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August 23, 2019
L-19-106

10 CFR 50.55a

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 Boiler and Pressure Vessel Code Section XI Examination Requirements

Pursuant to 10 CFR 50.55a(g)(5)(iii), FirstEnergy Nuclear Operating Company (FENOC) hereby provides the Nuclear Regulatory Commission (NRC) with the basis for the determination that the inservice examination of the welds listed below, as specified by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, or as specified by the NRC approved Risk-Informed Inservice Inspection Program, have been determined to be impractical. These determinations are based on experience obtained during the Beaver Valley Power Station, Unit No. 1 fourth 10-year inservice inspection interval which began April 1, 2008 and ended August 28, 2018.

The affected welds are:

1. Safety injection boric acid tank nozzle-to-vessel weld SI-TK-2-N-3
2. Safety injection boric acid tank nozzle-to-vessel weld SI-TK-2-N-4
3. Steam generator nozzle-to-vessel weld RC-E-1A-N-9
4. Residual heat removal pipe segment to isolation valve weld RH-1-3-F-04
5. Residual heat removal pipe segment to isolation valve weld RH-1-3-F-05
6. Residual heat removal pump outlet to pipe reducer weld RH-4-1-F-01
7. Residual heat removal discharge valve to pipe reducer weld RH-4-1-F-02
8. Residual heat removal pump outlet to pipe weld RH-5-1-F-01
9. Residual heat removal discharge valve to pipe reducer weld RH-5-1-F-02
10. Refueling water storage tank flange to nozzle weld QS-9-1-F-01

Information to support the basis for the impracticality determinations is provided in enclosures A and B.

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Phil H. Lashley, Acting Manager - Nuclear Licensing and Regulatory Affairs, at 330-315-6808.

Sincerely,

Rod L. Penfield

Enclosures:
A. Beaver Valley Power Station, Unit No.1, 10 CFR 50.55a Request 1-TYP-4-C2.21-1, Revision 0
B. Beaver Valley Power Station, Unit No.1, 10 CFR 50.55a Request 1-TYP-4-RA-1, Revision 0

cc: NRC Region I Administrator
NRC Resident Inspector
NRC Project Manager
Director BRP/DEP
Site BRP/DEP Representative

L-19-106
Enclosure A

Beaver Valley Power Station, Unit No. 1
10 CFR 50.55a Request 1-TYP-4-C2.21-1, Revision 0

(11 pages follow)

Relief Request
in Accordance with 10 CFR 50.55a(g)(5)(iii)

--Inservice Inspection Impracticality--

1. ASME Code Component(s) Affected

There are a total of three Class 2, Category C-B, Item Number C2.21 nozzle to vessel welds affected on two vessels at Beaver Valley Power Station Unit No. 1 (BVPS-1).

- Safety Injection Boric Acid Tank Nozzle Weld SI-TK-2-N-3
- Safety Injection Boric Acid Tank Nozzle Weld SI-TK-2-N-4
- "A" Steam Generator Feedwater Inlet Nozzle to Vessel Weld RC-E-1A-N-09

2. Applicable Code Edition and Addenda

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda was applicable for the BVPS Unit 1 fourth interval.

3. Applicable Code Requirement

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(a), (b), or (d) "Nozzle-To-Vessel Welds."

Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," states, in part, that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction in coverage is less than 10 percent (%) (greater than 90% coverage is obtained).

4. Impracticality of Compliance

The examination volume requirement specified in Figure IWC-2500-4 for the affected components in Section 1 of this request has been determined to be impractical. For the steam generator feedwater inlet nozzle weld (RC-E-1A-N-09), the surface exam area has also been determined to be impractical.

When examined, the details of the weld joint design and obstructions by insulation support material prevented obtaining greater than 90% of the required examination volume (or area for the surface exam). Table 1 provides a summary of details for each weld and the cause of the limited exam volume or area. Additional component examination details are discussed after the table.

Table 1: Summary of Impractical Exams

Component / ASME Class / Configuration	Description / Material	Pipe Size – Exam Thickness (inches)	ASME Item Number and Figure	ASME Code Coverage Obtained (%)	Impracticality- Cause for limited examination volume or area.
SI-TK-2-N-3 / Class 2 / Nozzle to vessel weld	Safety injection boric acid tank / Vessel head- A516 GR 70 with A240 TP 304 cladding (carbon steel plate, rolled and with stainless cladding) Nozzle- SA 350 LF2 (carbon steel forging)	6 - 2.125	C2.21 IWC-2500-4 (b)	72.5 with Ultrasonic technique (UT)	Axial scan on the nozzle side of the weld is not possible and the weld geometry limits access for 0 and 45 degree scan angles.
SI-TK-2-N-4 / Class 2 / Nozzle to vessel weld	Safety injection boric acid tank / Vessel head- A516 GR 70 with A240 TP 304 cladding (carbon steel plate, rolled and with stainless cladding) Nozzle- SA 350 LF2 (carbon steel forging)	6 - 2.27	C2.21 IWC-2500-4 (b)	72.5 with UT	Axial scan on the nozzle side of the weld is not possible and the weld geometry limits access for 0 and 45 degree scan angles.
RC-E-1A-N-9 / Class 2 / Nozzle to vessel weld	Steam Generator / Vessel wall- SA 508 Cl 3 (carbon steel forging) Nozzle- SA 508 Cl 3a (carbon steel forging)	16 - 4.21	C2.21 IWC-2500-4 (a)	31.6 with UT 62.8 with magnetic particle technique (MT)	Axial scan on the nozzle side of the weld is not possible and insulation brackets obstruct some of the scan area for all angles and the surface exam.

