

*L. William Pearce*  
Site Vice President

724-682-5234  
Fax: 724-643-8069

September 19, 2003  
L-03-138

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

**Subject: Beaver Valley Power Station, Unit No. 1 and No. 2**  
**BV-1 Docket No. 50-334, License No. DPR-66**  
**BV-2 Docket No. 50-412, License No. NPF-73**  
**Response to NRC Bulletin 2003-02**

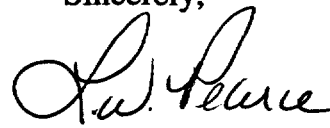
On August 21, 2003, the NRC issued Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity." For PWR facilities that will enter refueling outages before December 31, 2003, a response is requested within 30 days of the date of the bulletin. Beaver Valley Unit 2 will begin a refueling outage in September 2003. All other PWR facilities are to provide a response within 90 days of the date of the bulletin.

Attachment 1 to this letter contains the FirstEnergy Nuclear Operating Company (FENOC) response for Beaver Valley Power Station (BVPS) Units 1 and 2 to the information requested in NRC Bulletin 2003-02.

Attachment 2 provides a list of commitments made in this document. If there are any questions concerning this matter, please contact Mr. Larry R. Freeland, Manager, Regulatory Affairs/Performance Improvement at 724-682-5284.

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 19, 2003.

Sincerely,



L. William Pearce

Attachments

A109

**Beaver Valley Power Station, Unit No. 1 and No. 2**  
**Response to NRC Bulletin 2003-02**  
**L-03-138**  
**Page 2**

**c: Mr. T. G. Colburn, NRR Senior Project Manager**  
**Mr. P. C. Cataldo, NRC Sr. Resident Inspector**  
**Mr. H. J. Miller, NRC Region I Administrator**

## Attachment 1

### Response to NRC Bulletin 2003-02 Beaver Valley Power Station (BVPS) Units 1 and 2

This response addresses the Requested Information section in NRC Bulletin 2003-02 for BVPS Units 1 and 2.

***NRC Requested Information (1):*** All subject PWR addressees are requested to provide the following information. The responses for facilities that will enter refueling outages before December 31, 2003, should be provided within 30 days of the date of this bulletin. All other responses should be provided within 90 days of the date of this bulletin.

***NRC Request 1(a):*** A description of the RPV lower head penetration inspection program that has been implemented at your plant. The description should include when the inspections were performed, the extent of the inspections with respect to the areas and penetrations inspected, inspection methods used, the process used to resolve the source of findings of any boric acid deposits, the quality of the documentation of the inspections (e.g., written report, video record, photographs), and the basis for concluding that your plant satisfies applicable regulatory requirements related to the integrity of the RPV lower head penetrations.

#### **Response to Request 1(a):**

**Previous Inspections Performed:** As identified in the FENOC response (Reference 1) to Question 5 of the NRC request for additional information on boric acid inspection programs, previous inspections of the bottom mounted instrumentation penetrations (BMIs) at BVPS Units 1 and 2 have been performed as part of the ASME Section XI system leakage test walkdowns performed at every (18 month) refueling outage.

In addition, a remote visual (videoprobe) exam of a considerable portion of the BVPS Unit 1 RPV lower head was performed during a Maintenance Outage (1MO2) in the fall of 2002. This exam was performed to further investigate staining of the insulation at the bottom-most portion of the vessel that was documented during the Mode 5 walkdown inspection performed at the beginning of 1MO2. (See Reference 2)

**Extent of Previous Inspections:** Periodic walkdown inspections, with the insulation in place, have been performed per procedure at the beginning of each refueling outage in operational Mode 5 and also at the conclusion of each refueling outage with the Reactor Coolant System (RCS) at nominal operating pressure and temperature. The remote visual exam during 1MO2 was performed from three access points in the insulation, which conforms to the curvature of the reactor vessel. The inspection provided a qualitative view of approximately 60% of the RPV lower head.

**Inspection Methods:** The supplemental exam performed during 1MO2 was conducted from access points in the insulation on three sides of the reactor vessel. A videoprobe was used to collect video of a considerable portion of the RPV lower head, including the bottom-most portion where staining of the reactor vessel insulation had been observed. The video was reviewed by FENOC NDE personnel.

**Process used to resolve the source of the findings:** BVPS used the Corrective Action Program to evaluate findings identified during 1M02.

During the BVPS Unit 1 1M02 Maintenance Outage the leak inspection walkdown of the BMIs revealed a discoloration on the exterior of the stainless steel insulation at the bottom of the RPV lower head-conforming insulation. A condition report was generated and dispositioned as required by our Corrective Action Program. The stain was described as a dry rust film of no discernible thickness. During the follow-up videoprobe exam, no white boron deposits were noted on the vessel surface or around the nozzle under the insulation. No accumulation of any kind was noted around the circumference of the BMI nozzles as they penetrated the RPV surface. The source of the rust stain on the RPV lower head insulation surface was determined to be coming from above, most likely due to cavity seal ring leakage during previous refueling outages and not as a result of a BMI leak. Similar staining was also noted on the RPV cavity walls below the refueling cavity seal ring, which further supports the determination for the source of the rust stain on the insulation surface.

