February 24, 2006

Mr. James H. Lash
Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
P. O. Box 4
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2) - EVALUATION OF INSERVICE TESTING (IST) RELIEF REQUEST PRR-3 AND PRR-7 (TAC NOS. MC5901, MC5902, AND MC5903)

Dear Mr. Lash:

By letter dated February 4, 2005, FirstEnergy Nuclear Operating Company (the licensee) submitted pump relief request PRR-7, Revision 1M, for the third 10-year IST interval at BVPS-1 and pump relief requests PRR-3, Revision 2J, and PRR-7, Revision 2J, for the second 10-year IST interval at BVPS-2. The licensee requested relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI. The 1989 ASME Code, Section XI, references ASME OM Standard, Part 6, for pump IST requirements. The licensee proposed in PRR-3, to use a pump curve to compare flowrate with developed head at the flow conditions dictated by seasonal temperatures each quarter in lieu of measuring flowrate and differential pressure against a fixed set of reference values for the component cooling water pumps. The licensee proposed in PRR-7 to test the residual heat removal pumps during cold shutdowns and refueling outages in lieu of testing the pumps quarterly. The licensee has stated that both of the test requirements for which the licensee requests relief are impractical.

The Nuclear Regulatory Commission (NRC) staff has completed its review and evaluated the information regarding the relief requests. The results are provided in the enclosed safety evaluation. The NRC staff concludes that the licensee's requests for relief (PRR-3 for BVPS-2 and PRR-7 for BVPS-1 and 2) may be granted pursuant to 10 CFR 50.55a(f)(6)(i) on the basis that compliance with Code requirements is impractical. The licensee's proposed alternative testing provides reasonable assurance of operational readiness and will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

If you have any questions, please contact your NRC Project Manager, Mr. Timothy G. Colburn, at 301-415-1402.

Sincerely,

/RA/

Richard J. Laufer, 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

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PRR-3 AND PRR-7 INSERVICE TESTING PUMP RELIEF REQUESTS

FIRSTENERGY NUCLEAR OPERATING COMPANY

BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2)

DOCKET NOS. 50-334 AND 50-412

1.0 INTRODUCTION

By letter dated February 4, 2005 (Agencywide Documents Access and Management System Accession No. ML050420209), FirstEnergy Nuclear Operating Company (the licensee), submitted pump relief request PRR-3, Revision 2J, associated with its second 10-year inservice testing (IST) program interval for pumps and valves for BVPS-2. The licensee requested relief for primary component cooling water (CCP) pumps P21A, P21B, and P21C from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, which references the ASME Code, OM Standard, Part 6 (OM-6), for IST of pumps. The licensee also submitted pump relief request PRR-7 requesting relief for residual heat removal (RHR) pumps 1RH-P-1A, 1RH-P-1B, 2RHS-P21A, and 2RHS-P21B from the requirements of the ASME Code, OM-6 for IST of pumps. Pump relief request PRR-7, Revision 1M, is applicable to BVPS-1 for the third 10-year IST interval, and pump relief request PRR-7, Revision 2J, is applicable to BVPS-2 for the second 10-year IST interval.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, requires that IST of certain ASME Code, Class 1, 2, and 3 pumps and valves be performed at 120-month (10-year) IST program intervals in accordance with the specified ASME Code incorporated by reference in the regulations, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii),or (f)(6)(i) of 10 CFR 50.55a. In accordance with 10 CFR 50.55a(f)(4)(ii), licensees are required to comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in the regulations 12 months prior to the start of each 120-month IST program interval. In accordance with 50.55a(f)(4)(iv), IST of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to NRC approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions and addenda are met. 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 the facility. Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon

making necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," provides alternatives to Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, "Guidance for Inservice Testing at Nuclear Power Plants."

The BVPS-2 second 10-year IST interval commenced November 17, 1997. The program was developed in accordance with the 1989 Edition of the ASME Code, Section XI. The 1989 ASME Code, Section XI, references the ASME Code, OM Standards, Part 1 (OM-1), Part 6 (OM-6), and Part 10 (OM-10) for its IST requirements. The licensee requested relief from the requirements of OM-6, paragraph 5.2, which requires that either flow rate or differential pressure be held constant while measuring the other required parameters, for its BVPS-2, second 10-year IST interval.

The BVPS-1 third 10-year IST interval commenced September 20, 1997. The program was developed in accordance with the 1989 Edition of the ASME Code, Section XI. The 1989 ASME Code, Section XI, references the ASME Code, OM-1, OM-6, and OM-10 for its IST requirements. The licensee requested relief from the requirements of OM-6, paragraph 5.1 which requires that an IST shall be run on each pump, nominally every 3 months for its BVPS-1 third 10-year IST interval and its BVPS-2 second 10-year IST interval.

