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Energy to Serve Your World™

April 24, 2009

Docket Nos.: 50-348
50-364

NL-09-0587

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

Joseph M. Farley Nuclear Plant – Units 1 and 2
Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval
(TAC Nos. MB9742 through MC9751)

Ladies and Gentlemen:

In letter dated September 22, 2008, Southern Nuclear Company (SNC) submitted the Unit 1 and Unit 2 Proposed Relief Requests for the Third ISI Interval for NRC review and approval.

On January 29, 2009, a NRC Request for Additional Information (RAI) was received regarding the proposed relief requests. The SNC response to the requested information is provided in the Enclosure.

Additionally, included in the SNC response to RAI 2.5 is a revision to weld ALA1-1100-1 information contained in the original submittal dated September 22, 2008.

This letter contains no NRC commitments.

If you have any questions, please advise.

Sincerely,

A handwritten signature in black ink that reads "Mark J. Ajluni". The signature is written in a cursive, flowing style.

M. J. Ajluni
Manager, Nuclear Licensing

MJA/JLS/daj

U. S. Nuclear Regulatory Commission
NL-09-0587
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Enclosure: Response to Request for Additional Information Regarding Proposed
Relief Requests for the Third ISI Interval

cc: Southern Nuclear Operating Company

Mr. J. T. Gasser, Executive Vice President
Mr. J. R. Johnson, Vice President – Farley
Ms. P. M. Marino, Vice President – Engineering
RTYPE: CFA04.054

U. S. Nuclear Regulatory Commission

Mr. L. A. Reyes, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Farley
Mr. E. L. Crowe, Senior Resident Inspector – Farley

Joseph M. Farley Nuclear Plant – Units 1 and 2

Enclosure

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**

Response to Request for Additional Information Regarding Proposed Relief Requests for the Third ISI Interval

2.1 RR-62, RR-64, RR-65, RR-66, RR-67, R-68 and RR-69, Piping Weld Examinations, on FNP, Unit 1; and RR-61, and RR-62 on FNP Unit 2

NRC RAI

State whether any outside diameter surface feature, such as weld crown, diametrical weld shrinkage, or surface roughness conditions caused limited volumetric coverage during the subject piping weld examinations. Discuss the efforts that were used to correct these conditions in order to maximize coverage.

SNC Response

Outside diameter surface features previously caused limited volumetric coverage of the FNP-1 pressurizer dissimilar metal welds; however, they have now been overlaid. For FNP-2, the surge nozzle has been overlaid and the remainder of the pressurizer welds are scheduled to be overlaid in 2010. The RPV dissimilar metal welds were examined from the inside surface during the third Interval; therefore, outside diameter surface features did not apply. The Alloy 690 steam generator nozzle welds cannot be fully examined; however, outside diameter surface features did not appreciably limit the coverage (see Figures 1 and 2 of the response for RAI 2.4).

For austenitic or ferritic welds examined prior to the implementation of Appendix VIII, Supplements 2 and 3, there were no industry requirements regarding outside diameter surface features. However, for those welds examined after the implementation of Appendix VIII, the following outside diameter surface feature requirements shown in Section 5.4 of Performance Demonstration Initiative (PDI) generic procedure PDI-UT-2 were met.

The weld crown condition may be either mechanically conditioned or examined in the "as-welded" condition provided the "as-welded" crown width is not excessive.

Excessive "as-welded" crown width is defined as when the weld crown width is greater than 3 times the nominal material thickness or when the weld crown condition prohibits adequate volumetric coverage from the base material surface in either the axial or circumferential scanning directions (e.g., weld repair sites, excessive or offset weld width or reinforcement on one side of the weld).

Additionally, 10 CFR 50.55a(b)(2)(xv)(A)(2) requires that when examination from both sides is not possible on austenitic welds, full coverage from a single side may be claimed only after completing a successful single-sided Appendix VIII demonstration using flaws on the opposite side of the weld. Since the industry has not qualified single-sided examinations, SNC does not claim Code coverage on the far side of the weld. Therefore, the maximum Code coverage is 50%.

As shown in the attached figures for the SNC responses to NRC RAI questions 2.2 and 2.8, limitations were primarily due to the configuration (pipe to valve or pipe to flange configurations). While, in a few cases, surface conditioning may have improved the ability to scan over a weld, Code coverage would not have increased because of the 10 CFR 50.55a(b)(2)(xv)(A)(2) requirements stated above. Therefore, surface conditioning was not performed. Until a successful single-sided Appendix VIII demonstration, using flaws on the opposite side of the

Response to Request for Additional Information Regarding Proposed Relief Requests for the Third ISI Interval

weld has been performed by the industry, no other actions are currently considered as a practical means to appreciably increase the Code coverage for the relief requests listed above.

2.2 RR-62. (FNP, Unit 1) ASME Code, Section XI, Examination Category R-A, Risk-Informed Piping Examinations

NRC RAI

The licensee has requested relief from the 100 percent ASME Code volumetric examination requirements for piping Weld ALA2-4540-32-RI, as defined by the FNP Unit 1, Risk-Informed Inservice Inspection Program. The basis for the RR is that 100 percent of the ASME Code-required inspection volume cannot be obtained because of component configuration and access restrictions.

The licensee's submittal states that the subject weld root area was interrogated with both 45 and 70-degree shear waves (S-waves) looking for circumferential cracking. The licensee's submittal further states that examinations were performed after the implementation of Appendix VIII (performance demonstration), and consisted of single-sided examinations from the pipe side of the weld.

Confirm that subject Weld ALA2-4540-32-RI was examined only using 45 and 70-degree S-wave techniques. If only S-wave techniques were used to examine the stainless steel weld, please explain why longitudinal wave (L-wave) examination techniques were not used as part of a best effort examination. The L-wave method has been shown capable of detecting planar (DP) inside diameter surface-breaking flaws on the far-side of wrought stainless steel welds. Recent studies recommend the use of both S-waves and L-waves to obtain the best detection results, with minimum false calls, in austenitic welds.

It is noted that for RR-64, the licensee used both a 45-degree S-wave and a 60-degree refracted L-wave looking for circumferential cracking. RR-64 covers welds with similar access constraints. It is also noted that the licensee uses RR-50 (in a previous submittal) as a precedent for this RR. However, a review of RR-50 shows that both S-wave and L-wave techniques were used in the examination of the welds.

SNC Response

Weld ALA2-4540-32-RI was examined with a 0.25-inch diameter, 45-degree shear wave, 2.25 MHz transducer. An additional 0.25-inch diameter, 70-degree shear wave, 2.25 MHz transducer was used to examine the weld. All procedure requirements were met, with a maximum of 50% Code coverage claimed, since it was a single-sided examination. Figure 1 of NRC RAI 2.2 shows the limitations for weld ALA2-4540-32-RI.

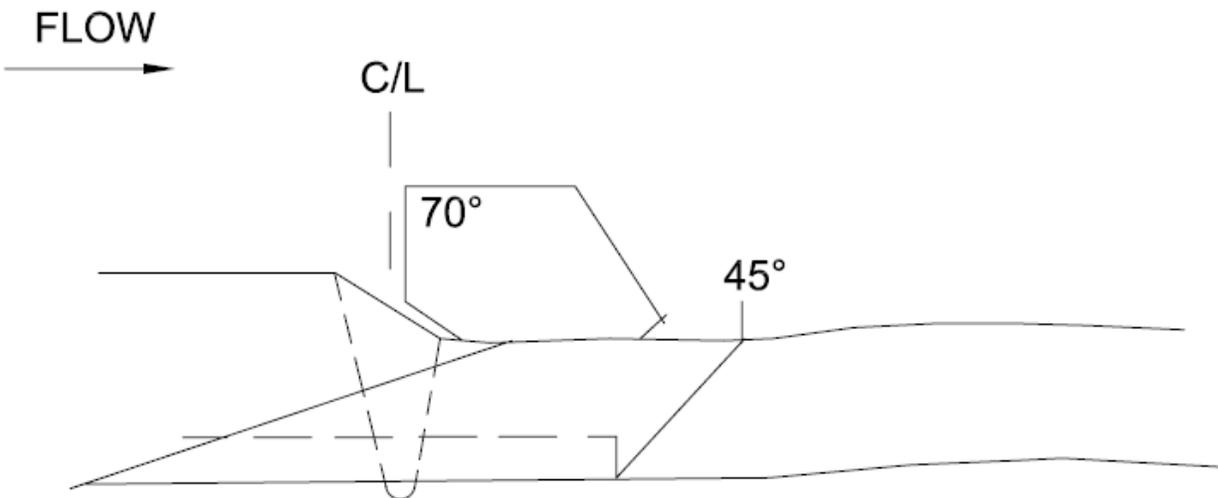
The reason for not using the L-Wave technique for weld ALA2-4540-32-RI is because it is an austenitic weld with a nominal wall thickness of 0.46-inch. The procedure used to examine wrought austenitic piping weld configurations after the implementation of Appendix VIII was the SNC Supplement 2 procedure that utilized generic procedure PDI-UT-2. PDI-UT-2 requires that, when accessibility is limited to a single side in materials with a nominal wall thickness equal to or less than 0.50-inch thick, a 2.25 MHz, 70-degree shear wave search unit shall be used for the detection and length sizing of flaws on the far side of the weld. When the material

Response to Request for Additional Information Regarding Proposed Relief Requests for the Third ISI Interval

is greater than 0.50-inch thick, a longitudinal wave search unit that provides adequate coverage on the far side of the weld shall be used for the detection and length sizing of flaws.

Any apparent inconsistencies in the use of shear wave and longitudinal search units between relief requests identified in the RAI can be summarized as follows.

- Prior to the implementation of Supplement 2, examinations were primarily performed using 45-degree and 60-degree shear waves.
- After the implementation of Supplement 2, those welds limited to single-sided access that are equal to or less than 0.50-inch thick were examined using 45-degree and 70-degree shear waves.
- After the implementation of Supplement 2, those welds limited to single-sided access that are greater than 0.50-inch thick were examined using 45-degree shear waves and a longitudinal wave search unit that provides adequate coverage on the far side of the weld.



50% Coverage achieved based on one-sided access

Weld No. ALA2-4540-32-RI
Figure 1 (RAI 2.2)

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**

2.3 RR-62 and RR-65 (FNP Unit 1), and RR-61 and RR-62 (FNP Unit 2), Examination Category R-A, Risk-Informed Piping Examinations

NRC RAI

Please indicate the risk informed ISI Item Number for each of the welds in these requests. For example, Examination Category R-A, Item R1.16, *Elements Subject to Inter-granular Stress Corrosion Cracking, Full Penetration Piping Welds*.

SNC Response

The requested Item Numbers are provided in the table below.

Relief Request	Weld Number	Risk-Informed Category	Risk-Informed Item Number
RR-62 (Unit 1)	ALA2-4540-32-RI	R-A	R1.11
RR-65 (Unit 1)	ALA1-4300-26RDM-R1	R-A	R1.15
	ALA1-4300-27RDM-R1	R-A	R1.15
RR-61 (Unit 2)	APR2-4103-2-RI	R-A	R1.11
	APR2-4103-5-RI	R-A	R1.11
	APR2-4202-4-RI	R-A	R1.11
	APR2-4202-6-RI	R-A	R1.11
	APR2-4302-2-RI	R-A	R1.11
	APR2-4302-6-RI	R-A	R1.11
	APR2-4302-7-RI	R-A	R1.11
	APR2-4302-10-RI	R-A	R1.11
	APR2-4101-31-RI	R-A	R1.11
	APR2-4101-32-RI	R-A	R1.11
	APR2-4101-33-RI	R-A	R1.11
	APR2-4201-23BC-RI	R-A	R1.11
	APR2-4201-30-RI	R-A	R1.11
RR-62 (Unit 2)	APR2-4503-23-RI	R-A	R1.11
	APR2-4503-34-RI	R-A	R1.11
	APR2-4509A-33-RI	R-A	R1.11
	APR2-4509A-36-RI	R-A	R1.11
	APR2-4511-2-RI	R-A	R1.11

Response to Request for Additional Information Regarding Proposed Relief Requests for the Third ISI Interval

2.4 RR-65 (FNP, Unit 1) Examination Category R-A, Risk-Informed Dissimilar Metal Weld Piping Examinations

NRC RAI

RR-65 applies to primary system safe-end-to-nozzle dissimilar metal welds ALA1-4300-26ROM-RI [*sic*], and ALA1-4300-27ROM-RI [*sic*] on a steam generator at FNP Unit 1. The NRC staff notes that Supplement 10 demonstrations are single-side (from the safe end) access qualifications. It is unclear why the licensee cannot examine the full ASME Code volume by using multiple ultrasonic techniques from the safe end side of these welds.

Please describe the ultrasonic inspection techniques that were used to examine the subject dissimilar metal welds and confirm that all of these techniques were demonstrated during qualification to Supplement 10 of the ASME Code, Section XI, Appendix VIII. Include discussion as to whether site-specific demonstrations occurred, and provide any technical justifications or reports resulting from this site-specific activity

The sketches provided with RR-65 do not illustrate the amount of weld that was inspected or what inspection angle(s) were used during the ultrasonic examination. Please submit information in the form of sketches or technical descriptions that illustrate the inspection techniques (scan angles) and the amount of ASME Code coverage that was obtained by each of the techniques (scan angles) applied.

Discuss whether the use of advanced ultrasonic techniques such as phased array might significantly increase coverage for the subject welds.

