March 22, 2000

Mr. J. A Scalice
Chief Nuclear Officer
and Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT - RELIEF FROM ASME CODE REQUIREMENTS FOR PUMP AND VALVE INSERVICE TESTING PROGRAM (TAC NO. MA7212)

Dear Mr. Scalice:

By a letter dated November 15, 1999, the Tennessee Valley Authority (TVA) submitted two requests for relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, for the Watts Bar Nuclear Plant, Unit 1. The requests addressed stroke-time test requirements for Items PV-15, Revision 1, for valves 1-FSV-68-396-b and 1-FSV-68-397-A and PV-16 for valves 0-FSV-67-1221-A and 0-FSV-67-1223-B.

The staff has reviewed the information provided in TVA's November 15, 1999, letter. The staff's evaluation and conclusions are contained in the Enclosure. The alternative testing provides reasonable assurance of the valves' operational readiness. Based on the impracticality of complying with the Code and the burden on the licensee if those requirements were imposed, relief is granted pursuant to 10 CFR 50.55a(f)(6)(i).

Sincerely,

/RA/

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure: Safety Evaluation

cc w/enclosures: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE TESTING PROGRAM, FIRST10-YEAR INTERVAL

FOR

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT

DOCKET NUMBER 50-390

1.0 INTRODUCTION

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a, requires that inservice testing (IST) of certain American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves be performed in accordance with Section XI of the ASME *Boiler and Pressure Vessel Code* (the Code) and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the U.S. Nuclear Regulatory Commission (NRC or Commission) pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for its facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME code requirements upon making the necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to the Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants."

By letter dated November 15, 1999, Tennessee Valley Authority, the licensee, submitted two relief requests for the first 10-year interval of the IST program for pumps and valves for Watts Bar Nuclear Plant Unit 1. Watts Bar Nuclear Plant Unit 1 is currently implementing its first 10-year IST interval which began on May 27, 1996, and is scheduled to end May 26, 2006. The IST program was developed in accordance with the requirements of the 1989 Edition of the ASME Code by implementation of the 1987 ASME/American National Standards Institute *Operations and Maintenance (OM) Standards* Part 1, Part 6, and Part 10 (OM-1, OM-6, and OM-10) for IST of safety and relief devices, pumps, and valves.

The NRC's findings with respect to authorizing alternatives and granting or denying the IST program relief requests are given below.

2.0 RELIEF REQUESTS

2.1 Relief Request PV-15, Revision 1

The licensee requests relief from the stroke-time requirements of OM-10 paragraph 4.2.1.4(b) for two reactor coolant head vent throttle valves. The licensee proposes an alternative to this requirement which includes an enhanced maintenance program, calibration of the valves' position control system, full-stroke exercising during refueling outages, and verification that the valve is capable of fulfilling its function.

Relief was granted for PV-15 in a safety evaluation dated February 1996. The licensee has since revised the alternative test method and in its November 15, 1999, letter, requested authorization of a new alternative. This new alternative is evaluated below.

2.1.1 Licensee's Basis for Requesting Relief

The licensee states:

> These two valves are totally enclosed [seal welded bonnet], one-inch Target Rock solenoid valves, which prevents local confirmation of valve position. Design requirements impose a minimum stroke time limitation on these valves of not faster than 5 seconds. These valves are remotely positionable throttle valves with a thumb-wheel actuated controller that positions the valve. Restricting the stroke time to not less than 5 seconds effectively prohibits stroke timing the valve because the valve is capable of stroking considerably faster than the 5 second limit. Even if the 5 second limit did not exist, stroke timing of the valve using its thumb-wheel actuated controller would result in timing the ability of the operator to turn the thumb-wheel and not the ability of the valve to move.
>
> An enhanced maintenance program of disassembly and inspection of valve internal parts was evaluated. This method was not considered appropriate for the following reasons:
>
> [1] Frequent disassembly can lead to distortion of the valve parts caused by the repetitive welding process to reinstall the seal weld. This distortion could cause unacceptable operational seat leakage, binding of internal parts, and other operational problems.
>
> [2] The physical appearance of the internal parts does not always provide clear and evident verification of acceptable valve operation.