3.0 TECHNICAL EVALUATION

3.1 Pump Relief Request PRR-3, Revision 2J

3.1.1 Code Requirements

The licensee requested relief from OM-6, paragraph 5.2 which requires that either flow rate or differential pressure (ΔP) be held constant while measuring the other required parameters. Relief was requested for the following pumps:

CCP pump P21A
CCP pump P21B
CCP pump P21C

3.1.2 Licensee's Basis for Requesting Relief

The amount of CCP system flow is dependent on the service water system and on seasonal Ohio river water temperatures due to the design of the CCP temperature control system. During CCP pump testing additional flow is obtained by placing the RHR system heat exchangers into service. The overall amount of flow may vary by several hundred gallons-per-minute between cool winter months and warm summer months.

In order to increase flow to a reference value during cold winter months, the throttled manual valves at the discharge of the RHR heat exchangers would require additional throttling in the open direction. These valves are located in the reactor containment building. If tested at power, test personnel would have to make a containment entry in order to throttle these valves. Since the radiation levels and air temperature inside containment are higher than normal during power operation, this would involve higher radiological dose rates and heat stress risk to plant personnel. This presents a working environment for station personnel that is not considered

practicable for quarterly surveillance testing on a routine basis on-line.

In order to throttle flow to a reference value during warm summer months, a manual valve at the discharge of the pumps needs to be used since the RHR heat exchanger throttle valves are located inside containment. Operating experience has shown that any throttling of the pump discharge valves results in a large reduction in cooling water flow to the reactor coolant pump thermal barrier heat exchangers, bearing lube oil coolers and motor stator air coolers resulting in low flow alarms. This could result in heatup of the reactor coolant pumps to near the required manual pump trip setpoints which could ultimately result in a plant trip. In addition, the added thermal cycling of these coolers for pump testing could prematurely degrade these heat exchangers.

OM-6, paragraph 4.5, provides for multiple sets of reference values. A pump curve is a graphical representation of the fixed response of the pump to an infinite number of flow conditions which are based on some finite number of reference values verified by measurement. The licensee, therefore, requested relief to use a pump curve, which should provide an equivalent level of quality and safety in trending pump performance and degradation. Flow will be permitted to vary as system conditions require, ΔP will be calculated and converted to a developed head for which OM-6 ranges will be applied.

3.1.3 Licensee's Proposed Alternative Testing

A pump curve (developed per the guidelines in NUREG-1482, Section 5.2, "Use of Variable Reference Values for Flow Rate and Differential Pressure During Pump Testing") will be used to compare flowrate with developed pump head at flow conditions dictated by seasonal temperatures each quarter per 2OST-15.1, 2OST-15.2, and 2OST15.3 (Component Cooling Water Pump Tests). Since normal flow varies based on CCP system requirements due to service water system and seasonal Ohio river water temperatures, the most limiting vibration acceptance criteria will be used over this range of flows based on baseline vibration data obtained at various flow points on the pump curve.

3.1.4 Evaluation

Paragraph 5.2 of OM-6 requires that pump flow rate and ΔP be evaluated against reference values to monitor pump condition and to allow detection of degradation. The CCP pumps operate under a variety of flow rate and ΔP conditions. Varying the flow rate of these pumps to establish a fixed set of reference values is impractical during normal plant operating conditions due to radiation levels and environmental conditions inside containment and the potential loss of adequate flow to heat exchangers which may result in plant transients which could ultimately result in a reactor trip.

As discussed in NUREG-1482, Section 5.2, the use of pump curves for reference values of flow rate and ΔP is acceptable when it is impractical to establish a fixed set of reference values. Pump curves represent a set of infinite reference points of flow rate and ΔP. Establishing a reference curve for the pump when it is known to be operating acceptably and basing the acceptance criteria on this curve can permit evaluation of pump condition and detection of degradation. However, because of a greater potential for error associated with the use of pump curves, Section 5.2 of NUREG-1482 delineates seven elements on the procedures for developing and implementing the curves that should be incorporated into the IST program. The

licensee's proposed alternative incorporates the guidelines in Section 5.2 of NUREG-1482 and provides reasonable assurance of the operational readiness of the CCP pumps.

3.2 Pump Relief Request PRR-7, Revisions 1M and 2J, for BVPS-1 and 2

3.2.1 Code Requirements

The licensee requested relief from OM-6, paragraph 5.1 which requires that IST shall be run on each pump, nominally every 3 months. Relief was requested for the following pumps:

RHR pump 1RH-P-1A
RHR pump 1RH-P-1B
RHR pump 2RHS-P21A
RHR pump 2RHS-P21B

3.2.2 Licensee's Basis for Requesting Relief

The RHR pumps are in a standby condition during power operation, and are not required to be in service until the reactor coolant system (RCS) temperature is less than or equal to 350 degrees Fahrenheit and RCS pressure is less than or equal to 360 pounds per square inch gauge (psig). Therefore, they are not exposed to operational wear except when the RCS is at low temperature and pressure and the RHR system is operating.

