

March 1, 2021

AEP-NRC-2021-04  
10 CFR 50.55a

Docket No.: 50-315  
50-316

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

Donald C. Cook Nuclear Plant Units 1 and 2  
Relief Request for Limited Coverage Examinations Performed In  
The Fourth 10-Year Inspection Interval

The fourth 10-year interval for the inservice inspection program for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2 concluded on February 29, 2020. During this interval, the components identified in Enclosure 1 received less than the required examination coverage. Accordingly, pursuant to 10 CFR 50.55a(g)(5)(iii), Indiana Michigan Power Company (I&M) requests relief on the basis that the required examination coverage is impractical due to physical obstructions and limitations imposed by design, geometry, and materials of construction of the subject components.

Enclosure 1 contains the relief request and the basis for this request.

There are no new or revised commitments in this letter. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Director, at (269) 466-2649.

Sincerely,



Q. Shane Lies  
Site Vice President

JMT/ml

Enclosures:

1. Donald C. Cook Nuclear Plant (CNP) Units 1 and 2, American Society of Mechanical Engineers (ASME) Section XI 10 CFR 50.55a Request for Relief Number ISIR-4-11, Revision 0. In Accordance with 10 CFR 50.55a(g)(5)(iii) Inservice Inspection Impracticality

AD47

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**Enclosure 1 of AEP-NRC-2021-04**

**Donald C. Cook Nuclear Plant (CNP) Units 1 and 2**

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10 CFR 50.55a Request for Relief Number ISIR-4-11, Revision 0**

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

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10 CFR 50.55a Request for Relief Number ISIR-4-11, Revision 0**

**In Accordance with 10 CFR 50.55a(g)(5)(iii) Inservice Inspection Impracticability**

**I. ASME Code Component(s) Affected**

The Donald C. Cook Nuclear Plant (CNP), Units 1 and 2, Class 1 and 2 welds with limited examination coverage that are included in this request for relief are for the Fourth Ten-Year Inservice Inspection Interval. The content of this request includes the insights gained from guidance provided by the NRC to the industry in Reference 1. The following Code Classes, Examination Categories, and Item Numbers apply.

Code Classes: 1 and 2

Examination Categories: B-A, B-D, B-K, C-B, R-A

Item Numbers: B1.11, B1.21, B1.22, B3.110, B10.10, C2.21, R1.11, R1.11/16, R1.16, R1.20

**II. Applicable Code Edition and Addenda**

The applicable ASME Boiler and Pressure Vessel Code of Record ("Code") edition and addenda was ASME Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 2004 Edition (Reference 2) and was used for the Fourth 10-Year Inservice Inspection (ISI) Interval at CNP as modified by 10 CFR 50.55a. The Appendix VIII requirements and use of the Performance Demonstration Initiative (PDI) requirements at CNP were in accordance with the 2001 Edition of Section XI (Reference 3) for the limited examinations contained in this request as conditioned by 10 CFR 50.55a(b)(2)(xv) and 10 CFR 50.55a(b)(2)(xxiv).

The CNP Fourth 10-Year ISI Interval ended on February 29, 2020, for Units 1 and 2. The limited coverage examinations contained in this request are required to be submitted to the NRC on or before 12 months after this date.

**III. Applicable Code Requirements**

<b>Exam Cat.</b>	<b>Item No.</b>	<b>Class 1 Weld Examination Coverage Requirements</b>
B-A	B1.11	To include the examination volume of the Reactor Pressure Vessel Shell Welds as depicted in the applicable figure shown in Figure IWB-2500-1
B-A	B1.21	To include the examination volume of the Reactor Pressure Vessel Head Welds as depicted in the applicable figure shown in Figure IWB-2500-3
B-A	B1.22	To include the examination volume of the Reactor Pressure Vessel Head Welds as depicted in the applicable figure shown in Figure IWB-2500-3
B-D	B3.110	To include the examination volume of the Pressurizer Nozzle-to-Vessel Welds as depicted in the applicable figure shown in Figures IWB-2500-7(a), (b), (c), or (d)
B-K	B10.10	To include the surface area of the Pressurizer support skirt attachment weld as depicted in the applicable figure shown in Figure IWB-2500-14

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<b>Exam Cat.</b>	<b>Item No.</b>	<b>Class 2 Weld Examination Coverage Requirements</b>
C-B	C2.21	To include essentially 100% examination of the Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Weld as depicted in Figures IWC-2500-4(a), (b), or (d)

<b>Exam Cat.</b>	<b>Item No.</b>	<b>Class 1 Piping Welds / Risk-Informed Inservice Inspection Program Coverage Requirements</b>
R-A	R1.11	To include essentially 100% of the examination location potentially subject to thermal fatigue.
R-A	R1.11/16	To include essentially 100% of the examination location potential subject to thermal fatigue and Intergranular Stress Corrosion Cracking (IGSCC)
R-A	R1.16	To include essentially 100% of the examination location potentially subject to Intergranular Stress Corrosion Cracking (IGSCC)
R-A	R1.20	To include essentially 100% of the examination location with no degradation mechanism

As previously defined in 10 CFR 50.55a(g)(6)(ii)(A)(2), and as stated in ASME Section XI Code Case N-460 (Reference 4) as approved in Regulatory Guide 1.147, Revision 19 (Reference 5), essentially 100% equates to more than 90% of the examination volume or required surface area of each weld where the reduction in coverage is due to interference by another component or part geometry. Code Case N-460 was invoked for the required coverage associated with the welds in this request.

**Limited Class 1 Welds**

Table IWB-2500-1, Examination Category B-A, "Pressure Retaining Welds in Reactor Vessel," Item Nos. B1.11 - limitations applied to the Lower Shell to Bottom Head Weld 2-RPV-D; B1.21 limitations applied to the Lower Head Circumferential Weld 2-RPV-E; B1.22 limitation applied to the seven Bottom Head Meridional Welds 2-LHM-01 @ 26°, 2-LHM-02 @ 77°, 2-LHM-03 @ 129°, 2-LHM-04 @ 180°, 2-LHM-05 @ 231°, 2-LHM-06 @ 283°, and 2-LHM-07 @ 334°.

Table IWB-2500-1, Examination Category B-D, "Full Penetration Welded Nozzles in Vessels - Inspection Program B," Item No. B3.110 - limitations applied to six pressurizer nozzle-to-vessel welds 4"-2-RC-28 (Upper Head to Spray Nozzle), 6"-2-RC-22 (Upper Head to Relief Nozzle), 6"-2-RC-25 (Upper Head to Relief Nozzle), 6"-2-RC-26 (Upper Head to Relief Nozzle), 6"-2-RC-27 (Upper Head to Relief Nozzle) and 14"-2-RC-21 (Surge Nozzle to Lower Head). Table IWB-2500-1, Examination Category B-K, "Welded Attachments for Vessels, Piping, Pumps, and Valves," Item No. B10.10 - limitations applied to weld 1-PRZ-26 (Pressurizer Lower Head to Support Skirt Weld).

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Limited Class 2 Welds

Table IWC-2500-1, Examination Category C-B, "Pressure Retaining Nozzle Welds in Vessels," Item No. C2.21 - limitations applied to one Steam Generator Nozzle-to-Shell Weld on "Steam Generator No. 21". The examination coverage was limited to 76.3%. This limitation was due to the non-removable insulation support ring and configuration.

Limited Class 1 Piping Welds / Risk-Informed Inservice Inspection Programs

Only Class 1 piping welds were selected for examination during the fourth interval under the Risk-Informed Inservice Inspection (RI-ISI) Programs used for CNP. These were examined in accordance with Code Case N-716 (Reference 6). Use of the Code Case was based on request for an alternative ISIR-4-01 that was authorized for use per Reference 7. The examinations performed during Unit 1 Outage U1C29 and Unit 2 Outage U2C25 were performed under Code Case N-716-1 (Reference 8) which was approved in RG 1.147 Revision 18.

Additional Examination Volume Requirements for Code Case N-716

Table 1, Examination Categories "Examination Category R-A," Item No. R1.11 – Elements Subject to Thermal Fatigue, required the use of the examination volumes depicted in the ASME Section XI, Figures IWB-2500-8(c) and IWC-2500-9, -10, and -11 with an additional requirement that read, Note (1) The length of the examination volume shown in Fig. IWB-2500-8(c) shall be increased by enough distance [approximately ½ in.] to include each side of the base metal thickness transition or counterbore transition.

Evaluation of Change in Risk due to Limited Examinations per Code Case N-716-1

Footnote 3 states "Includes essentially 100% of the examination location. When the required examination volume or area cannot be examined due to interference by another component or part geometry, limited examinations shall be evaluated for acceptability. Acceptance of limited examinations or volumes shall not invalidate the results of the change-in-risk evaluation. Areas with acceptable limited examination and their bases shall be documented.

**UNIT 1**

CNP has reviewed each instance of limited coverage and taken the appropriate steps (e.g., relief requests) consistent with its impact on the basis of the N-716 application. This is done using the delta risk values. N-716-1 change in risk acceptance criteria is 1E-7/1E-8 CDF/LERF at the system level and 1E-6/1E-7 total CDF/LERF for all systems. The "With Probability of Detection (POD) Credit" column is the official result that must meet these criteria. Below is a summary of the cumulative effect of the limited examinations.

This request identifies fifteen Unit 1 piping welds with limited examination coverage of 90% or less. Welds 1-CS-96-60F, 1-RH-29-01F, 1-RC-1-11N, 1-RC-1-14N, 1-RC-9-03S, 1-RC-11-12S, 1-SI-29-20S, 1-SI-29-23S, 1-SI-29-26F, 1-SI-31-21S, 1-SI-31-24S, 1-SI-31-27F, 1-SI-51-22F, 1-SI-51-27F, and 1-SI-33-26F are addressed below, by system.

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○ Chemical and Volume Control (CS) Weld 1-CS-96-60F

To conservatively quantify the effect on delta risk for the CS weld, the delta risk is adjusted by not crediting the CS weld with limited examination coverage. The below table provides the delta risk with the CS weld credited and with the CS weld not credited. The columns under heading "Examined" are the delta risk with the weld included, the columns under heading "Not Examined" is the adjusted delta risk after removing the weld. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of this CS weld is acceptable.

CS	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-3.78E-08	-3.78E-08	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-3.24E-08	-3.24E-08	Adjusted delta risk using the periodic update delta risk

○ ECCS (RH) Weld 1-RH-29-01F

To conservatively quantify the effect on delta risk for the RH weld, the delta risk is adjusted by not crediting the RH weld with limited examination coverage. The below table provides the delta risk with the RH weld credited and with the RH weld not credited. The columns under heading "Examined" are the delta risk with the weld included, the columns under heading "Not Examined" is the adjusted delta risk after removing the weld. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of this RH weld is acceptable.

RH	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-2.91E-10	-2.99E-10	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-1.41E-10	-1.49E-10	Adjusted delta risk using the periodic update delta risk

○ Reactor Coolant (RC) Welds 1-RC-1-11N, 1-RC-1-14N, 1-RC-9-03S, and 1-RC-11-12S

Weld 1-RC-1-14N was in Examination Category B-J, Item No. 9.21 and only required surface examination. It is a 1½" Branch Connection with no degradation mechanism and therefore only receives a VT-2 visual examination. This examination does not impact the delta risk calculation and therefore a limited examination does not affect total risk.

To conservatively quantify the effect on delta risk for the remaining three RC welds, the delta risk is adjusted by not crediting the three RC welds with limited examination coverage. The below table provides the delta risk with the three RC welds credited and with the three RC welds not

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credited. The columns under heading "Examined" are the delta risk with the three welds included, the columns under heading "Not Examined" is the adjusted delta risk after removing the three welds. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of the three RC welds is acceptable.

	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
RC	Examined		
	-1.55E-08	-1.55E-08	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-9.75E-09	-9.75E-09	Adjusted delta risk using the periodic update delta risk

- o Safety Injection (SI) Welds 1-SI-29-20S, 1-SI-29-23S, 1-SI-29-26F, 1-SI-31-21S, 1-SI-31-24S, 1-SI-31-27F, 1-SI-51-22F, 1-SI-51-27F, and 1-SI-33-26F

To conservatively quantify the effect on delta risk for the nine SI welds, the delta risk is adjusted by not crediting the nine SI welds with limited examination coverage. The below table provides the delta risk with the nine SI welds credited and with the nine SI welds not credited. The columns under heading "Examined" are the delta risk with the nine SI welds included, the columns under heading "Not Examined" is the adjusted delta risk after removing the nine SI welds. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of the nine SI welds is acceptable.

	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
SI	Examined		
	-4.20E-10	-4.52E-10	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	7.39E-11	4.20E-11	Adjusted delta risk using the periodic update delta risk

- Cumulative Effect to Delta Risk for One CS Weld, One RH Weld, Three RC Welds and Nine SI Welds

The impact of the limited examination on the delta risk for the individual system is addressed above. The cumulative effect on the total delta risk is provided below. The columns under heading "Examined" are the delta risk with the fourteen welds included, the columns under heading "Not Examined" is the adjusted delta risk after removing the fourteen welds. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of the one CS Weld, one RH Weld, three RC Welds and the nine SI Welds is acceptable.

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CS RH RC SI	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-5.41E-08	-5.40E-08	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-4.23E-08	-4.23E-08	Adjusted delta risk using the periodic update delta risk

**UNIT 2**

CNP has reviewed each instance of limited coverage and taken the appropriate steps (e.g., relief requests) consistent with its impact on the basis of the N-716 application. This is done using the delta risk values. N-716-1 change in risk acceptance criteria is 1E-7/1E-8 CDF/LERF at the system level and 1E-6/1E-7 total CDF/LERF for all systems. The "With POD Credit" column is the official result that must meet these criteria. Below is a summary of the cumulative effect of the limited examinations.

This request identifies twelve Unit 2 piping welds with limited examination coverage of 90% or less. Welds 2-CS-120-13, 2-RC-17-06N, 2-RC-17-09N, 2-RH-33-01, 2-SI-63-17, 2-SI-58-23, 2-SI-59-24, 2-SI-59-25, 2-SI-60-31, 2-SI-60-32, 2-SI-61-15, and 2-SI-62-32 are addressed below, by system.

○ Chemical and Volume Control (CS) Weld 2-CS-120-13

To conservatively quantify the effect on delta risk for the CS weld, the delta risk is adjusted by not crediting the CS weld with limited examination coverage. The below table provides the delta risk with the CS weld credited and with the CS weld not credited. The columns under heading "Examined" are the delta risk with the weld included, the columns under heading "Not Examined" is the adjusted delta risk after removing the weld. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of this CS weld is acceptable.

CS	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-5.40E-08	-5.40E-08	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-4.86E-08	-4.86E-08	Adjusted delta risk using the periodic update delta risk

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○ ECCS (RH) Weld 2-RH-33-01

To conservatively quantify the effect on delta risk for the RH weld, the delta risk is adjusted by not crediting the RH weld with limited examination coverage. The below table provides the delta risk with the RH weld credited and with the RH weld not credited. The columns under heading "Examined" are the delta risk with the weld included, the columns under heading "Not Examined" is the adjusted delta risk after removing the weld. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of this RH weld is acceptable.

RH	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-1.44E-10	-1.49E-10	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	5.60E-12	1.10E-12	Adjusted delta risk using the periodic update delta risk

○ Reactor Coolant (RC) Welds 2-RC-17-06N and 2-RC-17-09N

Weld 2-RC-17-09N was in Examination Category B-J, Item No. 9.21 and only required surface examination. It is a 1½" Branch Connection with no degradation mechanism and therefore only receives a VT-2 visual examination under N-716-1. This examination does not impact the delta risk calculation and therefore a limited examination does not affect total risk.

