August 17, 2007

Mr. Peter P. Sena III
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FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 - RELIEF REQUEST NO. BV3-PT-3 REGARDING HYDROSTATIC PRESSURE TESTING (TAC NOS. MD2940 AND MD2941)

Dear Mr. Sena:

By letter dated September 1, 2006, FirstEnergy Nuclear Operating Company (the licensee), requested approval of an alternative to the hydrostatic pressure testing of Class 1 pressure retaining piping and valves requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for Beaver Valley Power Station, Unit No. 1 (BVPS-1) third interval inservice inspection (ISI) program and Unit No. 2 (BVPS-2) second 10-year ISI program. The licensee proposed to perform: (1) a system leakage test at a lower pressure than that specified in ASME Code Case N-498-1, "Alternative Rules for 10-year System Hydrostatic Testing for Class 1, 2, 3 Systems," which requires that the boundary subject to test pressurization during the system leakage test extend to all Class 1 pressure retaining components within the system boundary, and (2) alternative visual examinations of components and piping between residual heat removal system redundant inlet isolation valves during the system leakage test.

The Nuclear Regulatory Commission (NRC) staff has concluded that compliance with the ISI Code of Record would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that the proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to Section 50.55a(a)(3)(ii) of Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), the staff authorizes the ISI program alternative for the third 10-year ISI interval of BVPS-1 and the second 10-year interval of BVPS-2.

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

**/RA/**

Mark G. Kowal, Chief
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
As stated

cc w/encl: See next page

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

**/RA/**

Mark G. Kowal, Chief
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Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
As stated

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING THE INTERVAL INSERVICE INSPECTION PROGRAMS

FOR RELIEF REQUEST NO. BV3-PT-3

FIRSTENERGY NUCLEAR OPERATING COMPANY

FIRSTENERGY NUCLEAR GENERATION CORP.

OHIO EDISON COMPANY

THE TOLEDO EDISON COMPANY

BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-334 AND 50-412

## 1.0 INTRODUCTION

By letter dated September 1, 2006, Agencywide Document Access and Management System (ADAMS) accession number ML062490202, FirstEnergy Nuclear Operating Company (licensee), requested approval of an alternative to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for Beaver Valley Power Station, Unit No. 1 (BVPS-1) third interval inservice inspection (ISI) program and Unit No. 2 (BVPS-2) second 10-year ISI program. The ASME Code, Section XI requires system hydrostatic testing of Class 1 pressure retaining piping and valves once per 10-year interval. In lieu of this requirement, the licensee proposed to perform a system leakage test using a modified version of ASME Code Case N-498-1 “Alternative Rules for 10-year System Hydrostatic Testing for Class 1, 2, 3 Systems,” which requires that the boundary subject to test pressurization during the system leakage test extend to all Class 1 pressure retaining components within the system boundary. However, the normal system alignment of valves in the Class 1 segment of the residual heat removal (RHR) system between the inlet isolation valves prevents pressurization to the test pressure without making temporary provisions for use of an external pressurization source. Therefore, the licensee’s proposed alternative modifies ASME Code Case N-498-1 so that the system leakage test is performed at a pressure approximately 300 - 350 pounds per square inch gauge (psig) for a small segment of Class 1 pressure boundary in the RHR system.

## 2.0 REGULATORY REQUIREMENTS

Section 50.55a(g) of Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR) requires that ISI of ASME Code Class 1, 2, and 3 components are performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3)(ii), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the Director of the Office of Nuclear Reactor Regulation, if an applicant demonstrates that compliance with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests, conducted during the first 10-year interval and subsequent intervals, comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI Code of Record for the third 10-year inspection interval of BVPS-1 and the second 10-year inspection interval of BVPS-2, is the 1989 Edition of the ASME Code, Section XI.

## 3.0 TECHNICAL EVALUATION

### 3.1 System/Component(s) Affected

BVPS-1:

Piping and valves between motor operated valves (MOV)-1RH-700 and MOV-1RH-701

BVPS-2:

Piping and valves between motor operated valves 2RHS-MOV-701A(B) and 2RHS-MOV-702A(B)

### 3.2 ASME Code Requirements

Table IWB-2500-1, Category B-P, Item B15.51 requires hydrostatic testing of Class 1 pressure retaining piping once per ten-year interval. Code Case N-498-1 (referenced in the BVPS Ten-Year Inservice Inspection Program) allows a system leakage test in lieu of the ten-year hydrostatic testing. Note 2 of Table IWB-2500-1 and Paragraph (a)(2) of N-498-1 require that the test pressurization boundary extend to all Class 1 components.

Paragraph IWB-5221(a) states, "The system leakage test shall be conducted at a test pressure not less than the nominal operating pressure associated with 100% rated

power."