2.1.2 Alternative Testing

The licensee proposes:

> TVA proposes to utilize an enhanced maintenance program based on the following attributes:

[1] Periodic replacement of critical valve parts [i.e., the linear voltage differential transformer (LVDT) that provides valve position indication feedback, the coil that operates the valve, and the valve's electrical terminal board] is in accordance with TVA's environmental qualification binder for the valve. The current schedule for valve part replacement is every 132 months for the LVDT, every 294 months for the coil, and every 432 months for the valve terminal board.

[2] Calibration of the valve's position control system is performed each refueling outage. This calibration involves utilizing the valve controller to position the valve at various positions and utilizing the LVDT to determine the valve stem position. These are compared to ensure valve operation is as expected.

In addition to the enhanced maintenance program, tests will be conducted as follows to provide positive verification of the valve's ability to fulfill its specific function:

[1] Full stroke exercise of each valve is performed during shutdowns under the provisions of Paragraphs 4.2.1.2(f) and 4.2.1.2(g) of OM-10. This test consists of cycling the valve controller through one complete cycle and verifying [using the valve position indicator operated by the LVDT attached to the valve stem] that the valve cycles through one full cycle in response to the valve controller.

[2] During refueling outages, in addition to cycling the controller through one complete cycle and using the valve position indicator to verify valve travel, supplement the verification of valve travel by (a) ensuring no detectable flow is present through the valves with the valves closed, (b) ensuring that with each valve open flow is present, and (c) ensuring that when each valve is returned to the closed position no detectable flow is present. The presence or absence of flow is verified by monitoring a change in a process perimeter either the valve tail pipe temperature for an increase/decrease or the pressurizer relief tank [to which the valves discharge] for a temperature increase/decrease or level increase/no change. This additional verification which is consistent with OM-10, Paragraph 4.2.1.3, Valve Obturator Movement, ensures the valve disk is still attached to the stem and is capable of controlling flow.

Frequency of Proposed Alternative: Each refueling outage.

2.1.3 Evaluation

The reactor coolant head vent throttle valves, 1-FSV-68-396-B and 1-FSV-68-397-A, throttle open by operator action to control the rate at which non-condensable gases and hydrogen are vented from the reactor vessel following an accident. The Code, OM-10 paragraph 4.2.1.4(b), requires that the stroke time of all power-operated valves be measured to at least the nearest second. The licensee proposes an alternative to this requirement which includes an enhanced maintenance program, calibration of the valves' position control system, full-stroke exercising during refueling outages, and verification that the valve is capable of fulfilling its function.

The Code requirement for stroke-timing power operated valves allows for monitoring degrading conditions so that the valves may be repaired or replaced before they fail. The licensee states that it is impractical to stroke time the valves because they are totally enclosed with no means

of position indication. In Sections 4.2.8 and 4.2.9 of NUREG-1482, the staff recommends that when stroke-time testing is impractical, the licensee investigate alternatives that include stroke-timing with acoustic or other nonintrusive methods, stroke-timing with local observation or observation of system conditions, enhanced maintenance with a periodic stroke which may not be timed, stroke-timing and fail-safe testing during cold shutdowns or refueling outages, and control system signal calibration to verify the stroke times of the valves. The licensee's proposed alternative incorporates several of these recommendations and provides reasonable assurance of the valves' operational readiness.

2.1.4 Conclusion

Relief from the requirements of OM-10 paragraph 4.2.1.4(b), for the reactor coolant head vent throttle valves, 1-FSV-68-396-B and 1-FSV-68-397-A, is granted pursuant to 10 CFR 50.55a(f)(6)(i). The alternative testing provides reasonable assurance of the valves' operational readiness. Based on the impracticality of complying with the Code and the burden on the licensee if those requirements were imposed, relief is granted.

2.2 Relief Request PV-16

The licensee requests relief from the stroke-time requirements of OM -10 paragraphs 4.2.1.4(a), 4.2.1.4(b), and the corrective actions of 4.2.1.9(b) for two cooling water supply solenoid valves contained in the auxiliary air compressor skid. The licensee proposes to test the ability of the auxiliary air compressor to function properly as a means of assuring the operation readiness of the skid-mounted valves.