Safety Injection Boric Acid Tank Nozzle Welds SI-TK-2-N-3 and SI-TK-2-N-4

SI-TK-2-N-3 and SI-TK-2-N-4 are shop welds joining the forged carbon steel nozzles to the top and bottom carbon steel hemispherical vessel heads of the safety injection boric acid tank. The inside of the vessel is clad in stainless steel. The nozzles are "set-in" design with large external reinforcement to achieve the design transition profile. This configuration is shown in ASME Section XI as Figure IWC-2500-4 (b). These nozzles have a nominal pipe size of six inches.

The limitation of examination volume was experienced when using the ultrasonic technique. Scans were performed with 0, 45, and 60-degree transducers. The 0 degree is a single scan and is not included in ASME code coverage calculations. For the 45 and 60-degree (shear wave) transducers, scans were performed in four directions. Two scans (scan 1 and 2) are perpendicular and two (scan 3 and 4) are near parallel to the weld bead direction. This results in a total of nine potential scans. Figure 1 shows the shear wave scan directions where exam coverage was possible. Figure 1 is a photo of SI-TK-2-N-4.

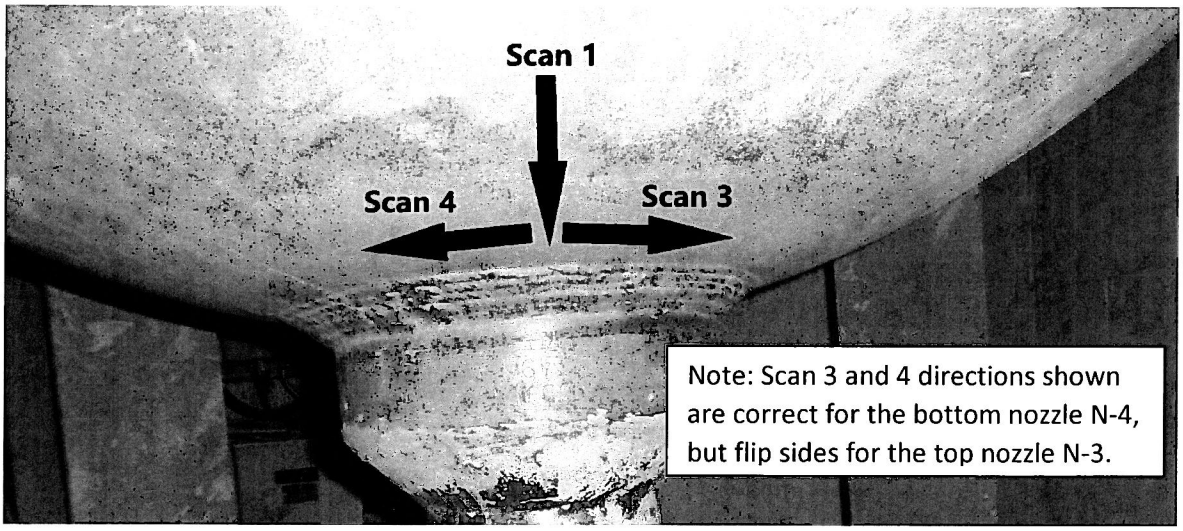

Figure 1: Ultrasonic Scan Directions.

For this weld, examination coverage was reduced due to the configuration of the nozzle weld. A cross section sketch of the weld joint is presented in Figure 2. Exams can only be performed from the vessel head side of the weld joint. This removes the ability to perform scan 2 for both the 45 and 60 degree transducers. The 0-degree (straight beam) exam was limited by the location of the weld over top of the desired exam coverage volume. Also, for the 45-degree scan 1, the approach towards the exam area is limited by the weld bead which reduces coverage on the far side of the exam area. This limitation is shown in Figure 2 as the triangle on the left side of the coverage area. Scanning with an additional angle would not have obtained additional coverage.

For weld SI-TK-2-N-4, the stainless cladding applied on the inside surface was of a smooth enough condition to interrogate the 45 and 60 degree scan 2 direction using the reflection on the inner surface of the vessel head (see Figure 3). This offers improved coverage and is not used for the ASME code coverage calculation. Notes from the NDE level 3 at the time indicate that this same consideration was evaluated during performance of the exam for the SI-TK-N-3 weld, but that the clad surface of that nozzle was not considered smooth enough for the additional coverage.

Ultrasonic examination coverage of SI-TK-2-N-3 is limited as noted in Table 2, and coverage of SI-TK-2-N-4 is limited as noted in Table 3. Note that additional coverage Note that the Total Coverage indicated in both tables represents additional coverage that is not included in ASME code coverage calculations. The required surface examination performed on both nozzle welds was completed without limitation. The volumetric and surface examinations found no recordable indications.

