October 23, 2006

Mr. James H. Lash
Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2), INSERVICE INSPECTION (ISI) PROGRAM, ALTERNATIVE EXAMINATION OF REACTOR COOLANT PIPE WELDS, REQUEST FOR RELIEF NO. BV3-RV-3 (TAC NOS. MD1140 AND MD1141)

Dear Mr. Lash:

By letter dated April 7, 2006, FirstEnergy Nuclear Operating Company (the licensee) submitted relief request BV3-RV-3, for the third 10-year ISI interval at BVPS-1 and for the second 10-year ISI interval at BVPS-2. The licensee requested Nuclear Regulatory Commission (NRC) approval to use an alternative examination of reactor coolant pipe welds.

The NRC staff has completed its review and evaluated the information regarding the relief request for BVPS-1 and 2. The results are provided in the enclosed safety evaluation. The staff concludes that an acceptable level of quality and safety will be maintained upon implementation of the licensee's proposed alternative examination and therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative examination is authorized for the remainder of the third 10-year ISI interval at BVPS-1, and for the remainder of the second 10-year ISI interval at BVPS-2.

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:
Safety Evaluation

cc w/encl: See next page

October 23, 2006

Mr. James H. Lash
Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 (BVPS-1 AND 2), INSERVICE INSPECTION (ISI) PROGRAM, ALTERNATIVE EXAMINATION OF REACTOR COOLANT PIPE WELDS, REQUEST FOR RELIEF NO. BV3-RV-3 (TAC NOS. MD1140 AND MD1141)

Dear Mr. Lash:

By letter dated April 7, 2006, FirstEnergy Nuclear Operating Company (the licensee) submitted relief request BV3-RV-3, for the third 10-year ISI interval at BVPS-1 and for the second 10-year ISI interval at BVPS-2. The licensee requested Nuclear Regulatory Commission (NRC) approval to use an alternative examination of reactor coolant pipe welds.

The NRC staff has completed its review and evaluated the information regarding the relief request for BVPS-1 and 2. The results are provided in the enclosed safety evaluation. The staff concludes that an acceptable level of quality and safety will be maintained upon implementation of the licensee's proposed alternative examination and therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative examination is authorized for the remainder of the third 10-year ISI interval at BVPS-1, and for the remainder of the second 10-year ISI interval at BVPS-2.

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:
Safety Evaluation

cc w/encl: See next page

DISTRIBUTION:

PUBLIC	LPLI-1 R/F	RidsNrrLpl1-1	RidsNrrLASLittle	GGeorgiev
RidsOgcRp	RidsNrrDciCpnb	GHill (2 copies)	BSosa, OEDO, RI	
RidsAcrsAcnwMailCenter		RidsNrrPMTColburn	RidsRgnIMailCenter	

ACCESSION NUMBER: ML062790072 *SE input provided. No substantive changes made.

OFFICE	LPLI-1/PM	LPLI-1/LA	CPNB/BC	OGC	LPLI-1/BC
NAME	TColburn	SLittle	TChan*		RLaufer
DATE	10/10/06	10/10/06	09/28/06	10/19/06	10/23/06

OFFICIAL RECORD COPY

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

BV3-RV-3, INSERVICE INSPECTION (ISI) RELIEF REQUEST

FIRSTENERGY NUCLEAR OPERATING COMPANY (FENOC)

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 April 7, 2006 (Agencywide Documents Access and Management System (ADAMS), Accession No. ML061020306), FirstEnergy Nuclear Operating Company (the licensee) requested, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(i), that the Nuclear Regulatory Commission (NRC) approve relief request BV3-RV-3 which pertains to the examination of certain reactor coolant pipe welds from the inner diameter surface during the third 10-year ISI interval at BVPS-1 and the second 10-year ISI interval at BVPS-2. The American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, 1989 Edition, no Addenda is the ISI Code of record for the BVPS-1 third 10-year ISI Interval and the BVPS-2 second 10-year ISI interval.

2.0 REGULATORY EVALUATION

10 CFR 50.55a(g) specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i).
10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.
10 CFR 50.55a(g)(5)(iii) states that if the licensee has determined that conformance with certain Code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in 10 CFR 50.4, to support the determinations.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the request has been evaluated by the NRC staff and the bases for disposition are documented below.

3.1 Licensee's Evaluation (As stated)

ASME Code Components Affected

Beaver Valley Power Station (BVPS) Unit Nos. 1 and 2 Reactor Coolant Pipe Welds. Nozzle-to-safe end, nozzle-to-piping and safe end-to-piping welds examined from the inner diameter (ID) surface using the remote mechanized, reactor vessel examination tool.

Applicable Code Edition and Addenda

ASME [Code] Section XI, 1989 Edition, no Addenda.

ASME [Code] Section XI, 1995 Edition, 1996 Addenda (Appendix VIII, Supplements 2 and 10, as required by 10 CFR 50.55a(g)(6)(ii)(C).

