



Tennessee Valley Authority, P.O. Box 2000, Spring City, TN 37381

January 10, 2014

10 CFR 50.55a

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Watts Bar Nuclear Plant, Unit 1  
Facility Operating License No. NPF-90  
NRC Docket No. 50-390

Subject: **American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Section XI Code of Record for Second 10-Year Inservice Interval 2001 Edition**

In accordance with Title 10 of the Code of Federal Regulations (10 CFR) 50.55a(a)(3)(ii), the Tennessee Valley Authority (TVA) is requesting approval for the use of an alternative to the pressure testing requirements specified in American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel (B&PV) Code, Section XI, 2001 Edition through 2003 Addenda for nominal pipe size (NPS) 1 inch, 3/4 inch, and 3/8 inch Reactor Pressure Vessel (RPV) Flange Seal Leak-Off Piping. The proposed alternative test method for the required testing is provided in Enclosure 1.

This request for alternative (RFA) would be applicable to the current, second 10-year Inservice Inspection System Pressure Testing (ISPT) Interval, which began on May 27, 2007 and will end on May 26, 2016. The second 10-year ISPT Interval was shortened to nine years due to the first Interval being extended by one year to 11 years.

TVA requests approval of this RFA by March 1, 2014, in order to support ASME system leakage testing during the Unit 1 Cycle 12 Refueling Outage.

There are no commitments associated with this submittal. If you have any questions about this change, please contact Tom Hess at (423) 751-3487.

Respectfully,

  
Timothy P. Cleary  
Vice President, Watts Bar Nuclear Plant

U.S. Nuclear Regulatory Commission  
Page 2  
January 10, 2014

Enclosure:

Request for Alternative ISPT-02

cc: (Enclosure):

NRC Regional Administrator – Region II  
NRC Resident Inspector – Watts Bar Nuclear Plant  
Director, Division of Radiological Health - Tennessee State Department  
of Environment and Conservation

## **Enclosure 1**

### **Tennessee Valley Authority Watts Bar Nuclear Plant, Unit 1 Second 10-Year Interval**

#### **Request For Alternative Number ISPT-02**

##### **Systems/Component(s) Affected**

Watts Bar Nuclear (WBN) Generating Station Reactor Vessel Head Flange Seal Leak Detection Piping:

- (1-PIPE-68-B) (1-47W813-1); piping from the two Reactor Pressure Vessel (RPV) taps and terminating at the inline isolation valve, 1-FCV-68-22, of the common header to the Reactor Coolant Drain Tank.

##### **Applicable Code Edition and Addenda**

For the current, second 10-year Inservice Inspection System Pressure Testing (ISPT) Interval, the applicable Code edition and addenda are the American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel (B&PV) Code, Section XI, 2001 Edition through 2003 Addenda. The second interval began on May 27, 2007 and will end on May 26, 2016 to return the ISPT Intervals to the original 10-year schedule due to the first Interval being extended by one year to 11 years.

##### **Applicable Code Requirement From Which Alternative Is Requested**

This request for alternative (RFA) is requesting approval for the use of an alternative to the pressure testing requirements specified in ASME B&PV Code, Section XI, IWC-5221, "The system leakage test shall be conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operating function or at the system pressure developed during a test conducted to verify system operability (e.g., to demonstrate system safety function or satisfy technical specification surveillance requirement)."

## **Reason for Request for Alternative**

The proposed alternative is in accordance with 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality. The RPV head flange leak detection line is separated from the reactor pressure boundary by one O-ring located on the RPV flange. A second O-ring is located on the opposite side of the tap in the RPV flange. This line is required during plant operation and will indicate failure of the inner flange seal O-ring. The configuration of this line precludes manual testing while the RPV head is removed. The configuration of the RPV tap, combined with the small size of the tap and the high test pressure requirement prevents the tap from being temporarily plugged. Plugging or installing a connection would require machining threads in each flange opening with attendant concern over chips that may become a foreign material threat for fuel integrity or in the lines themselves. Additionally, machining would require extensive time in the estimated 20-40 millirem/minute (mRem/min) field at the RPV flange, which is an as low as is reasonably achievable (ALARA) concern. After machining, installing and removing the plugs or pressure connections would require [additional] time for installation personnel in the estimated 20-40 mRem/min field, which is an additional ALARA concern. Also, when the RPV head is installed, an adequate pressure test cannot be performed because the inner O-ring is designed to withstand pressure in one direction only. Pressurization in the opposite direction would likely damage the O-ring. Pressure testing of this line during the ASME Code, Class 1 System Leakage Test is precluded because the line will only be pressurized in the event of a failure of the inner O-ring. Purposely failing the inner O-ring to perform the ASME Code required test would require purchasing a new set of O-rings, additional time, and radiation exposure to de-tension the RPV head, install the new O-rings, and then reset and re-tension the RPV head. This would impose a hardship and burden on WBN.