To conservatively quantify the effect on delta risk for the remaining RC Weld 2-RC-17-06N, the delta risk is adjusted by not crediting the RC weld with limited examination coverage. The below table provides the delta risk with the RC weld credited and with the RC weld not credited. The columns under heading "Examined" are the delta risk with the weld included, the columns under heading "Not Examined" is the adjusted delta risk after removing the weld. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of this RC weld is acceptable.

RC	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-7.50E-09	-7.50E-09	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-2.10E-09	-2.10E-09	Adjusted delta risk using the periodic update delta risk



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- Safety Injection (SI) Welds 2-SI-63-17, 2-SI-58-23, 2-SI-59-24, 2-SI-59-25, 2-SI-60-31, 2-SI-60-32, 2-SI-61-15, and 2-SI-62-32

To conservatively quantify the effect on delta risk for the eight SI welds, the delta risk is adjusted by not crediting the eight SI welds with limited examination coverage. The below table provides the delta risk with the eight SI welds credited and with the eight SI welds not credited. The columns under heading "Examined" are the delta risk with the eight SI welds included, the columns under heading "Not Examined" is the adjusted delta risk after removing the eight SI welds. As can be seen, the change is negligible and well below the acceptable limits of 1E-07 for CDF and 1E-08 for LERF. Therefore, a limited examination of these eight welds is acceptable.

SI	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-7.03E-10	-7.28E-10	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	3.53E-10	3.28E-10	Adjusted delta risk using the periodic update delta risk

- Cumulative Effect to Delta Risk for One CS Weld, One RH Weld, One RC Weld and Eight SI Welds

The impact of the limited examination on the delta risk for the individual system is addressed above. The cumulative effect on the total delta risk is provided below. The columns under heading "Examined" are the delta risk with the eleven welds included, the columns under heading "Not Examined" is the adjusted delta risk after removing the eleven welds. As can be seen, the change is negligible and well below the acceptable limits of 1E-06 for CDF and 1E-07 for LERF. Therefore, a limited examination of the one CS Weld, one RH Weld, one RC Weld and the eight SI Welds is acceptable.

CS RH RC SI	CDF Impact	LERF Impact	Source of Delta Risk
	w/ POD	w/ POD	
	Examined		
	-6.25E-08	-6.24E-08	Latest interval periodic update required by N-716, Section 7
	Not Examined		
	-5.05E-08	-5.04E-08	Adjusted delta risk using the periodic update delta risk

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**IV. Reason for Request**

10 CFR 50.55a(g)(5)(iii), states: *ISI program update: Notification of impractical ISI Code requirements.*

"If the licensee has determined that conformance with a Code requirement is impractical for its facility the licensee must notify the NRC and submit, as specified in § 50.4, information to support the determinations. Determinations of impracticability in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the Code requirements during the inservice inspection interval for which the request is being submitted. Requests for relief made in accordance with this section must be submitted to the NRC no later than 12 months after the expiration of the initial or subsequent 120-month inspection interval for which relief is sought."

Pursuant to 10 CFR 50.55a(g)(5)(iii) above, the required submittal of this request for relief is due on or before February 28, 2021 because CNP has determined that compliance with the code requirements of achieving essentially 100% coverage of the welds listed in this request is impractical to achieve. However, because February 28, 2021 falls on a Sunday, and 10 CFR 50.4(a) states that: "If a submission due date falls on a Saturday, Sunday, or Federal holiday, the next Federal working day becomes the official due date," it is appropriate to submit the request on the next business day, March 1, 2021. This request is based on actual demonstrated limitations experienced when attempting to comply with the code requirements in the performance of the examinations listed in this request.

**V. Impracticability of Compliance**

The construction permits for CNP Unit 1 and 2 were issued on March 25, 1969 and fall under the provisions of 10 CFR 50.55a(g)(1), which were applied to components (including supports) that must meet the requirements of paragraphs (g)(4) and (g)(5) to the extent practical. Components that are part of the reactor coolant pressure boundary and their supports must meet the requirements applicable to components that are classified as ASME Code Class 1. Components that are classified as ASME Code Class 2 and 3 must meet the requirements applicable to components that are classified as ASME Code Class 2 and or Class 3. Therefore, although the design of the plants has provided access for examinations to the extent practical, component design configurations with conditions resulting in examination limitations such as those from support interference, geometric configurations of welds and materials such as fittings or valve bodies made of cast stainless steel may not allow the full required examination volume or surface area coverage with the latest techniques available and thus this request for relief addresses those conditions. A typical example of such a condition is a valve-to-pipe weld where essentially 100% of the code required volume cannot be examined from the valve side of the weld and where a plant modification would be needed to provide this coverage. Details of examination restrictions and reductions in required examination coverage are provided in Attachment 1.

When examined, the welds listed in Attachment 1 of this request did not receive the required code volume or surface area coverage due to their component design configurations or interference by other items. These conditions resulted in scanning or surface area access limitations that prohibited obtaining essentially 100% examination coverage of the required examination volumes

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or surface areas, but when this situation occurred 100% of the accessible volumes or surface areas of each weld was covered.

**Burden Caused by Compliance**

To comply with the code required examination volumes or surface areas for obtaining essentially 100% coverage for the welds listed in this request for relief, the welds and their associated components would have to be physically modified and/or disassembled beyond their current design. Overall, components and fittings associated with the welds listed in this request are constructed of standard design items and materials meeting typical national standards that specify required configurations and dimensions. To replace these items with items of alternate configurations or materials to enhance examination coverage would require unique redesign and fabrication. Because these items are in the Class 1 and 2 boundaries and for the Class 1 items that form a part of the reactor coolant pressure boundary, their redesign and fabrication would be an extensive effort based on the limitations that exist.

For the Class 1, Examination Category B-A, Item No. B1.11, "Lower Shell to Bottom Head Weld" 2-RPV-D limitation was caused by the six core support lugs. Item No. B1.21 "Lower Head Circumferential Weld" 2-RPV-E limitation was caused by the proximity of the Bottom Mounted Instrumentation Tubes. Item No. B1.22 "Bottom Head Meridional Welds" 2-LHM-01, 2-LHM-02, 2-LHM-03, 2-LHM-04, 2-LHM-05, 2-LHM-06, and 2-LHM-07 were caused by the proximity of the Bottom Mounted Instrumentation Tubes.

For the Class 1, Examination Category B-D, Pressurizer Nozzle-to-Vessel Welds, Item No. B3.110, 6"-2-RC-22, 6"-2-RC-25, 6"-2-RC-26, 6"-2-RC-27, 14"-2-RC-21, and 4"-2-RC-22, limitations were caused by the configuration of the nozzle. The examination was performed from the vessel OD and the examination could not be performed from the vessel side. For the four nozzle welds, all with design limitations, to obtain the required coverage for each of these welds would require a design modification.

For the Class 1, Examination Category B-K, Item No. B10.10, Pressurizer Lower Head to Support Skirt Weld, limitations were caused by the close proximity of the Pressurizer enclosure ventilation duct. The examination was performed from the skirt OD, and the examination could not be performed from the inside due to the heater sleeves and associated cables, as well as the small space between the skirt and the Pressurizer lower head. To obtain the required coverage for this weld the ventilation duct would have to be disassembled.

For the Class 2 Examination Category C-B, Nozzle-to-Shell Welds in Vessels, Item No. C2.21, limitations on the Feedwater Nozzle-to-Shell Weld (STM-21-FWN) on Steam Generator No. 21 is due to the non-removable insulation support ring and configuration.

For the Class 1 piping welds examined per the RI-ISI Programs the limitations listed in this request are typically limited by their design configurations or materials. The configurations of these welds or their materials only allow UT examination coverage from one side of the weld or limited coverage from a specific area or areas of one side of the weld, and thus they would also require a design modification or replacement to obtain the required examination coverage.

Overall it is not possible to obtain UT interrogation of greater than 90% of the required code examination volume or surface areas for the welds in this request without extensive weld or

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component design modifications or plant component disassembly. Examinations have been performed to the maximum extent possible, and radiography is impractical due to the amount of work being performed in the areas on a 24-hour basis when the welds are available for examination. Using radiography would result in numerous work-related stoppages and increased exposure due to the shutdown and startup of other work in the areas. The water may need to be drained from systems or components where radiography is performed, which increases the radiation dose rates over a much broader area than the weld being examined. There is significant impracticality associated with the performance of weld or area modifications or the use of radiography in order to increase the examination coverage.

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

Proposed Alternative

- 1) Periodic system pressure tests and VT-2 visual examinations will continue to be performed in accordance with ASME Section XI, Examination Category B-P, for Class 1 pressure retaining welds and items each refueling outage and Examination Category C-H for Class 2 pressure retaining welds and items each inspection period of Table IWB-2500-1 and Table IWC-2500-1, respectively.
- 2) Conduct required PT, MT or UT examinations to the maximum extent possible as required by ASME Section XI or the RI-ISI Programs.

Basis for Use

10 CFR 50.55a(g)(4) recognizes that throughout the service life of a nuclear power facility, components which are classified as ASME Code Class 1, Class 2 and Class 3 must meet the requirements set forth in the ASME Code to the extent practical within the limitations of design, geometry and materials of construction of the welds and items described in Attachment 1. When a component is found to have conditions which limit the required examination volume or surface area, CNP is required to submit this information to the enforcement and regulatory authorities having jurisdiction at the plant site. This request for relief has been written to address areas where these types of conditions exist and where the required amount of coverage was reduced below the minimum acceptable. CNP has performed the weld examinations listed in this request to the maximum extent possible for each of the welds identified with limitations in Attachment 1.

The Class 1 Examination Category B-A, Pressure Retaining Welds in Reactor Vessel, Examination Category B-D, Pressurizer Nozzle-to-Vessel Welds, Examination Category B-K, Pressurizer Lower Head to Support Skirt Weld, the Class 2 Examination Category C-B, Pressure Retaining Nozzle Welds in Pressure Vessels, and the Class 1 Risk-Informed piping welds within the scope of this request are all located inside containment. Even though their examination did not meet the essentially 100% code required volume coverage requirement, there is instrumentation in place to assure that early detection of any Reactor Coolant System (RCS) pressure boundary leakage is identified. This is accomplished by the leakage detection instrumentation inside the containment where the RCS leakage detection instrumentation is required to be operable. As stated in CNP TS 3.4.15 "RCS Leakage Detection Instrumentation," the instrumentation consists of monitoring of containment sump level in each sump, containment atmosphere particulate radioactivity, and containment atmosphere gaseous radioactivity. These instruments are used to quantify any unidentified leakage from the RCS and to meet the CNP

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Technical Specifications Surveillance Requirements that have a Limiting Condition for Operation (LCO) in 3.4.13 stating that RCS Operational Leakage shall be limited to:

- a. No pressure boundary LEAKAGE;
- b. 0.8 gpm unidentified LEAKAGE;
- c. 10 gpm identified LEAKAGE; and
- d. 150 gallons per day primary to secondary LEAKAGE through any one steam generator

**VII. Duration of Proposed Alternative**

This request for relief is for the CNP, Units 1 and 2, Fourth 10-Year ISI Intervals, which began on March 1, 2010, and ended on February 29, 2020.

**VIII. Precedents**

**Note:** Industry requests for relief due to impracticability associated with limited weld examinations are common and are filed by all licensees. Some of the more recent NRC approvals of requested relief that are aligned with Reference 1 are:

- (1) NRC Safety Evaluation Report (SER) for Palo Verde Nuclear Generating Station, Unit 3 – Relief Request 63 for Impractical Examinations for the Third 10-Year Inservice Inspection Interval, (EPID L-2019-LLR-0002), Dated December 4, 2019 [ADAMS Accession No.: ML19331A608].
- (2) NRC Safety Evaluation Report (SER) for Grand Gulf Nuclear Station – Relief Request GG-ISI-023, Examination Coverage of Class 1 Piping and Vessel Welds, (EPID L-2018-LLR-0197), Dated October 11, 2019 [ADAMS Accession No.: ML19266A586].
- (3) NRC Safety Evaluation Report (SER) for St. Lucie Plant, Unit No. 1 – Safety Evaluation for Relief Request RR#15, Revision 0, Regarding Limited Piping Examinations, (EPID L-2019-LLR-0018), Dated September 30, 2019 [ADAMS Accession No.: ML19254B533].
- (4) NRC Safety Evaluation Report (SER) for River Bend Station, Unit 1 – Relief Request RBS-ISI-021 Proposed Alternative to 10 CFR 50.55a Examination Requirements for Third 10-Year Interval Volumetric Examinations, (EPID L-2018-LLR-0388), Dated September 27, 2019 [ADAMS Accession No.: ML19261A167].
- (5) NRC Safety Evaluation Report (SER) for Limerick Generating Station, Units 1 and 2 – Relief Request 13R-23, Third 10-Year Inservice Inspection Interval, Exelon Generation Company, LLC, (EPID L-2017-LLR-0098), Dated August 7, 2018 [ADAMS Accession No.: ML18192C172].
- (6) NRC Safety Evaluation Report (SER) for Cooper Nuclear Station – Request RI-21, Revision 1 – Request for Relief concerning Examinations for the Fourth 10-Year Inservice Inspection Interval (CAC No. MF9623; EPID L-2017-LLR-0026), Dated March 22, 2018 [ADAMS Accession No.: ML18064A102].

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- (7) NRC Safety Evaluation Report (SER) for Sequoyah Nuclear Plants, Units 1 and 2 – Relief Request No. 17-ISI-1 Regarding the Requirements of the American Society of Mechanical Engineers Code (CAC NOS. MF9690 and MF9691; EPID L-2017-LLR-0025), Dated January 26, 2018 [ADAMS Accession No.: ML18008A068]
- (8) NRC Safety Evaluation Report (SER) for Indian Point Nuclear Generating Unit No. 2 – Safety Evaluation Regarding Relief Requests IP2-ISI-RR-20, IP2-ISI-RR-21, and IP2-ISI-RR-22 Regarding the Fourth 10-Year Interval of Inservice Inspection Program (EPID L-2017-LLR-0052, L-2017-LLR-0050, and L-2017-LLR-0051), Dated January 23, 2018 [ADAMS Accession No.: ML18005A066]
- (9) NRC Safety Evaluation (SER) for North Anna Power Station, Unit No. 1 – Relief Request (RR) N1-I4-LMT-002, Limited Coverage Examinations for the Fourth Ten-Year Inspection Interval (CAC NO. MF9689, EPID L-2017-LLR-0024), Dated January 10, 2018 [ADAMS Accession No.: ML18005A109]
- (10) NRC Safety Evaluation Report (SER) for Watts Bar Nuclear Plant, Unit 2 – Relief from the Requirements of the American Society of Mechanical Engineers Code (CAC NO. MF8515; EPID L-2016-LLR-0003), Dated October 28, 2017 [ADAMS Accession No.: ML17292B295]

**IX References**

- 1. NRC presentation “Coverage Relief Requests”, Industry/NRC NDE Technical Information Exchange Public Meeting January 13-15, 2015, [ADAMS Accession No.: ML15013A266].
- 2. ASME Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, 2004 Edition.
- 3. ASME Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, Appendix VIII, Performance Demonstration for Ultrasonic Examination Systems, 2001 Edition.
- 4. ASME Code Case N-460, “Alternative Examination Coverage for Class 1 and Class 2 Welds Section XI, Division 1”.
- 5. NRC Regulatory Guide 1.147, Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1, Revision 19, Dated October 2019. [ADAMS Accession No.: ML19128A244].
- 6. ASME Code Case N-716, “Alternate Classification and Examination Requirements”.
- 7. NRC SER Donald C. Cook Nuclear Plant, Units 1 and 2 – “Evaluation of Inservice Inspection Relief Requests ISIR-4-01, -02, -03, and -04”, (TAC NO. ME4495 and ME4496), Dated March 30, 2011 [ADAMS Accession No. ML11073A084].
- 8. ASME Code Case N-716-1, “Alternate Classification and Examination Requirements”.