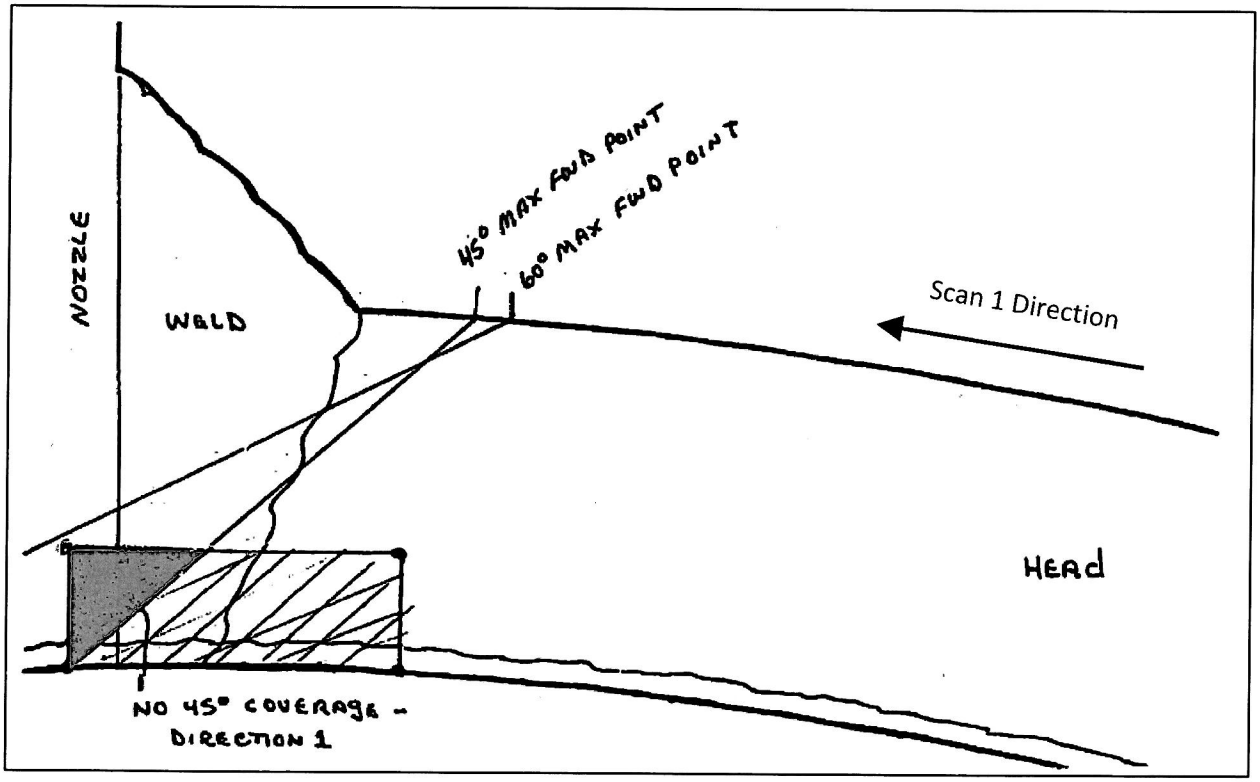

Figure 2: Sketch of weld configuration.

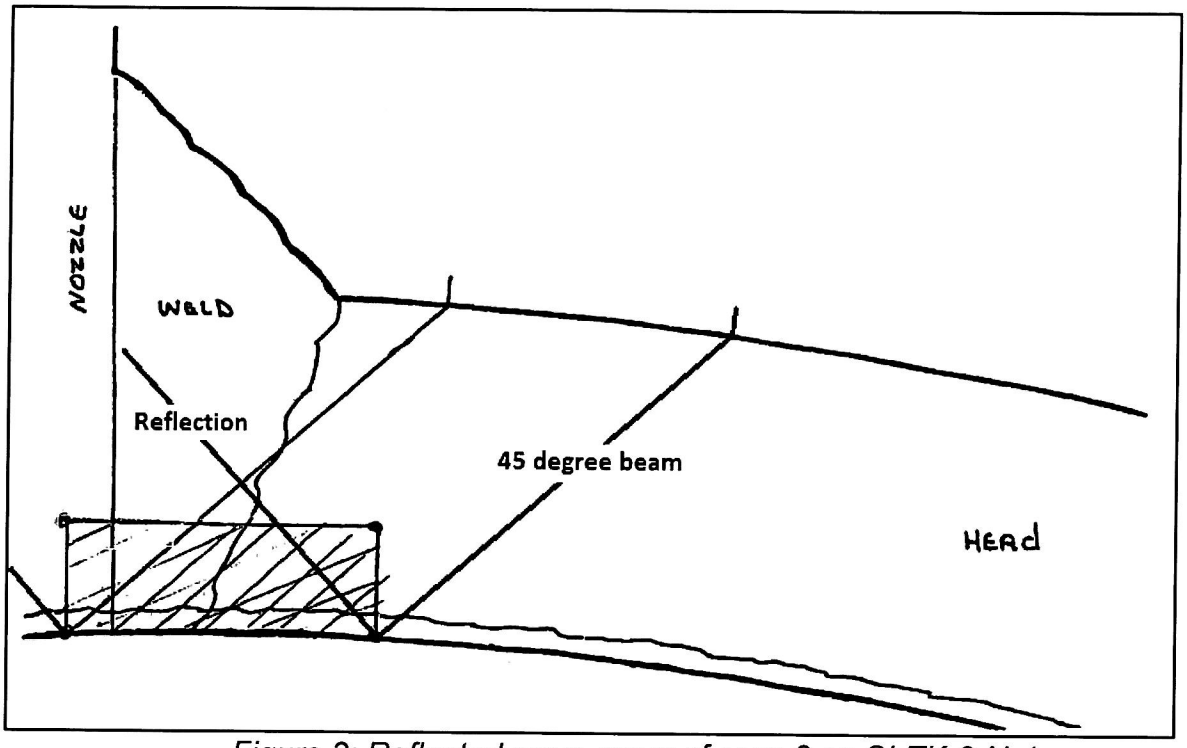

Figure 3: Reflected wave exam of scan 2 on SI-TK-2-N-4

Table 2: Weld SI-TK-2-N-3 Examination Coverage Details

Exam Angle (degrees)	Beam Direction	Code Coverage (%)	Limitation – clarification
0	N/A	10	Design and weld reinforcement interfere
45	1 (from head side)	80	Configuration - weld location limits approach
45	2 (from nozzle side)	0	Physical configuration prevents scan
45	3 (clockwise)	100	None
45	4 (counterclockwise)	100	None
60	1 (from head side)	100	None
60	2 (from nozzle side)	0	Physical configuration prevents scan
60	3 (clockwise)	100	None
60	4 (counterclockwise)	100	None
ASME Cumulative Coverage		72.5	The 0-degree scan is not included in code credited coverage calculations.

