

March 17, 2003  
L-03-008

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  
Proposed Alternative Repair Methods for Reactor Vessel Head  
Penetrations  
(Relief Request No. BV3-RV-01)**

REFERENCE: Westinghouse letter LTR-NRC-01-41, dated December 13, 2001, ASME Section XI Inservice Inspection Program Relief Requests – Alternative Repair Techniques, from H. A. Sepp, Manager Regulatory and Licensing Engineering, Westinghouse Electric Company, LLC. to S. J. Collins, NRC.

During the upcoming Beaver Valley Power Station (BVPS) Unit 1 and Unit 2 refueling outages, FirstEnergy Nuclear Operating Company (FENOC) will be conducting inspections of the reactor vessel head penetrations (VHP) in accordance with the NRC Order dated February 11, 2003.

Pursuant to 10 CFR 50.55(a)(3)(i), FENOC is submitting Relief Request BV3-RV-01 to the requirements of Section XI of the ASME Code requesting authorization to use the embedded flaw repair technique transmitted to the NRC in the referenced letter. This technique would be used as an alternative to the requirements in the ASME Code, Section XI, that preclude welding over or embedding an existing flaw. The enclosure to this letter includes the BVPS component identification information as well as the BVPS plant-specific information as it applies to the Westinghouse relief request.

This relief request proposed alternative would allow use of an embedded flaw repair technique to repair flaws on the inside diameter (ID) of control rod drive mechanisms (CRDM), the outside diameter (OD) of the CRDM as well as repair flaws on the J-groove attachment welds on VHPs. The proposed alternative method of embedded flaw repair has shown to provide an acceptable level of quality and safety.

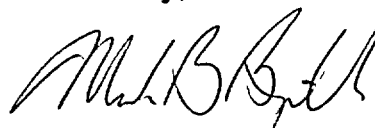
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(Relief Request No. BV3-RV-01)  
L-03-008  
Page 2

Should BVPS identify the need to perform repairs using the embedded flaw repair technique during the 1R15 refueling outage which began on March 8, 2003, BVPS may request expedited approval of these Code alternative requests.

No new commitments are contained in this submittal. 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

Enclosure

c: Mr. T. G. Colburn, NRR Project Manager  
Mr. D. M. Kern, NRC Sr. Resident Inspector  
Mr. H. J. Miller, NRC Region I Administrator

**ENCLOSURE**

**Proposed Alternative Repair Method for  
Reactor Vessel Head Penetrations**

**Relief Request No. BV3-RV-01**

**Proposed Alternative Repair Method for  
BVPS Reactor Vessel Head Penetrations**

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**Relief Request No. BV3-RV-01**

**Code Class:** 1

**Code References:** 1989 Edition, No Addenda of The American Society of Mechanical Engineers (ASME) Code, Section III, NB-4450, Section XI, IWA- 4120, IWA-4310.

**Examination Category:** B-E

**Item Numbers:** B4.12, B4.11

**System/Component:** Control rod drive mechanisms (CRDM) nozzles (65 penetrations)  
Reactor head vent nozzle (1 penetration)

**Inspection Intervals:** Third 10-Year ISI Interval (BV1)  
Second 10-Year ISI Interval (BV2)

**Code Requirement:**

BVPS Units 1 and 2 are in the third and second ten-year inservice inspection intervals, respectively, using the 1989 Edition, No Addenda of ASME Code, Section XI.

ASME Section XI, IWA- 4120, "Rules and Requirements," states in part:

(a) "Repairs shall be performed in accordance with the Owner's Design Specification and the original Construction Code of the component or system. Later Editions and Addenda of the Construction Code or of Section III, either in their entirety or portions thereof, and Code Cases may be used...."

ASME Section XI, IWA-4310, Defect Removal Procedure, states in part:

"Defects shall be removed or reduced in size in accordance with this Article...."

ASME Code, Section XI, sub-sections IWA- 4120 and IWA-4310, do not allow welding over or embedding an existing flaw.

**Proposed Alternative:**

As an alternative to the rules contained in the 1989 ASME Code, Section XI, sub-sections IWA- 4120 and IWA-4310, which do not allow welding over or embedding an existing flaw, it is requested that the NRC approve the use of the proposed alternative method presented to the NRC by Westinghouse Electric Company, LLC. on

## **Proposed Alternative Repair Method for BVPS Reactor Vessel Head Penetrations**

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December 13, 2001 (Reference 1) for repair of flaws on the ID of CRDM's, OD of CRDM's and J-groove attachment welds.

### **Basis for Alternative Requirements:**

BVPS will be performing inspections of the vessel head penetrations (VHP) in accordance with the BVPS in response to the NRC Order dated February 11, 2003. In the event that any of these inspections indicate flaws in these penetrations, it will be necessary to repair such flaws. Pursuant to 10 CFR 50.55a(a)(3)(i), the alternative is proposed on the basis that it will provide an acceptable level of quality and safety.

The embedded flaw repair technique is considered a permanent repair for the following reasons:

1. As long as a Primary Water Stress Corrosion Cracking (PWSCC) flaw remains isolated from the primary water (PW) environment, it cannot propagate. Since Alloy 52 weldment is considered highly resistant to PWSCC, a new PWSCC flaw cannot initiate and grow through the Alloy 52 overlay to reconnect the PW environment with the embedded flaw. Structural integrity of the affected VHP J-groove attachment weld will be maintained by the remaining unflawed portion of the weld.
2. The residual stresses produced by the embedded flaw technique have been measured and found to be relatively low. This was documented in the attachment to a letter from E. E. Fitzpatrick, Indiana Michigan Power Company (I&M), to the Nuclear Regulatory Commission, "Reactor-Vessel Head Penetration Alternate Repair Techniques" (letter AEP:NRC:1ZZ8A, dated March 12, 1996). The low residual stresses indicate that no new flaws will initiate and grow in the area adjacent to the repair weld.
3. There are no other known mechanisms for significant flaw propagation in this region since cyclic fatigue loading is negligible.

## Proposed Alternative Repair Method for BVPS Reactor Vessel Head Penetrations

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### Conclusion:

10 CFR 50.55a(a)(3) states:

“Proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant shall demonstrate that:

- (i) The proposed alternatives would provide an acceptable level of quality and safety, or
- (ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.”

BVPS considers the embedded flaw repair technique to be an alternative to Code requirements that provides an acceptable level of quality and safety, as required by 10 CFR 50.55a(a)(3)(i).

### Precedent:

NRC has approved a similar alternative for North Anna Power Station Unit 2 on January 23, 2003. Additionally, the NRC previously approved a similar alternative for Cooper Nuclear Plant, Units 1 and 2 on April 9, 1996. Although the alternative was applied to the VHP tube base metal rather than VHP welds, both alternatives use an embedded flaw repair technique. Also, DC Cook received approval to use an embedded flaw alternative repair technique on December 12, 2001.

### Reference:

- (1) WCAP-15987-P Rev.1, “Technical Basis for the Embedded Flaw Process for Repair of Reactor Vessel Head Penetrations”