## **Attachment 1**

**American Electric Power (AEP)  
Donald C. Cook Nuclear Plant (CNP)**

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### **Introduction**

This attachment contains figures and tables as applicable that are used to depict the limitations and calculations used for obtained coverage, materials and product forms, with ultrasonic examination angles and wave modes used, any limited surface examinations and the examination results for the welds associated with this request for relief, including any applicable previous examination history used. The following Table 1 for CNP identifies the welds within the scope of this request and summarizes the extent of examination coverage achieved for each weld.

Many of the welds listed were examined with different CNP approved procedures and techniques during the span of the Fourth 10-Year ISI Interval. Therefore not all the coverage calculations used are identical, but they are based on the actual NDE data reports that were provided for the examinations completed.

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 2 1.1 / 4"-2-RC-28	1 B-D B3.110	Pressurizer <sup>1</sup> Upper Head Spray Nozzle- to-Vessel Weld	SA-508 Class 2 Mn-Mo 4.0" diameter Schedule 120	SA-533 Grade A (Class 2) 2.5" thick	83.3%	Single side exam due to Nozzle-to-Shell Configuration	Figures 1.1- 1, 1.1-2, and 1.1-3
Unit 2 1.2 / 6"-2-RC-22	1 B-D B3.110	Pressurizer <sup>1</sup> Upper Head Relief Nozzle- to-Vessel Weld	SA-508 Class 2 Mn-Mo 6.0" diameter Schedule 160	SA-533 Grade A (Class 2) 2.4" thick	86.7%	Single sided access due to the nozzle-to-head configuration with an existing recordable indication evaluated to be acceptable	Figures 1.2- 1, 1.2-2, 1.2- 3, and 1.2-4
Unit 2 1.3 / 6"-2-RC-25	1 B-D B3.110	Pressurizer <sup>1</sup> Upper Head Relief Nozzle- to-Vessel Weld	SA-508 Class 2 Mn-Mo 6.0" diameter Schedule 160	SA-533 Grade A (Class 2) 2.4" thick	86.7%	Single sided access due to the nozzle-to-head configuration with one previously recordable indication and one new indication evaluated to be acceptable	Figures 1.3- 1, 1.3-2, 1.3- 3, 1.3-4, and 1.3-5
Unit 2 1.4 / 6"-2-RC-26	1 B-D B3.110	Pressurizer <sup>1</sup> Upper Head Relief Nozzle- to-Vessel Weld	SA-508 Class 2 Mn-Mo 6.0" diameter Schedule 160	SA-533 Grade A (Class 2) 2.4" thick	86.7%	Single sided access due to the nozzle-to-head configuration	Figures 1.4- 1, 1.4-2, and 1.4-3
Unit 2 1.5 / 6"-2-RC-27	1 B-D B3.110	Pressurizer <sup>1</sup> Upper Head Relief Nozzle- to-Vessel Weld	SA-508 Class 2 Mn-Mo 6.0" diameter Schedule 160	SA-533 Grade A (Class 2) 2.4" thick	86.7%	Single sided access due to the nozzle-to-head configuration	Figures 1.5- 1, 1.5-2, and 1.5-3
Unit 2 1.6 / STM-21-FWN	2 C-B C2.21	Steam Generator <sup>1</sup> Feedwater Nozzle-to-Shell Weld	SA-508 Class 2 16.0" diameter Schedule 80	ASTM A-533 Grade A Class 1 3.7" thick	76.3%	Limitation due to non- removable insulation support ring and configuration	Figures 1.6- 1, 1.6-2, and 1.6-3



**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 1 1.7 / 1-RC-9-03S	1 R-A R1.20	Reactor Coolant Pipe to Elbow <sup>1</sup>	ASTM A-376 Grade TP 316 6.0" diameter Schedule 160	A-403 Grade WP 316 6.0" diameter Schedule 160	85.1% <sup>3</sup>	Limitation due to adjacent weld	Figures 1.7- 1, 1.7-2, and 1.7-3
Unit 1 1.8 / 1-SI-33-26F	1 R-A R1.20	Safety Injection Elbow to Branch Connection <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A- 182 Grade F316 10.0" diameter	50% <sup>3</sup>	Single sided access due to the branch connection configuration	Figures 1.8- 1, 1.8-2, and 1.8-3
Unit 1 1.9 / 1-RH-29-01F	1 R-A R1.20	Residual Heat Removal Branch Connection to Pipe <sup>1</sup>	ASTM A- 182 Grade F316 14.0" diameter	ASTM A-376 Grade TP 316 14.0" diameter Schedule 160	50% <sup>3</sup>	Single sided access due to the branch connection configuration	Figures 1.9- 1, 1.9-2, and 1.9-3
Unit 1 1.10 / 1-RC-1-11N	1 R-A R1.11	Chemical and Volume Control 3 in. Nozzle Branch Connection <sup>1</sup>	ASTM A- 182 Grade F316 3.0" diameter	ASTM A-351 Grade CF8M 27.5" inside diameter	50% <sup>3</sup>	Single sided access due to the branch connection configuration	Table 1.10-1, Figures 1.10- 1, 1.10-2, 1.10-3, and 1.10-4
Unit 1 1.11 / 1-RC-1-14N	1 R-A R1.20	Reactor Coolant 1-1/2 in. Nozzle Branch Connection <sup>1</sup>	ASTM A-182 Grade F316 1.5" diameter	ASTM A-351 Grade CF8M 27.5" inside diameter	50% UT Coverage, but only requires a VT-2 per N- 716-1	Single sided access due to the branch connection configuration	Table 1.11-1, Figures 1.11- 1, 1.11-2, 1.11-3, and 1.11-4
Unit 1 1.12 / 1-RC-11-12S	1 R-A R1.20	Reactor Coolant Elbow to Pipe <sup>1</sup>	ASTM A-403 Grade WP 316 4.0" diameter Schedule 120	ASTM A-376 Grade TP 316 4.0" diameter Schedule 120	50% <sup>3</sup>	Single sided access due to a non-removable pipe clamp	Table 1.12-1, Figures 1.12- 1, 1.12-2, 1.12-3, and 1.12-4
Unit 1 1.13 / 1-SI-29-20S	1 R-A R1.16	Safety Injection Elbow to Tee <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	61.45% <sup>3</sup>	Limited coverage due to configuration of tee	Table 1.13-1, Figures 1.13- 1, 1.13-2, 1.13-3, and 1.13-4

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 1 1.14 / 1-SI-29-23S	1 R-A R1.16	Safety Injection Tee to Pipe <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A-376 Grade TP 316 10.0" diameter Schedule 140	50% <sup>3</sup>	Single sided access due to configuration of tee	Table 1.14-1, Figures 1.14- 1, 1.14-2, 1.14-3, and 1.14-4
Unit 1 1.15 / 1-SI-29-26F	1 R-A R1.20	Safety Injection Elbow to Branch Connection <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A-182 Grade F316 10.0" diameter	50% <sup>3</sup>	Single sided access due to branch configuration	Table 1.15-1, Figures 1.15- 1, 1.15-2, 1.15-3, and 1.15-4
Unit 1 1.16 / 1-SI-31-21S	1 R-A R1.16	Safety Injection Elbow to Tee <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	50% <sup>3</sup>	Single sided access due to configuration of tee	Table 1.16-1, Figures 1.16- 1, 1.16-2, 1.16-3, and 1.16-4
Unit 1 1.17 / 1-SI-31-24S	1 R-A R1.16	Safety Injection Tee to Pipe <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A-376 Grade TP 316 10.0" diameter Schedule 140	50% <sup>3</sup>	Single sided access due to configuration of tee	Table 1.17-1, Figures 1.17- 1, 1.17-2, 1.17-3, and 1.17-4
Unit 1 1.18 / 1-SI-31-27F	1 R-A R1.20	Safety Injection Elbow to Branch Connection <sup>1</sup>	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A-182 Grade F316 10.0" diameter	50% <sup>3</sup>	Single Sided access due to branch connection configuration	Table 1.18-1, Figures 1.18- 1, 1.18-2, 1.18-3, and 1.18-4
Unit 1 1.19 / 1-SI-51-22F	1 R-A R1.20	Safety Injection Elbow to Tee <sup>1</sup>	ASTM A-403 Grade WP 304 3.0" diameter Schedule 160	ASTM A-403 Grade WP 304 3.0" diameter Schedule 160	50% <sup>3</sup>	Single Sided access due to configuration of tee	Table 1.19-1, Figures 1.19- 1, 1.19-2, 1.19-3, and 1.19-4

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 1 1.20 / 1-SI-51-27F	1 R-A R1.20	Safety Injection Tee to Pipe <sup>1</sup>	ASTM A-403 Grade WP 304 3.0" diameter Schedule 160	ASTM A-376 Grade TP 304 3.0" diameter Schedule 160	50% <sup>3</sup>	Single Sided access due to configuration of tee	Table 1.20-1, Figures 1.20- 1, 1.20-2, 1.20-3, and 1.20-4
Unit 1 1.21 / 1-CS-96-60F	1 R-A R1.11	Chemical and Volume Control Elbow to Branch Connection <sup>1</sup>	ASTM A-403 Grade WP 304 3.0" diameter Schedule 160	ASTM A- 182 Grade F316 3.0" diameter	50% <sup>3</sup>	Single Sided access due to branch connection configuration	Table 1.21-1, Figures 1.21- 1, 1.21-2, 1.21-3, and 1.21-4
Unit 2 1.22 / 2-RC-17-06N	1 R-A R1.11	Reactor Coolant 3-IN Nozzle Branch Connection <sup>1</sup>	ASTM A- 182 Grade F316 3.0" diameter	ASTM A-351 Grade CF8M 27.5" inside diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Figures 1.22- 1, 1.22-2 and 1.22-3
Unit 2 1.23 / 2-RC-17-09N	1 R-A R1.20	Reactor Coolant 1-1/2- IN Nozzle Branch Connection <sup>1</sup>	ASTM A- 182 Grade F316 1.5" diameter	ASTM A-351 Grade CF8M 27.5" inside diameter	50% UT Coverage, but only requires a VT-2 per N- 716-1	Single sided access due to branch connection configuration	Figures 1.23- 1, 1.23-2, and 1.23-3
Unit 2 1.24 / 2-SI-63-17	1 R-A R1.11/16	Safety Injection Pipe to Valve <sup>1</sup>	ASTM A-376 Grade TP 316 6.0" diameter Schedule 160	ASTM A-351 Grade CF8M 6.0" diameter Schedule 160	70% <sup>3</sup>	Single sided access due to configuration	Figures 1.24- 1, 1.24-2, and 1.24-3
Unit 2 1.25 / 2-RH-33-01	1 R-A R1.20	Residual Heat Removal Tee to Pipe <sup>1</sup>	ASTM A- 182 Grade F316 14.0" diameter	ASTM A-376 Grade TP 316 14.0" diameter Schedule 160	50% <sup>3</sup>	Single sided access due to configuration	Table 1.25-1, Figures 1.25- 1, 1.25-2, 1.25-3, 1.25- 4 and 1.25-5
Unit 2 1.26 / 2-RPV-D	1 B-A B1.11	RPV Lower Shell to Lower Head	ASTM A-533 Gr. B Class 1 Thickness tapered from 8.31" to 5.38"	ASTM A-533 Gr. B Class 1 5.38" thick	80.56%	Limitations due to six Core Support Pads	Table 1.26-1, Figures 1.26- 1, 1.26-2, 1.26-3 and 1.26-4

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 2 1.27 / 2-RPV-E	1 B-A B1.21	RPV Lower Head Dollar Plate Weld	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	47.61%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.27-1, Figures 1.27- 1, 1.27-2, 1.27-3, 1.27- 4 and 1.27-5
Unit 2 1.28 / 2-LHM-01	1 B-A B1.22	RPV Lower Head Meridional Weld at 26 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	66.30%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.28-1, Figures 1.28- 1, 1.28-2 and 1.28-3
Unit 2 1.29 / 2-LHM-02	1 B-A B1.22	RPV Lower Head Meridional Weld at 77 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	83.44%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.29-1, Figures 1.29- 1, 1.29-2, 1.29-3, 1.29- 4 and 1.29-5
Unit 2 1.30 / 2-LHM-03	1 B-A B1.22	RPV Lower Head Meridional Weld at 129 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	73.09%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.30-1, Figures 1.30- 1, 1.30-2, 1.30-3, 1.30- 4 and 1.30-5
Unit 2 1.31 / 2-LHM-04	1 B-A B1.22	RPV Lower Head Meridional Weld at 180 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	71.03%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.31-1, Figures 1.31- 1, 1.31-2 and 1.31-3
Unit 2 1.32 / 2-LHM-05	1 B-A B1.22	RPV Lower Head Meridional Weld at 231 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	67.15%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.32-1, Figures 1.32- 1, 1.32-2 and 1.32-3

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 2 1.33 / 2-LHM-06	1 B-A B1.22	RPV Lower Head Meridional Weld at 283 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	83.69%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.33-1, Figures 1.33- 1, 1.33-2 and 1.33-3
Unit 2 1.34 / 2-LHM-07	1 B-A B1.22	RPV Lower Head Meridional Weld at 334 Deg.	ASTM A-533 Gr. B Class 1 5.38" thick	ASTM A-533 Gr. B Class 1 5.38" thick	84.46%	Limitations due to Bottom Mounted Instrument Tubes	Table 1.34-1, Figures 1.34- 1, 1.34-2 and 1.34-3
Unit 2 1.35 / 2-SI-58-23	1 R-A R1.20	Safety Injection Elbow to Branch Connection	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A- 182 Grade F316 10.0" diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Table 1.35-1, Figures 1.35- 1, 1.35-2, 1.35-3, 1.35- 4, 1.35-5 and 1.35-6
Unit 2 1.36 / 2-SI-59-24	1 R-A R1.20	Safety Injection Valve to Elbow	ASTM A-351 Grade CF8 10.0" diameter Schedule 140	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	50% <sup>3</sup>	Single sided access due to valve configuration	Table 1.36-1, Figures 1.36- 1, 1.36-2, 1.36-3, 1.36- 4, 1.36-5 and 1.36-6
Unit 2 1.37 / 2-SI-59-25	1 R-A R1.20	Safety Injection Elbow to Branch Connection	ASTM A-403 Grade WP 316 10.0" diameter Schedule 140	ASTM A- 182 Grade F316 10.0" diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Table 1.37-1, Figures 1.37- 1, 1.37-2, 1.37-3, 1.37- 4, 1.37-5 and 1.37-6

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

<b>Unit Seq. Number / Weld Identification Number</b>	<b>Class, Category and Item No.</b>	<b>Weld Description</b>	<b>Material 1 and Product Form</b>	<b>Material 2 and Product Form</b>	<b>Examination Code Coverage Obtained<sup>2</sup></b>	<b>Examination Limitations and Results</b>	<b>Applicable Tables and Figures</b>
Unit 2 1.38 / 2-SI-60-31	1 R-A R1.20	Safety Injection Valve to Elbow	ASME SA-351 Grade CF8M 6.0" diameter Schedule 160	ASTM A-403 Grade WP 316 Schedule 160 6.0" diameter	50% <sup>3</sup>	Single sided access due to valve configuration	Table 1.38-1, Figures 1.38- 1, 1.38-2, 1.38-3, 1.38- 4, 1.38-5 and 1.38-6
Unit 2 1.39 / 2-SI-60-32	1 R-A R1.20	Safety Injection Elbow to Branch Connection	ASTM A-403 Grade WP 316 6.0" diameter Schedule 160	ASTM A- 182 Grade F316 6.0" diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Table 1.39-1, Figures 1.39- 1, 1.39-2, 1.39-3, 1.39- 4, 1.39-5 and 1.39-6
Unit 2 1.40 / 2-SI-61-15	1 R-A R1.20	Safety Injection Elbow to Branch Connection	ASTM A-403 Grade WP 316 6.0" diameter Schedule 160	ASTM A- 182 Grade F316 6.0" diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Table 1.40-1, Figures 1.40- 1, 1.40-2, 1.40-3, 1.40- 4, 1.40-5 and 1.40-6
Unit 2 1.41 / 2-SI-62-32	1 R-A R1.20	Safety Injection Elbow to Branch Connection	ASTM A-403 Grade WP 316 6.0" diameter Schedule 160	ASTM A- 182 Grade F316 6.0" diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Table 1.41-1, Figures 1.41- 1, 1.41-2, 1.41-3, 1.41- 4, 1.41-5 and 1.41-6
Unit 2 1.42 / 2-CS-120-13	1 R-A R1.11	Chemical and Volume Control Elbow to Branch Connection	ASTM A-403 Grade WP 304 3.0" diameter Schedule 160	ASTM A- 182 Grade F316 3.0" diameter	50% <sup>3</sup>	Single sided access due to branch connection configuration	Table 1.42-1, Figures 1.42- 1, 1.42-2, 1.42-3, 1.42- 4, 1.42-5, 1.42-6 and 1.42-7

