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March 27, 2003  
L-03-053

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

**Subject: Beaver Valley Power Station, Unit No. 1  
BV-1 Docket No. 50-334, License No. DPR-66  
Order (EA-03-009) Relaxation Request**

References:

- 1) NRC Order EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 11, 2003.
- 2) FirstEnergy Nuclear Operating Company (FENOC) response to NRC Order EA-03-009 for Beaver Valley Power Station (BVPS) Unit 1 and Unit 2, L-03-035 dated March 3, 2003.

This letter transmits a request for relaxation of requirements contained in an NRC Order (Reference 1) that established interim inspection requirements for reactor pressure vessel (RPV) heads at pressurized water reactors. These requirements involve nondestructive examination (ultrasonic, eddy current, and dye penetrant testing) of the penetration nozzles below the J-groove weld that attaches the nozzle to the head. In Reference 2, FENOC consented to the Order for BVPS Unit 1 and Unit 2 and identified potential items for relaxation.

BVPS Unit 1 is currently in a refueling outage and is conducting inspections of the reactor vessel head penetrations as required by the Order. Pursuant to the procedure specified in Section IV, paragraph F of the Order, FENOC requests relaxation from the requirements specified in Section IV, paragraph C.(1)(b)(i) and C.(1)(b)(ii) for BVPS Unit 1 for the RPV head penetration nozzles for which ultrasonic testing and eddy current testing requirements could not be completed as required.

Attachment 1 to this letter provides the relaxation request. As demonstrated in the attachment, the requested relaxation meets item IV.F.(2) of the Order, as compliance with this Order for the nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

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Beaver Valley Power Station, Unit No. 1  
Order (EA-03-009) Relaxation Request  
L-03-053  
Page 2

FENOC requests approval of the subject relaxation by April 11, 2003 to support the present BVPS Unit 1 refueling outage. The target date for RPV head re-installation activities is currently scheduled for completion as early as April 13, 2003.

FENOC considers that, upon approval by the NRC, the alternative proposed in Attachment 1 constitutes a condition of the Order rather than a regulatory commitment. Therefore, there are no new commitments identified in this document. If there are any questions regarding this matter, please contact Mr. Larry R. Freeland, Manager, Regulatory Affairs/Performance Improvement at 724-682-5284.

Sincerely,



Mark B. Bezilla

Attachment

c: Mr. T. G. Colburn, NRR Senior Project Manager  
Mr. D. M. Kern, NRC Sr. Resident Inspector  
Mr. H. J. Miller, NRC Region I Administrator  
Mr. S. J. Collins, Director, Office of Nuclear Reactor Regulation

**BEAVER VALLEY POWER STATION (BVPS) UNIT 1  
RELAXATION REQUEST from NRC Order EA-03-009**

**Alternative for Inspection of Nozzles  
That Will Provide an Acceptable Level of Quality and Safety**

**1. Components Affected**

Beaver Valley Unit 1 Reactor Pressure Vessel (RPV) head penetration nozzles.

**2. Applicable Document**

Nuclear Regulatory Commission (NRC) Order EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 11, 2003.

**3. Applicable Requirement**

NRC Order EA-03-009 requires ultrasonic, eddy current, and/or dye penetrant testing of RPV head penetration nozzles at various intervals, depending on their susceptibility to primary water stress corrosion cracking. The Beaver Valley Unit 1 RPV head is currently in the high susceptibility category. The requirements governing ultrasonic and eddy current testing for RPV head in the high susceptibility category are stated in Section IV.C.(1)(b)(i) and IV.C.(1)(b)(ii) of the Order, respectively. These sections require:

*IV.C.(1)*

*(b) Either:*

*(i) Ultrasonic testing of each RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle... , OR*

*(ii) Eddy Current testing or dye penetrant testing of the wetted surface of each J-Groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.*

Relaxation is requested from parts IV.C.(1)(b)(i) and IV.C.(1)(b)(ii) of the Order. Specifically, the relaxation is related to ultrasonic, eddy current, and dye penetrant testing of a limited bottom portion of the RPV penetration nozzles, which are not part of the pressure boundary.

