



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

July 29, 2010

Mr. R. M. Krich  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
3R Lookout Place  
1101 Market Street  
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - SAFETY EVALUATION OF RELIEF  
REQUEST PV-05 FOR THE THIRD 10-YEAR INTERVAL OF THE INSERVICE  
TESTING PROGRAM (TAC NO. ME4205)

Dear Mr. Krich:

By letter dated July 1, 2010, Tennessee Valley Authority submitted Relief Request PV-05 that proposed an alternative to certain inservice testing (IST) requirements of the American Society of Mechanical Engineers *Code for Operation and Maintenance of Nuclear Power Plants* for Watts Bar Nuclear Plant (WBN), Unit 1. The relief request applies to the second 10-year IST interval that began on May 27, 2007, and will end on May 26, 2016. The subject relief request involves an extension to the test interval for two pressure relief valves in the essential raw cooling water system and component cooling system.

The U.S. Nuclear Regulatory Commission staff has completed its review of the subject relief request as documented in the enclosed Safety Evaluation (SE). Our SE concludes that: (1) compliance with the specified IST requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety; and (2) the proposed alternative provides reasonable assurance of the operational readiness of the subject relief valves. Therefore, pursuant to Section 50.55a(a)(3)(ii) of Title 10 of the *Code of Federal Regulations*, the proposed alternative is authorized for WBN Unit 1. The proposed alternative is authorized until restart after Refueling Outage U1C10, which is currently scheduled to begin in March 2011.

R. Krich

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If you have any questions concerning this matter, please contact the WBN Unit 1 Senior Project Manager, Mr. John G. Lamb, at (301) 415-3100.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen J. Campbell". The signature is written in a cursive style with a large, looping initial "S".

Stephen Campbell, Chief  
Watts Bar Special Projects Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST PV-05

FOR THE SECOND 10-YEAR INTERVAL OF THE INSERVICE TESTING PROGRAM

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

1.0 INTRODUCTION

By letter dated July 1, 2010 (Agencywide Documents Access and Management System Accession No. ML101870601), Tennessee Valley Authority (TVA) submitted request PV-05 applicable to the second ten-year inservice testing (IST) program interval at the Watts Bar Nuclear Plant (WBN), Unit 1. TVA requested authorization to use an alternative test interval than required by the American Society of Mechanical Engineers (ASME), Code for Operation and Maintenance of Nuclear Power Plants (OM Code). TVA requested authorization to extend the test/replacement interval for WBN Unit 1 relief valves, 1-RFV-67-573C-A and 1-RFV-70-584, beyond 10 years, on a one-time basis, until the March 2011 refueling outage (RFO).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(ii), TVA requested to use the proposed alternative in PV-05, since complying with the current ASME OM Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

Section 50.55a(f) of 10 CFR, "Inservice Testing Requirements," requires, in part, that ASME Class 1, 2, and 3 components must meet the requirements of the ASME OM Code and applicable addenda, except where alternatives have been authorized pursuant to paragraph (a)(3)(i) or (a)(3)(ii).

In proposing alternatives, a licensee must demonstrate that the proposed alternative provides an acceptable level of quality and safety (10 CFR 50.55a(a)(3)(i)), or compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety (10 CFR 50.55a(a)(3)(ii)). Section 50.55a allows the U.S. Nuclear Regulatory Commission (NRC) to authorize alternatives to ASME OM Code requirements upon making necessary findings. The NRC's findings with respect to authorizing the alternative to the ASME OM Code are given below.

Enclosure

### 3.0 TECHNICAL EVALUATION

#### 3.1 Alternative Request PV-05

The applicable ASME OM Code edition and addenda for WBN Unit 1 is the 2001 Edition through the 2003 Addenda.

ISTC-5240, "Safety and Relief Valves," states that safety and relief valves shall meet the inservice test requirements of Mandatory Appendix I.

I-1390, "Test Frequency, Class 2 and 3 Pressure Relief Devices That Are Used for Thermal Relief Application," states that tests shall be performed on all Class 2 and 3 relief devices used in thermal relief application every 10 years, unless performance data indicate more frequent testing is necessary. In lieu of tests the Owner may replace the relief devices at a frequency of every 10 years, unless performance data indicate more frequent replacements are necessary.

Alternative testing was requested for the following components:

1-RFV-70-584      Chemical and Volume Control System (CVCS) Seal Water Heat Exchanger Outlet Thermal Relief Valve

1-RFV-67-573C-A    Lower Containment Cooler Header Thermal Relief Valve

TVA is requesting authorization in Relief Request PV-05, to extend the test interval for WBN Unit 1 relief valves, 1-RFV-67-573C-A and 1-RFV-70-584, beyond 10 years, on a one-time basis, until the March 2011 RFO.