**TABLE 1 – CNP UNITS 1 AND 2 WELDS WITH LIMITED EXAMINATIONS**

Unit Seq. Number / Weld Identification Number	Class, Category and Item No.	Weld Description	Material 1 and Product Form	Material 2 and Product Form	Examination Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
Unit 2 1.43 / 14"-2-RC-21	1 B-D B3.110	Pressurizer <sup>1</sup> Lower Head Surge Nozzle- to-Vessel Weld	SA-508 Class 2 Mn-Mo 14.0" diameter Schedule 160	SA-533 Grade A (Class 2) 3.0" thick	65.2%	Single sided access due to the nozzle-to-head configuration and adjacent heater sleeves	Table 1.43-1, Figures 1.43- 1, 1.43-2, 1.43-3 and 1.43-4
Unit 1 1.44 / 1-PRZ-26	1 B-K B10.10	Pressurizer Lower Head to Support Skirt Weld	SA-216 Grade WCC 1.5" thick	SA-516 Grade 70 1.5" thick	88.2%	Portion of weld inaccessible due to adjacent duct	Figures 1.44- 1, 1.44-2 and 1.44-3

NOTES: 1. Containment RCS Leakage Detection Applies  
2. Ultrasonic (UT) Examination, Phased Array UT Examination (PAUT) and Surface Examination by Liquid Penetrant (PT) or Magnetic Particle (MT).  
3. Acceptable limitation per Evaluation of Change in Risk for N-716-1.

## **1.1    Weld 4"-2-RC-28 – Pressurizer Upper Head Spray Nozzle-to-Vessel Weld**

Weld 4"-2-RC-28 was UT examined in Inspection Period 2 during the U2C21 refueling outage in 2013. The NDE data came from UT Report No. U2-VE-13-009. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-7(b). The corresponding CRV as shown on that Figure is A-B-C-D-E-F-G-H. The UT examination was limited by the configuration of the Nozzle-to-Shell resulting in total UT coverage of **83.3%** as described in Figure 1.1-2. A photograph of weld 4"-2-RC-28 is provided in Figure 1.1-3.

No recordable indications were detected during this scan.

Section XI Appendices and Supplements used for this UT examination were Appendix I and Article 4 of ASME Section V.

**Note:** No laminations were reported on the Pressurizer Head that could interfere with the angle beam examinations performed on Weld 4"-2-RC-28.



# 1.1 Weld 4"-2-RC-28 – Pressurizer Upper Head Spray Nozzle-to-Vessel Weld

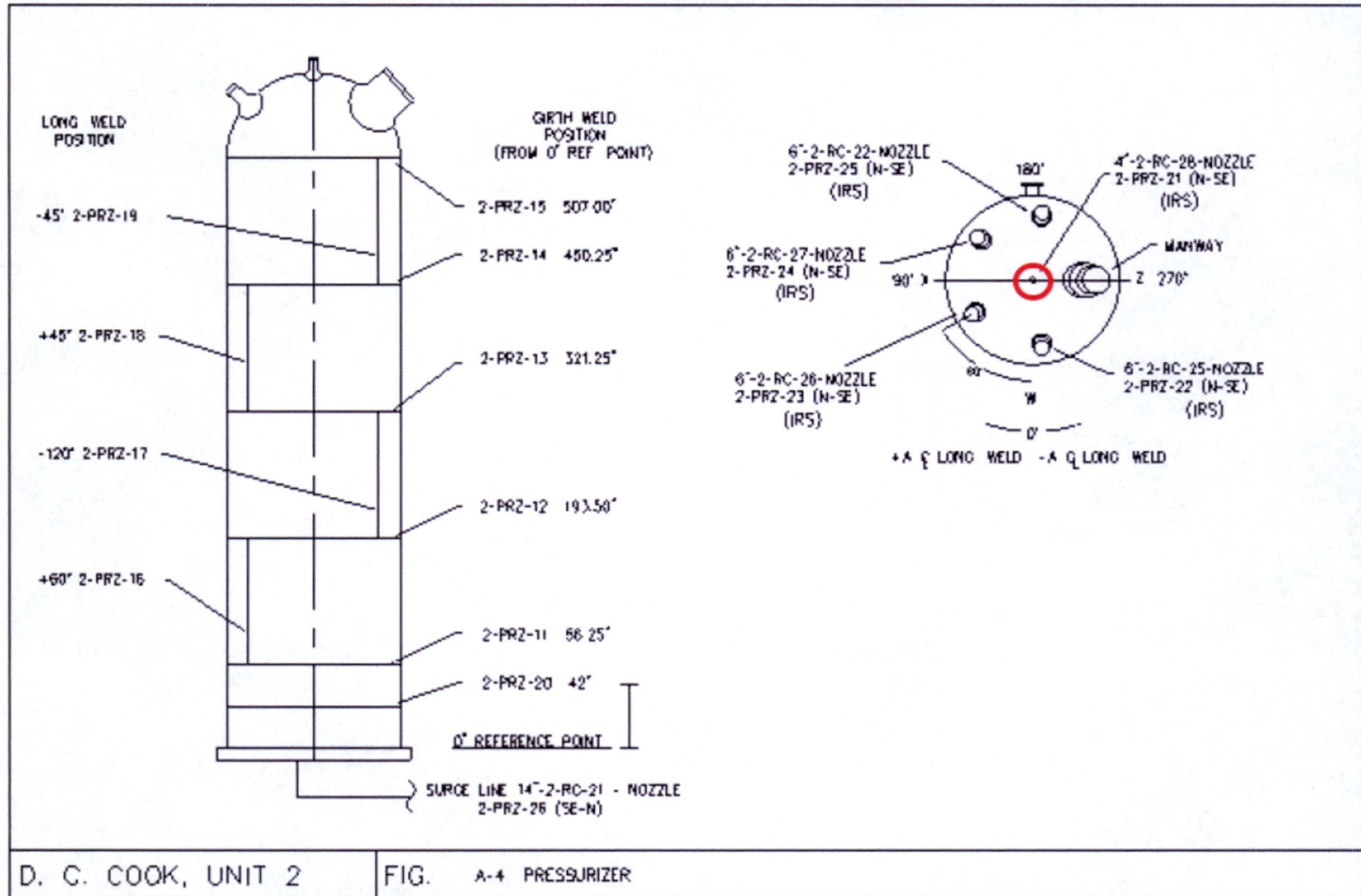
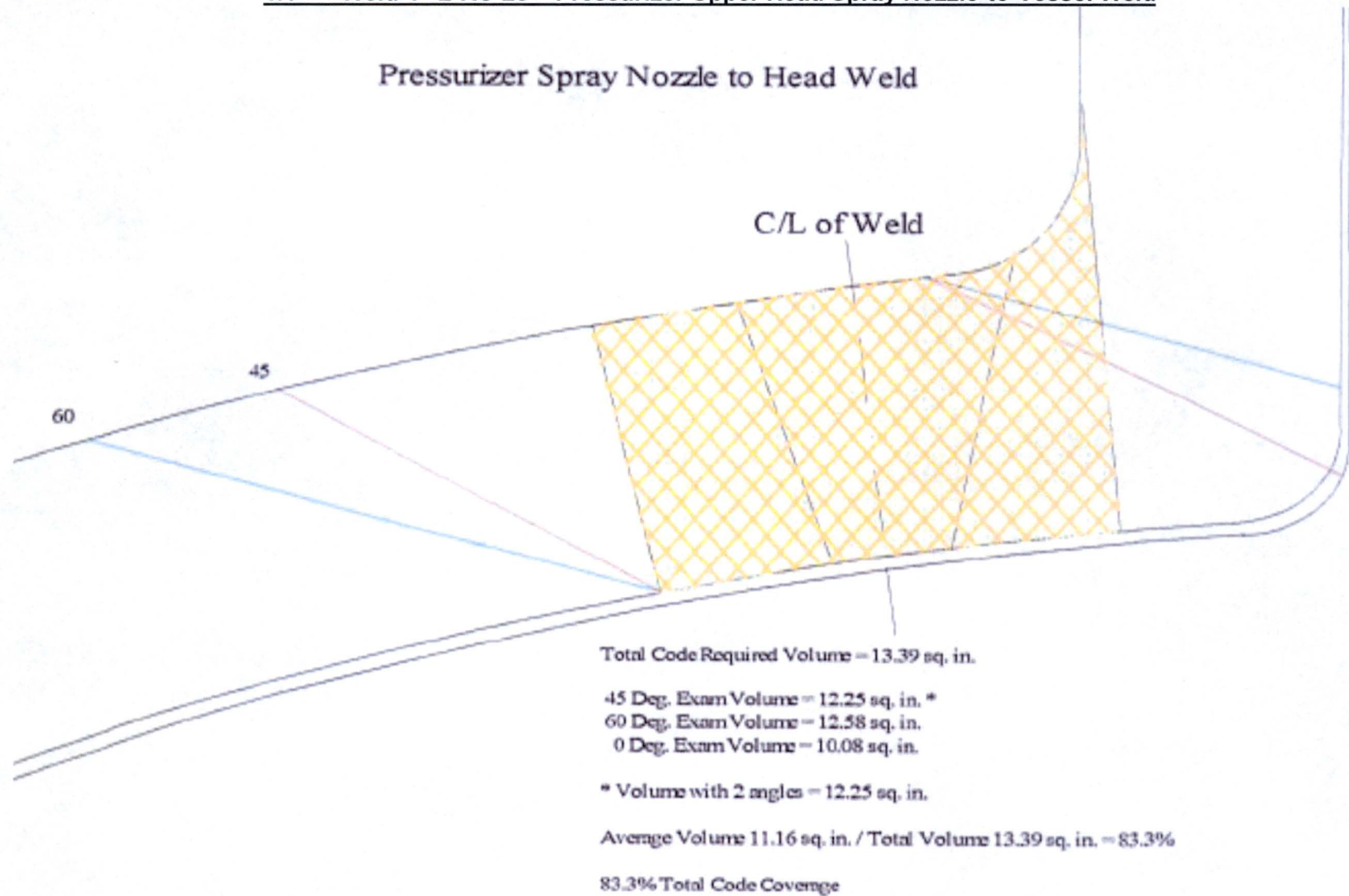


Figure 1.1-1 Weld 4"-2-RC-28 (Extracted from Reference DRAWING 2A-4)

**1.1 Weld 4"-2-RC-28 – Pressurizer Upper Head Spray Nozzle-to-Vessel Weld**



**Figure 1.1-2 Weld 4"-2-RC-28 Scan Coverage and Scan Summary**



**1.1 Weld 4"-2-RC-28 – Pressurizer Upper Head Spray Nozzle-to-Vessel Weld**



**Figure 1.1-3 Weld 4"-2-RC-28 Component Photograph**

## **1.2     Weld 6"-2-RC-22 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**

Weld 6"-2-RC-22 was UT examined in Inspection Period 1, during the U2C20 refueling outage in 2012. The NDE data came from UT Report No. U2-VE-12-004. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-7(b). The corresponding CRV as shown on that Figure is A-B-C-D-E-F-G-H. The UT examination was limited by the configuration of the nozzle to head resulting in total UT coverage of **86.7%** as described in Figure 1.2-3. A photograph of weld 6"-2-RC-22 is provided in Figure 1.2-4.

One previously recordable indication was identified using the 45° Shear wave 2.25 Mhz. transducer during this examination. Follow up scans using the 45° Shear wave 5.0 Mhz. transducer were performed. This indication was evaluated as acceptable per Table IWB-3512-1 (Figure 1.2-2).

Section XI Appendices and Supplements used for this UT examination were Appendix I and Article 4 of ASME Section V.

**Note:** No laminations were reported on the Pressurizer Head that could interfere with the angle beam examinations performed on weld 6"-2-RC-22.



## 1.2 Weld 6"-2-RC-22 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

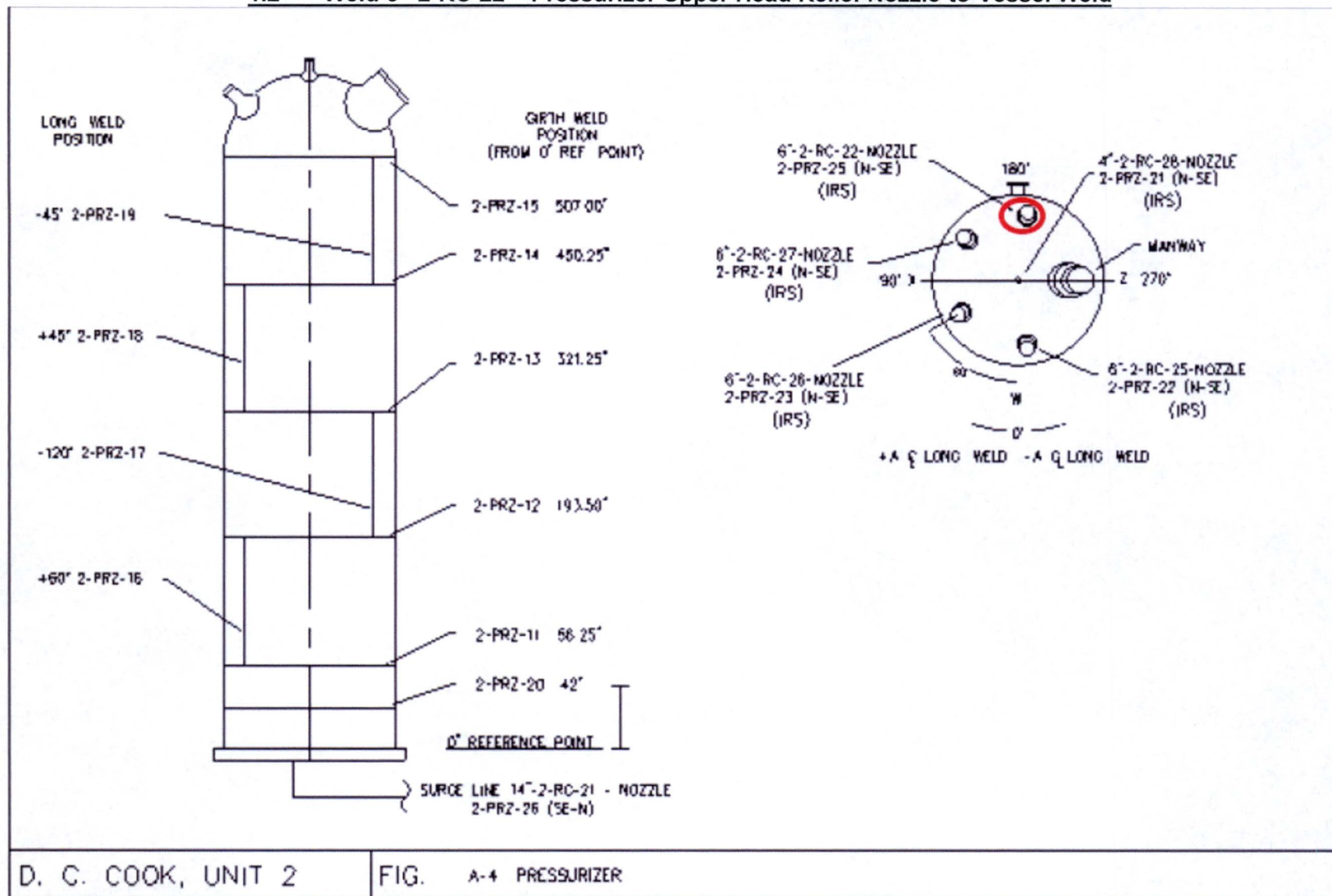


Figure 1.2-1 Weld 6"-2-RC-22 (Extracted from Reference DRAWING 2A-4)