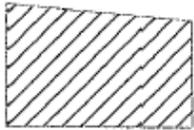
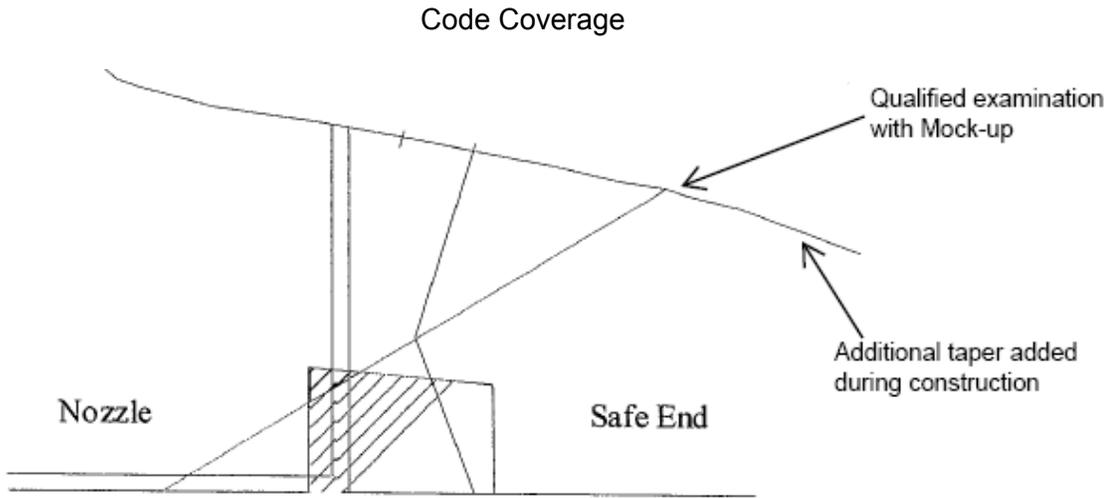
SNC Response

SNC worked with EPRI to develop Report number IR-2007-270, titled, "Technical Justification for the Acceptance of Ultrasonic Examination Demonstration Results on SNOC Farley Steam Generator Dissimilar Metal Weld Mockup." Pertinent pages of this report are included in the RAI response to address the NRC request. Generic procedure PDI-UT-10 was utilized for these examinations including the fabrication of specialized transducers. In March 2007, SNC qualified alternate angles (34-degree RL and 45-degree RL) for these examinations using the mock-up which was fabricated with an external taper of 11-degrees. The demonstration was witnessed by an ANII. During the installation of the steam generators, an additional second taper (in addition to the 11-degree taper) was made. This second taper caused some limitations during the examinations.

See Figure 1 of NRC RAI 2.4 to determine the amount of weld that was examined for weld ALA1-4300-26RDM and see Figure 2 of NRC RAI 2.4 to determine the amount of weld that was examined for weld ALA1-4300-27RDM.

SNC continues to evaluate the use of advanced UT techniques (e.g., phased array automated examinations) for these welds due to the multi-tapered surface. Another utility and a vendor are utilizing phased array to try to increase coverage on this type of configuration during the spring 2009 outage season. SNC will perform a detailed evaluation of the Farley configuration if this work is successful. Note: Some limitations may still exist due to the tapered surfaces.

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**



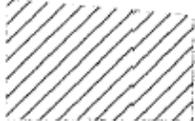
3.63 square inches required for complete coverage



1.90 square inches achieved with 34 degree exam angle- 52%



.16 square inches achieved with 45 degree exam angle- 4.4%

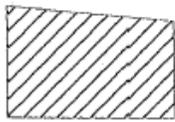
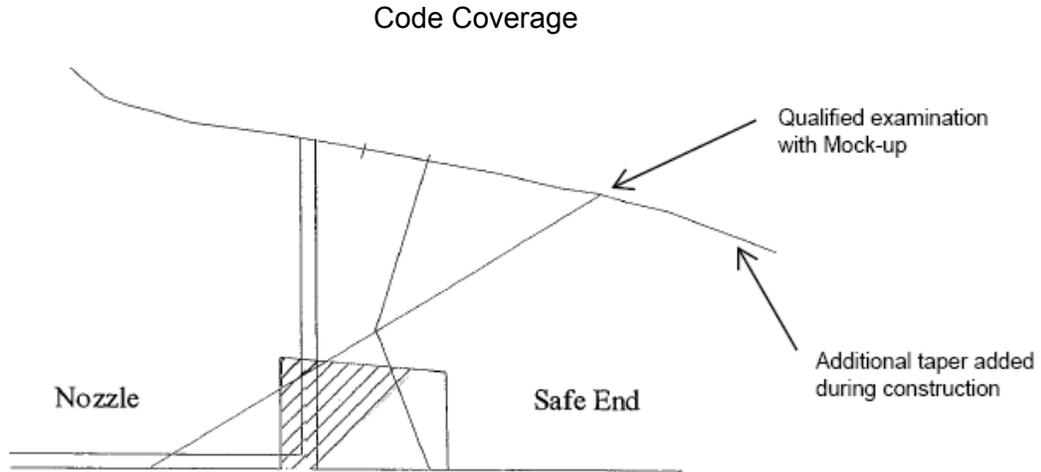


3.63 square inches achieved in the circumferential scan directions- all exam angles 100%

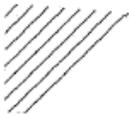
Total coverage obtained = 52.1%

Weld ALA1-4300-26RDM-RI
Figure 1 (RAI 2.4)

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Proposed Relief Requests for the Third ISI Interval**



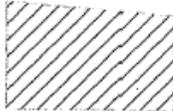
3.63 square inches required for complete coverage



1.90 square inches achieved with 34 degree exam angle- 52%



.16 square inches achieved with 45 degree exam angle- 4.4%



3.63 square inches achieved in the
circumferential scan directions- all exam angles 100%

Total coverage obtained = 52.1%

Weld ALA1-4300-27RDM-RI
Figure 2 (RAI 2.4)

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**



**Technical Justification for the Acceptance of
Ultrasonic Examination Demonstration Results on
SNOC Farley Steam Generator Dissimilar Metal Weld
Mockup**

IR-2007-270



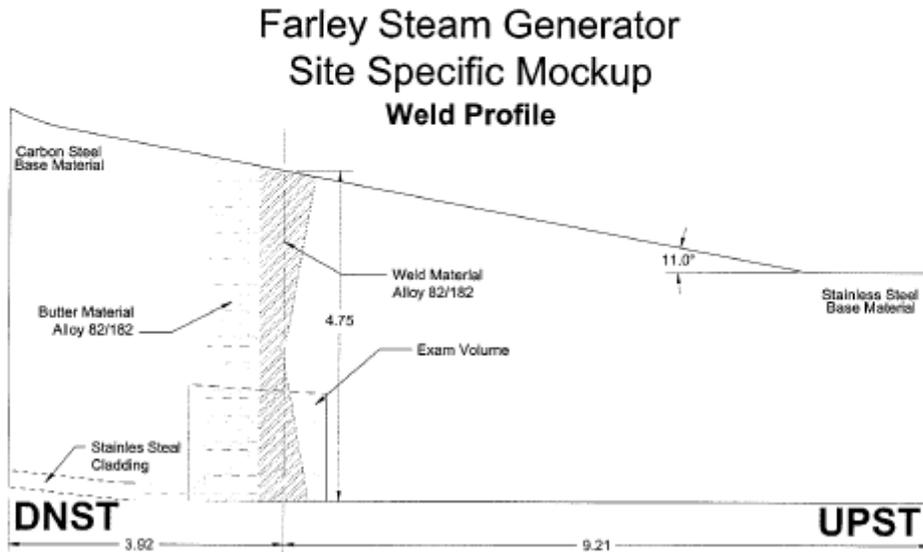
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Export Control Agreement
on the back cover.**

(RAI 2.4)

Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval

3 COMPONENT REQUIRING PROCEDURE MODIFICATION

This technical justification (TJ) is applicable to the first weld off of the vessel inlet and outlet nozzles of the steam generator. The materials and DMW configuration for the manufactured mockup is as indicated in Figure 3-1. This TJ was written and the search units were designed with the assumption that the conditions illustrated below are representative of the actual in-service components. The direction of flow indicated in Figure 3-1 may differ than that of the actual field installed component. All scan direction references in this report are based on the mockup and not the actual component.



**Figure 3-1
Weld Profile of the Farley Steam Generator Mockup**

(RAI 2.4)

Response to Request for Additional Information Regarding Proposed Relief Requests for the Third ISI Interval

4

BASIS OF EXPANSION

The PDI DMW qualification program does not contain samples in the thickness range that address the specific weld configuration associated with the Farley replacement steam generator inlet and outlet nozzles. Furthermore, the 11° taper of the nozzle and safe-end (see Figure 3-1) necessitates an adjustment to the refracted examination angles to create acceptable ID impingement angles. Additionally, the use of these optimized angles will improve coverage of the required examination volume. Adjustments made to the qualified ultrasonic procedure include replacing the refracted longitudinal (RL) and shear wave (SW) search units with search units designed to compensate for the component geometry. The search units were designed to maximize the coverage while maintaining an adequate, yet reasonable, number of search units.

Steam Generator Inlet and Outlet Configuration

Due to 11° taper of the nozzle, weld, and safe-end on the component, the 45° RL and 60° RL axial examinations were performed with a 34° RL and a 45° RL (both designed to scan from the tapered surface toward the nozzle) search units, which created inside surface impingement angles of approximately 45° and 56° respectively. Circumferentially contoured 40° RL search units were used to compensate for the curvature of the component and were designed to maintain a 47.5° to 48.4° impingement angle on the inside surface of the component throughout the entire examination volume. The elements within the circumferential search units were adjusted such that the ultrasonic beam would propagate in a plane normal to the inside surface (steered underneath the search units), compensating for the outside 11° taper for both the clockwise and counterclockwise scanning directions.

(RAI 2.4)

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**

5

REQUIRED DEVIATIONS TO THE QUALIFIED TECHNIQUES DEFINED IN PDI-UT-10

Table 5-1 below details the procedure deviations required to adjust for the unique configuration of Farley’s steam generator inlet and outlet nozzle-to-safe-end components. Only areas within the procedure that require modification are listed in Table 5-1. The primary reasons for the deviations are due to the unique geometric configurations including the thickness and taper, which required adjustment to the primary examination angles. Additional adjustments were made to the search units designed for circumferential scanning in order to adjust for the tapered examination surface.

Table 5-1 Table of Deviations

Procedure Paragraph	Deviations	Alternative Techniques/Comments
6.6.2 b&c	For circumferential scans, an alternate angle was chosen in support of “the examination of complex geometries.”	A 40° RL replaced the 45° RL to optimize initial flaw detection. The resultant inside surface impingement angle ranged from 47.5° to 48.4° due to the varying outside diameter caused by the nozzle taper.
6.6.3	Because of the 11° taper, the angles of the transducers used in the axial examinations were altered to produce more desirable angles at the ID of the component. The taper also caused the need for roof angle corrected tandem circumferential search units.	The 45° and 60° RL axial examinations were performed with 34° RL and a 45° RL search units, which created inside surface impingement angles of 45° and 56° respectively. Additionally the 45° circumferential scan was altered to allow for an improved impingement angle on the ID of the component.

The circumferential flaw lengths reported by UT compared to the physical measurements yielded length deviations in excess of one inch. Several tests were conducted in an effort to identify the cause(s) of the length sizing issues, but all results were inconclusive. Because the cause of this discrepancy could not be identified, the examiner shall not deviate from the length sizing instructions in PDI-UT-10. Section 9 explains in detail the steps taken to resolve the length sizing issues associated with this mockup.

(RAI 2.4)

Response to Request for Additional Information Regarding Proposed Relief Requests for the Third ISI Interval

7

ASSESSMENT OF COVERAGE

Figures below depict the expected examination volume coverage obtained using the techniques in this document. The extent of scanning is limited by the search unit size and the close proximity of the nozzle taper. Axial scans in the looking downstream direction were performed from the base material on the safe-end side and extended across the weld and onto the nozzle. No physical limitations were noted with the exception of the small amount of downstream access. Obtainable coverage will vary based on each of the in-service components' unique contour. All coverage plots were created with the assumption that the component shown represents the worst-case scenario of the in-service components. See Examination Limitations in Section 11 of this report for ASME code exam volume coverage details for the Farley steam generator mockup.

Farley Steam Generator Site Specific Mockup Ultrasonic Beam Plot

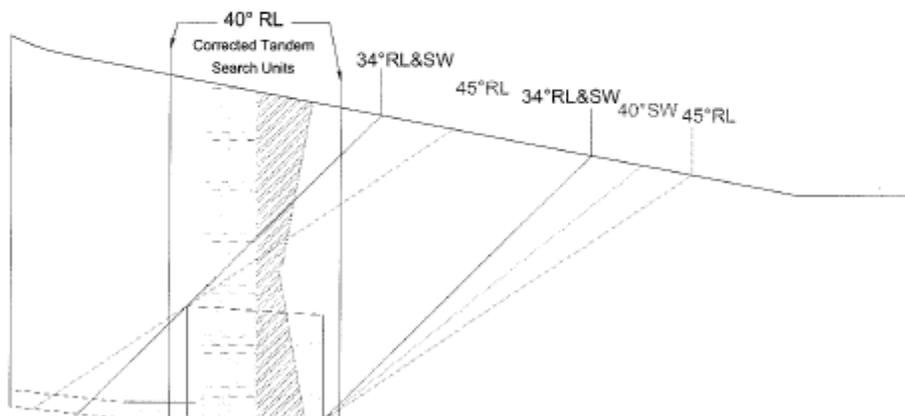


Figure 7-1
Farley Steam Generator Mockup - Ultrasonic Beam Plot

In Figure 7-2, the heavy red (bold) line indicates where both of the axial search units have passed through the ASME code examination volume. The focusing requirements of the procedure must be considered when calculating the coverage obtained on in-service components. In the case of the steam generator mockup, both axial transducers are within the acceptable focusing range across the entire exam volume.

(RAI 2.4)

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Farley Steam Generator
Site Specific Mockup
Axial Two Angle Coverage Plot

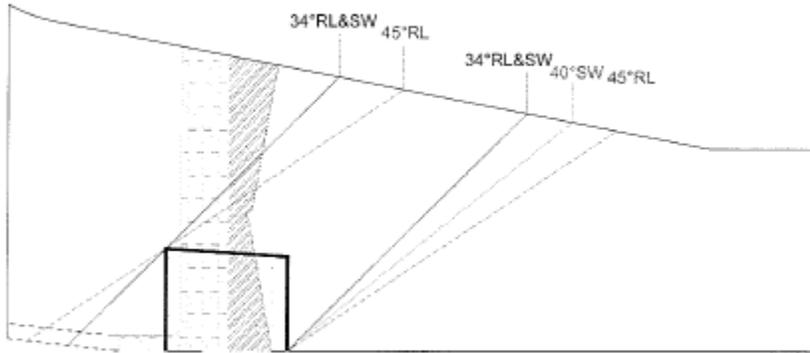


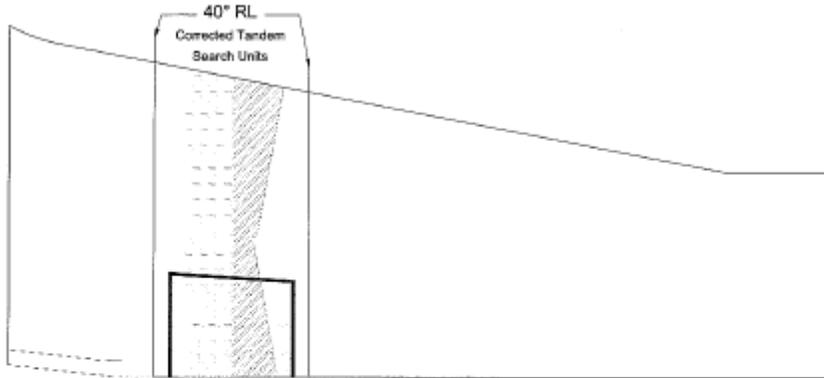
Figure 7-2
Farley Steam Generator Mockup - Ultrasonic Axial Two-Angle Coverage

Figure 7-3 illustrates the estimated circumferential coverage obtainable on the mockup with the taper corrected search units.