**Previous Inspection Documentation:** Previous walkdown inspections have been documented on system pressure test visual examination reports in accordance with our ASME Section XI program. The 1M02 supplemental probe exam discussed above was documented on videotape.

**Basis for concluding that the plant will satisfy applicable regulatory requirements:** The technical basis for concluding that the regulatory bases are met for BVPS Units 1 and 2 is provided in the Regulatory Requirements Section of MRP-48 (Reference 3) that was provided for the upper reactor vessel head alloy 600 penetrations (NRC Bulletin 2001-01). This is supplemented by the Beaver Valley plant-specific discussion of regulations provided in the BVPS response to NRC Bulletin 2002-01 (Item 1E) (Reference 4), which is applicable to the RPV lower head penetrations.

***NRC Request 1(b): A description of the RPV lower head penetration inspection program that will be implemented at your plant during the next and subsequent refueling outages. The description should include the extent of the inspections which will be conducted with respect to the areas and penetrations to be inspected, inspection methods to be used, qualification standards for the inspection methods, the process used to resolve the source of findings of boric acid deposits or corrosion, the inspection documentation to be generated, and the basis for concluding that your plant will satisfy applicable regulatory requirements related to the structural and leakage integrity of the RPV lower head penetrations.***

**Response to NRC Request 1(b):**

**Extent of the inspections:** The examination scope for BVPS Unit 2 Refueling Outage 2R10 (fall 2003) is planned to include a visual inspection of all 50 BMI penetrations including 100% of the circumference of each penetration as it enters the RPV lower head to the maximum extent practical.

The BVPS Unit 1 examination scope for 1R16 (fall 2004) is planned to include a visual inspection of all 50 BMI penetrations including 100% of the circumference of each penetration as it enters the RPV lower head to the maximum extent practical. Field experience gained during 1MO2 indicates that a substantial modification to the insulation will be required in order to obtain 100% coverage. This modification is planned for 1R16.

The examinations planned for the subsequent BVPS Unit 1 and Unit 2 refueling outages include the bare metal visual examination of the RPV lower head as part of normal boric acid leakage inspection program each refueling outage. The examination scope will include all 50 BMI penetrations including 100% of the circumference of each penetration as it enters the RPV lower head. The boric acid inspection program will be modified to include VT-2 bare metal examination of the BMIs at each refueling outage that follows until ASME Code changes or regulatory action justify a change in the examination frequency or method.

**Inspection methods:** The examination method planned for the BMI penetrations at both BVPS Units 1 and 2 is direct or equivalent remote visual (VT-2) aided by remote cameras and/or video probes.

**Qualification standards:** The visual examination personnel and procedures are expected to be qualified in accordance with the vendor's written practice, ASME Section XI, and supplemented by the March 2002 EPRI report (Reference 5) as applicable for the RPV lower head penetrations.

Personnel utilized to perform these supplemental examinations are expected to be certified in accordance with the vendor's written practices. Per our existing program, BVPS site personnel will review and approve NDE personal certifications and procedures prior to examinations being performed.

**Process used to resolve the source of findings:** BVPS plans to utilize the Corrective Action Program to evaluate all findings of leakage during the BMI penetration examination. The process would include evaluations to determine if the findings of leakage are relevant or non-relevant as an RCS leak, as well as to determine the source of the leakage. Examples of relevant leakage are identified in the March 2002 EPRI report (Reference 5) supplemented by the as found pictures of the boric acid accumulation at South Texas Project Unit 1 (STP-1) at BMI locations #1 and #46 available on the NRC web site to determine characteristics of relevant indications. Unlike the reactor vessel head upper penetrations, the RPV lower head location has no potential leak source location during normal plant operation that could result in significant boron accumulation. Cavity seal ring leakage, that can only occur during a

refueling outage, only occurs at low temperature and results in staining without "popcorn like" accumulation features of an RCS leak at normal operating temperature. The RPV lower head location of the BMI penetrations is also not likely to be affected by settled debris that could mask a VT-2 examination. The BMI penetrations at BVPS Units 1 and 2 have a boss welded to the vessel surface surrounding each penetration. The interface between the penetration and the boss, where BMI leakage would occur, is better protected from cavity seal ring leakage that might stain the vessel surface. Tools to evaluate relevant indications of leakage (boron accumulation) would likely include sample collection for chemical and isotopic analysis.

Examples of non-relevant leakage may include thin films or stains of boron or light surface rust having a characteristic of no discernable thickness with no accumulation around the penetration. Non-relevant indications would typically have a trail from the source, which is away from the BMI penetration. Each case of leakage would be documented and dispositioned using the Corrective Action Program. Thin film boron stains or light rust films are not likely to be chemically or isotopically analyzed due to there being no accumulation from which to sample.

**Documentation of the Inspections:** Our existing program requires that the examinations be documented by a report signed by the qualified VT-2 examiner who performed the examination. Video and/or photographic images to support the examination findings will be used to supplement the report, where applicable.