## 1.2 Weld 6"-2-RC-22 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

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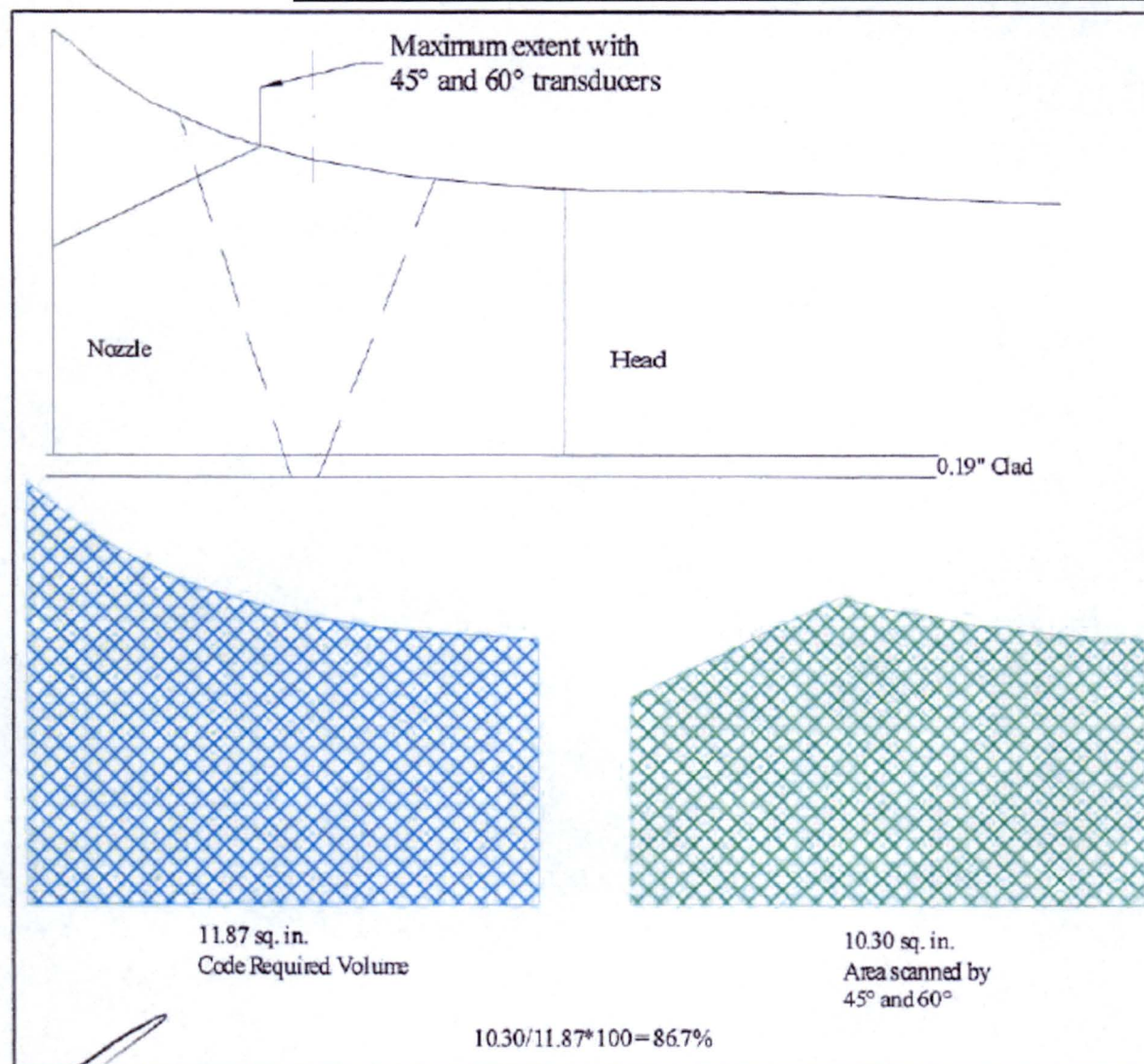
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WELD		INDICATION	
Weld 6"-2-RC-22		Indication #1 [45° 5 MHz]	
CODE CRITERIA			
ASME B31.1; Section XI, 2004 edition		IWB-3512	
ITEM	ACTUAL VALUE	ROUNDED VALUE (if used)	COMMENTS
<b>COMPONENT/WELD APPLICABLE DIMENSIONS</b>			
Thickness	2.4"		As measured by UT
Cladding (if applicable)	0.19"		Nominal per drawing
Thickness to use for calculations of t	2.21"	2.2"	Thickness - Cladding
<b>FLAW CHARACTERIZATION</b>			
Flaw minimum depth from OD	1.73		
Flaw maximum depth from OD	1.95		
Flaw through-wall depth = 2a or 2d	0.22	0.2	
Closest distance of flaw to either surface = s	0.26		
0.4d	0.04 <del>0.88</del>		Used to determine if flaw is surface or subsurface
Surface or Subsurface	Subsurface		If s < 0.4d the flaw is surface, If surface, a = 2d + s, If Subsurface, a = 1/2 of 2a or 2d
Calculated a	0.11	0.1	
Flaw start L1	30.75		
Flaw stop L2	31.75		
Flaw length = l	0.5		
<b>ASPECT RATIO &amp; a/t% DETERMINATION</b>			
Aspect Ratio, a/E	0.2		If a/E > 0.5 use 0.5
a/t% (a/t * 100)	4.54%	4.5%	
Surface proximity value y = (s/a)	2.6	1	Y > 1, use Y = 1
<b>LINEAR INTERPOLATION (if needed)</b>			
Lesser aspect ratio a/E			
Greater aspect ratio a/E			
Lesser a/t%			
Greater a/t%			
Greater a/E - lesser a/E = A			
a/E - lesser a/E = B			
Greater a/t% - lesser a/t% = C			
(B x C) / A = value to add to Lesser a/t%			
Interpolated a/t%			
<b>RESULTS</b>			
Table IWB-3512-1 acceptance limits			
	Surface	Subsurface	
Aspect Ratio = 0.5	N/A	5.7%	Y = 1
Interpolated	N/A	N/A	
Actual a/t%	N/A	4.5%	Acceptable to Table IWB-3512-1
Comments: Flaw measurements obtained with 45° 5.0 MHz.			
Evaluation Performed By: T.G. Carraher		Level: III	Date: 04/02/12
Reviewed: E. L. McClair		Level: III	Date: 4/2/12

Figure 1.2-2 Weld 6"-2-RC-22 Indication #1 (Table IWB-3512-1 Calculation)



1.2 Weld 6"-2-RC-22 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld



**Limited examination:**

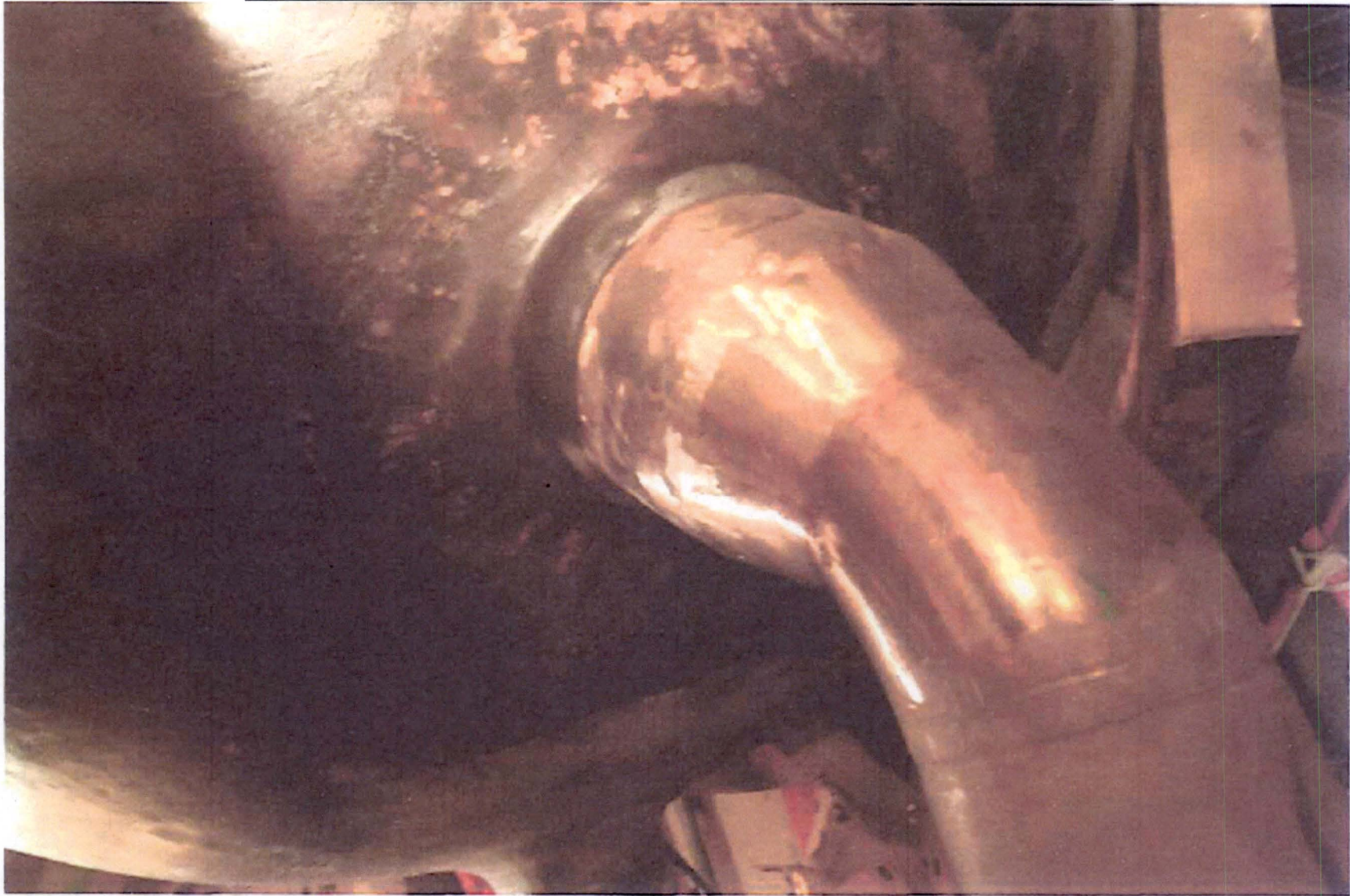
Single sided access due to  
nozzle to head configuration  
86.7% Code Required  
Volume Achieved.

Scale 2:1

Figure 1.2-3 Weld 6"-2-RC-22 Examination Location and Coverage Map



**1.2 Weld 6"-2-RC-22 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**



**Figure 1.2-4 Weld 6"-2-RC-22 Component Photograph**



### **1.3     Weld 6"-2-RC-25 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**

Weld 6"-2-RC-25 was UT examined in Inspection Period 1, during the U2C20 refueling outage in 2012. The NDE data came from UT Report No. U2-VE-12-005. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-7(b). The corresponding CRV as shown on that Figure is A-B-C-D-E-F-G-H. The UT examination was limited by the configuration of the nozzle to head resulting in total UT coverage of **86.7%** as described in Figure 1.3-4. A photograph of weld 6"-2-RC-25 is provided in Figure 1.3-5.

One previously recordable indication was detected with the 45° and 60° Shear wave 2.25 Mhz. transducers during this examination. A second indication was detected using the 60° Shear wave 2.25 Mhz. transducer. A follow up scan using a 45° and 60° 5.0 Mhz. transducers were used in the area of the indications. Both of these indications were found acceptable per Table IWB-3512-1 (Figures 1.3-2 and 1.3-3).

Section XI Appendices and Supplements used for this UT examination were Appendix I and Article 4 of Section V.

**Note:** No laminations were reported on the Pressurizer Head that could interfere with the angle beam examinations performed on weld 6"-2-RC-25.

### 1.3 Weld 6"-2-RC-25 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

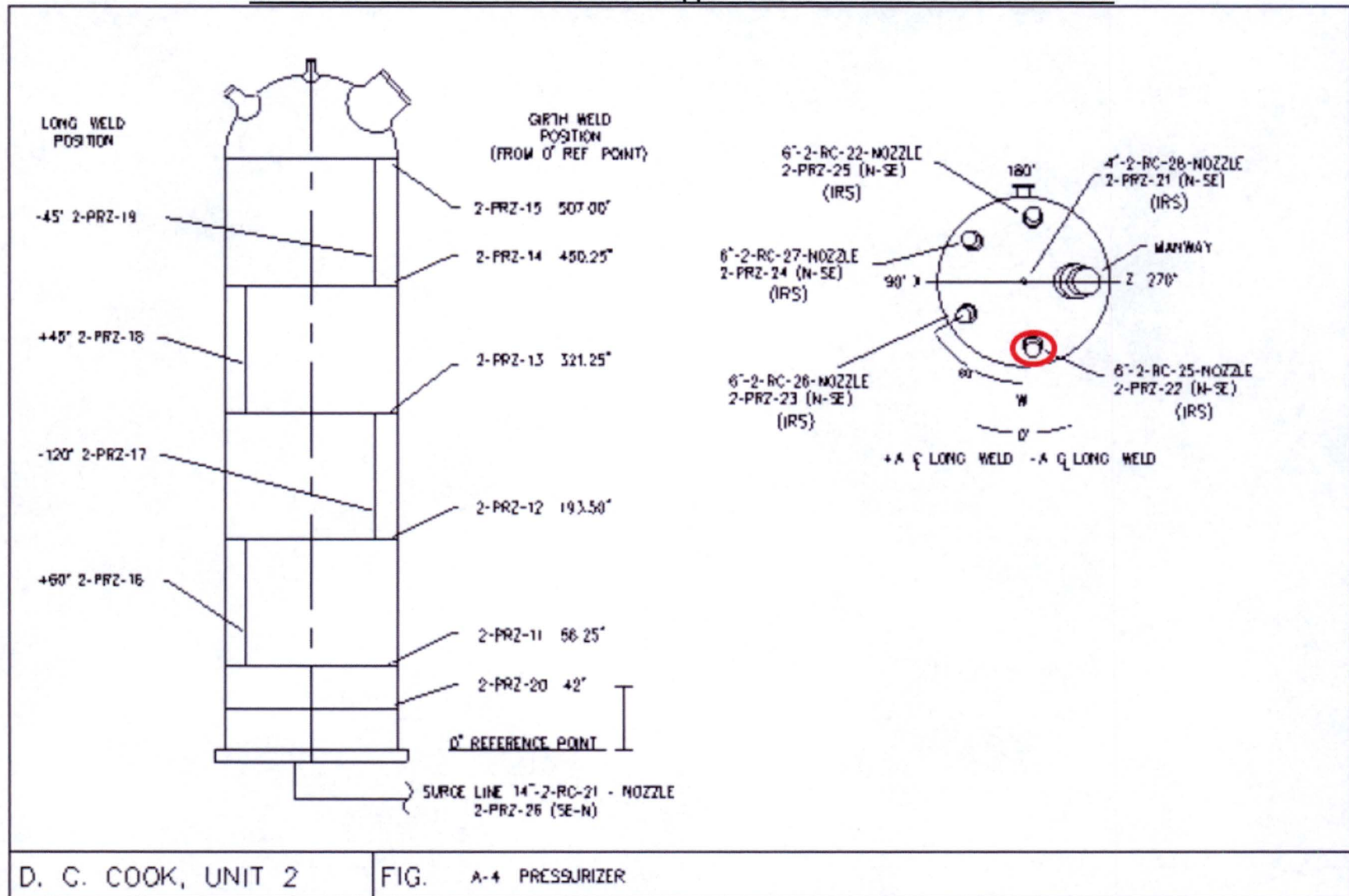


Figure 1.3-1 Weld 6"-2-RC-25 (Extracted from Reference DRAWING 2A-4)