(RAI 2.4)

**Response to Request for Additional Information Regarding
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**Farley Steam Generator
Site Specific Mockup
Circumferential Coverage Plot**



**Figure 7-3
Farley Steam Generator Mockup - Ultrasonic Circumferential Coverage**

7.1 Mockup Drawing

Figures 7-4 through 7-7 are graphical representations of the implanted flaws shown relative to their position in the examination volume and circumferential location. In the design phase of the mockup, flaw locations were chosen based on material susceptibility and challenging placement with regard to ultrasonic detection capabilities. All flaws were successfully detected, with an automated system during the fingerprint process using techniques similar to those defined in PDI-UT-10. All flaws were detected with a signal-to-noise ratio greater than the required 2:1.

(RAI 2.4)

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**

12

ANII SIGN OFF/ACCEPTANCE

Farley Nuclear Station
Southern Nuclear Operating Co.

Procedure No.: PDI-UT-10		Revision: C	
Procedure Title: The Generic Procedure for the Ultrasonic Examination of Dissimilar Metal Welds			
Site Specific Demonstration Performed By (Company and/or Examiner): LMT - Jeffery Devers			Date: 2 Feb 2007 - Initial Demo 1 Mar 2007 - Demo of repaired 45 Degree Search Unit
Applicable Code: ASME	Section: XI	Appendix: VIII as modified by PDI	Year/Addenda: 2001/None
This Certifies that:			
Examinations Performed in accordance with this procedure satisfy the requirements within its purpose/scope demonstrated per EPRI PDI Dissimilar Metal Weld Mockup Criteria Rev. A for the Steam Generator Inlet/Outlet inlet-outlet pipe-DM welds located at Farley Nuclear Station. The ultrasonically measured lengths of the circumferential flaws were: Flaw 3 - 4.60" (Flaw 1 on Indication Report) and Flaw 1 - 3.50" (Flaw 2 on indication Report). The true OD projected lengths are: Flaw 3 - 2.93" and Flaw 1 - 2.48".			
Procedure Qualification Specifics:			
<u>Code Reference</u> This Procedure does not deviate from the Referenced Code with respect to material, technique, calibration method, and method of recording indications.			
<u>Physical Demonstration</u> Physical demonstration performed was representative of field conditions and adequately reflect the effectiveness of this procedure.			
<u>Calibration</u> Resolution of the calibration reflectors stipulated in the procedure was achieved during the demonstration.			
Qualification Performed/Witnessed By			
Examiner: Jeffery Devers  (Print/Sign)		Date: 03/1/2007	
NDE Level III: Danny Cordes  (Print/Sign)		Date: 03/1/2007	
ANII: Robert McGill  (Print/Sign)		Date: 03/1/2007	

STEAM GEN
NOZZLE TO
SAF-CHD

JRC
4-19-07

(RAI 2.4)

**Response to Request for Additional Information Regarding
Proposed Relief Requests for the Third ISI Interval**

**2.5 RR-66 and RR-68 (FNP, Unit 1), ASME Code, Section XI, Examination
Category B-A, Reactor Pressure Vessel (RPV) Welds**

NRC RAI

RR-66 requests relief for the reactor pressure welds shown in the table below.

Table 1 – ASME Code, Section XI, Examination Category B-A			
ASME Code Item	Weld ID	Weld Type	Coverage
RR-66			
B1.11	ALA1-1100-8	Lower Shell / bottom head	84%
B1.21	ALA1-1100-15	Lower Head / Circumferential	25%
B1.22	ALA1-1100-10	Lower Head Meridional Seam	51%
B1.22	ALA1-1100-11	Lower Head Meridional Seam	80%
B1.22	ALA1-1100-12	Lower Head Meridional Seam	88%
B1.22	ALA1-1100-13	Lower Head Meridional Seam	19%
B1.22	ALA1-1100-14	Lower Head Meridional Seam	39%
B1.30	ALA1-1100-1	Flange-to-Upper Shell	68%
RR-68			
B1.22	ALA1-1300-1	Meridional Plate Weld (Top Head)	59%
B1.22	ALA1-1300-2	Meridional Plate Weld (Top Head)	59%
B1.22	ALA1-1300-3	Meridional Plate Weld (Top Head)	59%
B1.22	ALA1-1300-4	Meridional Plate Weld (Top Head)	59%

The licensee’s submittal states:

“ASME [Code, Section XI,] Item Numbers B1.11 and B1.30 listed above for [ASME Code, Section XI,] Table IWB-2500-1, Examination Category B-A, require that 100% of the length of each weld be examined. However, ASME [Code, Section XI,] Item Numbers B1.21 and B1.22 listed above for [ASME Code, Section XI,] Table IWB-2500-1, Examination Category B-A, requires that the accessible length of each weld be examined. Even though only the accessible length was required for [ASME Code, Section XI,] Item B1.21 and B1.22 welds, they were conservatively included.”

It is unclear from the submittal whether the ultrasonic inspection coverage that was obtained for ASME Code, Section XI, Items B1.21 and B1.22, was a percentage of the total weld length or a percentage of the accessible weld length. State what percentage of the ASME Code-required accessible length of the welds for ASME Code, Section XI, Items B1.21 and B1.22, was achieved.

While the technical descriptions provided in RR-66 and RR-68 list the general bases for examination limitations, the descriptions do not state how the listed bases limit the examinations. As an example, Table RR-66 states that weld ALA1-1100-1 was limited due

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to the flange configuration, keyways and irradiation specimen slots. This does not state how or why the flange configuration, or other appurtenances, limits the examination. For each of the welds in RR-66 and RR-68, provide sketches or sufficient technical descriptions so that the reasons for the impracticalities are clear.

SNC Response for Item B1.21 and B1.22 welds

The coverage shown for Item B1.21 and B1.22 welds is a percentage of the total weld length. The accessible length of each weld was examined.

SNC Response for Weld ALA1-1100-1 (B1.30 Weld)

Conversations with the NRC indicated a need for clarification of information previously supplied to the NRC for this weld by SNC letter dated September 22, 2008. Based on those conversations, the information for "Basis for Limited Coverage" and "Coverage" shown in Table RR-66 on page E4-3 of Relief Request RR-66 for this weld (ALA1-1100-1) should be replaced with the following information, including the following Figure 1 through Figure 5:

The 1989 Edition of ASME Section XI requires that reactor vessel flange welds be examined in accordance with Article 4 of Section V [see Appendix I, I-2100]. (Note: Because of the vessel-to-flange configuration, Article 4 allows a supplemental examination to be performed from the flange surface).

In lieu of using Section V examinations, SNC obtained approval from the NRC to use alternative ISI-GEN-ALT-06-01. ISI-GEN-ALT-06-01 stated, "In lieu of Article 4 of Section V angle beam examination, SNC proposes to use an angle beam examination that will be performed using applicable examination procedures, personnel, and equipment qualified in accordance with Appendix VIII, Supplements 4 and 6, as amended by the conditions set forth in 10 CFR 50.55a." Additionally, ISI-GEN-ALT-06-01 stated, "The flange weld will have geometric limitations due to the configuration. However, the welds will be examined to the specified requirements to the fullest extent possible (i.e., scanning from both directions when achievable)."

The ISI-GEN-ALT-06-01 required scanning requirements were met by the vendor, to the extent practical. Additionally, the vendor also performed the Section V supplemental examination from the flange surface as part of their procedural requirements. The vendor then performed basic coverage calculations (factoring in the supplemental examination from the flange surface) instead of performing calculations per ISI-GEN-ALT-06-01. SNC has subsequently received revised coverage from the vendor based on the requirements of ISI-GEN-ALT-06-01.

The vendor performed examinations from the vessel shell (inside) surface below the weld and from the flange (inside) surface located above the weld using 45-degree shear, 45-degree longitudinal (single), and 45-degree longitudinal (dual) transducer configurations. These transducers were mounted on a sled. Beam directions were oriented perpendicular to the weld (from both sides of the weld to the extent practical)

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in order to detect circumferential indications and parallel to the weld (clockwise and counter-clockwise) to detect axial indications. Each of these configurations covered discrete regions within the required Code examination volume and were qualified in accordance with Appendix VIII. The regions are described below.

Region 1 - The 45-degree shear transducers were configured to examine from the outside diameter (OD) surface of the reactor vessel to 0.6T (where T is the thickness). Detail 1A in Figure 1 shows the missed Region 1 coverage when scanning from below the transition. Detail 1B in Figure 1 shows the missed Region 1 coverage when scanning from above the transition when there was no interference from the four keyways. Detail 1C in Figure 1 shows the missed Region 1 coverage when scanning from above the transition in the four keyway areas.

Region 2 - The 45-degree longitudinal (single) transducers were configured to examine from 0.6T to 2.5-inches from the reactor vessel inside diameter (ID) surface. Detail 2A in Figure 2 shows the missed Region 2 coverage when scanning from below the transition. Detail 2B in Figure 2 shows the missed Region 2 coverage when scanning from above the transition. Note: For Region 2 the keyways did not affect the coverage.

Region 3 - The 45-degree longitudinal (dual) transducers were configured to examine from 2.5-inches from the reactor vessel ID to the ID surface. Detail 3A in Figure 3 shows the missed Region 3 coverage when scanning from below the transition. Detail 3B in Figure 3 shows the missed Region 3 coverage when scanning from above the transition. Note: For Region 3 the keyways did not affect the coverage.

Coverage for Circumferential Indications

The examination coverage was limited due to the following factors:

- The configuration of the flange. As shown on Figure 5 of the attached vendor drawing, the examination volume includes severe transitions on both the ID and OD of the reactor vessel. This configuration affects coverage when scanning from above and below the weld. A description of the limitations is provided below for each of the three regions.
- There are eight vertical irradiation specimen slots as shown on Figure 4 of the attached vendor drawing. As shown on Figure 5 of the attached vendor drawing, there is a ledge on the ID about 11-inches below the top of the flange. The irradiation specimen slots extend from the ledge downward to the ID transition (as represented by the dashed line on Figure 5). Examinations can not be performed over these slots. Each of these eight slots prevents scanning for about 6-degrees of the circumference (total of 48-degrees). Scanning was conducted between the irradiation specimen slots with the scan boundaries maximized by visually assisted positioning of the sled.

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- There are four keyways shown on Figures 4 and 5 of the attached vendor drawings. The keyways extend from the ledge downward approximately 6-inches. Scanning was conducted between and below the obstructing keyways with the scan boundaries maximized by visually assisted positioning of the sled. There were no limitations except for coverage in Region 1. A description of the limitations for Region 1 is provided below. Regions 2 and 3 did not require raising the sled to the level where there was interference by the keyways.

Appendix VIII Supplement 4 and Supplement 6 single-sided examinations have been successfully demonstrated, by the industry's Performance Demonstration Initiative program administered by EPRI, to adequately detect cracking; therefore, single-sided coverage and the associated limitations is reported below for each region.

- Region 1 – As shown in detail 1a of Figure 1, the examination from below the weld covered the examination volume except for a very small volume on the outside which was missed due to the OD taper transition. Additionally, as shown in detail 1b of Figure 1, the examination from above the weld (when there was no interference from a keyway) covered a small portion of the volume missed by the scan from below. However, as shown in detail 1c of Figure 1, when there is interference due to the keyways, there is no appreciable extra coverage from above. It was determined that single-sided coverage exceeded 95%.
- Region 2 – As shown in detail 2a of Figure 2, the examination from below the weld covered the examination volume except for the missed coverage due to the ID taper transition. The sled could not be moved upward into the ID taper transition without causing the sled to lose contact with the vessel wall. The missed coverage from above the weld as shown in detail 2b of Figure 2 was due to the fact that the sled could not be moved below the ID taper transition. The curved surface prevented contact with the vessel wall as the sled moved downward. It was determined that single-sided coverage exceeded 65%.
- Region 3 – As shown in detail 3a of Figure 3, a large portion of the examination volume was covered when scanning from below the weld. The missed coverage was due to the fact that the sled could not be moved upward into the ID taper transition without the sled losing contact with the vessel wall. The missed coverage from above the weld as shown in detail 3b of Figure 3 was also due to the ID taper transition. The curved surface prevented contact with the vessel wall as the sled moved downward. It was determined that single-sided coverage exceeded 90%.

Coverage for Axial Indications

During the scanning of the three regions while moving parallel to the weld, examinations were performed in both directions (clockwise and counterclockwise) to the extent practical; however, limitations existed due to the ID taper transition. The missed coverage was due to the fact that the sled could not be moved upward into the ID taper transition without the sled losing contact with the vessel wall. Due

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to this limitation only the weld and the base material below the weld were scanned. Coverage in each region was approximately 60%.

Supplemental Examinations

A Section V supplemental examination was performed from the flange seal surface with 100% coverage of the examination volume.

SNC Response for Weld ALA1-1100-8 (B1.11 Weld)

The ultrasonic examination of circumferential weld ALA1-1100-8 was limited because the four core support lugs are positioned immediately above the weld. Figure 6 shows the configuration. As noted in the relief request, the automated scanning was conducted to maximize coverage.

