FENOC
FirstEnergy Nuclear Operating Company

Peter P. Sena III
Site Vice President

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

May 19, 2008
L-08-070

10 CFR 50.55a(g)(5)(iii)

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

SUBJECT:
Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Impractical American Society of Mechanical Engineers Code Section XI Weld Examination Requirement (Request Nos. 1-TYP-3-RV-WELDS, 1-TYP-3-RH-E-1-2, and 1-TYP-3-SI-TK-2-1)

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee has determined that conformance with certain code requirements is impractical for its facility, the licensee shall notify the Nuclear Regulatory Commission (NRC) and submit information to support the determinations. Pursuant to 10 CFR 50.55a(g)(5)(iv), the basis for this determination must be demonstrated to the satisfaction of the NRC not later than 12 months after the expiration of the ten-year inservice inspection interval. The Beaver Valley Power Station (BVPS) Unit No. 1 third ten-year inservice inspection interval ended on March 31, 2008.

Pursuant to 10 CFR 50.55a(g)(5)(iii), FirstEnergy Nuclear Operating Company (FENOC) hereby notifies the NRC that inservice examination of the required volume for the welds listed below, as specified by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, has been determined to be impractical. This determination is based on experience obtained during the BVPS Unit No. 1 third ten-year inservice inspection interval.

Request Number	Weld Description	Weld
1-TYP-3-RV-WELDS	Reactor Vessel Circumferential Welds	RC-R-1-C-1, RC-R-1-C-8
1-TYP-3-RH-E-1-2	Residual Heat Removal Heat Exchanger Circumferential Welds	RH-E-1A-C-1,RH-E-1A-C-2
1-TYP-3-SI-TK-2-1	Safety Injection System Boron Injection Tank Nozzle Welds	SI-TK-2-N-3, SI-TK-2-N-4

A047
NRR

Consistent with 10 CFR 50.55a(g)(4) requirements, as modified by ASME Code Case N-460, FENOC performed examination of the welds listed above during the third ten-year interval to the extent practical within the limitations of design, geometry and materials of construction, but with coverage less than 100 percent. Therefore, it is requested that the NRC grant relief in accordance with 10 CFR 50.55a(g)(6) for the fourth ten-year interval. The details of the determination of impracticality and the associated relief request are provided in the attachments to this letter.

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – FENOC Fleet Licensing, at 330-761-6071.

Sincerely,

Edward H. Hubley

for: Peter P. Sena III

Attachment:

1. 10 CFR 50.55a Request Number 1-TYP-3-RV-WELDS, Revision 0
2. 10 CFR 50.55a Request Number 1-TYP-3-RH-E-1-2, Revision 0
3. 10 CFR 50.55a Request Number 1-TYP-3-SI-TK-2-1, Revision 0

cc: Mr. S. J. Collins, NRC Region I Administrator
Mr. D. L. Werkheiser, NRC Senior Resident Inspector
Ms. N. S. Morgan, NRR Project Manager
Mr. D. J. Allard, Director BRP/DEP
Mr. L. E. Ryan (BRP/DEP)

Determination of Inservice Inspection Impracticality
in Accordance with 10 CFR 50.55a(g)(5)(iii)

1.0 ASME Code Components Affected

Class 1 Reactor Vessel Circumferential Welds RC-R-1-C-1 (C-1) and RC-R-1-C-8 (C-8) at Beaver Valley Power Station (BVPS) Unit No. 1

2.0 Applicable Code Edition and Addenda

American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 1989 Edition, no Addenda (third ten-year inservice inspection interval)

ASME Code Section XI, 2001 Edition, 2003 Addenda (fourth ten-year inservice inspection interval)

3.0 Applicable Code Requirement

The examination coverage requirements for welds C-1 and C-8 that are applicable during the fourth ten-year inservice inspection interval are the same as those applicable during the third ten-year inservice inspection interval. Table IWB-2500-1, "Examination Category B-A, Pressure Retaining Welds in Reactor Vessel," Item Nos. B1.11 and B1.30 require volumetric examination of essentially 100 percent of the weld length each 10 year interval.

ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," as an alternative approved for use by the NRC Staff, states that a reduction in examination coverage due to part geometry or interference by another component for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent (that is, greater than 90 percent coverage is obtained).