### 1.3 Weld 6"-2-RC-25 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

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WELD		INDICATION	
Weld 6"-2-RC-25		Indication #1 (60° 5.0 MHz)	
CODE CRITERIA			
ASME B&PV; Section XI, 2014 edition		IWB-3512	
ITEM	ACTUAL VALUE	BOUNDED VALUE (if used)	COMMENTS
<b>COMPONENT/WELD APPLICABLE DIMENSIONS</b>			
Thickness	2.4"		As measured by UT
Cladding (if applicable)	0.19"		Nominal per drawing
Thickness to use for calculations of t	2.21"	2.2"	Thickness - Cladding
<b>FLAW CHARACTERIZATION</b>			
Flaw minimum depth from OD	1.7		
Flaw maximum depth from OD	1.9		
Flaw through-wall depth = 2a or 2d	0.2		
Closest distance of flaw to either surface = s	0.31		
0.4d	0.04 0.08	REF 1/20/2013	Used to determine if flaw is surface or subsurface
Surface or Subsurface	Subsurface		If s is < 0.4d the flaw is surface, if surface, a = 2d + s, if Subsurface, a = 1/2 of 2a or 2d
Calculated a	0.1		
Flaw start L1	0.25		
Flaw stop L2	0.75		
Flaw length = L	0.5		
<b>ASPECT RATIO &amp; a/t% DETERMINATION</b>			
Aspect Ratio, a/b	0.2		If a/b > 0.5 use 0.5
a/t% (a/t * 100)	4.54%	4.5%	
Surface proximity value y = (s/a)	3.1		Y > 1.0, use Y = 1.0
<b>LINEAR INTERPOLATION (if needed)</b>			
Lesser aspect ratio a/b			
Greater aspect ratio a/b			
Lesser a/t%			
Greater a/t%			
Greater a/b - lesser a/b = A			
a/b - lesser a/b = B			
Greater a/t% - lesser a/t% = C			
(B x C) / A = value to add to Lesser a/t%			
Interpolated a/t%			
<b>RESULTS</b>			
Table IWB-3512-1 acceptance limits			
	Surface	Subsurface	
Aspect Ratio = 0.2	N/A	5.7%	Y = 1
Interpolated	N/A	N/A	
Actual a/t%	N/A	4.5%	Acceptable to Table IWB-3512-1
Comments: Flow measurements obtained with 60° 5.0 MHz Shear wave transducer.			
Evaluation Performed By: T.G. Carruth <i>TGC</i> FOR		Level: III	Date: 04/02/12
Reviewed: E. L. McClain <i>ELM</i>		Level: III	Date: 4/2/12

Figure 1.3-2 Weld 6"-2-RC-25 Indication #1 (Table IWB-3512-1 Calculation)



### D. C. Cook Nuclear Plant Outage U2C20

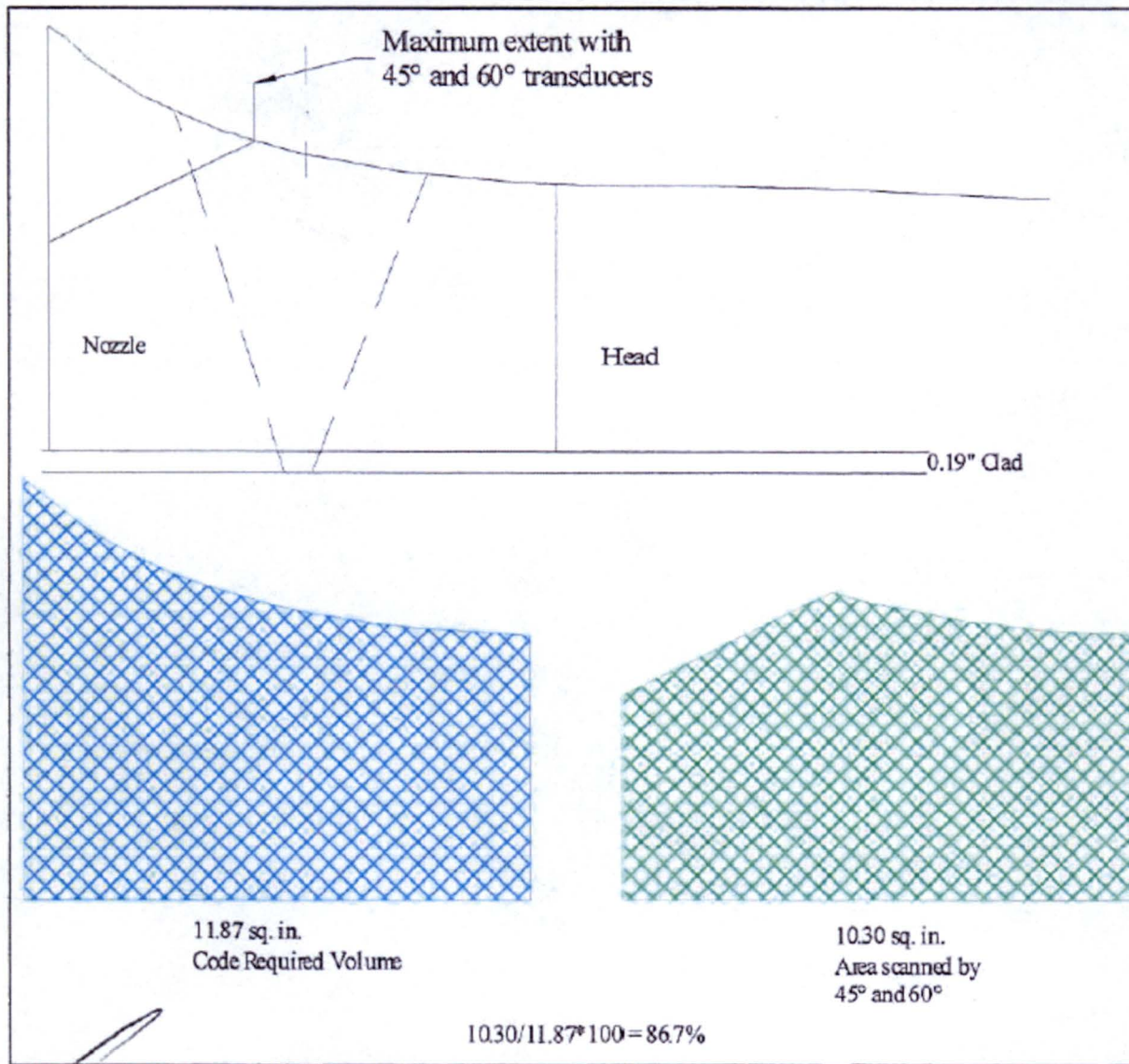


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**Figure 1.3-3 Weld 6"-2-RC-25 Indication #2 (Table IWB-3512-1 Calculation)**

1.3 Weld 6"-2-RC-25 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld



**Limited examination:**

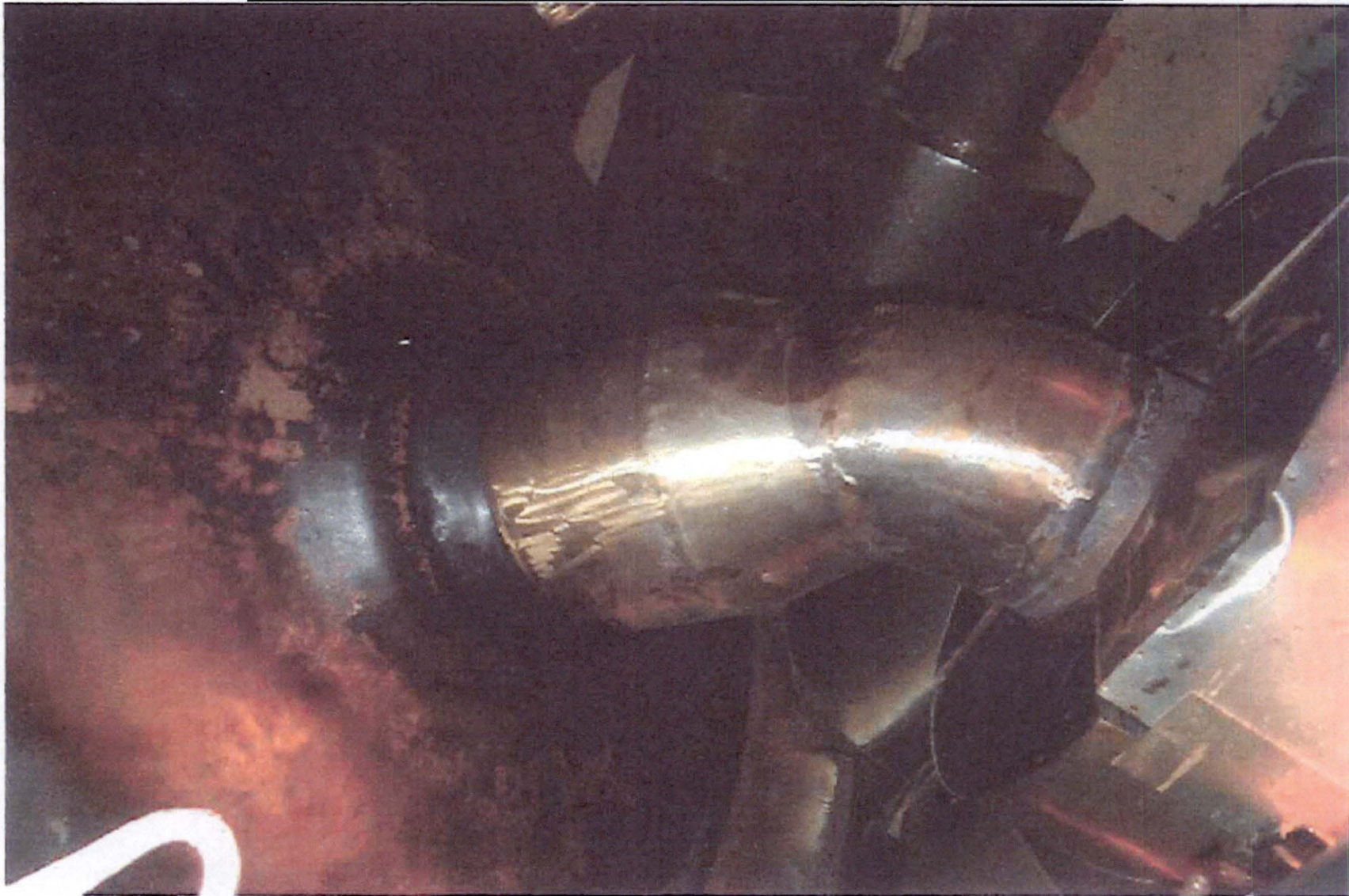
Single sided access due to  
nozzle to head configuration  
86.7% Code Required  
Volume Achieved.

Scale 2:1

Figure 1.3-4 Weld 6"-2-RC-25 Examination Location and Coverage Map



**1.3 Weld 6"-2-RC-25 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**



**Figure 1.3-5 Weld 6"-2-RC-25 Component Photograph**

#### **1.4     Weld 6"-2-RC-26 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**

Weld 6"-2-RC-26 was UT examined in Inspection Period 1, during the U2C20 refueling outage in 2012. The NDE data came from UT Report No. U2-VE-12-006. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-7(b). The corresponding CRV as shown on that Figure is A-B-C-D-E-F-G-H. The UT examination was limited by the configuration of the nozzle to head resulting in total UT coverage of **86.7%** as described in Figure 1.4-2. A photograph of weld 6"-2-RC-26 is provided in Figure 1.4-3.

There were no recordable indications identified during this examination.

Section XI Appendices and Supplements used for this UT examination were Appendix 1 and Article 4 of Section V.

**Note:** No laminations were reported on the Pressurizer Head that could interfere with the angle beam examinations performed on weld 6"-2-RC-26.