Table 3: Weld SI-TK-2-N-4 Examination Coverage Details

Exam Angle (degrees)	Beam Direction	Code Coverage (%)	Total Coverage (%)	Limitation – clarification
0	N/A	10		Design and weld reinforcement interfere
45	1 (from head side)	80	80	Configuration - weld location limits approach
45	2 (from nozzle side)	0	100	Coverage attained using bounce from inner diameter (ID)
45	3 (clockwise)	100	100	None
45	4 (counterclockwise)	100	100	None
60	1 (from head side)	100	100	None
60	2 (from nozzle side)	0	100	Coverage attained using bounce from ID
60	3 (clockwise)	100	100	None
60	4 (counterclockwise)	100	100	None
ASME Cumulative Coverage:		72.5		The 0 degree and reflected wave exams are not included in code credited coverage calculations.

"A" Steam Generator Feedwater Inlet Nozzle to Vessel Weld RC-E-1A-N-09

RC-E-1A-N-09 is a shop weld joining the forged carbon steel feedwater nozzle to the forged carbon steel "A" steam generator secondary side vessel wall. There is no cladding. This nozzle is a nominal pipe size of 16 inches. The nozzle transition is part of the nozzle with an attachment weld centerline diameter of 38 inches, and a material thickness of approximately 4.21 inches. This configuration is shown in ASME Section XI as Figure IWC-2500-4 (a).

The examination limitation was experienced during both the volumetric exam using the ultrasonic technique and the surface exam using the magnetic particle technique. For the volumetric exam, scans are performed with 0, 45, and 60-degree transducers. The 0 degree is a single scan and is not included in ASME code coverage calculations per FENOC procedure. For the 45 and 60 degree (shear wave) transducers, scans are performed in four directions. Two scans (scan 1 and 2) are perpendicular and two (scan 3 and 4) are near parallel to the weld bead direction. This results in a total of nine potential scans.

For the volumetric exam, the axial scan cannot be performed on the nozzle side of the weld due to the nozzle geometry. For the surface exam, a probe with adjustable spacing from 4 to 8 inches was used to maximize coverage. The exam is performed in at least two directions approximately 90 degrees from each other across the weld.

The exam coverage was limited for both surface and volumetric exams by a physical obstruction with nearby insulation supports. These supports are metal bands installed around the steam generator body. Figure 4 shows the nozzle and the angle iron supports above and below it. This obstruction impeded coverage at the top and the bottom of the weld for both the volumetric and surface exams. Due to the additional space needed with increasing examination angle in the ultrasonic technique, the

coverage obtained is greater at lesser exam transducer angles. Figure 5 shows the coverage area for each exam angle.

For the magnetic particle technique, Figure 6 shows the coverage area. See Table 4 for a summary of the coverage obtained by both exam methods.

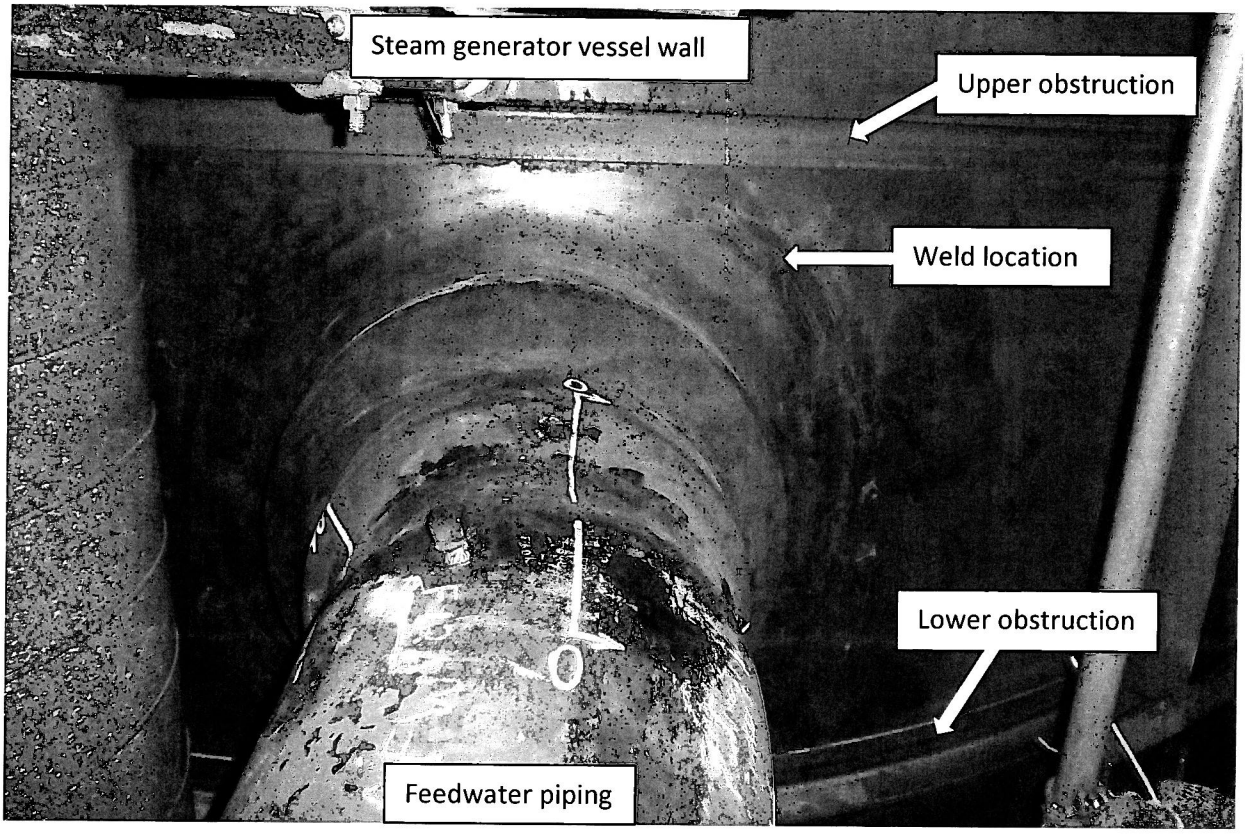

Figure 4: RC-E-1A-N-09 nozzle and obstructing angle iron supports.