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Farley Unit 1
Weld No. ALA1-1100-1

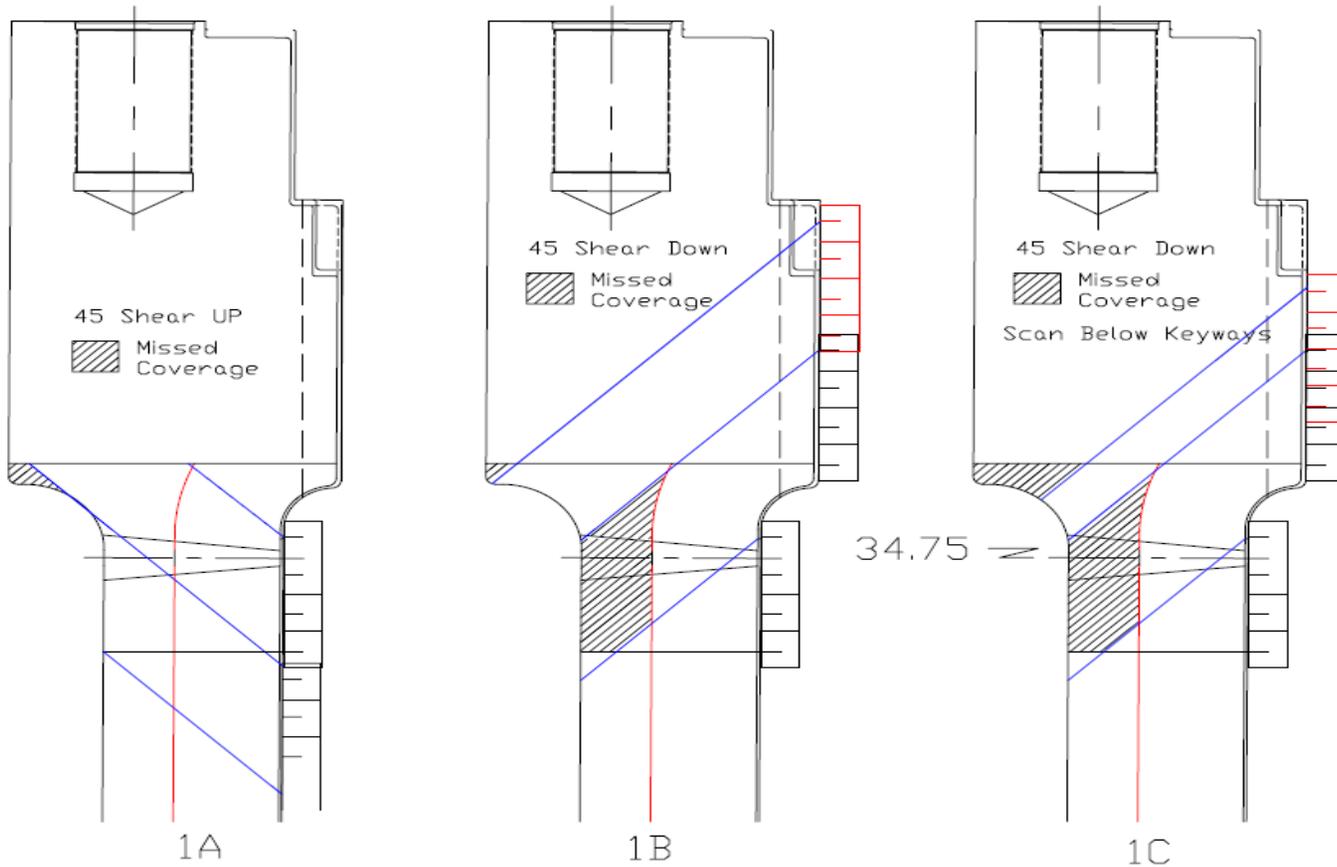
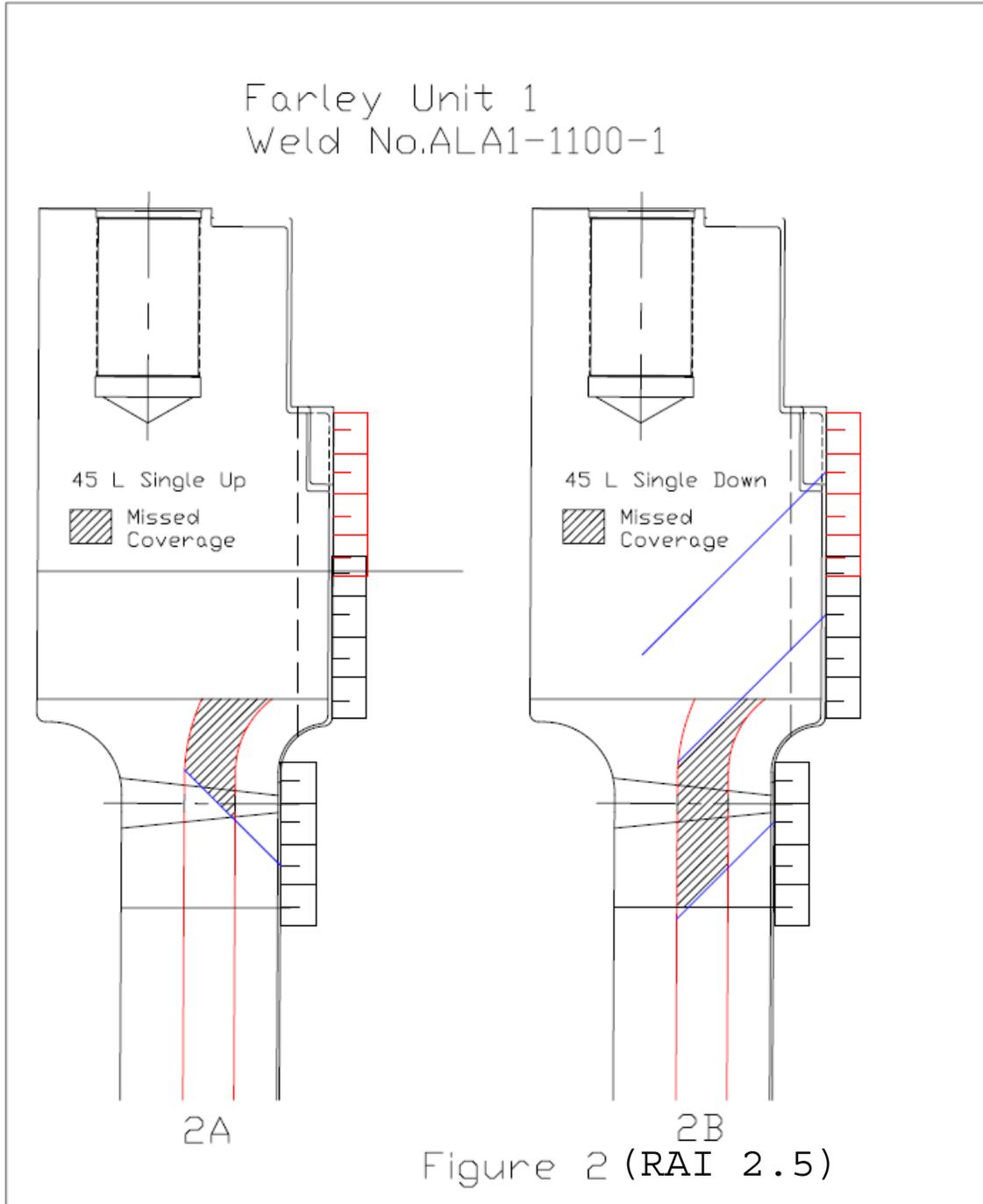


Figure 1 (RAI 2.5)

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Farley Unit 1
Weld No. ALA1-1100-1

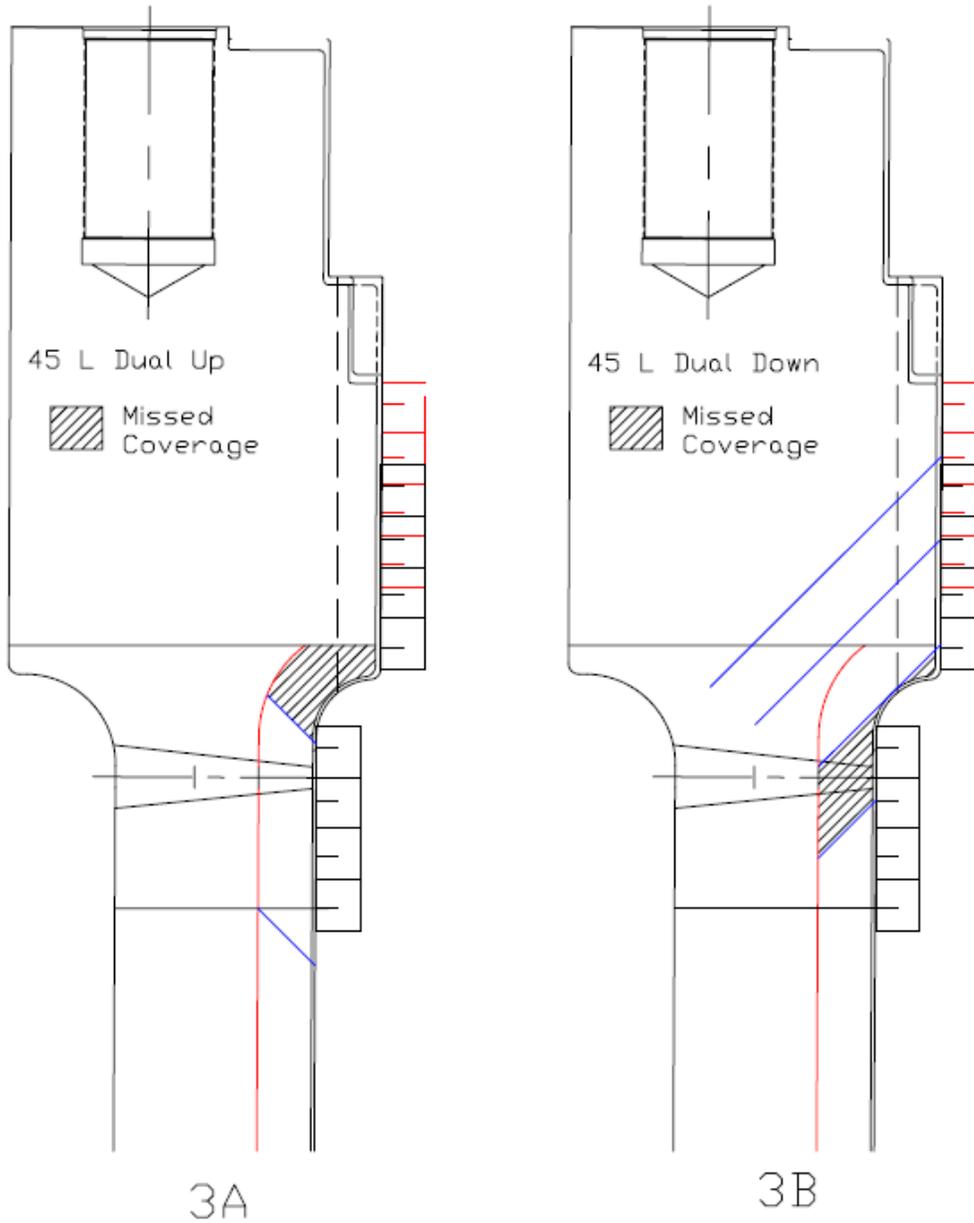


Figure 3 (RAI 2.5)

**Response to Request for Additional Information Regarding
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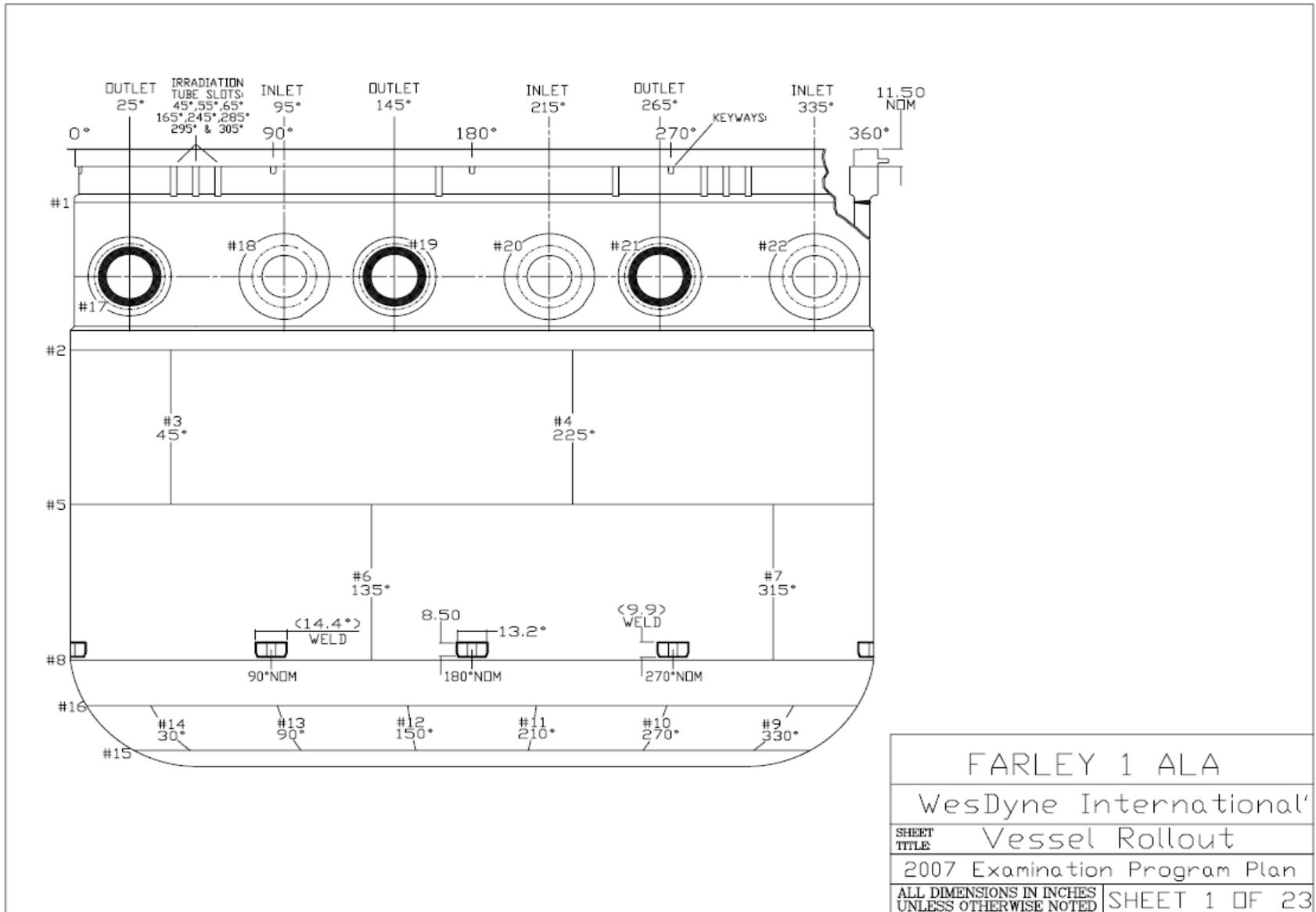


FIGURE 4 (RAI 2.5)