TVA initially, improperly categorized the relief valves, 1-RFV-67-573C-A and 1-RFV-70-584, as being able to be tested/replaced while WBN Unit 1 was online. As a result, the applicable ASME OM Code requirements for testing/replacement will be exceeded after September 14 and 27, 2010, respectively. This is approximately 6 months before the Cycle 10 RFO, which is currently scheduled to commence in March 2011.

TVA's justification for extending the test/replacement interval for relief valves 1-RFV-67-573C-A and 1-RFV-70-584 is as follows:

Relief valves 1-RFV-67-573C-A and 1-RFV-70-584 accommodate thermal expansion of isolated and out-of-service components. Removal and testing of the valves is performed when the unit is in a refueling outage because of the adverse affect to the operating unit. Isolation of these valves for testing/replacement would result in unnecessary risk to safety-related equipment and power generation as described below.

Testing relief valve 1-RFV-70-584 before the Unit 1 Cycle 10 refueling outage would constitute a hardship, because the clearance boundary needed to replace this CVCS seal water heat exchanger outlet thermal relief valve would result in removing the CVCS seal water heat exchanger from service. The main concern with taking this portion of the system out-of-service for performance of the valve replacement is that in the event of a small break Loss of Coolant Accident, the CVCS centrifugal charging pump (CCP)

mini-flow would not be cooled. This could cause the pumped fluid to increase in temperature, which could create net positive suction head (NPSH) issues for the CCP. The seal water heat exchanger provides cooling for the water returning from the reactor coolant pump (RCP) seals to the volume control tank. Without the additional margin for saturation temperature and NPSH provided by the CVCS seal water heat exchanger, the safety-related CCP could cavitate, which could cause component damage and resultant loss or degradation of the CCP function.

Testing relief valve 1-RFV-67-573C-A before the Unit 1 Cycle 10 refueling outage would constitute a hardship, because the clearance boundary needed for this lower containment cooler header thermal relief valve would remove the associated Loop 3 lower containment coolers (control rod drive mechanism (CRDM), lower compartment, and RCP motor cooler) from service while the unit is online. Currently the associated Loop 3 RCP motor discharge cooler, all four lower compartment coolers, and three CRDM coolers are in service. The current river temperature is 76 °F and the lower containment temperature is 105 °F with a Technical Specification (TS) maximum limit of 117.5 °F. As the river temperature increases over the course of the summer, more cooling capacity is required in lower containment. It was expected that the fourth, and last, available CRDM cooler would be placed inservice during July 2010. Since all available coolers are expected to be in service, there will be no means to swap a cooling loop for another standby loop to allow this testing or replacement work to proceed. Additionally, this activity would produce a substantial amount of radioactive waste that would not be generated during an outage due to the method required to drain the header while the unit is in operation. This activity has an estimated duration of 24-48 hours, which could cause the lower containment temperature to increase to the point of the TS required unit shutdown, since 25% of the lower containment cooling units would have their cooling water removed from service.

A review of the test and maintenance history for these valves was performed. The test history search consisted of reviewing the test data for the valves during the first IST test interval. The maintenance history was performed by a search of the work management system to identify any maintenance work (non-test) that may have occurred since the last test.

Thermal relief valve 1-RFV-67-573C-A is a Target Rock Model 79A-0020. A review of the test history of 1-RFV-67-573C-A showed that this valve failed the as-found setpoint test when the initial test resulted in an opening pressure of 175 psig with a setpoint of 160 (156 to 164) psig. This result was approximately 9.5% higher than the setpoint. The valve was rebuilt and successfully as-left tested at 163 psig. The piping this valve serves has a design pressure of 160 psig and was originally hydrostatically tested during construction to 200 psig in accordance with the requirements of the ASME Section III hydrostatic test program. Therefore, the as-found data from this initial valve test, while high, was still less than the pressure used during hydrostatic testing.

The only maintenance activity performed on 1-RFV-67-573C-A since the last test in September 2000 was a work order to verify the correct torque of the valve flange.

This valve and piping are included in the WBN ASME System Pressure Test (SPT) Program and are periodically examined for leakage once each Inservice Period (approximately every three years). No findings of leakage at the valve have been documented.

A sample of three other WBN Target Rock Model 79A-0020 relief valves found that in each case, all as-found setpoint test results have documented acceptable results with no test failure.