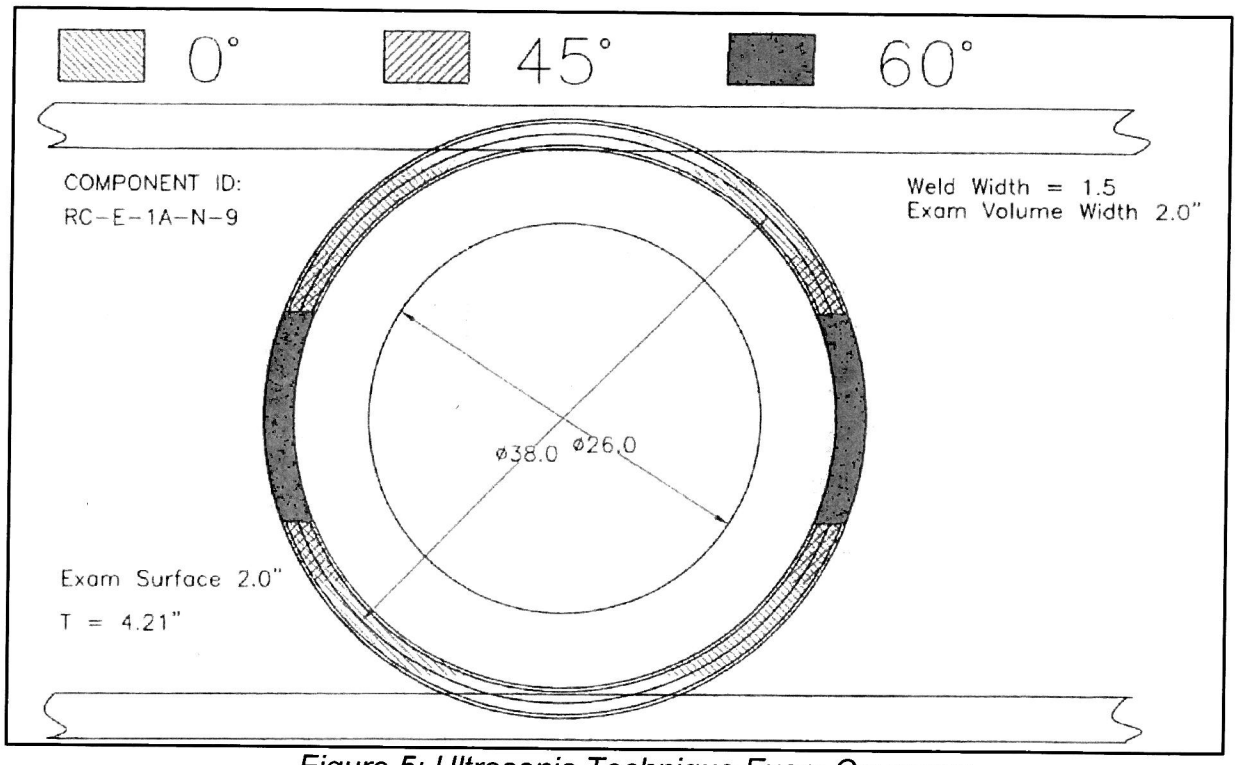

Figure 5: Ultrasonic Technique Exam Coverage

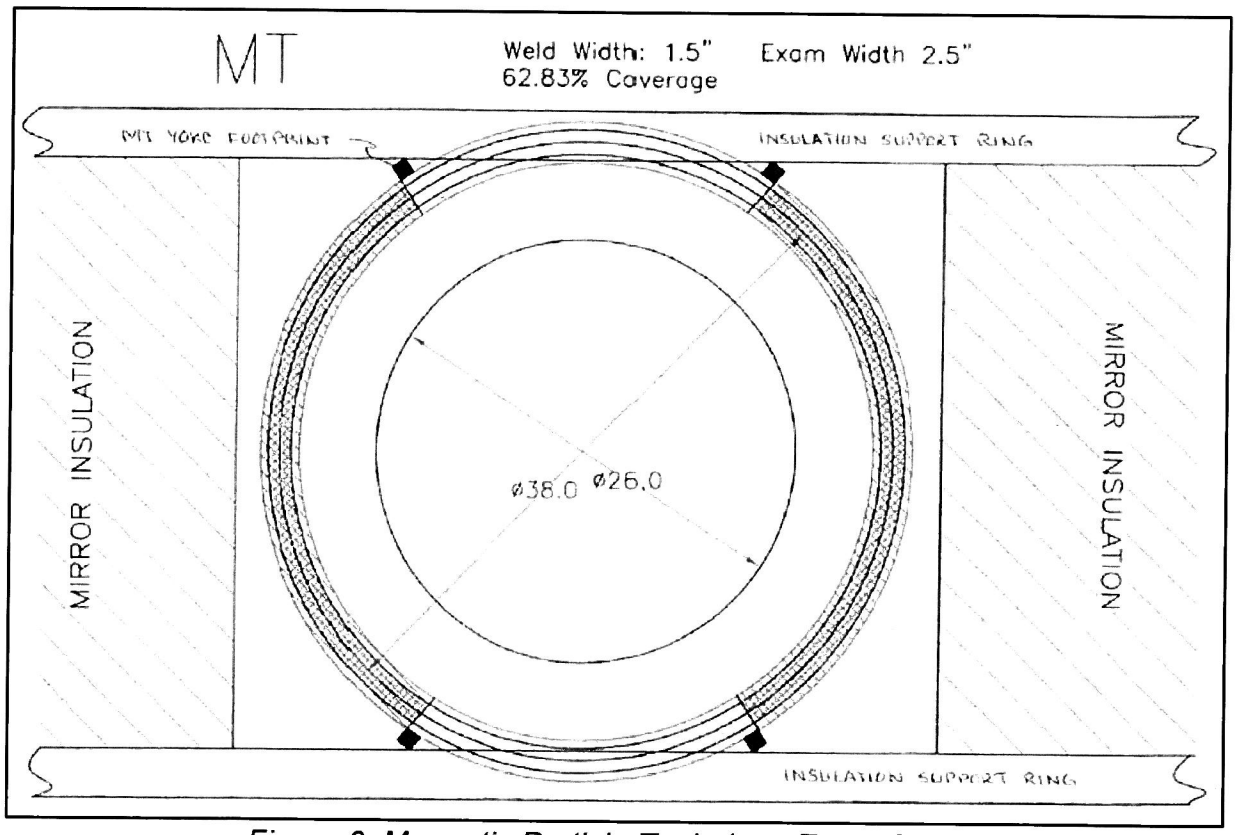

Figure 6: Magnetic Particle Technique Exam Coverage

Table 4: Volumetric Coverage Summary of RC-E-1A-N-9

Exam Angle (degrees)	Beam Direction	Code Examined (%)	Limitation – clarification
0	N/A	70.07	Obstruction
45	All	39.11	Geometry prevents one scan and obstruction
60	All	24.15	Geometry prevents one scan and obstruction
ASME Cumulative Coverage		31.63	The 0-degree scan is not included in code credited coverage calculations.

5. Burden Caused by Compliance

To obtain the specified volumetric examination volume would require redesign of the supports installed around the steam generator body and redesign of the safety injection boric acid tank nozzles. Replacement of components to obtain the required inspection volume is contrary to the intent of the code. Therefore, this option is considered impractical.

To remove the insulation bracket obstruction for the steam generator feedwater nozzle would require construction of extensive scaffolding followed by removal and storage of approximately 40 large insulation panels in a small space with limited storage capacity. Following this the installed bracketry would have to be removed for the exam with the potential for fitment issues upon replacement. This work would be required within the steam generator cubicle where radiological dose rates are elevated.

If fitment issues are not encountered, the estimated man hours in the field for scaffold and insulation work is 936 hours with approximately 6.68 REM of radiological dose. This is in addition to the time and exposure of the examiners. This work would provide additional coverage but still may not yield greater than 90% required for the volumetric exam. Discussion with insulators revealed a high likelihood that dose rates will increase due to adjustments needed during reinstallation of the band supports. It is likely that some insulation panels would have to be removed and reinstalled multiple times for fitment.

Removal of the insulation was considered during preparations for the exam, but due to the man hours and radiological dose needed to perform these actions the decision was made to obtain the best possible coverage with the bracketry in place. Therefore, this option is considered impractical.

6. ***Proposed Alternative and Basis for Use***

Safety Injection Boric Acid Tank Nozzle Welds SI-TK-2-N-3 and SI-TK-2-N-4

The proposed alternative to the examination volume requirement specified in Figure IWC-2500-4(b) is performing the ultrasonic examination to the maximum extent practicable and crediting leakage walkdowns.