**Response to Request for Additional Information Regarding
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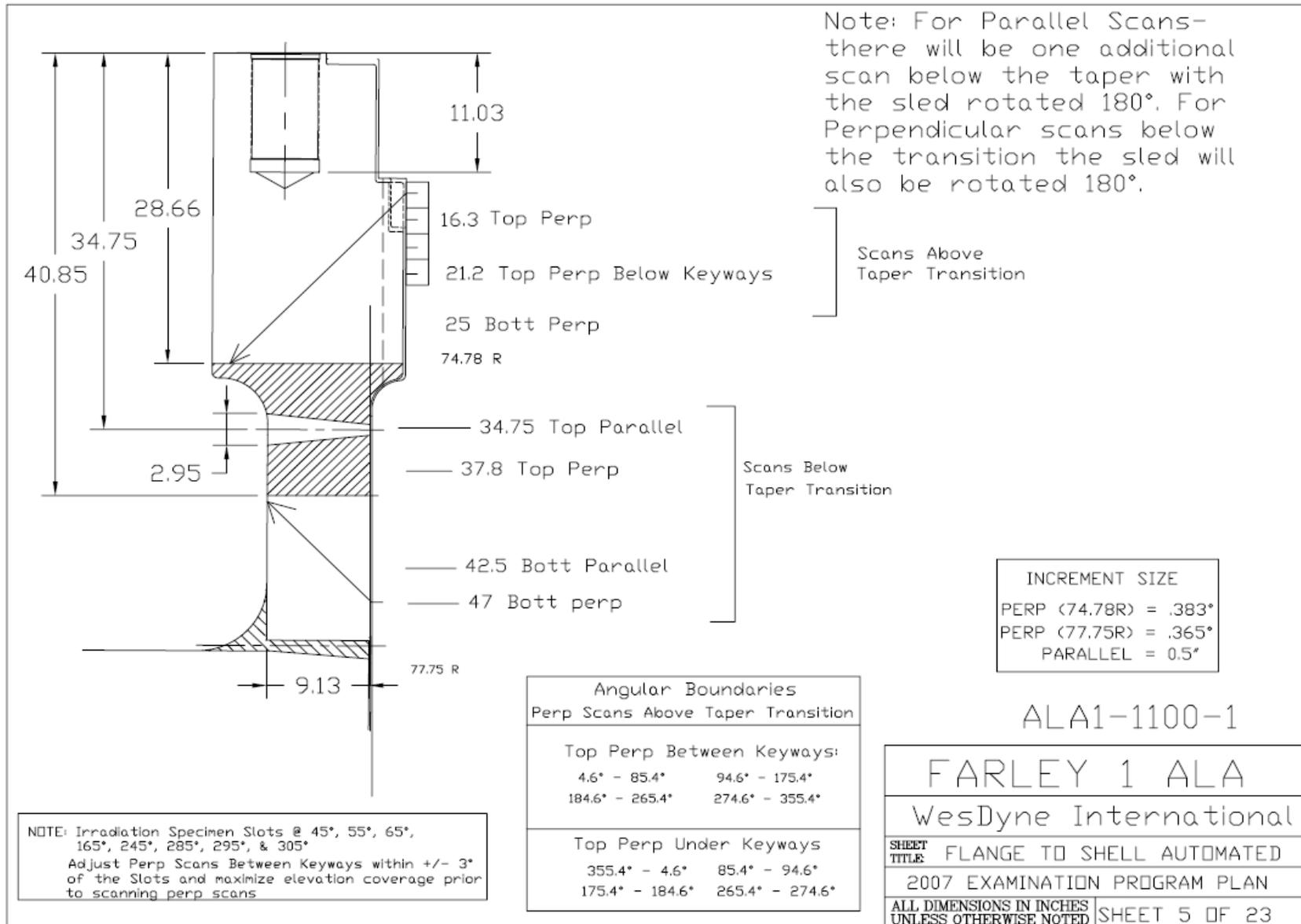


FIGURE 5 (RAI 2.5)

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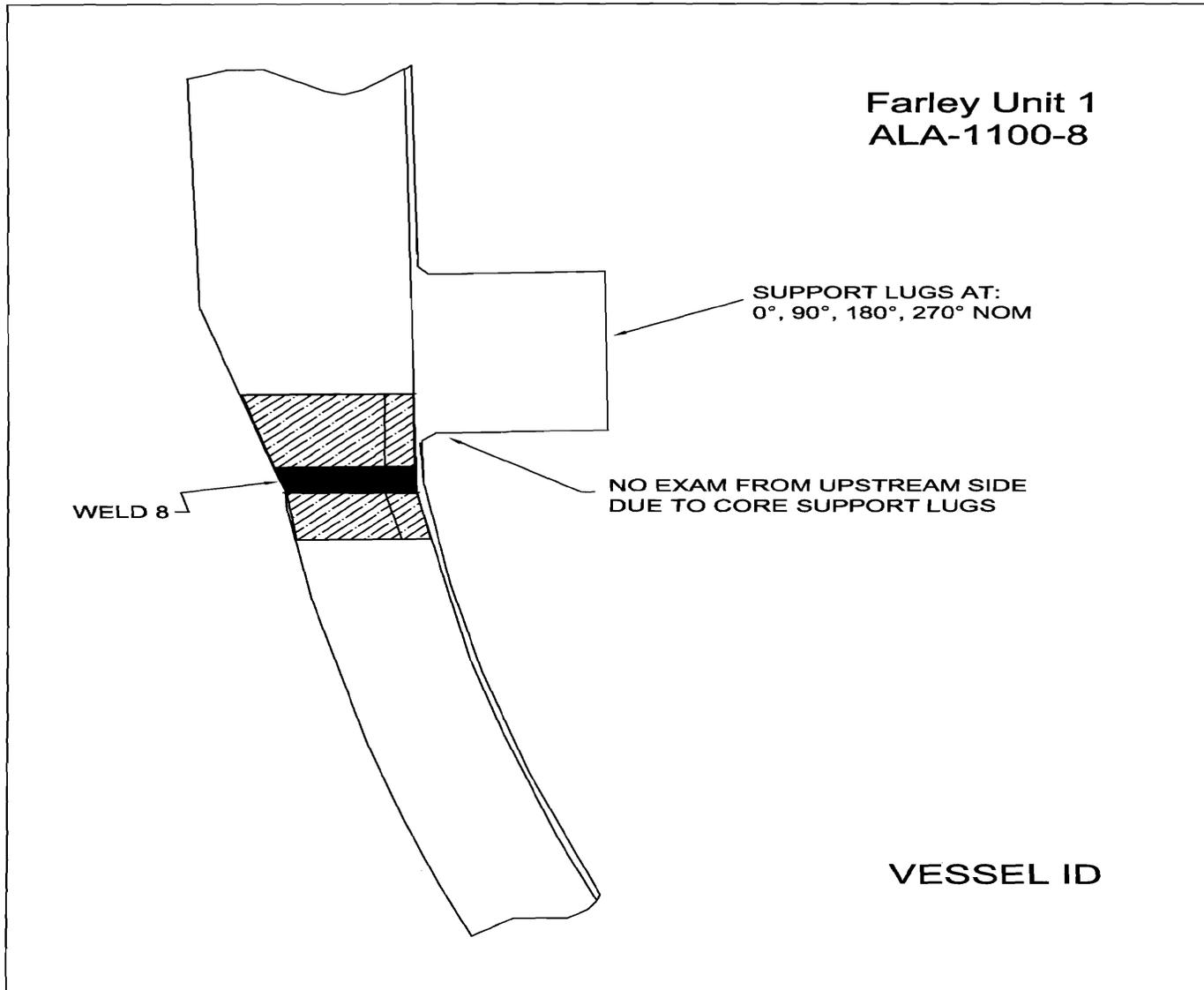


FIGURE 6 (RAI 2.5)

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2.6 RR-67 (FNP, Unit 1) ASME Code, Section XI, Examination Category B-J, Item B9.11, Austenitic Steel Piping Welds

NRC RAI

The licensee has requested relief from the 100 percent ASME Code volumetric examination requirements for ASME Code, Class 1 Category B-J austenitic piping weld ALA1-4103-4. The basis for the RR is that 100 percent of the ASME Code required inspection volume cannot be obtained because of the component configuration and an access restriction.

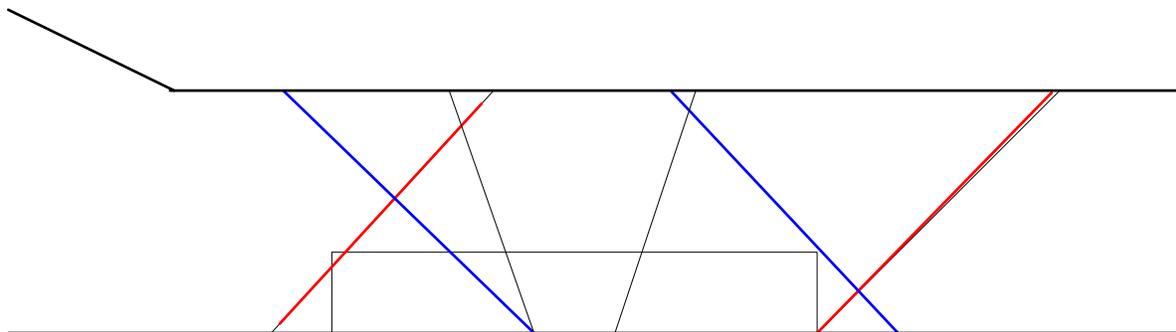
Confirm that this weld was examined using both S-wave and L-wave techniques. As stated in Section 2.2.1 above, the L-wave method has been shown capable of ID surface-breaking flaws on the far-side of wrought stainless steel welds.

SNC Response

Weld ALA1-4103-4 was examined prior to the implementation of Supplement 2 of Appendix VIII. This weld was examined using the requirements of Appendix III of the 1989 Edition of ASME Section XI, which requires that the examination volume receives two-directional coverage. A 45-degree and 60-degree shear wave was used with the 45-degree being the primary angle based on Paragraph III-4410 of Appendix III. Referencing Figure 1 below (Figure 1 was drawn from a field sketch), when scanning from the pipe side for detection of circumferentially-oriented flaws there were no limitations and the coverage was 100%. However, when scanning from the valve side for detection of circumferentially-oriented flaws, the valve taper prevented the transducer from being moved back to the extent necessary to pass the sound beam through the complete valve side examination volume. As a result, only about 60% of the volume was examined from the valve side, as depicted by the blue lines. Therefore approximately 80% of the examination volume received two-directional coverage and 20% received one-directional coverage when scanning for circumferentially-oriented flaws. When scanning for axially-oriented flaws there were no scanning limitations identified. There were no requirements to use an L-wave method to look for planar ID surface-breaking flaws on the far-side of the weld at the time these examinations were performed.

VALVE

PIPE



Weld ALA1-4103-4
Figure 1 (RAI 2.6)

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2.7 RR-61 (FNP, Unit 2) ASME Code, Section XI, Category R-A, Class 2 Carbon Steel Piping Welds

NRC RAI

The licensee has requested relief from the 100 percent ASME Code volumetric examination requirements for several ferritic steel piping welds. The NRC staff notes that ASME Code, Section XI, Appendix VIII, Supplement 3 demonstrations are acceptable for single-side weld access examinations (10 CFR 50.55a(b)(2)(xv)(A)(2)). It is unclear why the licensee cannot examine the full ASME Code volume by using multiple ultrasonic techniques from the accessible sides of these welds.

Please confirm that the ultrasonic inspection techniques that were used to examine the subject welds were qualified to Supplement 3 of Appendix VIII, and that the inspection techniques were qualified for single-side access.

In addition, it appears that, by the use of multiple inspection angles, a higher level of volumetric coverage can be obtained. Discuss whether inspection volume coverage could be increased by using multiple (higher) inspection angles.

The licensee's submittal summarizes limited examinations performed during the third 10-year ISI interval, and provides calculated coverage for each component. However, in order to show the impracticality of examining 100 percent of the ASME Code required volumes or surface areas, the licensee's submittal provides only "typical" figures that do not describe or depict the specific limitations for each weld listed in Table RR-61.

Please submit detailed and specific information to support the basis for each limited examination in RR-61, and, therefore, demonstrate impracticality. Include descriptions (written and/or sketches, as necessary) of the interferences to applied nondestructive examination (NDE) techniques. As applicable, describe NDE equipment, show accessibility limitations, and discuss whether alternative methods or advanced technologies could be employed to maximize ASME Code coverage.

SNC Response

Ultrasonic inspection techniques used to examine the subject welds were qualified to Supplement 3 of Appendix VIII, and the inspection techniques were qualified for single side access. As shown in Table 1, the inspection volume coverage of these thin-wall piping welds was increased with the addition of the 70-degree shear wave examination with the exception of two welds. These two welds had physical limitations which would have resulted in the same examination coverage with or without the addition of this examination.

Table 1 below lists the welds, the inspection angles used during the examination of each weld, a more detailed basis for the examination limitations, and the figure number for each weld. In lieu of the "typical figure" originally provided, sketches were developed from the data sheets and included as figures below to depict the specific limitations for each weld listed in Table RR-61.