4.0 Impracticality of Compliance

The 100 percent examination volume requirement for the affected welds has been determined to be impractical to obtain during the third ten-year inservice inspection interval due to component geometry in the case of weld C-1, and due to physical interference by the four radial support lugs in the case of weld C-8. Welds C-1 and C-8 are shown in the drawing provided on page 4. Examination limitations experienced are described in the paragraphs below.

Weld RC-R-1-C-1

The flange to upper circumferential shell weld C-1 was examined using an automated, Performance Demonstration Initiative (PDI) qualified technique during the eighteenth maintenance and refueling outage (third period of the third ten-year [current] interval)

from the vessel inside diameter surface. Additionally, a manual ultrasonic examination was performed on weld C-1 from the flange face surface in October 1997 (first period of the third ten-year interval) in accordance with Notes 2, 3 and 4 of Table IWB-2500-1 Examination Category B-A. The first period examination of the weld from the flange face surface covered 100 percent of the weld circumference and used five different beam angles (16 out, 12 out, 6 out, 0, and 6 degrees in, as permitted by ASME Code Section V, Article 4) to cover the required volume. There were no limitations identified for this examination.

The automated examination of the flange to shell weld C-1 was limited to 63.93 percent of the required volume due to the configuration of the flange. The proximity of the weld to the flange inside diameter taper transition limits scanning in both perpendicular and parallel directions to the weld below the transition. Additionally, four keyways and eight irradiation specimen slots limit scanning in the direction perpendicular to the weld from the area of the inside diameter flange face. Scanning was conducted between and below the obstructing keyways and between the irradiation specimen slots with the scan boundaries maximized by visually assisted positioning of the exam head so that scan starts and stops were as close to the keyways and irradiation specimen slots as possible. Extra transducers were also added to the exam sled and positioned in the fixture to maximize coverage. Two rotations of the examination head for both perpendicular and parallel scans were employed on the portions of the weld below the inside diameter taper transition. The extra rotations maximized the coverage by putting the extra dual element transducer in the proper orientation for additional near surface coverage for the perpendicular scans and transducers as near to the transition as possible for the parallel scans.

Calculating a combined coverage of the automated and manual examinations is complicated by the unique design of the weld and the PDI ultrasonic procedure application which eliminated the need for previously specified multiple examination angles. This calculation is further complicated by the PDI inner 15 percent thickness requirement for full coverage credit.

Weld RC-R-1-C-8

The automated examination of the lower head to shell weld (C-8) was limited to 80 percent of the required volume. The coverage limitation was due to the proximity of four core support lugs. Scanning was conducted between and below the obstructing lugs with the scan boundaries maximized by visually assisted positioning of the exam head so that scan starts and stops were as close to the support lugs as tool configuration would allow.

The actual examination coverage experienced during the third interval for welds C-1 and C-8 indicates that 100 percent coverage during the fourth interval would be impractical.

5.0 Burden Caused by Compliance

In order to meet the volumetric coverage requirements, the affected welds would have to be re-designed and modified. Re-design and modification of components to obtain the required examination volume is contrary to the intent of the code. Therefore, this option is considered impractical.