Most of the code coverage limitation is the result of the axial scan from the nozzle side of the weld not being possible due to geometry. Also, a portion of the 45-degree axial scan volume was limited due to interference with the weld bead before reaching the entire coverage area. The area that could not be examined with the 45 degree axial scan was not ID connected. It is likely that an inservice flaw would be planar in nature and ID connected, which is likely to be detected by the exam volume covered. The entire required examination volume was examined in three scan directions with 60-degree angle beams and at least 80% of the required examination volume was examined in three scan directions with 45-degree angle beams. No recordable indications were found.

This tank is in the primary auxiliary building, which is accessible during operation. Per ASME code category C-H, a VT-2 exam for leakage is conducted at operating pressure once per period (40 months). The tank is also surveilled monthly during walkdowns by system engineering. Leakage resulting from degradation would be discovered within a reasonable amount of time.

The surface exam was performed using magnetic particle technique and did not have a coverage limitation. No indications were found.

The VT-2 and surface examinations, along with the UT examination coverage detailed above provide reasonable assurance of continued reliability of these welds. A review of previous examinations showed no history of indications within these welds. Condition monitoring already in place would detect a through wall leak within a reasonable amount of time.

Also, in the current fifth 10-year ISI interval a risk-informed process has been implemented using Code Case N-716-1, "Alternative Classification and Examination Requirements." These safety injection tank boric acid welds have been determined to be low safety significant and no longer require volumetric or surface examination.

"A" Steam Generator Feedwater Inlet Nozzle to Vessel Weld RC-E-1A-N-09

The proposed alternative to the examination volume requirement specified in Figure IWC-2500-4(a) is performing the ultrasonic and magnetic particle examinations to the maximum extent practicable, continuing leakage walkdowns, and monitoring for leakage in accordance with plant technical specifications. The UT examination covered 31.6 percent of the required volume, and the MT examination covered 62.8 percent of the

required area. No recordable indications were found for either the volumetric or surface exam areas achieved.

The steam generator is located in the primary containment building. Although not accessible for walkdowns during normal operation, leakage rates within containment are monitored and sources identified as part of compliance to plant technical specifications. Per ASME code category C-H, a VT-2 exam for leakage is conducted at operating pressure once per period (40 months), and any leakage would be noted during Class 1 pressure test walkdowns performed after each outage during startup. Leakage resulting from degradation would be discovered within a reasonable amount of time.

A review of previous operating experience for both Beaver Valley and the industry did not reveal a history of problems in the feedwater nozzle to shell weld of the steam generators.