# 1.4 Weld 6"-2-RC-26 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

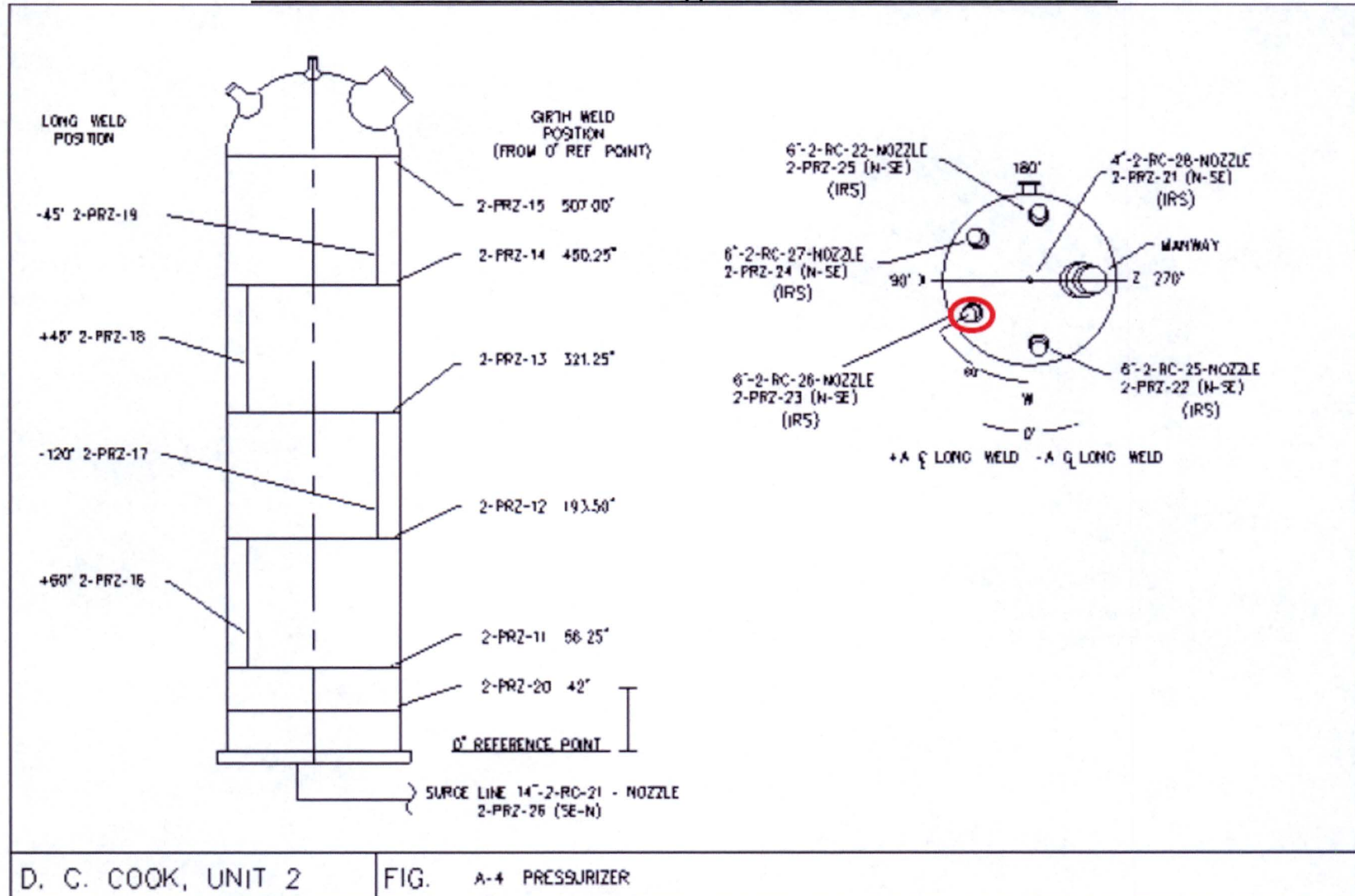
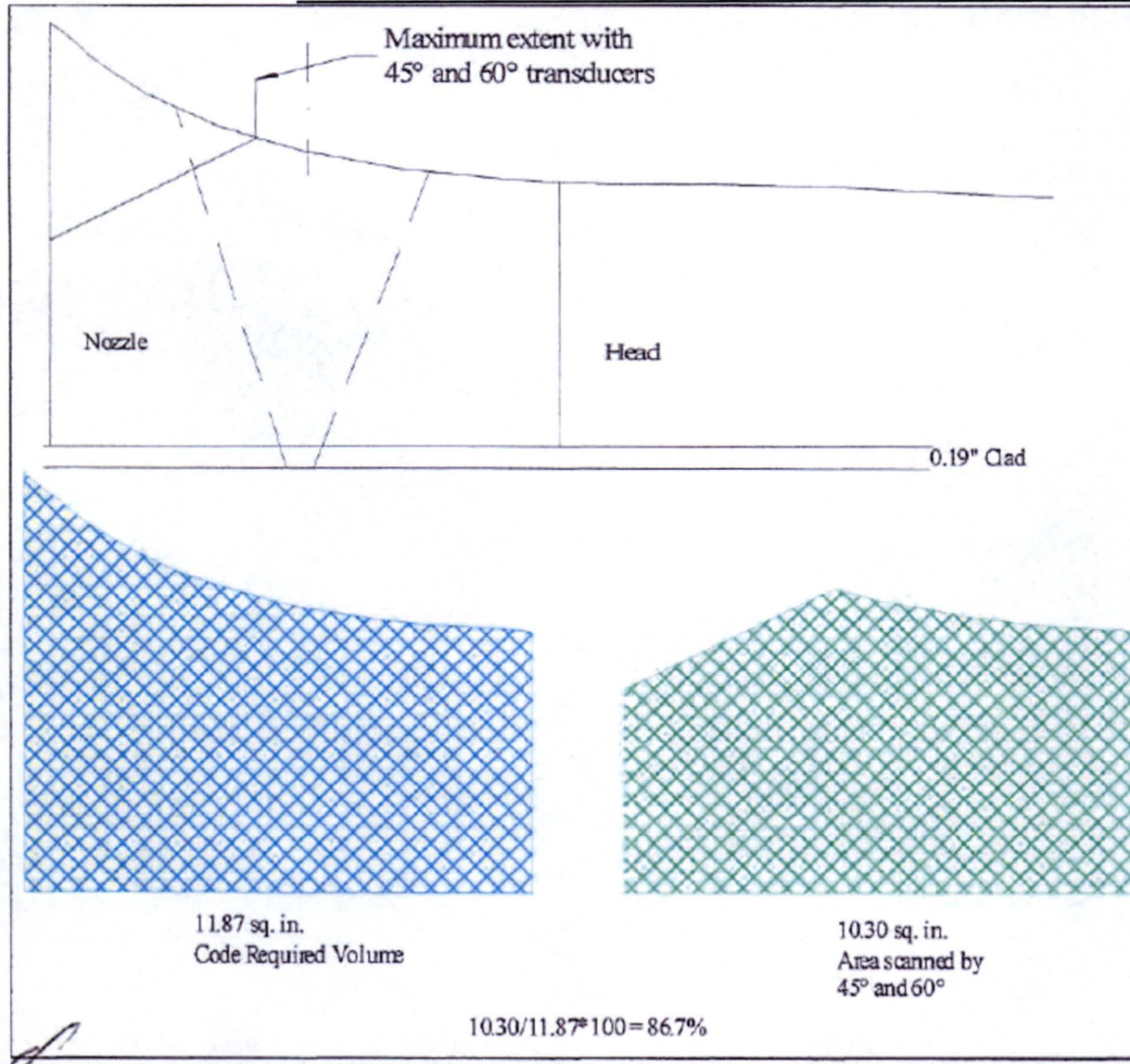


Figure 1.4-1 Weld 6"-2-RC-26 (Extracted from Reference DRAWING 2A-4)



1.4 Weld 6"-2-RC-26 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld



**Limited examination:**

Single sided access due to  
nozzle to head configuration  
86.7% Code Required  
Volume Achieved.

Scale 2:1

Figure 1.4-2 Weld 6"-2-RC-26 Examination Location & Coverage Map



1.4 Weld 6"-2-RC-26 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

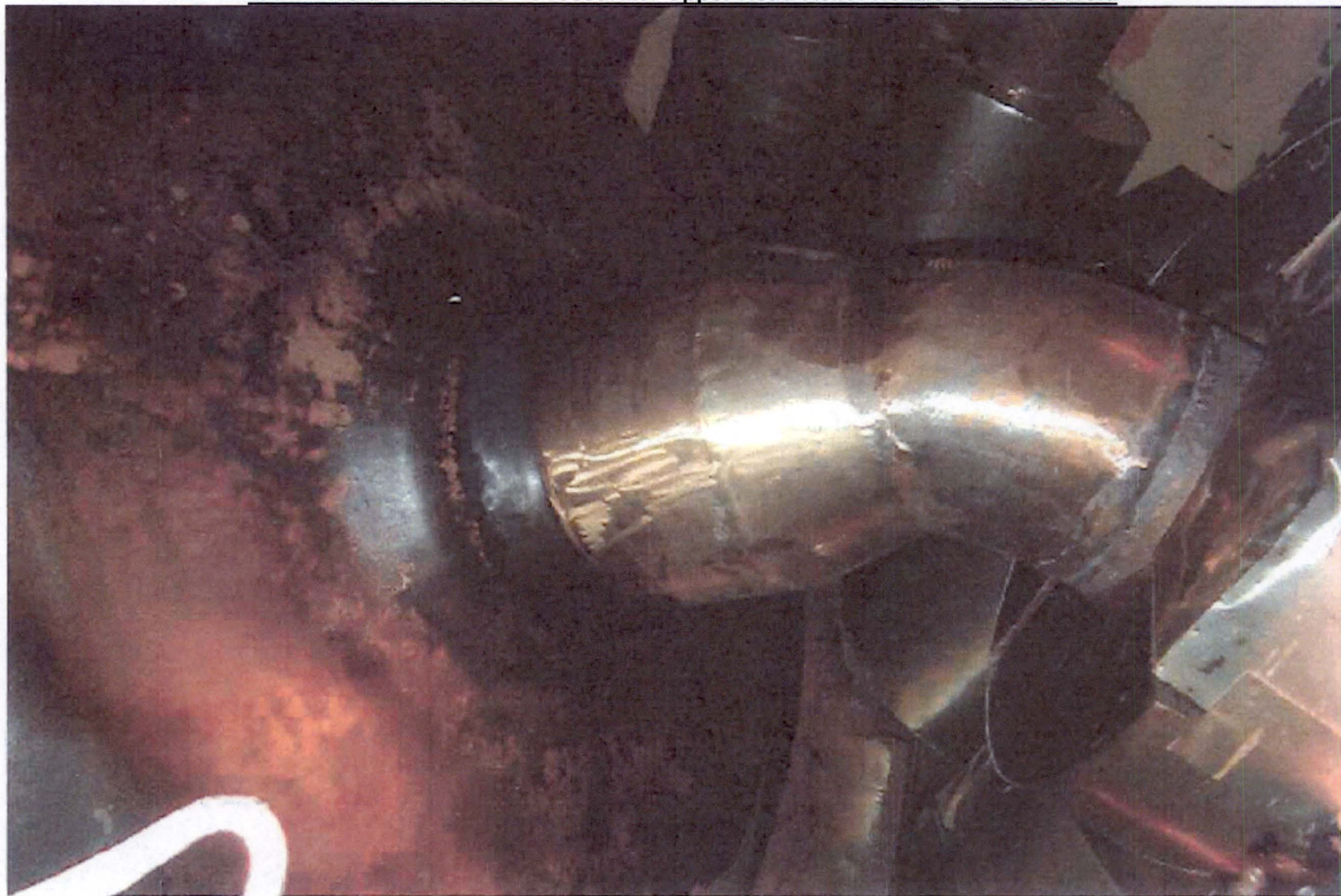


Figure 1.4-3 Weld 6"-2-RC-26 Component Photograph

### **1.5     Weld 6"-2-RC-27 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**

Weld 6"-2-RC-27 was UT examined in Inspection Period 1, during the U2C20 refueling outage in 2012. The NDE data came from UT Report No. U2-VE-12-007. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-7(b). The corresponding CRV as shown on that Figure is A-B-C-D-E-F-G-H. The UT examination was limited by the configuration of the nozzle to head resulting in total UT coverage of **86.7%** as described in Figure 1.5-2. A photograph of weld 6"-2-RC-27 is provided in Figure 1.5-3.

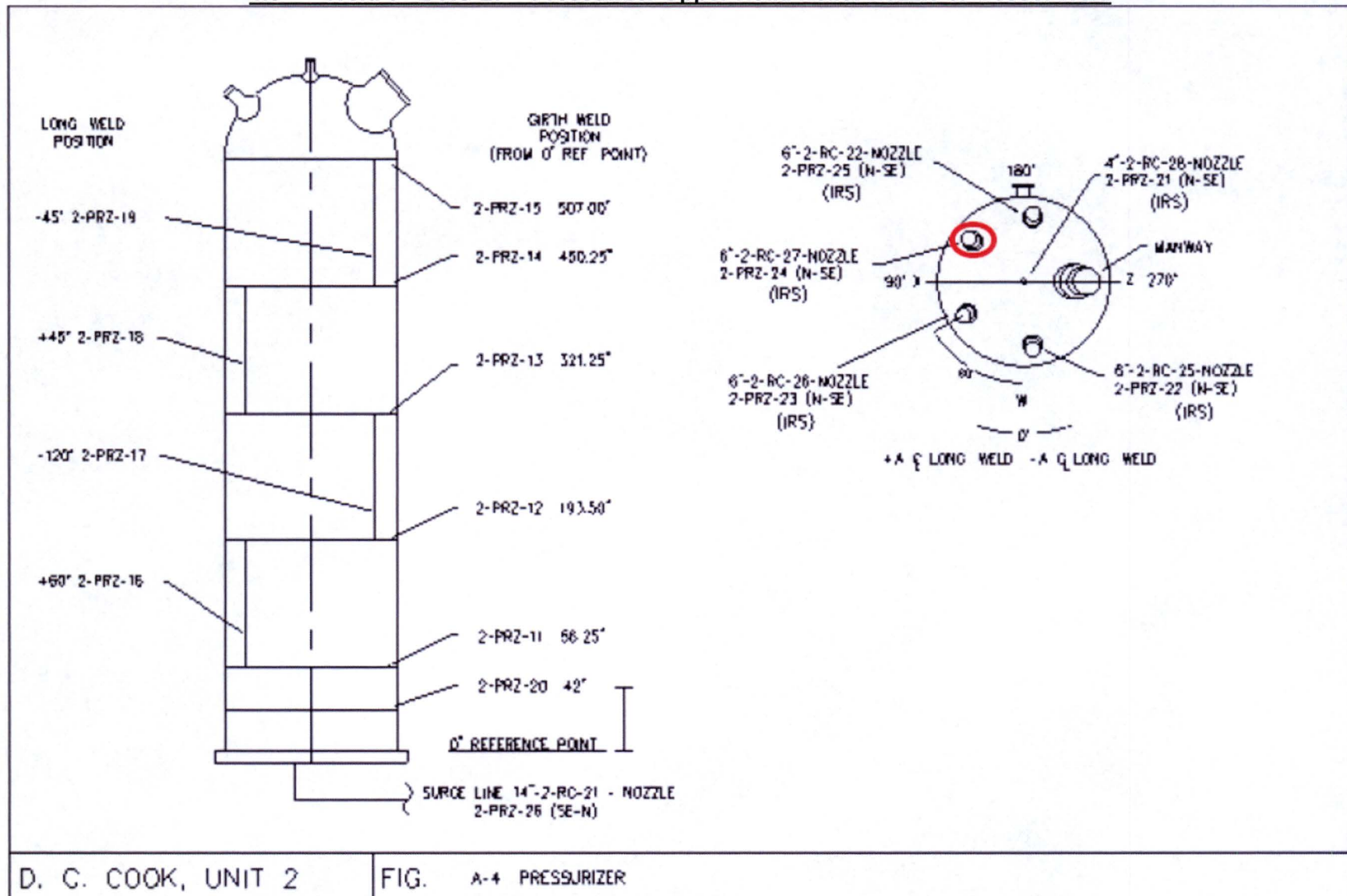
No recordable indications were detected during the examination.

Section XI Appendices and Supplements used for this UT examination were Appendix I and Article 4 from Section V.

**Note:** No laminations were reported on the Pressurizer Head that could interfere with the angle beam examinations performed on weld 6"-2-RC-27.



# 1.5 Weld 6"-2-RC-27 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld

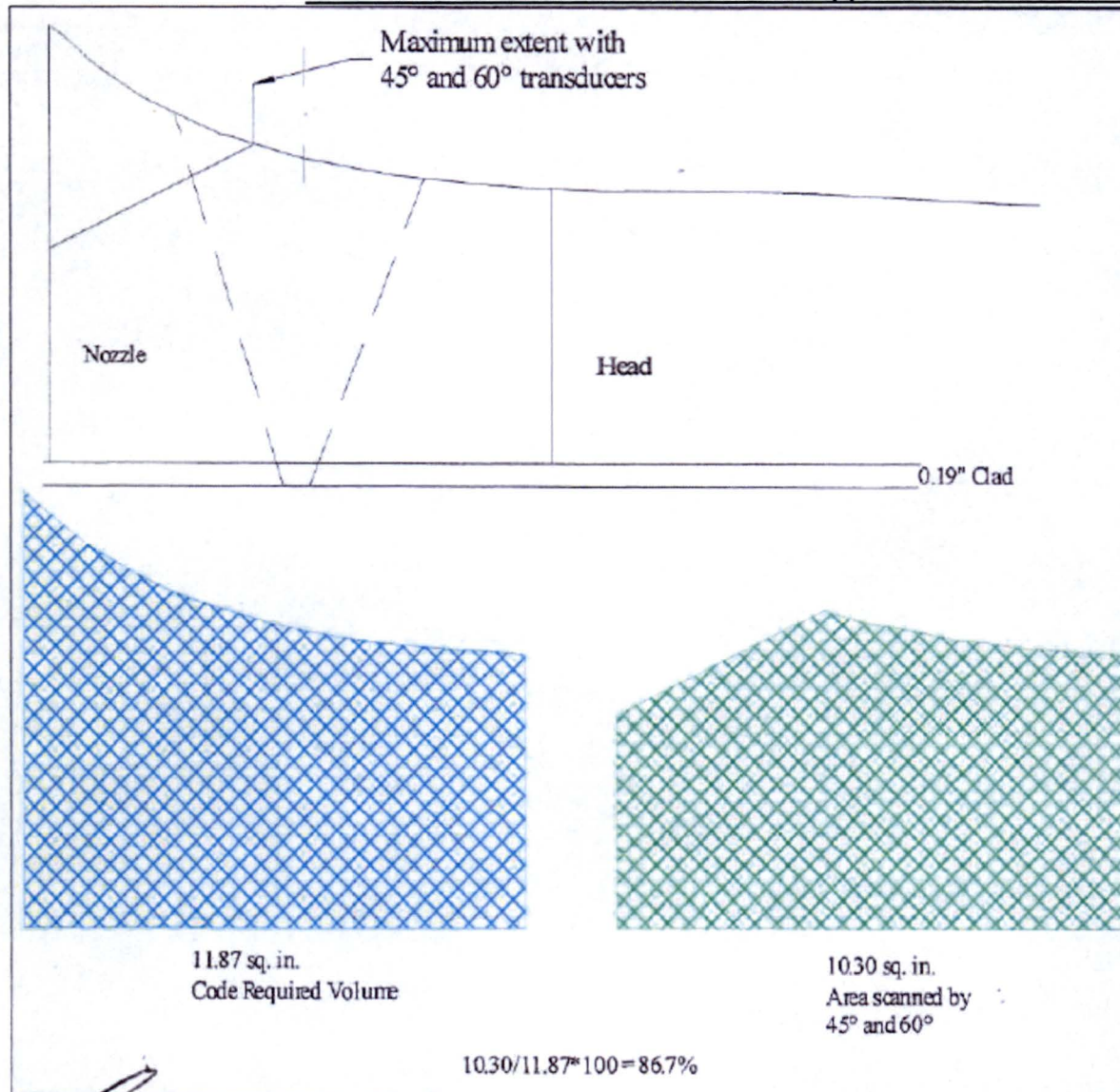


D. C. COOK, UNIT 2

FIG. A-4 PRESSURIZER

Figure 1.5-1 Weld 6"-2-RC-27 (Extracted from Reference DRAWING 2A-4)

1.5 Weld 6"-2-RC-27 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld



**Limited examination:**

Single sided access due to  
nozzle to head configuration  
86.7% Code Required  
Volume Achieved.