**Basis for concluding that the plant will satisfy applicable regulatory requirements:** The technical basis for concluding that the regulatory bases are met for BVPS Units 1 and 2 is provided in the Regulatory Requirements Section of MRP-48 (Reference 3) that was provided for the upper reactor vessel head alloy 600 penetrations (NRC Bulletin 2001-01). This is supplemented by the Beaver Valley plant-specific discussion of regulations provided in the BVPS response to NRC Bulletin 2002-01 (Item 1E) (Reference 4), which is applicable to the RPV lower head penetrations.

***NRC Request 1(c):*** *If you are unable to perform a bare-metal visual inspection of each penetration during the next refueling outage because of the inability to perform the necessary planning, engineering, procurement of materials, and implementation, are you planning to perform bare-metal visual inspections during subsequent refueling outages? If so, provide a description of the actions that are planned to enable a bare-metal visual inspection of each penetration during subsequent refueling outages. Also, provide a description of any penetration inspections you plan to perform during the next refueling outage. The description should address the applicable items in paragraph (b).*

**Response to NRC Request 1(c):**

FENOC is planning to modify the RPV lower head insulation design at BVPS Unit 1, and Unit 2 if necessary, to accommodate a complete bare metal examination of all 50 BMI penetrations for subsequent refueling outages.

***NRC Request 1(d):*** *If you do not plan to perform either a bare-metal visual inspection or non-visual (e.g., volumetric or surface) examination of the RPV lower head penetrations at the next or subsequent refueling outages, provide the basis for concluding that the inspections performed will assure applicable regulatory requirements are and will continue to be met.*

**Response to NRC Request 1(d):**

FENOC is planning bare metal visual inspections at Beaver Valley Units 1 and 2 as described above.

***NRC Request (2):*** *Within 60 days of plant restart following the next inspection of the RPV lower head penetrations, the subject PWR addressees should submit to the NRC a summary of the inspections performed, the extent of the inspections, the methods used, a description of the as-found condition of the lower head, any findings of relevant indications of through-wall leakage, and a summary of the disposition of any findings of boric acid deposits and any corrective actions taken as a result of indications found:*

**Response to NRC Request (2):**

FENOC will provide the requested information within 60 days after plant restart following the next inspections of the RPV lower head penetrations at Beaver Valley Units 1 and 2.

**References:**

- 1) FENOC letter L-03-004, "Beaver Valley Power Station Units 1 and 2, Docket Nos. 50-334 and 50-412, NRC Bulletin 2002-01, Request for Additional Information Response," January 24, 2003
- 2) FENOC letter L-02-121, "Beaver Valley Power Station Units 1 and 2, Docket Nos. 50-334 and 50-412, Updated Information Regarding Bulletin 2001-01 and Bulletin 2002-01," January 8, 2003
- 3) EPRI Document MRP-48, " PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48)," EPRI, Palo Alto, CA, August 2001 (1006284)
- 4) FENOC letter L-02-032, "Beaver Valley Power Station Units 1 and 2, Docket Nos. 50-334 and 50-412, Response to NRC Bulletin 2002-01," April 1, 2002
- 5) "Visual Examination for Leakage of PWR Reactor Head Penetrations on Top of RPV Head: Revision 1 of 1006296, Includes Fall 2001 Results," EPRI, Palo Alto, CA, March 2002 (1006899)

## ATTACHMENT 2

### Commitment List

The following list identifies those actions committed to by FirstEnergy Nuclear Operating Company (FENOC) for Beaver Valley Power Station (BVPS) Unit No. 1 and No. 2 in this document. Any other actions discussed in the submittal represent intended or planned actions by Beaver Valley. These other actions are described only as information and are not regulatory commitments. Please notify Mr. Larry R. Freeland, Manager, Regulatory Affairs/Performance Improvement, at Beaver Valley on (724) 682-5284 of any questions regarding this document or associated regulatory commitments.

<u>Commitment</u>	<u>Due Date</u>
The BVPS Unit 2 examination scope for 2R10 is planned to include a visual inspection of all 50 BMI penetrations including 100% of the circumference of each penetration as it enters the RPV lower head to the maximum extent practical.	Completion of 2R10 (fall 2003)
The BVPS Unit 1 examination scope for 1R16 is planned to include a visual inspection of all 50 BMI penetrations including 100% of the circumference of each penetration as it enters the RPV lower head to the maximum extent practical.	Completion of 1R16 (fall 2004)
The examinations planned for the subsequent BVPS Unit 1 and Unit 2 refueling outages include the bare metal visual examination of the RPV lower head as part of normal boric acid leakage inspection program each refueling outage. The boric acid inspection program will be modified to include VT-2 bare metal examination of the BMIs at each refueling outage that follows until ASME Code changes or regulatory action justify a change in the examination frequency or method.	Completion of 2R10 (fall 2003)
The information requested by Item 2 of Bulletin 2003-02 will be provided within 60 days after plant restart following the next inspections of the RPV lower head penetrations at BVPS Units 1 and 2.	60 days after plant restart following 1R16 and 2R10 (for BVPS Units 1 and 2, respectively)