Based on the above, TVA requests approval for the use of an alternative to the pressure testing requirements specified in ASME Code, Section XI requirements for system leakage testing of the RPV head flange seal leak detection line.

## **Proposed Alternative and Basis for Use**

1. A VT-2 visual examination of the accessible portions (from the biological shield wall to 1-FCV-68-22) of the ASME Code Class 2 piping of the RPV head flange seal leak detection line will be performed during every other refueling outage (RFO), beginning with the current Cycle 12 RFO, at ambient conditions when the RPV head is off and the reactor cavity is flooded and has been flooded above the RPV flange for a minimum of 4 hours (Reference 1). The static head developed with the leak detection line filled with borated water will allow for the detection of any gross indications in the line. This examination will be performed every other refueling outage (once per period) as per the frequency specified by ASME B&PV Code, Section XI, Table IWC-2500-1.
2. The RPV head flange seal leak detection line consists of approximately 21 feet of 3/4-inch and 3/8-inch piping with a minimal length of less than approximately 12-inches of 1-inch piping of ASME Section III Code Class 2 piping (see Attachment). The piping design conditions are 2500 psia and 650°F. A VT-2 visual examination of the inaccessible portions (from the biological shield wall to the RPV flange taps) will be performed in conjunction with the visual inspections of the RPV Hot Leg nozzle safe end welds by observing the area near the leak off line for evidence of leakage.

3. The station Operations staff continually monitors for leakage past the RPV head flange seal leak detection line O-rings by use of plant instrumentation (temperatures in excess of 140°F). In the event leakage is detected, plant procedures direct that the header isolation valve 1-FCV-68-22 be closed.

### **Justification for the Approval of Alternative**

In order to perform the required test, TVA could pressurize between the RPV head O-rings, but this could possibly damage the inner O-ring. If the inner O-ring were damaged, TVA would need to replace the O-ring set. The time and radiation exposure to remove and reinstall the RPV head to replace the O-rings would be a significant burden with no obvious benefit. TVA proposes performing a VT-2 visual examination of the accessible areas each period on the piping subjected to the static pressure head when the reactor cavity is filled. Additionally, TVA proposes performing a VT-2 visual examination of the inaccessible areas in conjunction with the visual inspections of the RPV Hot Leg nozzle safe end welds by observing the area near the leak off line for evidence of leakage. If any significant leakage does occur, boric acid accumulation would be detected in the VT-2 visual examination. Further, TVA will monitor for any signs of O-ring leakage through the leak-off line temperature. A problem in the subject piping would be detected through these measures. The proposed alternative provides reasonable assurance of structural integrity. Requiring compliance with the IWC-5221 system pressure test requirements results in an unnecessary hardship without a sufficient compensating increase in the level of quality and safety.

### **Implementation Schedule**

This RFA would be applicable to the current, second 10-year ISPT Interval, which began on May 27, 2007 and will end on May 26, 2016. This proposed alternative is requested to begin with RFO12, currently scheduled to begin in March 2014.

### **Precedents**

Similar requests have been previously approved by the NRC.

1. NRC Safety Evaluation dated December 19, 2011 (TAC No. ME5214), Comanche Peak Nuclear Power Plant, Unit 1, Docket No. 50-445. (ML113110092)
2. NRC Safety Evaluation dated April 4, 2013 (TAC No. MF0447, MF0448, and MF0449), Palo Verde Nuclear Generating Station, Units 1, 2, and 3, Docket No. 50-528, 50-529, and 50-530. (ML13085A254)
3. NRC Safety Evaluation dated August 5, 2013 (TAC No. ME9491), Oyster Creek Nuclear Generating Station, Docket No. 50-219. (ML13175A100)
4. NRC Safety Evaluation dated August 13, 2013 (TAC No. MF1745), Callaway Plant, Unit 1, Docket No. 50-483. (ML13221A091)
5. NRC Safety Evaluation dated September 12, 2013 (TAC No. MR0408 and MF0409), Diablo Canyon Power Plant, Units 1 and 2, Docket No. 50-275 and 50-323. (ML13192A354)

**Reference**

1. Code Case N-805, Alternative to Class 1 Extended Boundary End of Interval or Class 2 System Leakage Testing of Reactor Vessel Head Flange O-ring Leak Detection System, was issued to the 2010 Edition of the ASME Section XI Code and is listed in Supplement 6 for Code Cases. Code Case N-805 has not been approved by the NRC and is not identified in Regulatory Guide 1.147, Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1.

**Attachment**

TVA Drawing 1-47W813-1, Rev 45

**Attachment**

**TVA Drawing 1-47W813-1, Rev 45**