Applicable Code Requirements

Examination Category R-A, Item R1.11 (RI-ISI Program categorization), formerly Category B-F, Item Number B5.10 (nozzle-to-safe end [BVPS Unit No. 2] / nozzle-to-piping welds [BVPS Unit No.1]) and Category B-J, Item Number B9.11 (safe end-to-piping welds [BVPS Unit No. 2 only]) specify volumetric examination. The volumetric examination is to be conducted in accordance with Appendix VIII, Supplements 2 and 10, in the 1995 Edition with the 1996 Addenda per 10 CFR 50.55a (g)(6)(ii)(c).

Relief is requested from using only the ultrasonic [UT] method of Appendix VIII, Supplements 2 and 10, in the 1995 Edition with 1996 Addenda, when performing volumetric examination of the near surface of nozzle-to-safe end or safe end-to-pipe welds in the presence of surface roughness when the examination is conducted for the ID surface.

Reason for Request

The examination vendor for BVPS reactor vessel examinations has been qualified for detection of circumferential flaws in accordance with Appendix VIII, Supplements 10 and 14, as demonstrated through the Electric Power Research Institute (EPRI) Performance Demonstration Initiative (PDI) Program, for nozzle-to-safe end, nozzle-to-piping, and safe end-to-piping welds examined from the ID surface. The vendor is similarly qualified for detection of axial flaws provided the inside surface is machined or ground smooth with no exposed root reinforcement or counterbore.

For the welds that are the subject of this relief request, surface roughness may be present that could call into question the UT qualification demonstrated for detection of axial flaws in the volume immediately under the surface.

Proposed Alternative and Basis for Use

FENOC proposes using surface geometry profiling software (profilometry), in conjunction with a focused immersion [UT] transducer positioned to provide accurate profile data across the examination volume, to confirm locations where the raw data indicates lack of transducer contact due to surface geometry. Eddy current examination will be used to supplement [UT] examination of the volume immediately under the surface for the nozzle-to-safe end or safe end-to-pipe welds when sufficient surface roughness calls into question the applicability of the [UT] examination qualification to detect axial flaws.

To supplement the [UT] examinations for rough surface detection coverage, the following eddy current techniques [ECTs] are utilized:

- Up to two plus point probes applied circumferentially on the pipe inside surface in scan increments of 0.080 inch circumferentially (for axial flaws) and 0.25 inch axially.

- Automated systems for data collection and analysis.

The target flaw size for the eddy current procedure is 0.28 inch, which is within the ASME Code linear flaw acceptance standards of 0.45 inch for austenitic material, and 0.625 inch for ferritic material (defined for the outside surface in the Code tables).

As discussed in the NRC safety evaluation for Diablo Canyon (see Precedent below) [ADAMS Accession No. ML052660331], the examination vendor has developed an [ECT] to augment the [UT] examination method and provide increased sensitivity at the near surface. The [ECT] was first used in the VC Summer reactor vessel primary nozzle examination of 2000. The procedure was refined after its first use in 2000 by applying it to the VC Summer hot leg dissimilar metal weld section removed from service. The removed section had a number of primary water stress corrosion cracking flaws along with non-relevant indications resulting from metallurgical interface and surface geometry. The technique was refined using these actual flaws and geometric conditions in the removed section, allowing for successful use of the procedure in the VC Summer 2002 and 2003 examinations.

Since that time, the technique has been successfully blind tested for the Swedish authority SQC Kvalificeringscentrum AB (SQC NDT Qualification Center) under the program, "Qualification of Equipment, Procedure and Personnel for Detection, Characterization and Sizing of Defects in Areas in Nozzle to Safe End Welds at Ringhals Unit 3 and 4," by Hakan Soderstrand, dated July 10, 2003. The important qualification parameters (Reference SQC Qualification Report No. 019A/03) for Eddy Current in the SQC blind tests were as follows:

- Defect types: fatigue and stress corrosion cracks
- Tilt: +/- 10 degrees; Skew: +/- 10 degrees
- Detection target size: IDSCC [inner diameter stress-corrosion cracking]

6 mm (0.25 inches) long
- Flaws Location: within 10 mm (13/32 inch)
- Length of the planar flaw within a 70% confidence level: +/- 9 mm (3/8 inch)
- False call rate: less than or equal to 20% for the personnel qualification tests

The technique has also been used to supplement examination of portions of the relevant near-surface volumes during the last 10 domestic pressurized reactor nozzle-to-pipe examinations conducted by the vendor.

The [UT] examinations, profilometry, and supplemental eddy current examinations will be conducted to the maximum extent practical and are subject to third party review by the Authorized Nuclear Inservice Inspector.

