

March 17, 2003
L-03-009

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
Alternative Repair Request on Material Removal Requirements
Following Thermal Removal Processes
(Relief Request BV3-RV-02)**

Pursuant to 10 CFR 50.55a(a)(3)(i), FirstEnergy Nuclear Operating Company (FENOC) is proposing an alternative method to the thermal removal process requirements of ASME Section XI, IWA-4322. This request is for Beaver Valley Power Station (BVPS) Units 1 and 2 during the third and second 10-Year intervals, respectively, of the Inservice Inspection Program.

Specifically, BVPS is planning to use an Electrical Discharge Machining (EDM) process if it becomes necessary to perform certain repairs as a result of inspections of the reactor vessel head penetrations (VHP) in accordance with the NRC Order dated February 11, 2003. Later editions of the Code have recognized the different characteristics of the newer processes such as EDM and allow for the alternative of qualifying the process in lieu of requiring additional material to be removed from the thermally cut surfaces.

As documented in the attached request, BVPS proposes to use the alternative rules of later editions of the Code to qualify the EDM process. This submittal is consistent with the NRC approval of the Entergy alternative (References 1 & 2) for the use of the EDM process. The details of this relief request are provided in the enclosure to this letter.

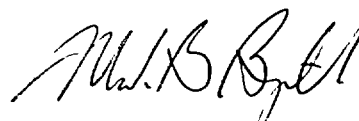
Should BVPS identify the need to perform repairs using the EDM process during the 1R15 refueling outage, which began on March 8, 2003, BVPS may request expedited approval of these Code alternative requests.

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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

References:

1. Entergy letter CNRO-2002-00013, "Use of Electrical Discharge Machine (EDM)," dated March 14, 2002.
2. NRC letter to Entergy, Subject: Authorization to use EDM, dated June 17, 2002.

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

**Alternative Repair Request on Material Removal
Requirements Following Thermal Removal Processes**

Relief Request BV3-RV-02

Alternative Repair Request on Material Removal Requirements Following Thermal Removal Processes

Relief Request BV3-RV-02

Code Class: 1

Code References:

The American Society of Mechanical Engineers (ASME) Code, Section XI, 1989 Edition.

Construction code for BVPS Units 1 and 2: ASME Section III, 1971 Edition, 1973 Winter Addenda.

Applicable component construction codes:

BVPS 1 – Reactor Vessel -- ASME Section III, Class A, 1968 Edition, Winter 1968 Addenda.

BVPS 1 – Full and Part length CRDM Housings -- ASME Section III, Class A, 1968 Edition, Winter 1969 Addenda

BVPS 2 – Reactor Vessel -- ASME Section III, 1971 Edition, Summer 1972 Addenda

Examination Category: B-E

Item Numbers: B4.12, B4.11

System/Components: Control Rod Drive Mechanism (CRDM) nozzles
(65 penetrations)
Reactor Head Vent Nozzle (1 penetration)

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

Code Requirement

IWA- 4120 of ASME Section XI, 1989 Edition states that repairs and the installation of replacement items 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 ASME Section III, either in their entirety or portions thereof, and Code Cases may be used.

ASME Section XI also imposes repair requirements that supplement or amend the repair rules of the construction code. Where applicable, compliance with these additional requirements is mandatory. When performing defect removal of P-No. 43

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(inconel) materials using a thermal removal process, the supplemental requirements of IWA-4322 apply:

- IWA-4322 "If thermal removal processes are used on P-No. 8 and P-No. 43 materials, a minimum of 1/16" material shall be mechanically removed from the thermally processed areas."

Proposed Alternative

Background

RPV head penetration nozzles at BVPS Units 1 and 2 are considered to have a moderate susceptibility to Primary Water Stress Corrosion Cracking (PWSCC) based upon a susceptibility ranking of MRP-75 using the time-at-temperature method.

Susceptibility rankings for BVPS Units 1 and 2 have been reported to the NRC in response to NRC Bulletin 2002-02 (Reference 4). RPV head penetration nozzles at BVPS Units 1 and 2 are manufactured from SB-166 or SB-167 Alloy 600 materials which are P-Number 43 inconel alloys. It is noted that the susceptibility ranking performed in support of this relief request was calculated and ranked in accordance with NRC Order EA-03-009, which supercedes the requirements of NRC Bulletin 2002-02.