**4. Reason for Request**

As described in Section 3 above, NRC Order EA-03-009 requires that ultrasonic or eddy current testing extend to the bottom of the nozzle. FirstEnergy Nuclear

Operating Company (FENOC) is requesting approval of a proposed alternative to requirements that are appropriate to the ultrasonic and eddy current probes used at Beaver Valley Unit 1, the geometric design of the bottom portion of the nozzles, and the phenomena of concern as identified in the Order. Reasons for requesting the proposed alternative are as follows:

- a. Ultrasonic probes used to detect circumferential flaws are not effective near the end of the nozzle. These probes have separate transducers for sending and receiving the ultrasonic signal that are arranged vertically. The transducers in the probe are approximately one inch apart. With this configuration, the lower transducer will not contact the inside wall of the nozzle unless the upper transducer is inserted greater than approximately one inch into the nozzle. Since the scanning process requires that both transducers be in contact with the surface, the probe cannot scan the lower end of the nozzle. Based on the geometry involved in the transducer location and the radius at the lower end of the nozzle, the portion that cannot be scanned is the portion extending from the bottom of the nozzle upward for a distance of approximately one inch.
- b. Eddy current probes do not maintain adequate contact with the nozzle at its lower end due to nozzle geometry. The bottom of each nozzle terminates in a rounded surface that begins more than two inches below the J-groove weld. This curvature causes lift-off of the probe as it approaches the bottom end of the nozzle. Based on the geometry involved in the transducer location and the radius at the lower end of the nozzle, the portion that cannot be scanned is the portion extending from the bottom of the nozzle upward for a distance of approximately one inch.
- c. Ultrasonic or eddy current testing of portions of the nozzle significantly below the J-groove weld is not significant to the phenomena of concern. The phenomena that are of concern are leakage through the J-groove weld and circumferential cracking in the nozzle above the J-groove weld. This is appropriately reflected in the requirement (as stated in Section 3 above) that the ultrasonic or eddy current testing extend to 2 inches above the J-groove weld. However, the Order also requires that ultrasonic or eddy current testing be extended to the bottom of the nozzle. The nozzle is essentially an open-ended tube and the nozzle wall below the J-groove weld is not part of the reactor coolant system pressure boundary.
- d. The Order allows for performing dye penetrant testing in lieu of eddy current or ultrasonic testing. Performing dye penetrant testing on the bottom nozzle area would result in significant radiation exposure to personnel without a compensating increase in the level of quality or safety.

## 5. Proposed Alternative and Basis for Use

In lieu of requiring that ultrasonic or eddy current testing of each RPV head penetration nozzle extend to the bottom of the nozzle, FENOC proposes that the ultrasonic and eddy current testing conducted pursuant to Sections IV.C(1)(b)(i) and IV.C(1)(b)(ii) of NRC Order EA-03-009 be required to extend to:

The lowest elevation that can be practically inspected on each nozzle with the probe being used.

The requirement that ultrasonic or eddy current testing extend to 2 inches above the J-groove weld would be unaffected.

This proposed alternative will provide an acceptable level of quality and safety because the only portion of the nozzle involved is the portion below the J-groove weld. Below the J-groove weld, the nozzle is essentially an open-ended tube and the nozzle wall in this portion is not part of the reactor coolant system pressure boundary.

The magnitude of the stresses in these portions of the nozzles is low based on information from other plants of similar design and construction; and with the corresponding low crack growth rates, there are no concerns with the structural integrity of the vessel head penetration nozzles from the unexamined bottom portions of the nozzles addressed in this request.

Consequently, the bottom portion of the nozzle below the J-groove weld is not involved in the phenomena of concern. This proposed alternative does not affect ultrasonic or eddy current testing of the portion of the nozzle involved in the phenomena of concern, the portion involved in the J-groove weld and above. Therefore, the proposed alternative provides an acceptable level of quality and safety.

In conclusion, this requested relaxation meets item IV.F.(2) of the Order, as compliance with the Order for the nozzles would result in hardship or unusual difficulty without a compensating increase in the level of safety.

## 6. Duration of Proposed Alternative

The proposed alternative will apply only during the period in which NRC Order EA-03-009 is in effect.