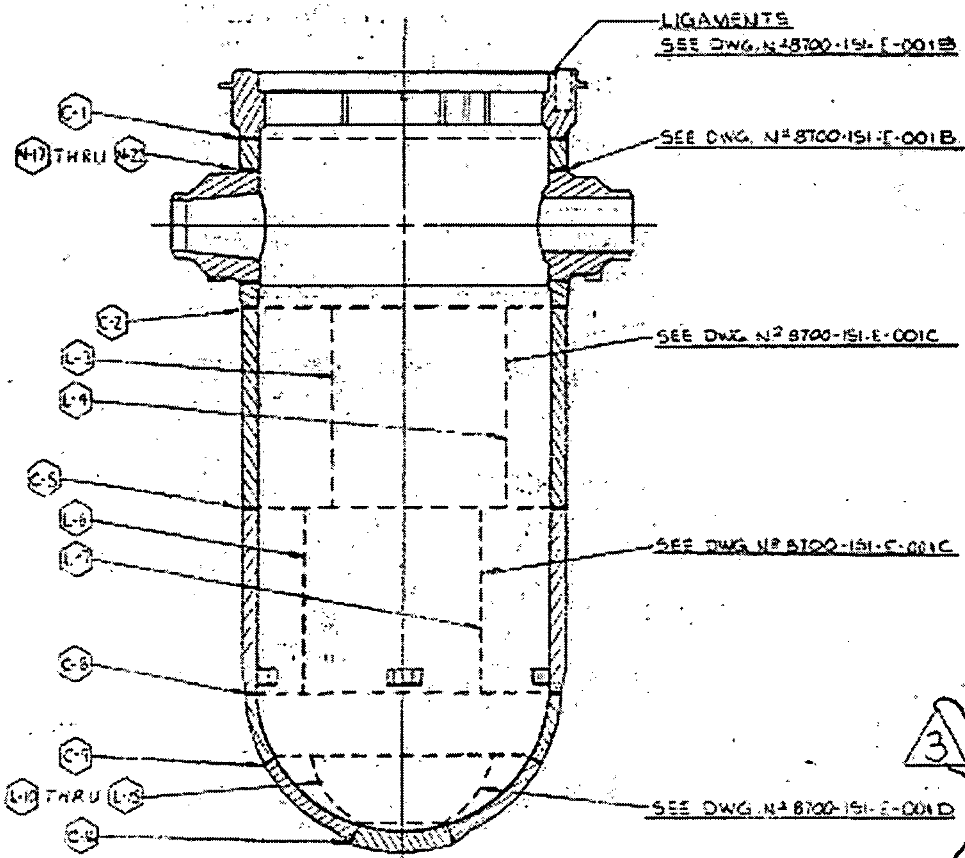
6.0 Proposed Alternative and Basis for Use

As an alternative to the 100 percent examination volume requirement, examination of reactor vessel circumferential welds RC-R-1-C-1 and RC-R-1-C-8 to the maximum extent practicable, which includes 100 percent of the weld circumference from the flange face (per ASME Code Section XI, only 50 percent of the weld was required to be examined from the flange face), is proposed. These examinations are supplemented by the visual examination performed on the interior of the vessel. The four support lugs and the flange to shell weld are included in this examination.

Ultrasonic test examinations coupled with the visual examination of the support lugs and the surrounding areas, and the visual examination of the interior surface of the flange to shell weld, provide adequate assurance of weld integrity.

7.0 Duration of the Relief Request and Proposed Alternative

The proposed alternative is requested for the fourth ten-year inservice inspection interval at BVPS Unit No. 1.



REACTOR VESSEL (RC-R-1)

CONTROLLED
BVPS UNIT 1

NOTES:

1) THIS DWG. SUPERSEDES WESTINGHOUSE DWG. Nº DLW-1-1100, DATED 9-9-81.
2) FOR SUPPORT DETAILS, SEE RV-6 SERIES. (3)

Q.A. CATEGORY I

REF: RM-37A RV-6 SERIES

Duquesne Light Company NUCLEAR GROUP	SHIPPINGPORT, PA.
SCALE	DATE 7-05-84
NUCLEAR APP. NA	QA:
ELECT. APP. N/A	MECH. APP. N/A
ARCH./STRUCT. APP. N/A	FINAL APP. FOR ISSUE
REACTOR VESSEL	
D.C.P. NO.	STA. NO.
DWG. NO. 8700-151-E-001A-3	

CHANGED FROM 8700-151-RCR-1 TO 8700-151-E-0001A. UPDATED PER QA AUDIT NO. BV-C-88-02 AND LATEST PLANT DESIGN CHANGES

2 | TER 1841 CORRECTED WELD NO'S

3 | TER 4551 ADDED NOTE 2 + REF. DWGS.

