



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NUMBER 50-390

1.0 INTRODUCTION

The Code of Federal Regulations, 10 CFR 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 utility and granted by the Commission pursuant to Sections (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 staff to approve alternatives and to grant relief from ASME Code requirements upon making the necessary findings. The NRC staff's findings with respect to authorizing alternatives and granting or not granting the relief requested as part of the utility's IST program are contained in this safety evaluation (SE).

2.0 BACKGROUND

In its letter of June 29, 1995, the Tennessee Valley Authority (TVA), the owner of the Watts Bar Nuclear Plant, Unit 1 (WBNP-1), requested that the NRC authorize an alternative to the ASME Code pursuant to 10 CFR 50.55a(a)(3). Specifically, TVA requested that the staff allow an alternative for set pressure testing of the three pressurizer safety relief valves that provide overpressure protection for the reactor coolant system. On July 13 and 14, 1995, further information was provided by Mr. Tom Dean, TVA WBN Licensing, Mr. Paul Law, TVA WBN Engineering, and Mr. Steve Krupski, TVA WBN Maintenance, in a teleconference with the NRC staff. The teleconference was documented and further information was provided in TVA's letter dated August 9, 1995.

The IST program for WBNP-1 complies with the 1989 Edition of Section XI which, by reference, incorporates Part 6, "Inservice Testing of Pumps in Light-Water Reactor Power Plants," and Part 10, "Inservice Testing of Valves in Light-Water Reactor Power Plants," of the ASME Operations and Maintenance (OM) Standard OMa-1988. Part 10 references Part 1 for testing pressure relief devices. In accordance with 10 CFR 50.55a, the first 10-year interval will commence on the date that WBNP-1 is placed in commercial operation.

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### 3.0 REQUESTED ALTERNATIVE

The ASME Code requirement applicable to the request is given in Part 1, "Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices," of the OM-1987 of the OMa-1988 OM Standard. The requirement is stated as follows:

#### **7.2 Testing After Installation Prior to Initial Electrical Power Generation**

##### **7.2.1 ASME Class 1 Pressure Relief Devices**

**7.2.1.1 Safety Valves.** Within 6 months prior to initial fuel loading, each valve shall have its set pressure verified. Set pressure verification shall be determined by pressurizing the system up to the valve set pressure and opening the valve, or the valve may be tested at or below normal system operating pressures with an assist device.

Periodic testing requirements do not specify that the valves be tested installed in the system, though in-place testing is not prohibited. The frequency for testing the three valves specifies that 20% be tested within any 24 months, beginning at plant "startup" (commercial operation), and 100% be tested within 60 months.

The current schedule for initial fuel loading for the WBNP-1 is September 1995. The pressurizer safety relief valves (PSRVs) were installed in March 1995. The valves were tested at a test facility in December 1994 and January 1995 so the schedule would be consistent with a projected initial fuel loading in June 1995. The schedule slippage for initial fuel loading was not anticipated. As a result of the schedule slippage, the PSRV set pressure testing which was performed in January 1995 will be approximately 9 to 12 months prior to initial fuel loading, depending on the actual fuel loading date, but not within 6 months as required by the code.

TVA proposes to take credit for the testing already performed, to monitor the valves during the hot function testing, and to test all three PSRVs during the first refueling outage following the initial operating cycle with a 12-month core.

The WBNP-1 PSRVs were manufactured by Crosby Valve and Gage Company. The set pressure testing was performed by Crosby at its test facility in Wrentham, Massachusetts. TVA discussed with the Crosby Chief Engineer the possibility of testing the valves as installed in the plant using an assist device which would meet the code requirements and allow testing to be performed during the July 1995 hot functional test. TVA determined that while Crosby Valve and Gage Company does manufacture an assist device that could be used to test the PSRVs, it is primarily for use on main steam safety valves. The Chief Engineer does not recommend testing the PSRVs in an "installed" configuration using the assist device during the hot functional test for several reasons:

- Testing with the assist device necessitates that personnel be in close proximity to the valves. The testing would involve hazards to personnel performing testing because the area at the top of the pressurizer where the PSRVs are located would be at temperatures above 160 degrees F which would increase with the lifting of the valves during testing.
- Testing the installed valves with pressure discharges the system fluid into the pressurizer relief tank (PRT). The PRT rupture disc might rupture during testing, further exacerbating the personnel hazards and possibly causing damage to equipment.
- Instruments, including those on the assist device, used during testing would have to be qualified for the high ambient temperature which is not feasible, thereby impacting the accuracy of the in-place testing.
- The accuracy of the testing performed at the test facility is better than the accuracy of testing with the assist device.
- Controlling the primary system pressure for testing would be difficult.

TVA is, however, exploring the possibility of procuring an assist device that will allow set pressure testing in-place for all of the PWRs in the TVA power generation system. The review and implementation will not be completed prior to the hot functional testing at WBNP-1.