The VT-2 and surface examinations, along with the UT examination coverage detailed above provide reasonable assurance of continued reliability of these welds. Condition monitoring already in place would detect a through-wall leak within a reasonable amount of time.

7. Duration of Proposed Alternative

The proposed alternative is requested for the fourth 10-year inservice inspection interval at BVPS-1, which began April 1, 2008 and ended August 28, 2018.

L-19-106
Enclosure B

Beaver Valley Power Station, Unit No. 1
10 CFR 50.55a Request 1-TYP-4-RA-1, Revision 0

(6 pages follow)

Relief Request
in Accordance with 10 CFR 50.55a(g)(5)(iii)

--Inservice Inspection Impracticality--

1. ASME Code Components Affected

Table 1 contains a listing of seven class 1 and 2, category R-A, item number R1.11 piping welds.

2. Applicable Code Edition and Addenda

The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda was applicable for the BVPS-1 fourth interval.

3. Applicable Code Requirement

The examination requirements for Class 1 and 2 piping welds at BVPS-1 for the fourth interval are from a risk-informed inservice inspection (RI-ISI) program approved by the NRC (Accession ML 110630403) and included as a reference to this document. The RI-ISI program was developed in accordance with WCAP-14572, Rev. 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report." Table 4.1-1 of WCAP-14572 assigns the Examination Category R-A, Item R1.11 to piping elements subject to thermal fatigue and requires examination of the required volume as described on Figure IWB-2500-8, "Similar and Dissimilar Metal Welds in Components, Nozzles, and Piping," for Class 1, and Figure IWC-2500-7 "Welds in Piping" for Class 2 circumferential piping welds. This program divided piping into segments and requires a complete volumetric exam on one weld within each high safety significant (HSS) segment. When an exam has limited exam coverage, the program requires examining other weld(s) in the segment if available.

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

4. Impracticality of Compliance

The examination volume requirement specified in Figure IWB-2500-8 and IWC-2500-7 for the noted welds has been determined to be impractical. When examined, these weld joints could not be axially scanned in one direction. Within these RI-ISI segments there were only pipe-to-component selections available, which contains geometry that prevents the component side axial scans. Per the RI-ISI program, when an examination yields a limited coverage volume, another weld in the segment is also examined if available. For three of the four segments in this relief request, another weld joint was available; however, it also yielded limited exam coverage. Table 1 provides a summary of details for each weld and the cause of the limited exam volume. Additional details on the RI-ISI segments are provided below.

Table 1: Summary of Impractical Exams

Component ID	ASME Class	Code Item Number	Risk Informed Segment	Configuration	Material	Pipe Size (inches) - Schedule	ASME Code Figure	ASME Code Coverage (%)	Best-Effort Coverage (%)	Impracticality
RH-1-3-F-04	1	R1.11	RH-002	Pipe to valve butt weld	Valve- ASTM-A-182 F304 (forged stainless steel) Pipe- A351 CF8M (cast stainless steel)	14-160	IWB-2500-8	50	80	Single-sided exam
RH-1-3-F-05	1	R1.11		Pipe to valve butt weld	Valve- ASTM-A-182 F304 (forged stainless steel) Pipe- A351 CF8M (cast stainless steel)	14-160	IWB-2500-8	50	50	Single-sided exam
RH-4-1-F-01	2	R1.11	RH-005	Pump outlet to pipe reducer butt weld	Pump volute- A351 CF8M (cast stainless steel) Reducer- A351 CF8M (cast stainless steel)	8-40S	IWC-2500-7(a)	50	80	Single-sided exam
RH-4-1-F-02	2	R1.11		Valve to pipe reducer butt weld	Valve- A351 CF8M (cast stainless steel) Reducer- A351 CF8M (cast stainless steel)	10-40S	IWC-2500-7(a)	50	80	Single-sided exam
RH-5-1-F-01	2	R1.11	RH-006	Pump outlet to pipe reducer butt weld	Pump volute- A351 CF8M (cast stainless steel) Reducer- A351 CF8M (cast stainless steel)	8-40S	IWC-2500-7(a)	50	80	Single-sided exam
RH-5-1-F-02	2	R1.11		Valve to pipe reducer butt weld	Valve- A351 CF8M (cast stainless steel) Reducer- A351 CF8M (cast stainless steel)	10-40S	IWC-2500-7(a)	50	80	Single-sided exam
QS-9-1-F-01	2	R1.11	QS-042	Pipe to Valve butt weld	Valve- A351 CF8 (cast stainless steel) Pipe- A351 CF8M (cast stainless steel)	6-10S	IWC-2500-7(a)	50	55	Single-sided exam

Risk-Informed Segment RH-002

RH-002 is a short, straight segment of 14-inch nominal schedule 160 ASME Class 1 piping that connects two valves. This segment is located in the Residual Heat Removal system between isolation valves before the pumps. The material is stainless steel with cast piping and forged valves. In this segment, the only eligible welds for examination were the pipe to valve welds at each end of the piping, RH-1-3-F-04 and RH-1-3-F-05. These welds are circumferential butt welds. Both welds were volumetrically examined using a procedure based on PDI-UT-2 and found to have limited exam coverage due to the valve body geometry preventing one axial scan. A refracted longitudinal (RL) wave exam was used as a supplemental axial scan to improve examination coverage.

The materials of construction reduce the code-credited coverage due to ultrasound attenuation. When the examiner determined that further coverage was obtained than what is qualified in the procedure, this is reported as total coverage in the table below.

Ultrasonic examination coverage of welds within segment RH-002 is limited as noted in Table 2. The volumetric examination coverage attained found no recordable indications.

Table 2: Segment RH-002 Examination Details.

Weld Number	Exam angles used	Qualified % Examined	Total % Examined	Exam notes
RH-1-3-F-04	45 and 45RL	50	80	Single sided exam.
RH-1-3-F-05	45, 60, and 60RL	50	50	Single sided exam.