An alternative test method for these skid-mounted valves was previously contained in PV-15 and authorized in a safety evaluation dated February 1996. Since then, the licensee revised PV-15 and created a new relief request, PV-16, to describe the alternative test method for these valves. The new alternative is evaluated below.

2.2.1 Licensee's Basis for Requesting Relief

The licensee states:

> These solenoid valves are mounted on the auxiliary air compressor skid. These valves are totally enclosed, solenoid actuated valves manufactured by Target Rock and have no remote position indication. The inability to see any moving parts of the valve prevents visual confirmation of valve position. This, in conjunction with the lack of remote position indication, prevents direct measurement of the stroke time of the valve.
>
> Additionally, the air compressors have a thermostatic valve, installed in series with these solenoid valves, that modulates in response to system temperature. The thermostatic valve does not start opening until air compressor temperatures are elevated. Until air compressor temperatures have risen sufficiently to open the thermostat, no cooling water flow exists to the compressor, even though the solenoid valves are open. Although a flow element is provided in the cooling water line, the presence of the thermostatic valve prevents use of the flow measurement as an indirect indication of solenoid valve stroke time.

> As discussed in NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," section 3.4, "Skid-Mounted Components and Component Subassemblies," when an individual component cannot be tested to the requirements of the OM-10, testing of the larger component [in this case, the auxiliary air compressor] ensures that the subcomponent is functioning properly. Demonstration of the ability of the auxiliary air compressors to operate without overheating will provide an adequate means for assuring operational readiness of cooling water supply valves 0-FSV-67-1221-A and 0-FSV-67-1223-B.

2.2.2 Alternative Testing

The licensee proposes:

> Exercise the valves to the open position by operating the auxiliary air compressor and observing the discharge air and jacket water temperatures during compressor operation to ensure the temperatures are maintained at acceptable levels. This verifies that the cooling water supply solenoid valves operate to supply ERCW [emergency raw cooling water system] cooling water to the auxiliary air compressors.
>
> Frequency of Proposed Alternative: Quarterly

2.2.3 Evaluation

Valves 0-FSV-67-1221-A and 0-FSV-67-1223-B are solenoid operated valves which are mounted on the auxiliary air compressor skid. They open to admit cooling water to the jackets and aftercooler of the auxiliary air compressors. The Code, OM-10 paragraphs 4.2.1.4(a) and 4.2.4.1(b) requires the limiting value of the full-stroke time for these valves to be specified and the stroke time to be measured to the nearest second. Paragraph 4.2.1.9(b) states the required corrective actions should the valves fail to meet the acceptance criteria. The licensee has requested relief from these requirements based on the impracticality of measuring the stroke time of the valves.

The licensee states that these valves are totally enclosed, solenoid actuated valves and have no remote position indication. This prevents direct measurement of the stroke time of the valve and therefore, compliance with the Code requirements is impractical. The licensee proposes to indirectly verify acceptable valve operation by successfully meeting the acceptance criteria for the auxiliary air compressor. The licensee proposes to observe the discharge air and jacket water temperature during compressor operation to ensure the temperatures are maintained at acceptable levels. This verifies that the cooling water supply solenoid valves operate properly.

Section 3.4 of NUREG-1482 addresses the issue of skid-mounted components. The staff has determined that the testing of the major component is an acceptable means for verifying the operational readiness of the skid-mounted and component subassemblies if the licensee documents this approach in the IST Program. The licensee's proposed alternative is consistent with the staff's guidance in NUREG-1482 and provides a reasonable assurance of operational readiness.

2.2.4 Conclusion

Relief from the stroke time requirements of OM-10 paragraphs 4.2.1.4(a), 4.2.1.4(b), and the corrective actions of 4.2.1.9(b), for valves 0-FSV-67-1221-A and 0-FSV-67-1223-B, is granted pursuant to 10 CFR 50.55a(f)(6)(i). The alternative testing provides reasonable assurance of operational readiness. Based on the impracticality of complying with the Code and the burden on the licensee if those requirements were imposed, relief is granted.

3.0 CONCLUSION

Based on our review of the information provided in the requests for relief, relief is granted for VR-15, Revision 1 and VR-16 pursuant to 10 CFR 50.55a(f)(6)(i). In making this determination, the staff has considered the impracticality of performing the required testing and the burden on the licensee if the requirements are imposed.

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Date: March 22, 2000

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