Use of [UT] profilometry and eddy current examination, with procedures and personnel qualified through the SQC blind tests to supplement Appendix VIII qualified [UT] procedures and personnel for these welds, provides additional assurance that surface-breaking flaws would be detected regardless of orientation or potential surface roughness. This provides equivalent or better examination results than those realized from ASME Code requirements. Therefore, the proposed alternative provides an acceptable level of quality and safety. In accordance with 10 CFR 50.55a(a)(3)(i), FENOC requests approval of the proposed alternative.

Duration of the Proposed Alternative

The proposed alternative is requested for the remainder of the third 10-Year ISI Interval at BVPS Unit No.1 and the second 10-Year ISI Interval at BVPS Unit No. 2.

3.2 NRC Staff's Evaluation

Supplement 10 of Appendix VIll to the ASME Code, Section XI, requires that examination procedures, equipment, and personnel meet specific criteria as specified in Table VIII-S10-1 of Appendix VIll for both detection and false calls. However, a limitation was noted for detection of axial flaws where transducer contact could not be maintained in certain areas of the specimen.

As an alternative, the licensee will use a surface geometry profiling technique to identify locations that lack transducer contact. An ECT will be used to supplement the UT procedure at these locations. The eddy current probe will provide data from areas with irregular surface conditions. The licensee's proposed alternative will use surface geometry profiling software in conjunction with a focused immersion UT transducer positioned to permit accurate profile data across the examination volume to help the examiner confirm locations where the raw data indicates lack of transducer contact due to rough surface geometry. In addition to profilometry, the licensee will use eddy current examination to supplement UT examination of the volume immediately under the surface of the nozzle-to-safe end or safe end-to-pipe welds with sufficient surface roughness which may challenge the applicability of the UT examination qualification to detect axial flaws. The technique proposed by the licensee has also been

demonstrated and blind tested by the industry in recent years. The staff finds that the licensee's proposed alternative, which combines UT and ECT in examining axial flaws, will provide an acceptable level of quality and safety (the NRC staff has not reviewed the blind qualification program that was demonstrated to the Swedish authority SQC, and therefore, takes no position regarding the program acceptability). Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the proposed alternative for the third 10-Year ISI Interval at BVPS-1 and the second 10-Year ISI Interval at BVPS-2.

4.0 CONCLUSION

The licensee has provided an acceptable alternative to the ASME Code, Section XI, requirements in this case. Use of the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternative is authorized for the third 10-Year ISI Interval at BVPS-1 and the second 10-Year ISI Interval at BVPS-2. All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: G. Georgiev

Date: October 23, 2006

Beaver Valley Power Station, Unit Nos. 1 and 2

cc:

Gary R. Leidich
President and Chief Nuclear Officer
FirstEnergy Nuclear Operating Company
Mail Stop A-GO-19
76 South Main Street
Akron, OH 44308

Joseph J. Hagan
Senior Vice Presdient of Operations
and Chief Operating Officer
FirstEnergy Nuclear Operating Company
Mail Stop A-GO-14
76 South Main Street
Akron, OH 44308

Danny L. Pace
Senior Vice President, Fleet Engineering
FirstEnergy Nuclear Operating Company
Mail Stop A-GO-14
76 South Main Street
Akron, OH 44308

Jeannie M. Rinckel
Vice President, Fleet Oversight
FirstEnergy Nuclear Operating Company
Mail Stop A-GO-14
76 South Main Street
Akron, OH 44308

David W. Jenkins, Attorney
FirstEnergy Corporation
Mail Stop A-GO-18
76 South Main Street
Akron, OH 44308

Manager, Fleet Licensing
FirstEnergy Nuclear Operating Company
Mail Stop A-GHE-107
395 Ghent Road
Akron, OH 44333

James H. Lash
Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

Lew W. Myers
Executive Vice President, Special Projects
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SGRP
P.O. Box 4, Route 168
Shippingport, PA 15077

Manager, Site Regulatory Compliance
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-A
P.O. Box 4, Route 168
Shippingport, PA 15077

Commissioner James R. Lewis
West Virginia Division of Labor
749-B, Building No. 6
Capitol Complex
Charleston, WV 25305

Director, Utilities Department
Public Utilities Commission
180 East Broad Street
Columbus, OH 43266-0573

Director, Pennsylvania Emergency
Management Agency
2605 Interstate Dr.
Harrisburg, PA 17110-9364

Ohio EPA-DERR
ATTN: Zack A. Clayton
P.O. Box 1049
Columbus, OH 43266-0149

Beaver Valley Power Station, Unit Nos. 1 and 2 (continued)

cc:

Dr. Judith Johnsrud
Environmental Coalition on Nuclear Power
Sierra Club
433 Orlando Avenue
State College, PA 16803

Director
Bureau of Radiation Protection
Pennsylvania Department of
Environmental Protection
Rachel Carson State Office Building
P.O. Box 8469
Harrisburg, PA 17105-8469

Mayor of the Borough of Shippingport
P.O. Box 3
Shippingport, PA 15077

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 298
Shippingport, PA 15077