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TABLE 1 (RAI 2.7)

Weld Number	Description	Primary Beam Angle	Secondary Beam Angle	Basis For Examination Limitations
APR2-4103-2-RI	3" Branch Connection to Pipe	45 ⁰ Shear	70 ⁰ Shear	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the branch connection and weld crown configuration as shown in Figure 1. Because of the thin-wall pipe and vibration issues it was not deemed appropriate to remove the reinforcement provided by the weld crown. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4103-5-RI	3" Elbow To Valve	45 ⁰ Shear	70 ⁰ Shear	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the valve taper and weld crown configuration as shown in Figure 2. Because of the thin-wall pipe and vibration issues it was not deemed appropriate to remove the reinforcement provided by the weld crown. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4202-4-RI	3" Elbow to Elbow	45 ⁰ Shear	-	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. A box restraint limits the coverage for 17% of the weld length. The weld was examined for 100% coverage (using the 45-degree Shear wave) for 83% of the weld length as shown in Figure 3. A 70-degree Shear wave would not increase the coverage because of the physical limitations associated with the box restraint. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4202-6-RI	3" Pipe To Valve	45 ⁰ Shear	-	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the valve taper as shown in Figure 4. Additionally, a welded pipe clamp is located 1-inch from the toe

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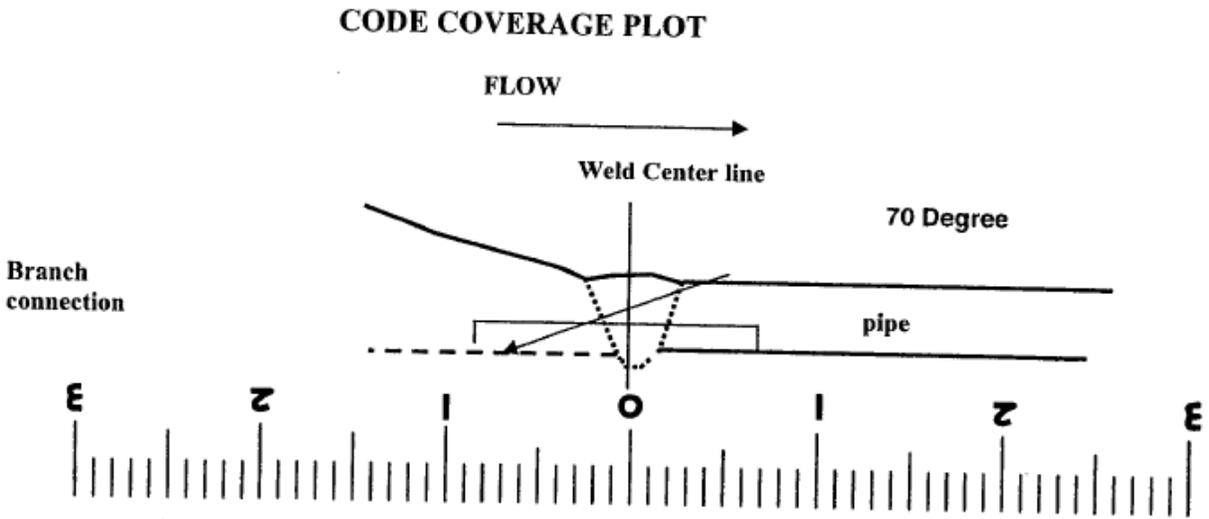
TABLE 1 (RAI 2.7)

Weld Number	Description	Primary Beam Angle	Secondary Beam Angle	Basis For Examination Limitations
				of the weld on the pipe side. A 70-degree Shear wave examination was not performed due to the limited scan area. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4302-2-RI	3" Branch Connection to Pipe	45° Shear	70° Shear	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the branch connection configuration as shown in Figure 5. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4302-6-RI	3" Pipe To Valve	45° Shear	70° Shear	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the valve taper and weld crown configuration as shown in Figure 6. Because of the thin-wall pipe and vibration issues it was not deemed appropriate to remove the reinforcement provided by the weld crown. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4302-7-RI	3" Valve To Pipe	45° Shear	70° Shear	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the valve taper configuration as shown in Figure 7. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4302-10-RI	3" Pipe To Valve	45° Shear	70° Shear	This thin-wall piping weld was selected as part of the risk-informed ISI program because of previous high vibration issues. The nominal pipe wall thickness is 0.3-inches. The examination was limited due to the valve taper and weld crown configuration as shown in Figure 8. Because of the thin-wall pipe and vibration issues it was not deemed appropriate to remove the reinforcement provided by the weld crown. A 70-degree Shear

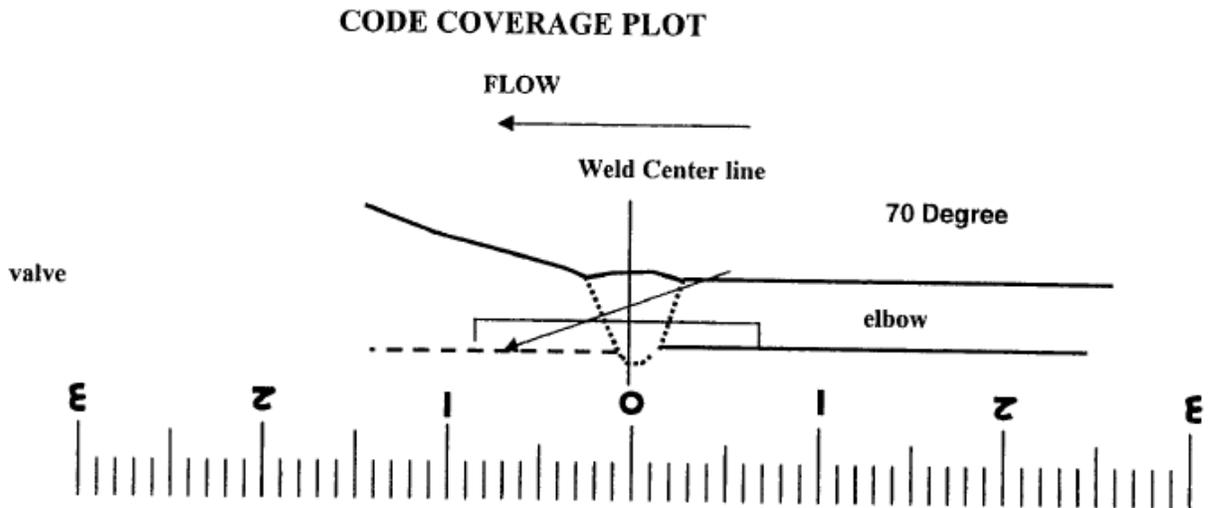
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TABLE 1 (RAI 2.7)				
Weld Number	Description	Primary Beam Angle	Secondary Beam Angle	Basis For Examination Limitations
				wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4101-31-RI	6" Pipe To Valve	45 ⁰ Shear	70 ⁰ Shear	The examination was limited due to the valve taper. This weld is located inside a permanent box restraint as shown in Figure 9. Scanning on the pipe side was limited to the corners of the box. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4101-32-RI	6" Valve To Pipe	45 ⁰ Shear	70 ⁰ Shear	The examination was limited due to the valve taper and weld crown configuration as shown in Figure 10. Since the coverage was 90%, reduction of the weld crown was not performed. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4101-33-RI	6" Pipe To Valve	45 ⁰ Shear	70 ⁰ Shear	The examination was limited due to the valve taper and weld crown configuration as shown in Figure 11. Since the coverage was 90%, reduction of the weld crown was not performed. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4201-23BC-RI	6" Branch Connection	45 ⁰ Shear	70 ⁰ Shear	The examination was limited due to the branch connection taper as shown in Figure 12. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.
APR2-4201-30-RI	6" Pipe To Valve	45 ⁰ Shear	70 ⁰ Shear	The examination was limited due to the valve taper as shown in Figure 13. A 70-degree Shear wave examination was performed to increase coverage. No other actions were considered as a practical means to appreciably increase the coverage.

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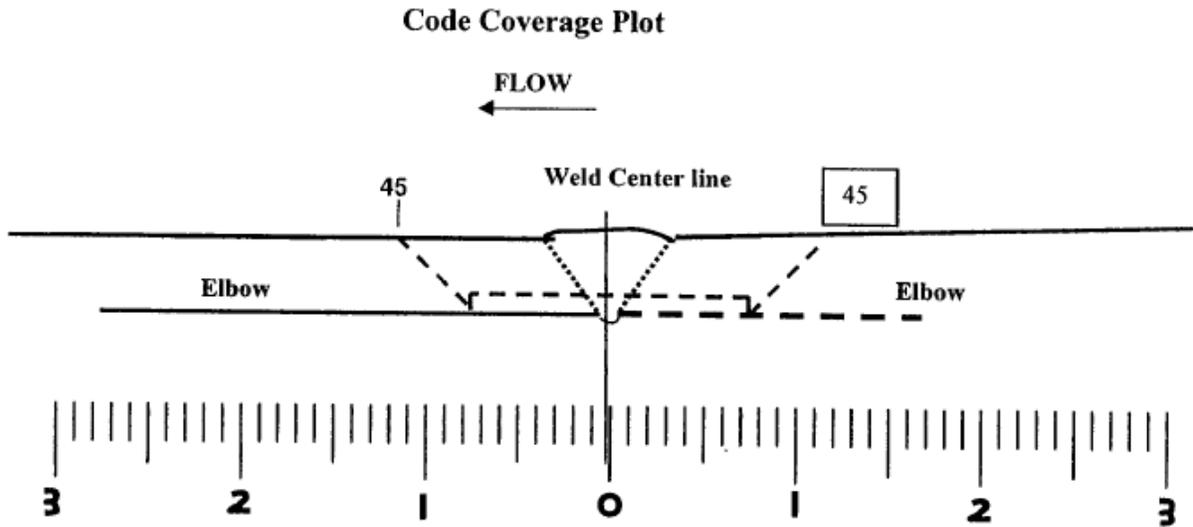


Weld ALA2-4103-2-RI
Figure 1 (RAI 2.7)

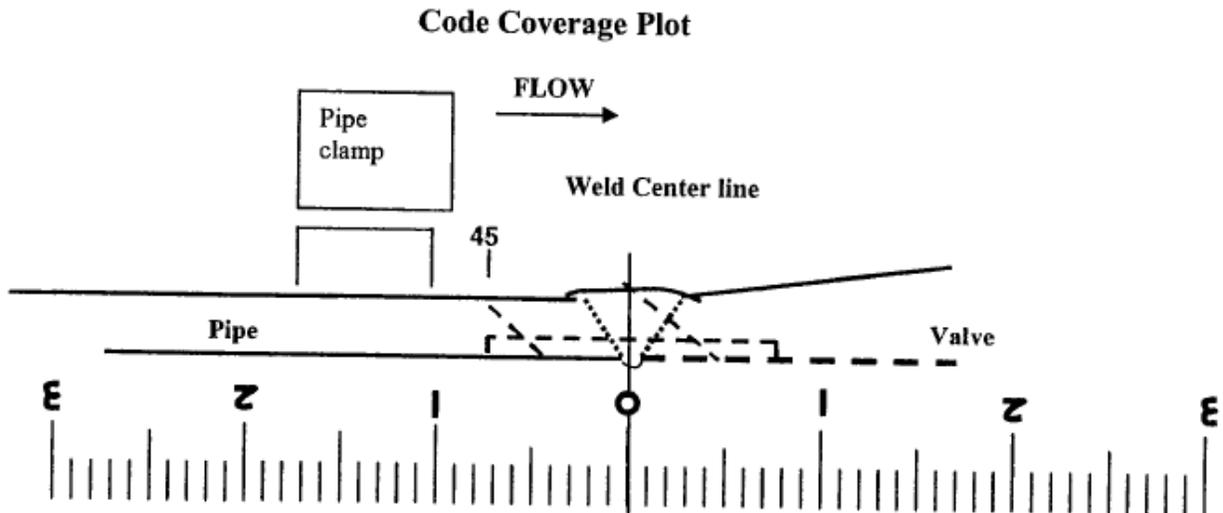


Weld ALA2-4103-5-RI
Figure 2 (RAI 2.7)

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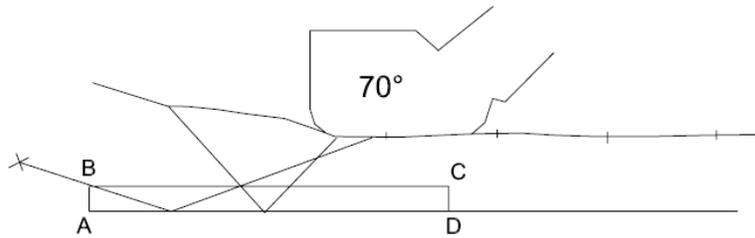
Box restraint limits examination from 3-inches to 5-inches on all scans. The weld was examined for 100% coverage for 83% of the weld length.



In addition to the valve taper, the welded pipe clamp (1-inch from the toe of the weld on the pipe side) limits the examination from that side.

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VALVE



PIPE

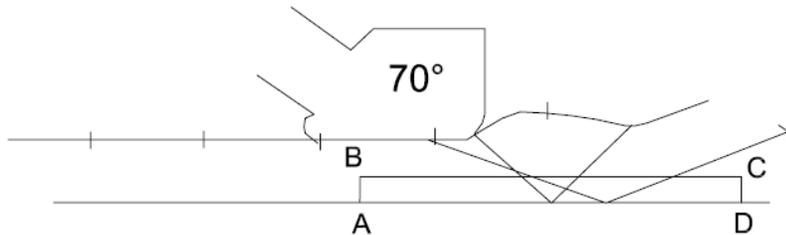
$$.1" \times 1.65" = .165 \text{ in}^2 = \text{volume ABCD}$$

$$\frac{.137}{.165} = 83\% \text{ coverage}$$

$$.15" \times .1" + \frac{.1" \times .26"}{2} = .028 \text{ in}^2 \text{ area missed}$$

Weld APR2-4302-2-RI
Figure 5 (RAI 2.7)

PIPE



VALVE

$$.1" \times 1.7" = .17 \text{ in}^2 = \text{volume ABCD}$$

$$.32" \times .1" + \frac{.1" \times .27"}{2} = .0455 \text{ in}^2 \text{ area missed}$$

$$\frac{.1245}{.17} = 73\% \text{ coverage}$$

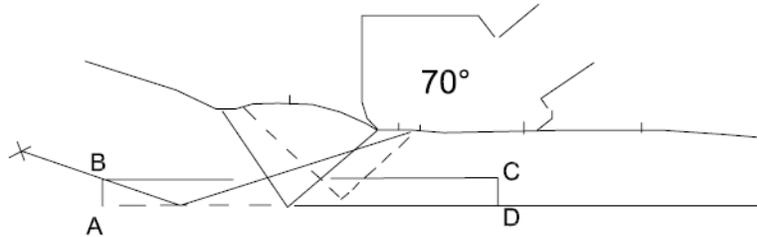
Weld APR2-4302-6-RI
Figure 6 (RAI 2.7)

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Code Coverage

VALVE

PIPE



$$.1" \times 1.65" = .165 \text{ in}^2 = \text{volume ABCD}$$

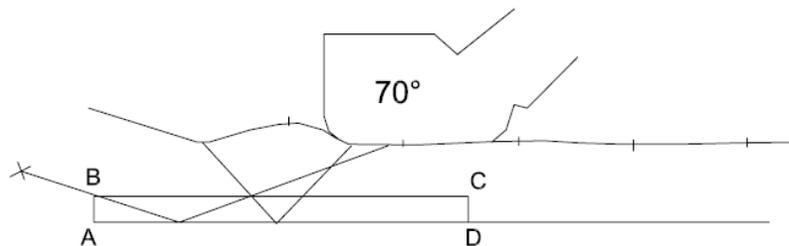
$$\frac{.1" \times .3"}{2} = .015 \text{ in}^2 \text{ area missed}$$

$$\frac{.15}{.165} = 91\% \text{ coverage}$$

Weld APR2-4302-7-RI
Figure 7 (RAI 2.7)