3.3 Licensee's Basis for Request

Normal reactor coolant pressure at 100% rated power is approximately 2235 psig. The subject components and piping are the portion of piping between the inlet isolation valves which are designed to the same pressure and temperature of the RCS, but are isolated from the RCS by an MOV normally closed during operation and, therefore, are not exposed to a pressure of 2235 psig. The RHR system is isolated from the RCS by two MOVs in series on each pump suction line. The Class 1 system boundary extends to the second isolation valve from the RCS. Each valve is interlocked to prevent its opening if the RCS pressure is greater than 430 psig (BVPS-1) or 360 psig (BVPS-2), and to automatically close if the RCS pressure exceeds 630 psig (BVPS-1) or 700 psig (BVPS-2).

The system design prevents Code compliance in regard to attaining system leakage test pressure that corresponds to a pressure associated with 100% rated power. In order to pressurize the segment of piping between the two isolation valves, temporary hoses could be connected to the segment from an external pressurization source. The use of temporary hoses is possible for BVPS-2. But, BVPS-1 has no vent or drain connection that would allow the connection of temporary hoses. However, the use of temporary hoses is neither feasible nor safe. Another alternative would be to install qualified piping to pressurize the subject segment between the isolation valves. This was determined by the licensee to be cost prohibitive. Therefore, compliance to the Code requirement in regard to attaining the required test pressure during system leakage for the segment of piping including the isolation valves, would result in hardship without a compensating increase in the level of quality and safety.

3.4 Licensee's Proposed Alternative

In lieu of performing the 10-year system hydrostatic test, the licensee plans to perform a system leakage test at a lower pressure than what is specified in ASME Code Case N-498-1. The piping segments identified in section 3.1 will be visually examined (VT-2) for leakage during the system leakage test each refueling outage with the valves in their normal system alignment. Additionally, these piping segments will be visually examined (VT-2) for leakage as part of the Class 2 system functional test, performed once every 40-month period, using the Class 2 test requirement.

4.0 STAFF EVALUATION

The Code of Record, 1989 Edition ASME Code, Section XI, Table IWB-2500-1, Category B-P, Item B15.51 requires hydrostatic testing of Class 1 pressure retaining piping once per 10-year interval. The licensee adopted Code Case N-498-1 in their 10-year ISI program, which allows a system leakage test in lieu of the Code-required system hydrostatic test. However, the Nuclear Regulatory Commission (NRC) approved a later revision (Code Case N-498-4) of the licensee's proposed Code Case N-498-1 in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability" Revision 14, which accepts a system leakage test conducted at or near the end of each inspection interval, prior to reactor startup in lieu of the 10-year system hydrostatic test for Class 1 system. The system leakage test is required to be performed at a test pressure not less than the nominal operating pressure of the RCS, corresponding to 100% rated reactor power and must include all Class 1 components within the RCS boundary. However, the RHR

suction piping segment, located between the two interlocked MOVs, does not allow normal RCS pressure to be used to pressurize the segment. In order to test the subject piping segment to normal operating RCS pressure (approximately 2235 psig), the licensee would have to modify the segment to connect temporary hose as a jumper around the valve or employ a hydrostatic pump as an external pressurization source. Either of these options would conflict with system configuration that requires double valve isolation of the RCS boundary when fuel is present in the reactor vessel.

The licensee has proposed to perform the VT-2 visual examination for leakage during system leakage testing each refueling outage of the subject piping segments with the valves in their normal system alignment. Additionally, these piping segments will be visually examined (VT-2) for leakage as part of the Class 2 system functional test performed once every 40-month period using the Class 2 test requirement. The test pressure will be approximately 300 - 350 psig, which is the maximum normal operating pressure of the RHR system.

The licensee's alternative represents the highest test pressure that can be obtained without making modifications, such as the use of temporary hoses or an external pressurization source for the subject piping segment, and is intended to test the segment at its operating condition. It is expected that the proposed test pressures will be sufficient to produce detectable leakage from significant service-induced degradation sources, if any. Therefore, to require the licensee to modify the piping to provide temporary connection to pressurize the segment of RHR piping would result in hardship without a compensating increase in the level of quality and safety. The licensee will also pressurize to nominal operating pressure for at least 4 hours for insulated components, 10 minutes for non-insulated components, and maintain at that pressure prior to and during the VT-2 visual examination. The NRC staff has determined that the licensee's proposed alternative would provide reasonable assurance of operational readiness and structural integrity of the subject pipe segments, and therefore, is acceptable.

## 5.0 CONCLUSION

The NRC staff has concluded that to require the licensee to pressurize the subject piping segments in accordance with Code Case N-498-1 during the system leakage test would require modifications that would result in hardship to the licensee without a compensating increase in the level of quality and safety. Based on the NRC staff's evaluation, the licensee's proposed alternative provides a reasonable assurance of operational readiness and structural integrity. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative is authorized for the third 10-year ISI interval of BVPS-1 and the second 10-year ISI interval of BVPS-2.

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: P. Patnaik

Date: