August 3, 2007

Mr. Peter P. Sena III
Site Vice President
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-1 REGARDING HYDROSTATIC PRESSURE TESTING (TAC NOS. MD2936 AND MD2937)

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 plans to perform a system leakage test at a lower pressure than what is specified in ASME Code Case N-498-1. The RCS vents, drains, and instrument connections will be visually examined (VT-2) for evidence of past leakage and/or leakage, if any, during a system leakage test with each inboard isolation valve in its normal closed position.

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.

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Enclosure:
As stated

cc w/encl: See next page

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ACCESSION NUMBER: ML071650122 *Input received. No substantive changes made.

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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-1

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 (the 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. In lieu of this requirement, the licensee proposed to perform a system leakage test in accordance with 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 boundary vents, drains, and instrument connections. However, the normal system alignment of valves in the Class 1 segment of the vents, drains, and instrument connections would exclude a small segment of the piping from attaining the required test pressure. In lieu of the 10-year system hydrostatic test for the reactor coolant system (RCS), the alternative pertains to performance of a system leakage test at a pressure less than the nominal operating pressure associated with 100% rated power and the visual examination of RCS vents, drains, and instrument connections with each inboard isolation valve in its normal closed position.

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 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

Class 1 reactor coolant pressure boundary vents, drains, and instrument connections less than 1 inch in diameter.

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 pounds per square inch gauge (psig). The components and piping in the RCS vents, drains, and instrument connections less than 1-inch diameter are the portion of piping between the inboard and the outboard isolation valves including the valves, or between an isolation valve and a closure device such as a pipe cap, blind flange, or plug. This segment of piping will not be pressurized to the required test pressure during system leakage test with the inboard isolation valve closed in the normal plant operation. In order to test the segment, the test crew would have to change each valve position when the RCS is at 2235 psig and a temperature greater than 500 °F. Since most of the valves are inaccessible, temporary scaffolding has to be erected to reposition the valves. Alternatively, a test rig connected to a pipe segment, in place

of a blind flange or end cap, could be used during plant shutdown to pressurize the segments. This would require excess man-hour for the test resulting in higher radiation exposure to personnel, which is inconsistent with as low as reasonably achievable (ALARA) radiation exposure goals. The test would not confirm leak-tightness of the removed closure device, such as a blind flange or an end cap. The radiation exposure to personnel in the evolution of pressurizing the segment of piping to the required test pressure, during the system leakage test, is estimated to be between 500 mrem (millirem) and 1500 mrem at BVPS-1, and between 100 mrem and 300 mrem at BVPS-2. Furthermore, the valve manipulation necessary to pressurize the isolated segments of vents, drains, and instrument connections and their return to normal closed position would impact the schedule for the outage. The licensee, therefore, considers that compliance with the requirement of Code Case N-498-1 to pressurize the downstream portion of the RCS vents, drains, and instrument connections less than 1 inch in diameter would result in hardship or unusual difficulty 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 RCS vents, drains, and instrument connections will be visually examined (VT-2) for evidence of past leakage and/or leakage, if any, during a system leakage test with each inboard isolation valve in its normal closed position.

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. 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.

The licensee proposed an alternative to the requirement of Code Case N-498-1 for the RCS vents, drains, and instrument connections, which would isolate a segment of piping between the inboard and outboard isolation valves or the inboard isolation valve and a closure device such as a pipe cap, blind flange, or plug from being pressurized during a system leakage test. The line configuration, as outlined, provides double-isolation of the RCS. Under normal plant operating conditions, the subject pipe segments would see RCS temperature and pressure only if leakage through the inboard isolation valves occurs. In order for the licensee to perform the ASME Code-required test, it would be necessary to manually open the inboard valves to pressurize the pipe segments. Pressurization by this method would preclude the RCS double-valve isolation and may cause safety concerns for the personnel performing the examination.

Typical line/valve configurations are in close proximity of the RCS main run of pipes and thus, would require personnel entry into high radiation areas within the containment. In order to test the segment, the test crew would have to change each valve position when the RCS is at 2235 psig and a temperature greater than 500 °F. Since most of the valves are inaccessible, temporary scaffolding has to be erected to reposition the valves. Manual actuation (opening

and closing) of these valves is estimated to expose plant personnel to approximately between 500 mrem and 1500 mrem at BVPS-1, and between 100 mrem and 300 mrem at BVPS-2. However, the licensee proposed a visual examination (VT-2) for leaks in the isolated portion of the subject segments of piping with the isolation valves in the normally closed position, which would indicate any evidence of past leakage during the operating cycle and any active leakage during the system leakage test if the inboard isolation valve leaks.

5.0 CONCLUSION

The NRC staff has concluded that to require the licensee to pressurize the subject piping segments in the RCS vents, drains, and instrument connections in accordance with Code Case N-498-1 during the system leakage test, would result in exposing personnel to high radiation, heat stress and will impact the schedule of the outage. Based on the NRC staff's evaluation, the licensee's proposed alternative provides a reasonable assurance of operational readiness, structural integrity, and has shown that compliance with the code case requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. 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: August 3, 2007