VALVE

PIPE



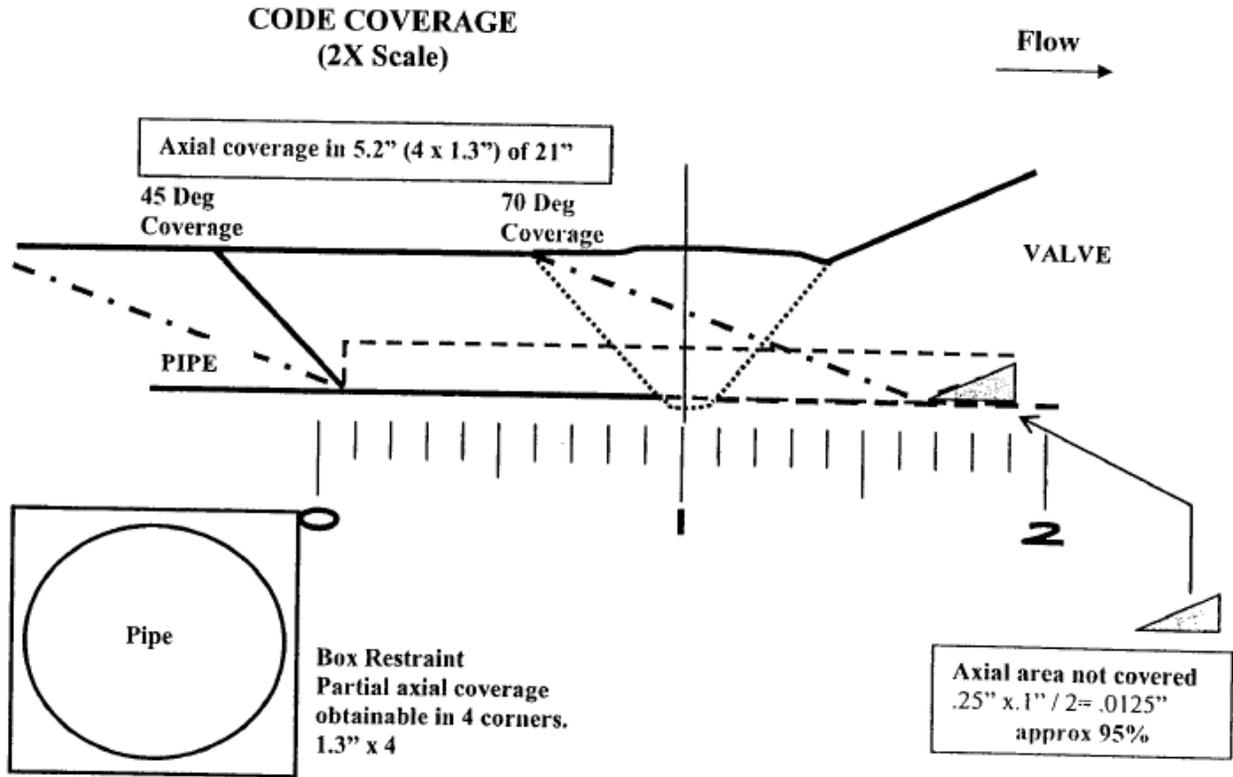
$$.1" \times 1.7" = .17 \text{ in}^2 = \text{volume ABCD}$$

$$.07" \times .1" + \frac{.1" \times .3"}{2} = .022 \text{ in}^2 \text{ area missed}$$

$$\frac{.148}{.17} = 87\% \text{ coverage}$$

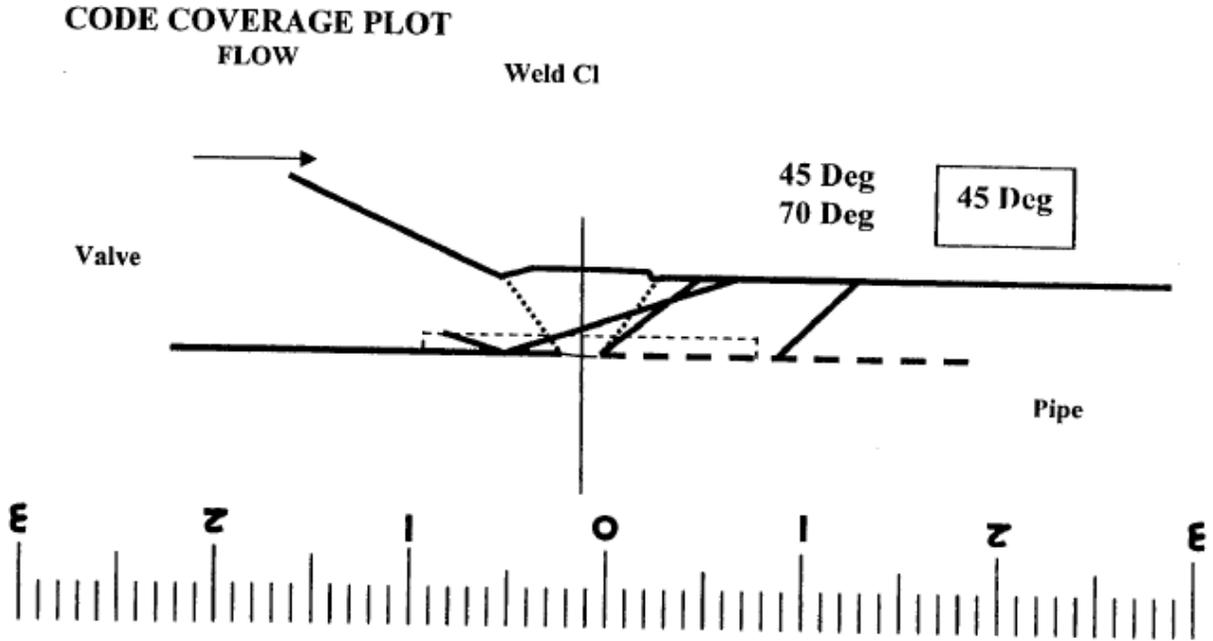
Weld APR2-4302-10-RI
Figure 8 (RAI 2.7)

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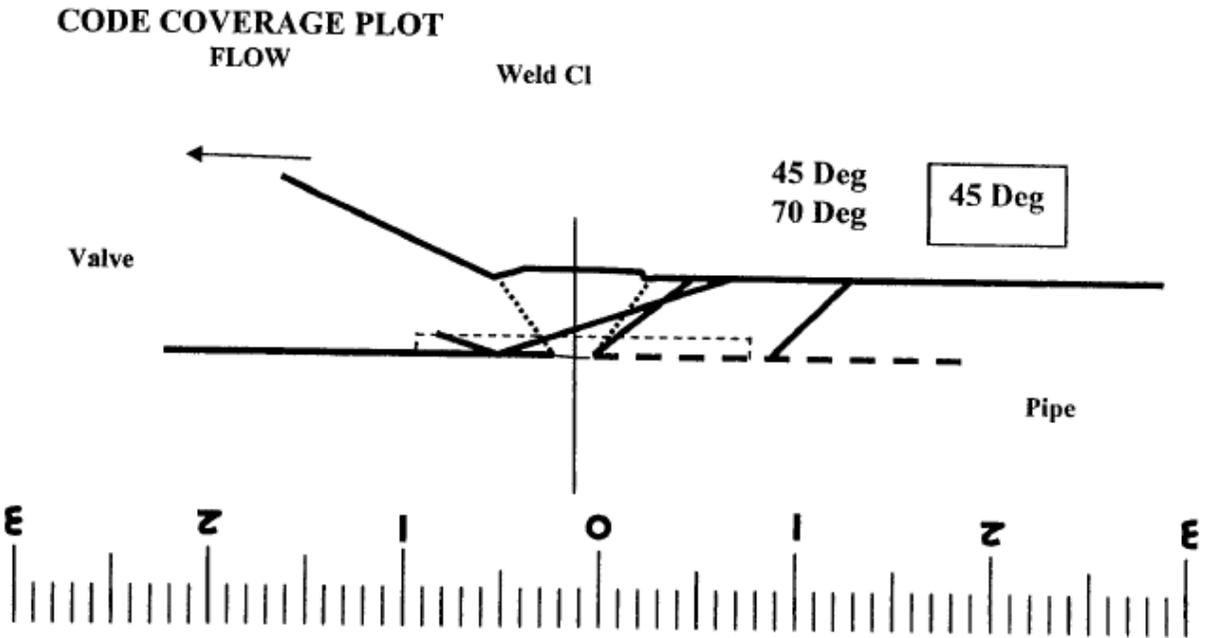


Weld ALA2-4101-31-RI
Figure 9 (RAI 2.7)

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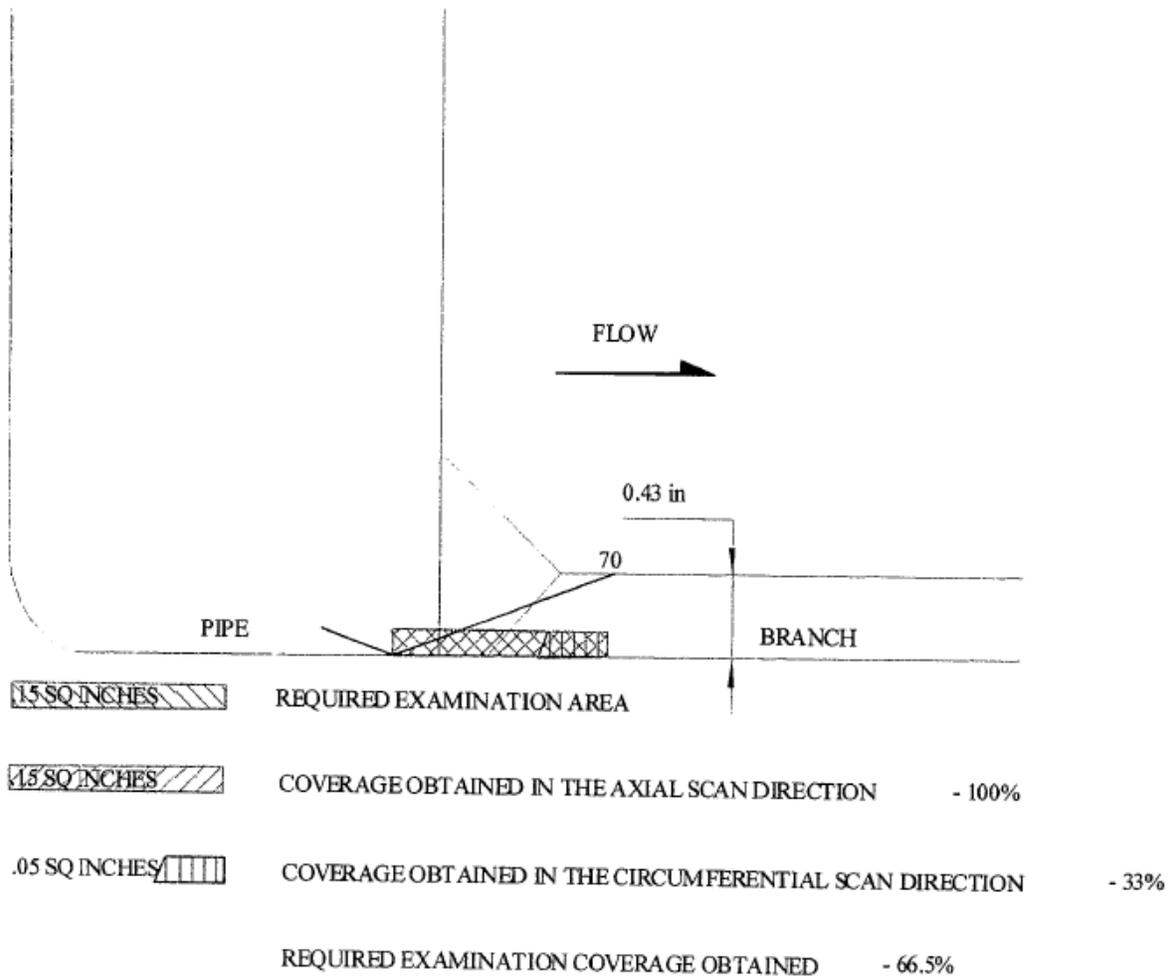
Weld ALA2-4101-32-RI
Figure 10 (RAI 2.7)



Weld ALA2-4101-33-RI
Figure 11 (RAI 2.7)

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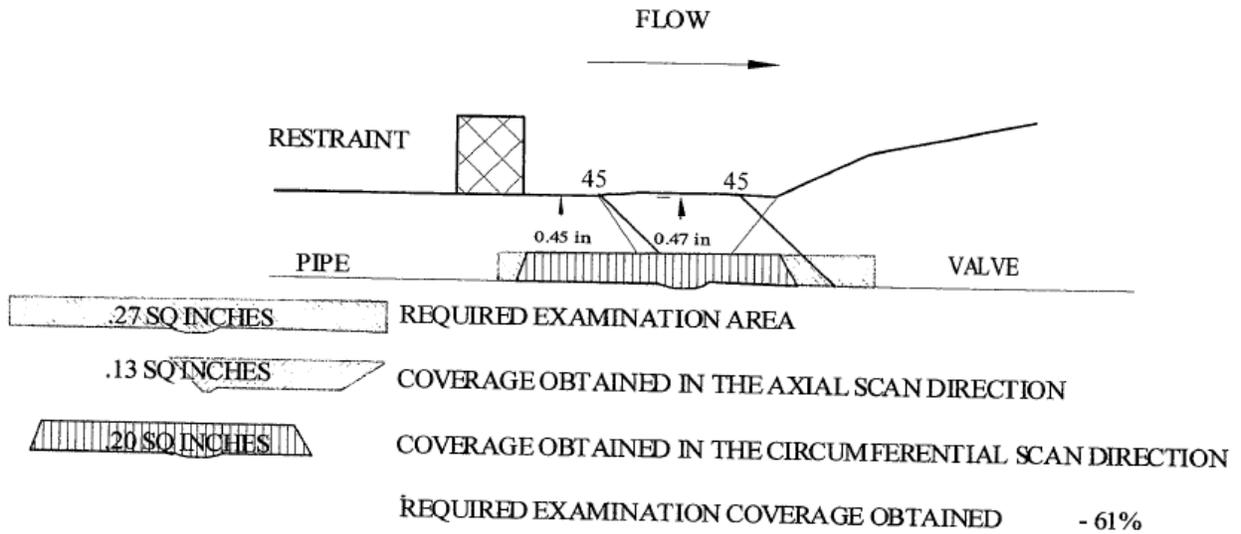
Code Coverage



Weld ALA2-4201-23BC-RI
Figure 12 (RAI 2.7)

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Code Coverage



Weld ALA2-4201-30-RI
Figure 13 (RAI 2.7)

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2.8 RR-62 (FNP, Unit 2), ASME Code, Section XI, Examination Category R-A, Risk-Informed Piping Examinations

NRC RAI

The licensee has requested relief from the 100 percent ASME Code volumetric examination requirements for piping welds, as defined by the FNP, Unit 2, Risk-Informed ISI Program. The basis for the request for relief is that 100 percent of the ASME Code-required inspection volume cannot be obtained because of component configuration and access restrictions.

The licensee's submittal states that the subject weld root areas were interrogated with 45-degree S-wave looking for circumferential cracking. The licensee's submittal further states that examinations were performed after the implementation of ASME Code, Section XI, Appendix VIII (performance demonstration), and consisted of single-sided examinations from the pipe side of the welds.