Determination of Inservice Inspection Impracticality
In Accordance with 10 CFR 50.55a(g)(5)(iii)

1.0 ASME Code Components Affected

Residual heat removal heat exchangers (RH-E-1A and RH-E-1B) circumferential welds RH-E-1A-C-1, RH-E-1A-C-2, RH-E-1B-C-1 and RH-E-1B-C-2 (two welds on each heat exchanger depicted as "C-1" and "C-2" on page 4 of this attachment) at Beaver Valley Power Station (BVPS) Unit No. 1

2.0 Applicable Code Edition And Addenda

American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 1989 Edition, no Addenda (third ten-year inservice inspection interval)

ASME Code Section XI, 2001 Edition, 2003 Addenda (fourth ten-year inservice inspection interval)

3.0 Applicable Code Requirements

The examination coverage requirements for welds C-1 and C-2 on both the RH-E-1A and RH-E-1B heat exchangers that are applicable during the fourth ten-year inservice inspection interval are the same as those applicable during the third ten-year inservice inspection interval. ASME Code Table IWC-2500-1, "Examination Category C-A, Pressure Retaining Welds in Pressure Vessels," Item Nos. C1.10 and C1.20 specify that the extent of examination "includes essentially 100 % of the weld length."

ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," as an alternative approved for use by the NRC Staff, states that a reduction in examination coverage due to part geometry or interference by another component for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent (that is, greater than 90 percent coverage is obtained).

4.0 Impracticality of Compliance

The 100 percent examination has been determined to be impractical because examination of weld C-1 during the third ten-year inspection interval was limited by curvature of the lower head and weld crown. Examination of welds C-1 and C-2 was limited by physical interference from welded support plates and inlet and outlet nozzle external reinforcing saddles. The 45 degree axial scans were supplemented with 60

degree axial scans to extend the examination coverage to the maximum extent practical for these welds.

Approximately 86 percent of weld RH-E-1A-C-1 and 71 percent of weld RH-E-1A-C-2 were examined in the third ten-year inspection interval. Since input values used to calculate coverage percentages are not precise, the calculated percentages differ between inspection intervals, even though the actual extent of examination does not differ and is the maximum extent practical. The examination limitations resulting from the curvature of the lower head and weld crown, welded support plates, and inlet and outlet nozzle external reinforcing saddles described above are common to both heat exchangers RH-E-1A and RH-E-1B. Relief is being requested because the actual coverage experienced during the third interval indicates that 100 percent coverage during the fourth interval would be impractical.

5.0 Burden Caused by Compliance

Examination of the weld length required by the ASME Code would require that physical interferences be eliminated. This would require redesign and replacement of the current residual heat removal heat exchangers or temporary removal of welded nozzle reinforcing saddles and welded support plates. These options are considered impractical because component replacement and temporary removal of welded parts of a component to accommodate weld examinations would not be consistent with the intent of the ASME Code.

6.0 Proposed Alternative and Basis for Use

As an alternative to the essentially 100 percent examination volume requirement specified in Table IWC-2500-1, Examination Category C-A, examination of welds RH-E-1A-C-1 and RH-E-1A-C-2 to the maximum extent practical using a 45 degree axial angle, supplemented with a 60 degree axial angle, is proposed.

The heat exchanger shell adjacent to welds C-1 and C-2 is 0.875-inch thick, SA-240, TP304 material. Welds C-1 and C-2 receive VT-2 examinations in accordance with Category C-H, which would detect through-wall leakage. Complete VT-2 examination along with volumetric examination to the maximum extent practical would ensure continued reliability of these welds.

The requested relief is consistent with relief granted on December 29, 1989 for weld C-1. It is also consistent with relief granted on December 29, 1989 for weld C-2, except that experience in the third ten-year interval shows that the calculation of examined weld volume produced a result that differed from (i.e., was less than) the volume calculated during the second interval even though the actual extent of examination was

the same in both cases. Approximate values of 84 and 86 percent have been obtained for weld C-1 and 80 and 71 percent for weld C-2 during the second and third ten-year intervals, respectively.