TVA also indicated that from the time the valves were installed on the pressurizer, the area has been under the control of Operations. All construction activities in the area were completed prior to the valve installation and the top of the pressurizer is above all other construction areas (i.e., there are no construction activities conducted above the pressurizer). The valves were shipped and receiving inspection was conducted in accordance with the TVA quality assurance program. Shipping and receiving records indicate that no potential damage to valves occurred during the return shipment. Neither TVA nor Crosby are aware of anything that has occurred that could have caused the set pressure of the valves to change from the settings verified during testing at the test facility. Therefore, the valves' set pressure settings should remain as tested. Monitoring the valves during the hot functional test will ensure that the valves do not leak or weep, causing damage to the seating surface.

The valves were set-pressure-tested approximately 9 months prior to the currently scheduled date for initial fuel loading, and the schedule is not expected to slip more than 3 months (i.e., the alternative requested an extension for up to 12 months prior to initial fuel loading). During the majority of the time between the set-pressure-testing and initial fuel loading, other than during hot functional testing, the valves are not in service providing overpressure protection and are not challenged. While the code requirements applicable to WBNP-1 specify testing "after installation," the 1995 Edition of the OM Code removes that requirement and therefore allows initial testing at a test facility or as installed in the plant system. Additionally, the testing at the test facility is more accurate than a test

that could be performed using an assist device with the valves in the installed configuration because the test conditions can be better controlled at the test facility. Requiring TVA to perform the set pressure verification again during the hot functional testing imposes a hardship or unusual difficulty in that the personnel hazards would be created, the system could be subjected to perturbations, and the test could result in resetting the valves to a less accurate value. Because the valves have already been set-pressure-tested within a reasonable time period, there would be no compensating increase in the level of quality and safety achieved by imposing the "as-installed" testing. By committing to test all three PSRVs during the first refueling outage, and continue the schedule in accordance with the code requirements for periodic testing, the valves' set pressure will be verified within a 24-month period following the beginning of commercial operation of the plant, and continue on a periodic schedule.

Based on the hardship or unusual difficulty without a compensating increase in the level of quality and safety that would incur if the requirements were imposed, TVA's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii). However, the authorization is not valid if initial fuel loading occurs beyond 12 months from the date the valves were tested. TVA has agreed that if the fuel loading occurs beyond 12 months from the date of the set pressure testing performed at the Crosby test facility, the PSRVs will be retested within 6 months prior to the actual initial fuel loading.

Principal Contributor: P. Campbell, Mechanical Engineering Branch

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WATTS BAR NUCLEAR PLANT

cc:

Mr. Oliver D. Kingsley, Jr.  
President, TVA Nuclear and  
Chief Nuclear Officer  
Tennessee Valley Authority  
6A Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

Mr. O. J. Zeringue, Sr. Vice President  
Nuclear Operations  
Tennessee Valley Authority  
3B Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

Dr. Mark O. Medford, Vice President  
Engineering & Technical Services  
Tennessee Valley Authority  
3B Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

Mr. D. E. Nunn, Vice President  
New Plant Completion  
Tennessee Valley Authority  
3B Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

Mr. J. A. Scalice, Site Vice President  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, TN 37381

General Counsel  
Tennessee Valley Authority  
ET 11H  
400 West Summit Hill Drive  
Knoxville, TN 37902

Mr. P. P. Carrier, Manager  
Corporate Licensing  
Tennessee Valley Authority  
4G Blue Ridge  
1101 Market Street  
Chattanooga, TN 37402-2801

Mr. B. S. Schofield  
Site Licensing Manager  
Watts Bar Nuclear Plant  
Tennessee Valley Authority  
P.O. Box 2000  
Spring City, TN 37381

TVA Representative  
Tennessee Valley Authority  
11921 Rockville Pike  
Suite 402  
Rockville, MD 20852

Regional Administrator  
U.S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, NW., Suite 2900  
Atlanta, GA 30323

Senior Resident Inspector  
Watts Bar Nuclear Plant  
U.S. Nuclear Regulatory Commission  
1260 Nuclear Plant Road  
Spring City, TN 37381

The Honorable Robert Aikman  
County Executive  
Rhea County Courthouse  
Dayton, TN 37321

The Honorable Garland Lanksford  
County Executive  
Meigs County Courthouse  
Decatur, TN 37322

Mr. Michael H. Mobley, Director  
Division of Radiological Health  
3rd Floor, L and C Annex  
401 Church Street  
Nashville, TN 37243-1532

Ms. Danielle Droitsch  
Energy Project  
The Foundation for  
Global Sustainability  
P.O. Box 1101  
Knoxville, TN 37901

Ms. Ann Harris  
305 Pickel Road  
Ten Mile, TN 37880

Ms. Beth Zilbert, Energy Campaigner  
Greenpeace  
20 13th Street, NE.  
Atlanta, GA 30309

Mr. James P. Riccio  
Public Citizen  
4340 Georgetown Square, #612  
Atlanta, GA 30338