The RHR pumps have a design pressure of 600 psig. They take suction from the RCS, pass flow through the RHR heat exchangers, and then discharge back to the RCS. The RHR system is considered to be a low pressure system that could be damaged if exposed to the normal operating RCS pressure of approximately 2235 psig. In order to prevent this, the RHR inlet and return isolation valves are interlocked with an output signal from the RCS pressure transmitters which prevent the valves from being opened when RCS pressure exceeds 360 psig. In addition, these valves are also maintained shut with their breakers de-energized and administratively controlled (caution tagged). Therefore, testing of the RHR pumps during normal operation is not practicable.

In addition, the RHR pumps are located inside containment, and if tested at power, test personnel would have to make a containment entry in order to properly monitor pump operation. Since radiation levels and air temperatures inside containment are higher than normal during power operation, this would involve higher radiological dose rates and heat stress risk to plant personnel. This presents a working environment for station personnel that is not considered practicable for quarterly surveillance testing on a routine basis on-line.

3.2.3 Licensee's Proposed Alternative Testing

The RHR pumps will be tested during cold shutdowns and refueling outages, not more than once every 92 days. For a cold shutdown or refueling outage that extends longer than 3 months, the pumps will be tested every 3 months in accordance with OM-6, paragraph 5.1.

3.2.4 Evaluation

The ASME Code, OM-6, paragraph 5.1 requires that IST be run on each pump in the IST

program, nominally every 3 months. However, in accordance with10 CFR 50.55a(f)(6)(i), the licensee has requested relief from the above OM-6 requirement because they have determined that quarterly testing of the RHR pumps is impractical. As such, the licensee has proposed an alternative to the requirements that would test the RHR pumps during cold shutdown or refueling outages but not more than once every 92 days. For a cold shutdown or refueling outage that extends longer than 3 months, the pumps will be tested every 3 months in accordance with OM-6, paragraph 5.1.

The RHR pumps are low-pressure (600 psig design pressure) pumps which take suction from the RCS hot leg, pass flow through the RHR heat exchangers, and discharge to the RCS cold leg. These pumps are in a standby condition during power operation and only activate when the RCS is at a low pressure and the RHR system is needed for decay heat removal. The RHR system is a low pressure system with motor-operated inlet and return isolation valves that are interlocked with RCS pressure transmitters to prevent the valves from being opened whenever the RCS system pressure exceeds 360 psig.

The Nuclear Regulatory Commission (NRC) staff has reviewed the OM-6 requirements with respect to the licensee's request for relief and has determined that due to the standby condition of the RHR pumps and the isolation of the RHR system during power operation, compliance with the quarterly testing requirements is not practical. Major plant and system modifications would be needed to allow quarterly testing of the RHR pumps in accordance with the Code requirements.

The NRC staff has reviewed the licensee's proposed alternative and has determined that the alternative test schedule provides reasonable assurance of the operational readiness of the RHR pumps. Therefore, in accordance with 10 CFR 50.55a(f)(6)(i), relief is granted from the OM-6, paragraph 5.1, test frequency requirements for the BVPS-1 and 2 RHR pumps.

4.0 CONCLUSION

Based on the above evaluation, the NRC staff concludes that the licensee's request for relief is granted pursuant to 10 CFR 50.55a(f)(6)(i) on the basis that compliance with the Code requirements is impractical. The NRC staff further concludes that granting the relief will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the CCP pumps and RHR pumps.

5.0 REFERENCES

1. *U.S. Code of Federal Regulations*, "Domestic Licensing of Production and Utilization Facilities," Part 50, Chapter I, Title 10, "Energy," paragraph 50.55a(a)(3)(i).

2. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 1989 Edition.
3. U.S. Nuclear Regulatory Commission, "Guidance on Developing Acceptable Inservice Testing Programs," Generic Letter 89-04, through Supplement 1, April 4, 1995.

4. U.S. Nuclear Regulatory Commission, "Guidelines for Inservice Testing at Nuclear

Power Plants," NUREG-1482, April 1995.

5. U.S. Nuclear Regulatory Commission, "Relief Request Reviews," NRR Office Instruction LIC-102, July 18, 2002.

6. Letter, L. W. Pearce, FirstEnergy Nuclear Operating Company to the Nuclear Regulatory Commission, "Inservice Testing Programs, Proposed Revisions 1M and 2J," dated February 4, 2005.

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Date: February 24, 2006

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