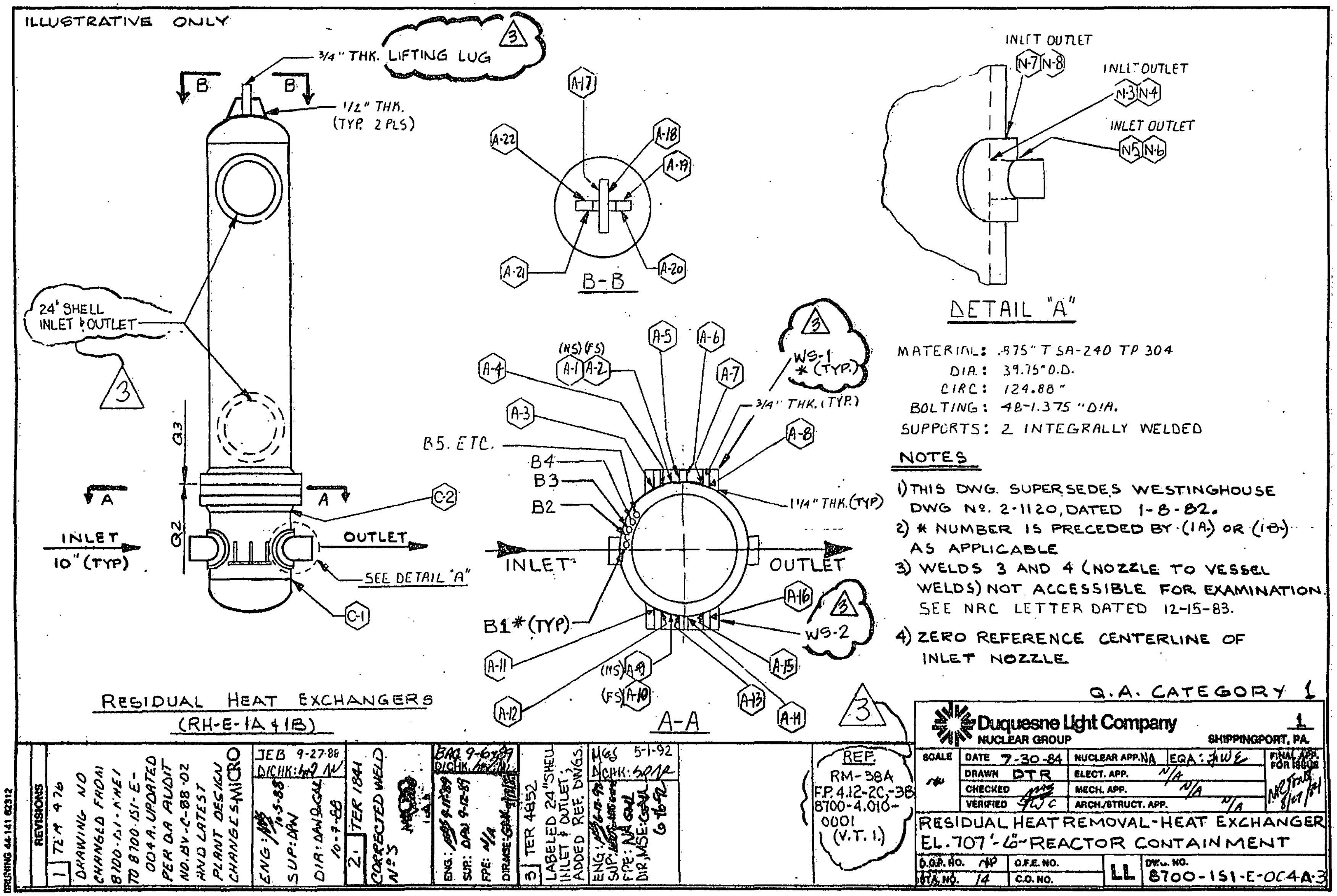
7.0 Duration of the Relief Request and Proposed Alternative

The proposed alternative is requested for the fourth ten-year inservice inspection interval at BVPS Unit No. 1.

8.0 Precedent

Relief granted by the NRC in a letter dated December 29, 1989 (Request Number 1-TYP-3-RH-E-1-1 in the precedent cited below) allowed reduced examination coverage. The relief allowed the welds to be examined "to the maximum extent practical" provided, as a minimum, 84 percent (for weld C-1) and 80 percent (for weld C-2) of the weld volume is examined. The percentages specified in the relief provided by the NRC were based on approximate coverage values described by the licensee in Relief Request Number 1-TYP-3-RH-E-1-1, that were observed during the second ten-year inspection interval.