1) The NDE report indicates that a 60-degree angle scan was also performed. Only one angle is used in coverage calculations.

Risk-Informed Segments RH-005 and RH-006

RH-005 and RH-006 are short segments each consisting of an 8-inch to 10-inch schedule 40S ASME Class 2 expander with a circumferential butt weld at each end. On the 8-inch end the expander is welded to the outlet of a residual heat removal pump and the 10-inch end is welded directly to a discharge check valve. The material of the expander, pump nozzle, and check valve is cast austenitic stainless steel. Due to the limitations of exam coverage, both segments examined the weld at each end of the expander for a total of four exams in two segments. No further weld locations were available to examine.

Both welds were volumetrically examined using a procedure based on PDI-UT-2 and found to have limited exam coverage due to the component geometry preventing one axial scan. Additionally, a 70-degree shear wave angle was used as a supplemental axial scan to improve the best-effort examination coverage.

The materials of construction further reduce the possible code-credited coverage due to ultrasound attenuation. However, the examiner determined that further coverage was

obtained than what is qualified in the procedure; this coverage was reported as total coverage in Tables 3 and 4.

Ultrasonic examination coverage of both welds within segments RH-005 and RH-006 is limited as noted in Tables 3 and 4. The volumetric examination coverage attained found no recordable indications.

Table 3: Segment RH-005 Examination Details.

Weld Number	Exam angles used	Qualified % Examined	Total % Examined	Exam notes
RH-4-1-F-01	45 and 70	50	80	Single sided exam.
RH-4-1-F-02	45 and 70	50	80	Single sided exam.

Table 4: Segment RH-006 Examination Details.

Weld Number	Exam angles used	Qualified % Examined	Total % Examined	Exam notes
RH-5-1-F-01	45 and 70	50	80	Single sided exam.
RH-5-1-F-02	45 and 70	50	80	Single sided exam.

Risk Informed Segment QS-042

QS-042 is a short segment connecting a valve to the refueling water storage tank. This segment consists of a single circumferential butt weld joining a weld neck flange to the tank nozzle. The nominal pipe size for this connection is 6 inch, schedule 10S. The material of the nozzle and weld neck flange are cast austenitic stainless steel. There is only one weld in this segment; therefore, no additional weld locations were available to examine.

This weld was volumetrically examined using a FENOC procedure based on PDI-UT-2 and found to have limited exam coverage. The physical configuration of the weld neck flange prohibits any ultrasonic coverage from the flange side of the weld. This prevents one axial scan. Additionally, a 70-degree shear wave angle was used as a supplemental axial scan to improve the examination coverage.

The materials of construction further reduce the possible code-credited coverage due to ultrasound attenuation. However, the examiner determined that further coverage was obtained than what is qualified in the procedure; this coverage was reported as total coverage in Table 5.

Ultrasonic examination coverage of QS-9-1-F-01 within segment QS-042 is limited as noted in Table 5. The volumetric examination coverage attained found no recordable indications.

Table 5: Segment QS-042 Examination Details.

Weld Number	Exam angles used	Qualified % Examined	Total % Examined	Exam notes
QS-9-1-F-01	45, 60, and 70	50	55	Single sided exam.

5. Burden Caused by Compliance

To obtain the specified volumetric examination volume would require redesign and replacement of the piping segments and components in Section 1 of this request. Replacement of components to obtain the required inspection volume is contrary to the intent of the code. Therefore, this option is considered impractical.

6. Proposed Alternative and Basis for Use

The proposed alternative is performing the ultrasonic examination to the maximum extent practicable. This, along with monitoring for leakage via the VT-2 examinations and engineering walkdowns provides acceptable means to ensure the continued reliability of these piping segments and prompt identification of problems.

The FENOC RI-ISI program requires complete volumetric examination coverage of one weld within each HSS segment listed in Table 1. The postulated damage mechanism for these segments was thermal fatigue. For each of these segments there were no welds to select that would not result in a single sided axial exam, and its associated coverage limitations. After examination resulted in limited coverage area for the selected welds, the additional welds available were also examined and resulted in limited coverage. As a result, seven limited coverage exams were performed in an attempt to fully examine one weld in each of the four segments. For all seven exams, no recordable indications were found.

Segment QS-042 is located on the refueling water storage tank, which is accessible during normal operation. Segments RH-002, RH-005, and RH-006 are located inside the reactor containment building and accessible during outages. Per ASME code category C-H, Class 2 segments receive a VT-2 exam for leakage at operating pressure once per period (40 months). Per ASME code category B-P, Class 1 segments receive a VT-2 exam for leakage at operating pressure each outage during startup. The refueling water storage tank is also surveilled during walkdowns by system engineering. For the segments in containment, leakage rates within containment are monitored and sources identified as part of compliance to plant technical specifications. Also, for the Class 2 segments in containment, any leakage would be noted during Class 1 pressure test walkdowns performed after each outage during startup. Therefore, leakage resulting from degradation would be discovered within a reasonable amount of time.

Therefore, in accordance with 10 CFR 50.55a(g)(5)(iii), FENOC has determined that the required examination coverage for these welds is impractical and requests that the proposed examinations be considered an acceptable alternative to the examination coverage requirement.

7. Duration of Proposed Alternative

The proposed alternative is requested for the fourth 10-year inservice inspection interval at BVPS-1, which began April 1, 2008 and ended August 28, 2018.

8. References

NRC letter dated March 23, 2011, *Beaver Valley Power Station, Unit Nos. 1 and 2 – Relief Request RI-ISI-1 and RI-ISI-2 Regarding the Fourth and Third Risk-Informed Inservice Inspection Intervals (TAC Nos. ME4104 and ME4105),* (ML110630403)