Thermal relief valve 1-RFV-70-584 is a Consolidated Dresser Model 1970-2. A review of the test history of 1-RFV-70-584 showed that this valve failed the as-found setpoint test when the initial test resulted in an opening pressure of 144 psig with a setpoint of 150 (146 to 154) psig. This result was approximately 4.0% lower than the setpoint. The valve was adjusted and successfully as-left tested at 150 psig. The piping this valve serves has a design pressure of 150 psig and was originally hydrostatically tested during construction to 188 psig per the requirements of the ASME Section III hydrostatic test program. The as-found data from this initial valve test, while not meeting acceptance criteria, is considered a failure in the conservative direction, and therefore, acceptable. There has been no maintenance activities performed on 1-RFV-70-584 since the last test date in September 2000.

This valve and piping are included in the WBN ASME SPT Program and are periodically 105 °F examined for leakage once each Inservice Period (approximately every three years). No findings of leakage at the valve have been documented.

A sample of three other WBN Consolidated Dresser, Model 1970-2 relief valves found that in two cases, the as-found setpoint test results documented acceptable results with no test failure. In the last sample, the relief valve was as-found tested at 2 psig above the allowed test acceptance criteria of  $\pm 3\%$  of the setpoint.

It is not considered likely that either valve would be challenged to lift. A long term containment isolation signal that could allow the contained fluid to heat up and expand so that 1-RFV-67-573C-A would be required to actuate is unlikely. In the case of 1-RFV-70-584, actuation is unlikely because the piping being served is only isolated by the very manual valves that TVA has deemed unacceptable to operate at power since that would potentially allow the contained fluid to heat up and expand requiring the device to actuate.

### 3.2 NRC Staff Evaluation

TVA is in its second 10-year IST program interval that commenced on May 27, 2007. TVA has proposed an alternative in lieu of the requirements found in 2001 Edition through 2003 Addenda of the ASME OM Code Section ISTC-5240 and Appendix I, Section I-1390 for relief valves 1-RFV-70-584 and 1-RFV-67-573C-A. Specifically, TVA proposes to extend the 10-year test and/or replacement interval, on a one time basis, for thermal relief valves 1-RFV-70-584 and 1-RFV-67-573C-A. The extension is until the next WBN Unit 1 scheduled RFO, currently set to begin on March 20, 2011.

The NRC staff has reviewed the information presented by TVA to determine if it is acceptable to extend the test/replacement interval. In its alternative request letter, TVA stated that relief valves 1-RFV-70-584 and 1-RFV-67-573C-A have had, with the exception of a minor setpoint drift, a favorable maintenance history. Because the maintenance history is limited due to time in service, an extended historical review of other same model valves was completed with no abnormal findings and no setpoint calibration performance issues. The NRC staff completed its own historical research of the model valves involved within the industry. There were no significant failures or abnormal performance issues found.

Relief valves 1-RFV-70-584 and 1-RFV-67-573C-A are being used in a thermal relief application that is defined as a relief device whose only overpressure protection function is to protect isolated components, systems, or portions of systems from fluid expansion caused by changes in fluid temperature. Under normal operation, relief valves 1-RFV-70-584 and 1-RFV-67-573C-A and the components they protect are not in an isolated configuration. Maintenance history has revealed no problems during normal operation. TVA has stated that the probability of relief valves 1-RFV-70-584 and 1-RFV-67-573C-A and their associated components and system being configured in a manner such that thermal expansion protection is needed would be extremely low. Industry experience indicates that the failure rates of thermal relief valves are low and additional degradation of these components would not be expected to occur during the additional test interval extension period. Therefore, the NRC staff finds that TVA's proposed alternative provides reasonable assurance of operational readiness.

The NRC staff further finds that compliance with the OM Code 10-year test interval requirement for relief valves 1-RFV-67-573-C-A and 1-RFV-70-584 would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety since the plant would need to be shutdown, in advance of the upcoming refueling outage, in order to test the valves.

#### 4.0 CONCLUSION

The NRC staff finds that the proposed alternative in Relief Request PV-05 provides reasonable assurance that thermal relief valves 1-RFV-70-584 and 1-RFV-67-573C-A are operationally ready. All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable. Accordingly, the NRC staff concludes that TVA has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(ii), and is in compliance with the ASME OM Code's requirements.

Therefore, the NRC staff authorizes the alternative in request PV-05 until the next WBN Unit 1 RFO, currently scheduled to start March 20, 2011.

Principal Contributor: Michael Farnan

Date: July 29, 2010

R. Krich

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If you have any questions concerning this matter, please contact the WBN Unit 1 Senior Project Manager, Mr. John G. Lamb, at (301) 415-3100.

Sincerely,

**/RA/**

Stephen Campbell, Chief  
Watts Bar Special Projects Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure:  
Safety Evaluation

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