Beaver Valley Power Station Unit No. 1 Relief Request 1-TYP-3-RH-E-1-1, Rev. 0, dated September 17, 1997; NRC Safety Evaluation dated December 29, 1998 (TAC No. M99673)


ILLUSTRATIVE ONLY
3/4" THK. LIFTING LUG
1/2" THK. (TYP. 2 PLS)
24" SHELL INLET & OUTLET
INLET 10" (TYP)
OUTLET
SEE DETAIL "A"
C-1
C-2
B-B
A-A
DETAIL "A"
INLET OUTLET N-7 N-8
INLET OUTLET N-3 N-4
INLET OUTLET N-5 N-6
WS-1 * (TYP.)
WS-2
3/4" THK. (TYP.)
1 1/4" THK. (TYP)
B5. ETC.
B4
B3
B2
B1* (TYP)
MATERIAL: .875" T SA-240 TP 304
DIA.: 39.75" O.D.
CIRC: 124.88"
BOLTING: 48-1.375" DIA.
SUPPORTS: 2 INTEGRALLY WELDED
NOTES
1) THIS DWG. SUPERSEDES WESTINGHOUSE DWG No. 2-1120, DATED 1-8-82.
2) * NUMBER IS PRECEDED BY (1A) OR (1B) AS APPLICABLE
3) WELDS 3 AND 4 (NOZZLE TO VESSEL WELDS) NOT ACCESSIBLE FOR EXAMINATION. SEE NRC LETTER DATED 12-15-83.
4) ZERO REFERENCE CENTERLINE OF INLET NOZZLE
Q.A. CATEGORY 1
RESIDUAL HEAT EXCHANGERS (RH-E-1A & 1B)
REVISIONS
1 TER 476 DRAWING NO. CHANGED FROM 8700-RI-RHE1 TO 8700-1S1-E-004A. UPDATED PER QA AUDIT NO. BV-C-88-02 AND LATEST PLANT DESIGN CHANGES. MICRO
2. TER 1841 CORRECTED WELD No. 3
3 TER 4852 LABELED 24" SHELL INLET & OUTLET; ADDED REF. DWGS.
REF. RM-38A F.P. 4.12-2C-3B 8700-4.010-0001 (V.T.1)
Duquesne Light Company
NUCLEAR GROUP
SHIPPINGPORT, PA.
DATE 7-30-84
DRAWN DTR
RESIDUAL HEAT REMOVAL-HEAT EXCHANGER
EL. 707'-6" REACTOR CONTAINMENT
DWG. NO. 8700-1S1-E-004A-3

Determination of Inservice Inspection Impracticality
in Accordance with 10 CFR 50.55a(g)(5)(iii)

1.0 ASME Code Components Affected

Safety Injection System Boron Injection Tank (BIT) nozzle welds SI-TK-2-N-3 (N-3) and SI-TK-2-N-4 (N-4) at Beaver Valley Power Station (BVPS) Unit No. 1

2.0 Applicable Code Addition and Addenda

American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI, 1989 Edition, no Addenda (third ten-year inservice inspection interval)

ASME Code Section XI, 2001 Edition, 2003 Addenda (fourth ten-year inservice inspection interval)

3.0 Applicable Code Requirements

The examination coverage requirements for welds N-3 and N-4 that are applicable during the fourth ten-year inservice inspection interval are the same as those applicable during the third ten-year inservice inspection interval. Table IWC-2500-1, "Examination Category C-B, Pressure Retaining Nozzle Welds in Vessels," Item Number C2.21 requires examination of welds in accordance with Figure No. IWC-2500-4, "Nozzle-To-Vessel Welds." Examination volume requirements specified in Figure No. IWC-2500-4(b) are applicable to nozzle welds N-3 and N-4.

ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," as an alternative approved for use by the NRC Staff, states that a reduction in examination coverage due to part geometry or interference by another component for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent (that is, greater than 90 percent coverage is obtained).

4.0 Impracticality of Compliance

The examination volume requirement specified in Figure IWC-2500-4(b) for the noted welds has been determined to be impractical to obtain during the third ten-year inservice inspection interval due to the configuration of the nozzle welds. The hemispherical heads of the Boron Injection Tank are 2.12" thick, A516, Gr 70 material

with A240, TP304L cladding. The nozzles are 5.375" thick, A541, Gr A350, LF2 material. The 0 degree weld examination angle was severely limited and one beam direction using the 45 degree angle was slightly limited.

Ultrasonic examination of nozzle welds N-3 and N-4 was limited during the third ten-year inservice inspection interval as noted in the following table. The limitations were due to the "set-in" nozzle weld design and the large external weld reinforcement shown in the drawing on Page 4. This design precludes examination from the nozzle surface or nozzle side of the weld.