Confirm that the subject welds were examined only using 45-degree S-wave techniques. If only S-wave techniques were used to examine the stainless steel welds, please explain why L-wave examination techniques were not used as part of a best effort examination. As stated in Section 2.2.1 above, the L-wave method has been shown capable of ID surface-breaking flaws on the far-side of wrought stainless steel welds. Recent studies as noted in Section 2.2.1 of this RAI recommend the use of both S-wave and L-waves to obtain the best detection results, with minimum false calls, in austenitic welds.

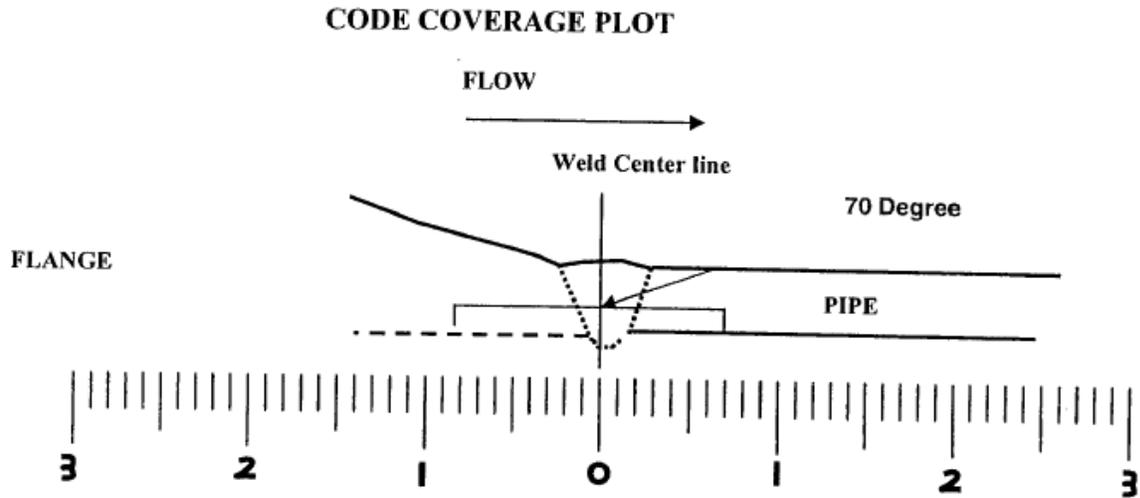
SNC Response

The procedure used to examine these welds was the SNC Appendix VIII, Supplement 2 procedure that utilizes PDI-UT-2. PDI-UT-2 requires, that when accessibility is limited to a single side in materials with nominal wall thickness equal to or less than 0.50-inch thick, a 2.25 MHz, 70-degree shear wave search unit shall be used for the detection and length sizing of flaws on the far side of the weld. When the material nominal wall thickness is greater than 0.50-inch thick, a longitudinal wave search unit that provides adequate coverage on the far side of the weld shall be used for the detection and length sizing of flaws.

Welds APR2-4503-23-RI and APR2-4503-34-RI have a nominal wall thickness less than 0.5-inch thick. These welds were examined with both a 45-degree shear wave and a 70-degree shear wave. All procedure requirements were met, with a maximum of 50% Code coverage claimed, due to single-side examination.

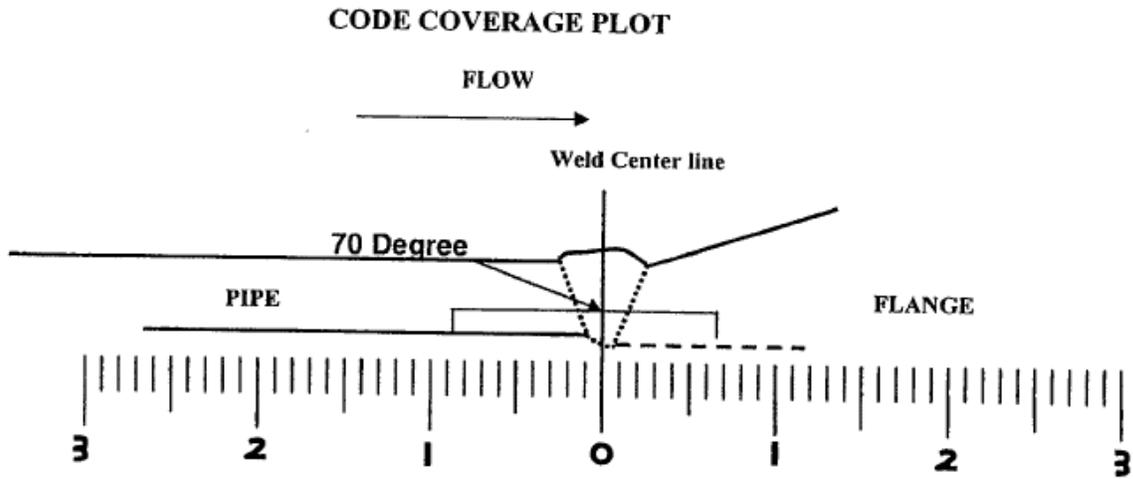
Welds APR2-4509A-33-RI, APR2-4509A-36-RI, and APR2-4511-2-RI have a nominal wall thickness of greater than 0.5-inch thick. APR2-4509A-33-RI was examined with 45-degree shear wave, 70-degree shear wave, and 60-degree refracted longitudinal wave transducers. Welds APR2-4509A-36-RI and APR2-4511-2-RI were examined with 45-degree shear wave and 60-degree refracted longitudinal wave transducers. These welds met all procedural requirements, and Code coverage was 50%. Sketches of the coverage are shown in the following figures.

Response to Request for Additional Information Regarding
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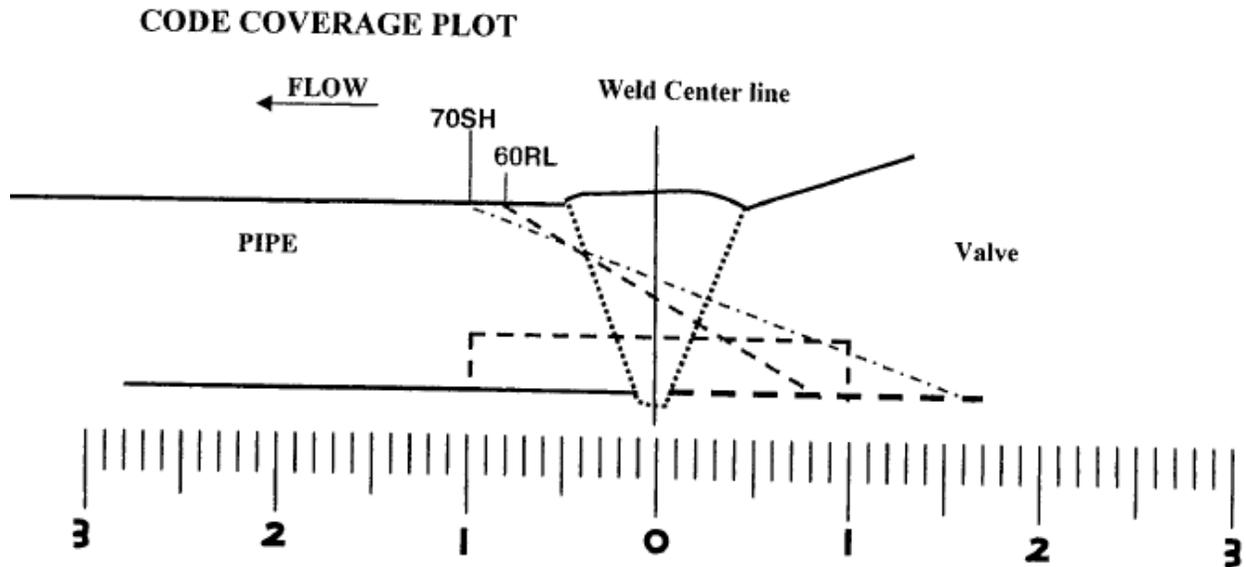


Weld ALA2-4503-23-RI
Figure 1 (RAI 2.8)

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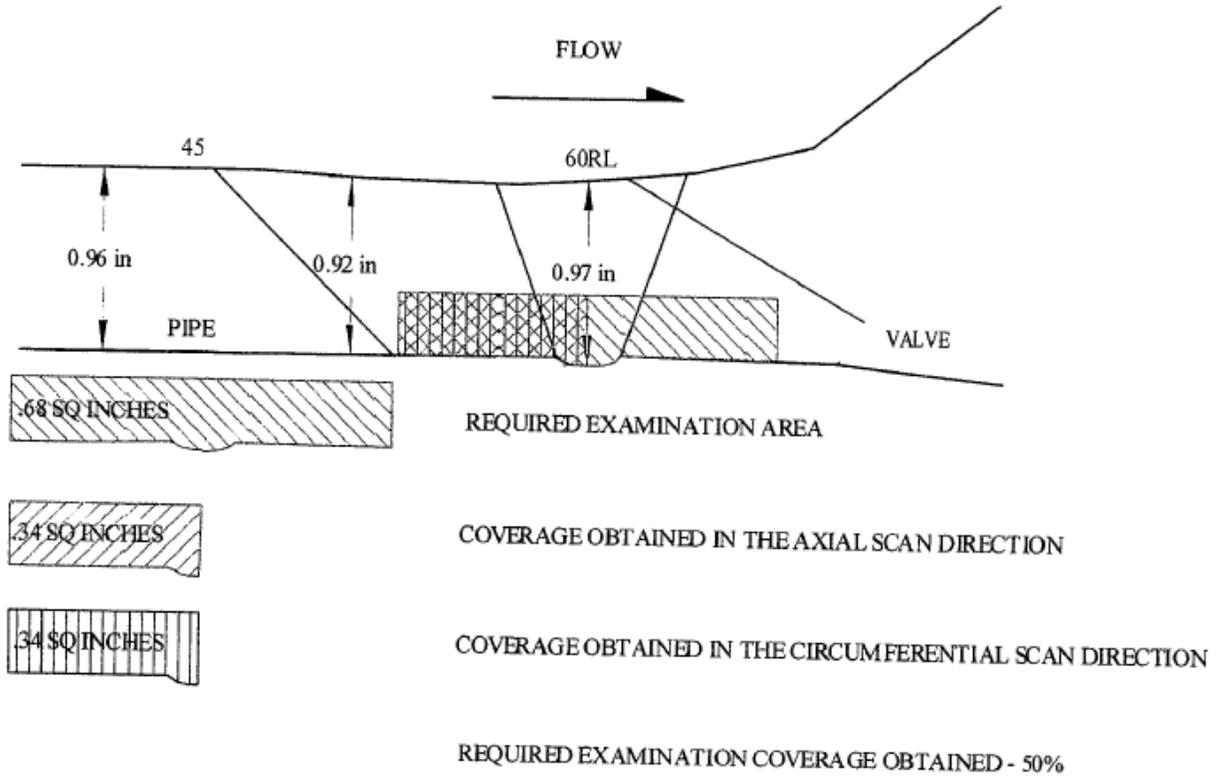
Weld ALA2-4503-34-RI
Figure 2 (RAI 2.8)



Weld ALA2-4509A-33-RI
Figure 3 (RAI 2.8)

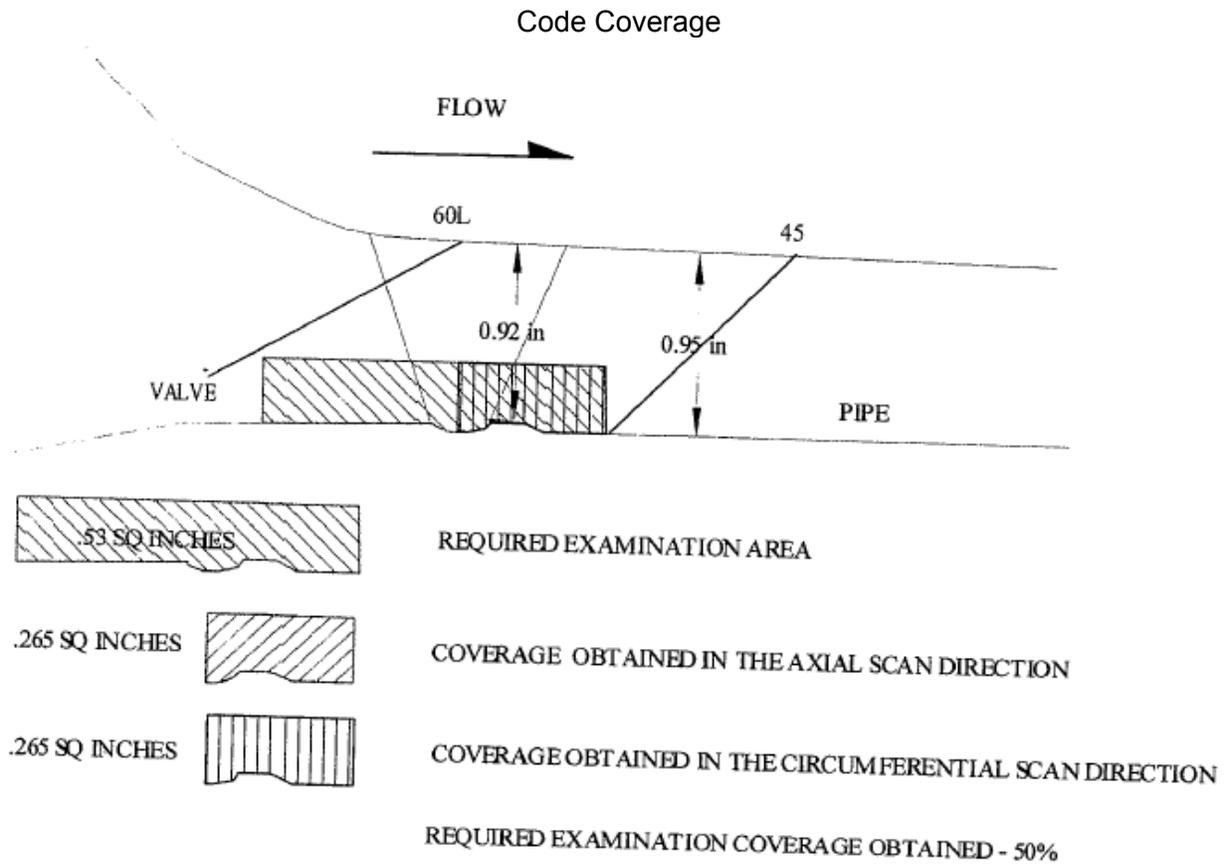
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Code Coverage



Weld ALA2-4509A-36-RI
Figure 4 (RAI 2.8)

**Response to Request for Additional Information Regarding
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Weld ALA2-4511-2-RI
Figure 5 (RAI 2.8)