Should repairs of RPV head penetration nozzles or J-welds become necessary at BVPS, BVPS plans to utilize the electrical discharge machining (EDM) process to excavate PWSCC cracks or defects and remove weld crown surfaces of repair welds to facilitate performance of final NDE. EDM is considered a thermal removal process by the ASME Code (References 2 and 3). As such, a minimum of 1/16" of material must be mechanically removed from all EDM processed areas to comply with IWA-4322.

Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(i), BVPS proposes an alternative to the thermal removal requirements of IWA-4322 applicable to P-No. 43 materials. Instead of mechanically removing 1/16" of material from all thermally processed areas as required by IWA-4322, the EDM process has been qualified by the repair vendor in accordance with IWA-4461.4 of the 1995 Edition, 1997 Addenda of ASME Section XI.

Based upon the oxide thickness measurements obtained during the EDM qualification process, post-EDM polishing operations will be performed to ensure that the oxide surface layer is removed, therefore, the oxide layer from cut or excavated surfaces will be removed when performing repair activities on RPV head penetration nozzles or J-welds.

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Basis of Alternative for Providing Acceptable Level of Quality and Safety

IWA-4322 of the 1989 Edition of ASME Section XI requires the removal of a minimum of 1/16" of material from all thermally processed areas of P-Number 43 materials. The apparent basis of this requirement is to ensure that thermally cut or excavated surfaces are free of unacceptable surface irregularities, oxides, and fissures that were created by the thermal removal process.

Suitability of IWA-4461.4 of ASME Section XI, 1995 Edition, 1997 Addenda

The qualification requirements of IWA-4461.4 ensure that the proposed thermal process is capable of producing a surface finish that is free of cracks or fissures and meets the required surface roughness criteria of the owner. Where the cut surface is exposed to a corrosive medium, then corrosion testing or evaluations must also be performed. The qualification requirements of IWA-4461.4 are summarized below.

- (a) The qualification test shall consist of two coupons of the same P-Number material to be cut in production.
- (b) The qualification coupons shall be cut using the maximum heat input to be used in production.
- (c) The thermally cut surface of each coupon shall be visually examined at 10X and shall be free of cracks. The Owner shall specify surface roughness acceptable for the application and shall verify that the qualification coupon meets the criterion.
- (d) Each qualification test coupon shall be cross-sectioned, and the exposed surfaces shall be polished, etched with a suitable etchant, and visually examined at 10X. All sectioned surfaces shall be free of cracks.
- (e) Corrosion testing of the thermally cut surface and heat affected zone shall be performed if the cut surface is to be exposed to a corrosive media. Alternatively, corrosion resistance of the thermally cut surface may be evaluated. The Owner shall specify the acceptance criteria.

In addition to the qualification testing requirements of IWA-4461.4 of ASME Section XI, 1995 Edition, 1997 Addenda, the thickness of the resultant oxide layer on the cut surfaces has been determined as part of the vendor EDM qualification. The thickness of the resultant oxide layer has been determined by metallographic examination. Based on the oxide thickness measurements obtained during the EDM process qualification, post-EDM polishing operations will be performed to ensure that the oxide surface layer is removed. The method described above for qualification of this process is consistent with the previously approved ENTERGY request.

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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 believes that compliance with the repair rules as stated in Reference 1 and as described in the "Background" section of this request would result in unnecessary radiation exposure. The proposed alternative would provide an acceptable level of quality and safety. Therefore, we request that the proposed alternative be authorized pursuant to 10 CFR 50.55a(a)(3)(i).

Precedents

This relief request is consistent with the previously approved ENTERGY request identified below.

Accession # ML020920712, Entergy Operations - submittal date: March 14, 2002.
Accession # ML021710191, Entergy Operations - approval date: June 17, 2002.

References

1. ASME Section XI, 1989 Edition
2. ASME Section XI, 1995 Edition, 1997 Addenda
3. Interpretation X1-1-95-60, Section XI, IWA-4322, EDM and MDM Processes
4. BVPS Response (L-02-095, dated September 11, 2002) to NRC Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs"
5. BVPS Response (L-03-035, dated March 3, 2003) to Order Establishing Interim Inspection Requirements for RPV Heads (EA-03-009)