pressure from the Class 2 direction.

1.4 Alternative Testing

a. All Class 2 MS system piping will be tested at the appropriate Class 1 pressure in conjunction with the Class 1 reactor vessel system hydrostatic pressure test.

b. That portion of the Class 2 HPCI system piping between FCV-73-44, FCV-73-45, and FCV-73-646 will be tested at the appropriate Class 1 pressure in conjunction with the Class 1 reactor feedwater system.

c. That portion of the Class 2 RCIC system piping between FCV-71-39 and FCV-71-40 will be tested at the appropriate Class 1 pressure in conjunction with the Class 1 reactor feedwater system.

2.0 STAFF EVALUATION

The NRC staff has reviewed the licensee's relief request H-3 for the SPT of certain Class 2 piping (the MS system and portions of the HPCI and RCIC systems) at 1.25 times the system design pressure. Requiring these operational valves, some of which are very large (26 inches inside diameter), to be replaced so that the pressure tests can be conducted on both sides of the valve is a significant undertaking. Extensive downtime, radiation exposure of workers and generation of large amounts of radioactive material waste will occur. Redesign of the systems and replacement of the valves would be necessary because of (1) pressurizing the main steam isolation valve in the Class 2 direction will cause the valve to unseat and leak. The valve manufacturer has stated that mechanically restraining the valve could damage the valve stem, (2) in the HPCI system, check valve FCV-73-45 is designed to prevent flow from Class 1 to Class 2, and is the boundary between Class 1 and Class 2. This valve cannot hold pressure from the Class 2 direction, (3) in the RCIC system, check valve FCV-71-40 is designed to prevent flow from Class 1 to Class 2 and is the boundary between Class 1 and Class 2. This valve cannot hold pressure from the Class 2 direction. During operation, these valves will not be subjected to higher pressures from the downstream side (Class 2) and therefore, the pressure tests do not represent an operational condition. The replacement of these valves is a significant burden to the licensee, in that it would also require extensive redesign of the system and possibly require other system changes. The fact that check valves FCV-73-45 and FCV-71-40 are in the line to be tested makes it impossible to set up operational flow in one direction and test flow (and pressure) in the opposite direction. Therefore, the testing must be performed from the same direction as operational flow and pressure. The proposed alternative Class 1 hydrostatic pressure test at 1.25 times design pressure versus the required Class 2 hydrostatic pressure test at 1.5 times design pressure will usually detect the type of defects and operating characteristics of concern.

3.0 CONCLUSION

Based on the staff review of the licensee's relief request H-3 for Browns Ferry, Units 1, 2, and 3, the staff concludes that the licensee's request for relief from certain specific requirements of Section XI of the ASME Code is acceptable. Relief is granted from the IWC-5220(a) requirement for the inservice SPT to be conducted at 1.25 times the system design pressure, provided the licensee incorporates the alternative pressure tests in the appropriate Surveillance Instructions (SI) defined below. The alternative system hydrostatic pressure tests shall be addressed in the SIs as follows:

a. MS system hydrostatic pressure test in SI 3.3.1.B, "Reactor Vessel."

b. HPCI system from FCV-73-44, FCV-73-45 and FCV-73-646 in SI 3.3.1.B, "Reactor Vessel" and SI 3.3.9, "High Pressure Coolant Injection."

c. RCIC system from FCV-71-30 to FCV-71-40 in SI 3.3.1.B, "Reactor Vessel" and SI 3.3.10, "Reactor Core Isolation Cooling."

Any additional program changes such as revisions or additional relief requests or deletion of any piping from the primary surge tank (PST) should be submitted to staff review and should not be implemented prior to review and approval by the staff.

The staff has determined (1) that relief may be granted pursuant to 10 CFR 50.55a(g)(6)(i) based on our finding that certain requirements of Section XI of the Code are impractical, and (2) that granting relief where the Code requirements are impractical is authorized by law and (3) that granting relief in conjunction with the proposed alternative testing requirements will not endanger life or property, or the common defense and security, and is otherwise in the public interest considering the burden that could result if they were imposed on the facility.

Principal Contributor: D. E. Smith

Dated: February 14, 1989