Welds SI-TK-2-N-3 and -N4 Examination Coverage Details			
Exam Angle	Beam Direction	Percent Examined	Limitation - clarification
0	N/A	10	Configuration, weld reinforcement
45	1	80	Configuration - nozzle weld limits 45 degree approach
45	2	100	Second direction coverage attained using bounce from inside diameter
45	3	100	Configuration - coverage attained by skewing into weld
45	4	100	Configuration - coverage attained by skewing into weld
60	1	100	None
60	2	100	Second direction coverage attained using bounce from inside diameter
60	3	100	Configuration - coverage attained by skewing into weld
60	4	100	Configuration - coverage attained by skewing into weld
Cumulative Coverage:		87.78	

The required surface examinations performed on the nozzle welds were completed without limitation. The examinations found no recordable indications.

5.0 Burden Caused by Compliance

To obtain the specified examination volume would require re-design and replacement of the Boron Injection Tank nozzles. Replacement of components to obtain the required volume is contrary to the intent of the code. Therefore, this option is considered impractical.

6.0 Proposed Alternative and Basis for Use

As an alternative to the examination volume requirement specified in Figure IWC-2500-4(b) for welds SI-TK-2-N-3 and SI-TK-2-N-4, ultrasonic examination of welds SI-TK-2-N-3 and N-4 to the maximum extent practicable is proposed.

The majority of the limitation experienced during the third ten-year inservice inspection interval resulted from the 0 degree exam angle. The nozzle-to-head weld configuration imposes the greatest limitation on the straight beam (0 degree) scan for planar and laminar reflectors within the weld volume. The straight beam examination for laminar reflectors within the adjacent vessel head, which might affect the interpretation of angle beam results, was completed. Additionally, approximately 10 percent of the required examination volume was covered with the straight beam scans. The remaining 90 percent of the required examination volume cannot be examined with straight beam for planar or laminar reflectors.

The entire required examination volume was examined during the third ten-year inservice inspection interval in three scan directions with 60 degree angle beams and 80% of the required examination volume was examined in three scan directions with 45 degree angle beams.

The 45 degree and 60 degree angle beam shear wave examination techniques are more sensitive for the detection of planar flaws than the straight beam (0 degree) longitudinal wave technique. The straight beam wave is more likely to detect laminar flaws as defined within the ASME code. It is more likely that an inservice flaw would be planar in nature.

Nozzle welds N-3 and N-4 receive VT-2 examinations in accordance with Category C-H, which would detect through-wall leakage. The VT-2 and surface examinations, along with the UT examination coverage of 87 percent of the required volume, provide acceptable means to ensure the continued reliability of these welds.

7.0 Duration of the Relief Request and Proposed Alternative

The proposed alternative is requested for the fourth ten-year inservice inspection interval at BVPS Unit No. 1.

FENOC

Supplemental Report

Report No.: UT-06-1031

Page: 2 of 2

Summary No.: 588500

Examiner:	Buck, George L.	Level:	III	Reviewer:	N/A	Date:	
Examiner:	N/A	Level:	N/A	Site Review:	Heimel, Timothy C. L-III	Date:	3/2/2006
Other:	N/A	Level:	N/A	ANII Review:	[illegible]	Date:	3-4-06

Comments:

Coverage attained - 87.78% - calculated as follows:

Weld SI-TK-2-N-4 Examination Coverage Details

Exam Angle	Beam Direction	% Examined	Limitation - clarification
0	NA	10%	Configuration
45	1	80%	Configuration – nozzle weld limits 45 degree approach
45	2	100%	Second direction coverage attained using bounce from ID
45	3	100%	Configuration – coverage attained by skewing into weld
45	4	100%	Configuration – coverage attained by skewing into weld
60	1	100%	None
60	2	100%	Second direction coverage attained using bounce from ID
60	3	100%	Configuration – coverage attained by skewing into weld
60	4	100%	Configuration – coverage attained by skewing into weld
Cumulative Coverage		87.78%	

Class 2 nozzle is set-in design with large external reinforcement as shown on previous examination report UT-96-85. Examination from the nozzle side of the weld is not feasible. Coverage calcs by T. Heimel 3/2/06.