Scale 2:1

Figure 1.5-2 Weld 6"-2-RC-27 Examination Location & Coverage Map



**1.5 Weld 6"-2-RC-27 – Pressurizer Upper Head Relief Nozzle-to-Vessel Weld**



**Figure 1.5-3 Weld 6"-2-RC-27 Component Photograph**

## **1.6     Weld STM-21-FWN – Steam Generator Feedwater Nozzle-to-Vessel Weld**

Weld STM-21-FWN was UT examined in Inspection Period 2, during the U2C23 refueling outage in 2016. The NDE data came from UT Report No. U2-VE-16-013. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWC-2500-4(a). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to non-removable insulation support ring and configuration. The examination resulted in total UT coverage of **76.3%** as described in Figure 1.6-2. A photograph of weld STM-21-FWN is provided in Figure 1.6-3.

No recordable indications were detected during this examination.

Section XI Appendices and Supplements used for this UT examination were Appendix I and Article 4 from Section V.

**Note:** No laminations were reported on the shell that could interfere with the angle beam examinations performed on weld STM-21-FWN.



# 1.6 Weld STM-21-FWN – Steam Generator Feedwater Nozzle-to-Vessel Weld

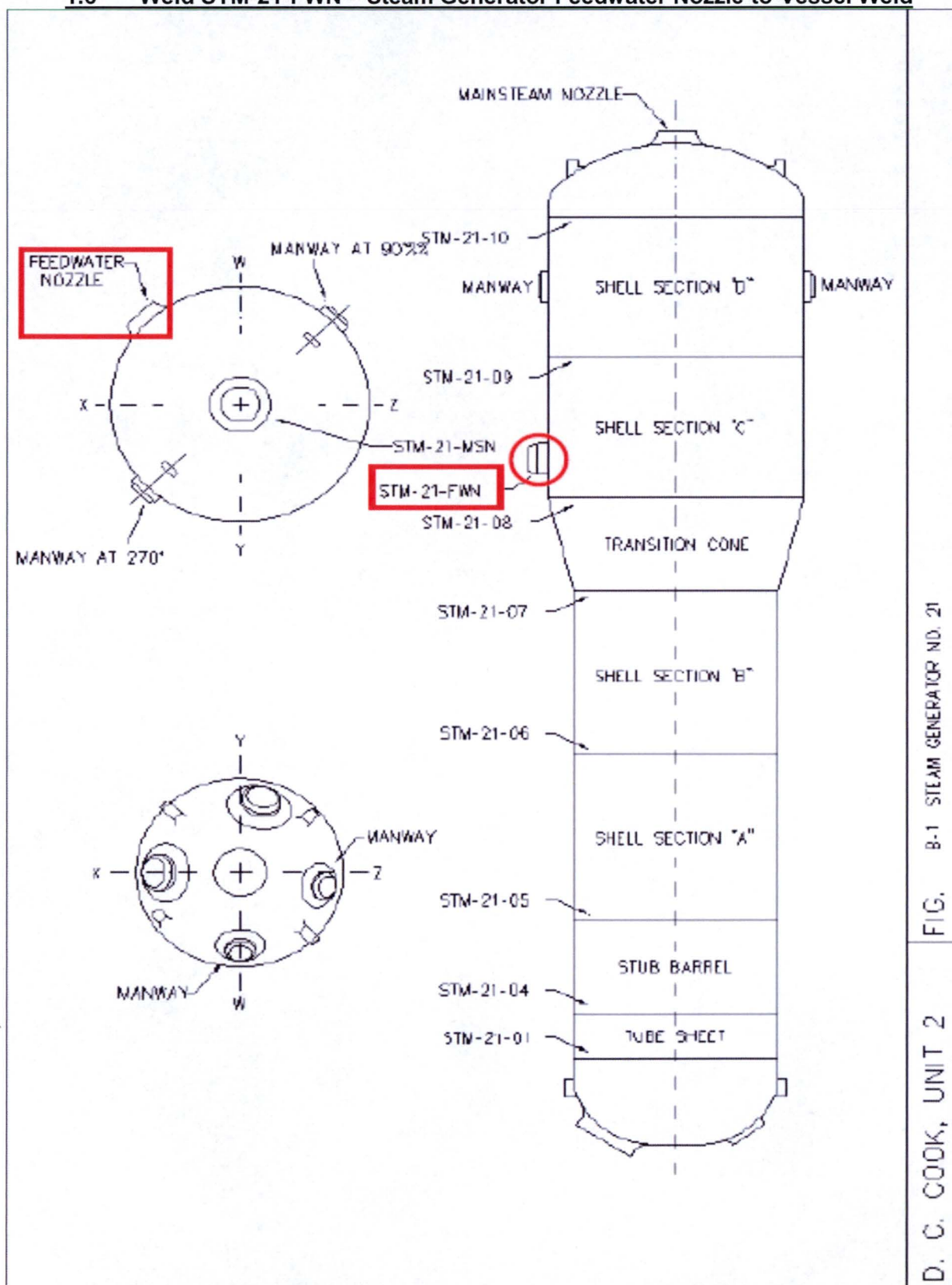


Figure 1.6-1 Weld STM-21-FWN (Extracted from Reference DRAWING 2B-1)



## 1.6 Weld STM-21-FWN – Steam Generator Feedwater Nozzle-to-Vessel Weld

ANGLE	EXAM AREA	% COVERAGE
0	BOTH	100
45	CW	100
45	CCW	100
45	UPST	0
45	DNST	94.5
60	CW	100
60	CCW	100
60	UPST	0
60	DNST	92

TOTAL 686.5

$$686.5 / 900 = 76.3\%$$

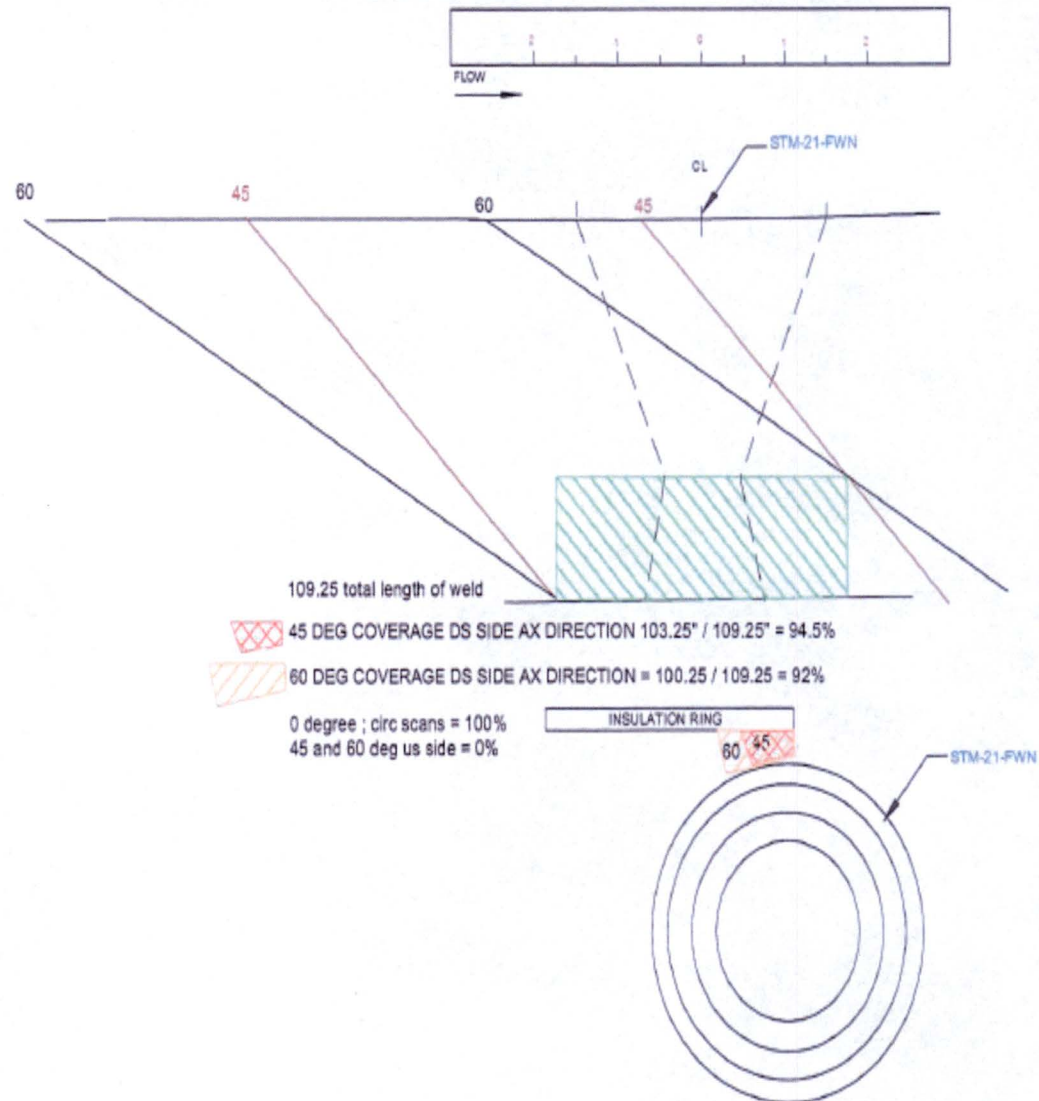
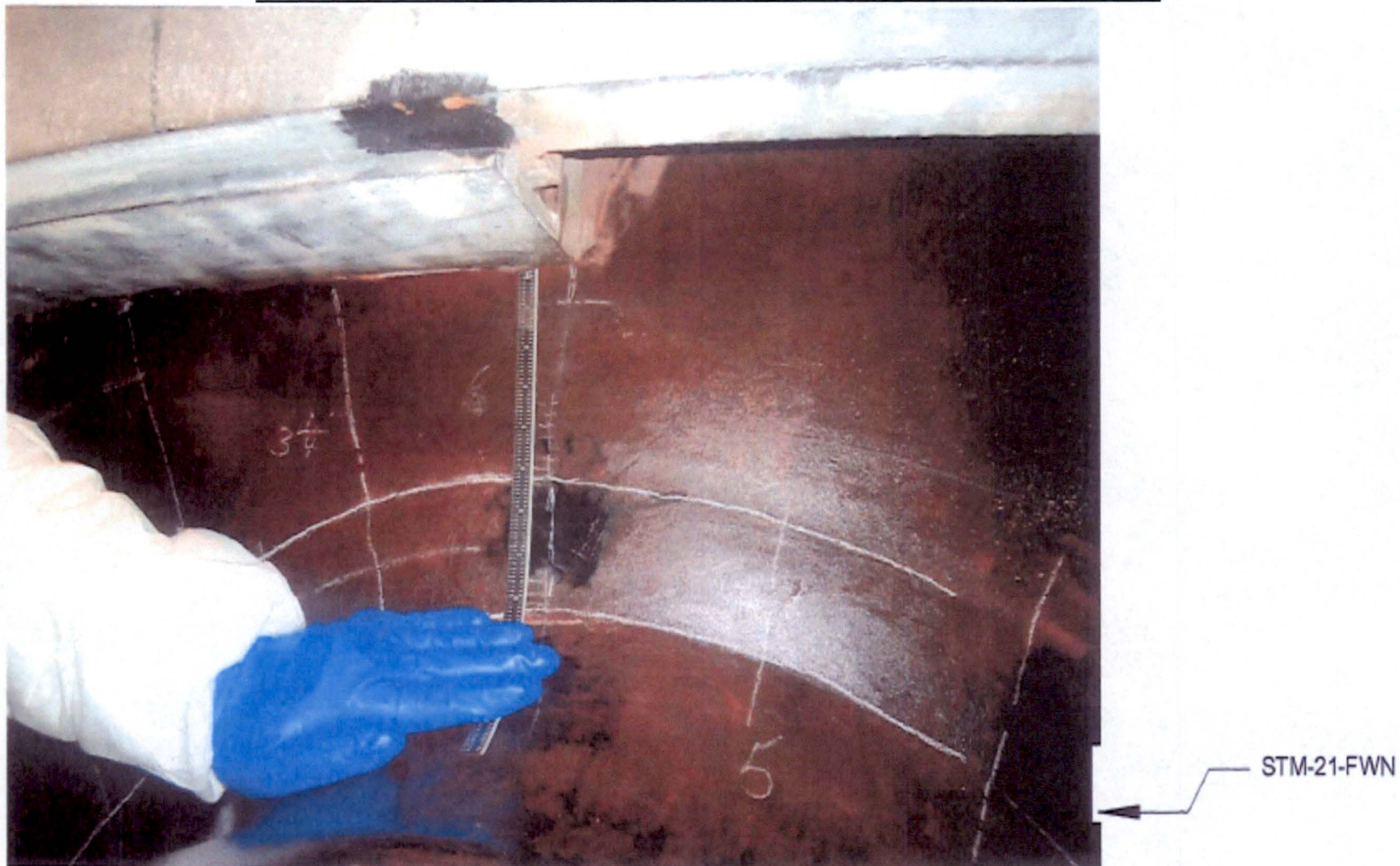


Figure 1.6-2 Weld STM-21-FWN Coverage Calculation

**1.6 Weld STM-21-FWN – Steam Generator Feedwater Nozzle-to-Vessel Weld**



Limitation due to non-removable insulation support ring and configuration..

**Figure 1.6-3 Weld STM-21-FWN Component Photograph**



## **1.7     Weld 1-RC-9-03S – Reactor Coolant Pipe to Elbow**

Weld 1-RC-9-03S was UT examined in Inspection Period 1, during the U1C25 refueling outage in 2013. The NDE data came from UT Report No. U1-VE-13-007. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to an adjacent weld. The examination resulted in total UT coverage of **85.1%** as described in with Figure 1.7-2. A photograph of weld 1-RC-9-03S is provided in Figure 1.7-3.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.7 Weld 1-RC-9-03S – Reactor Coolant Pipe to Elbow

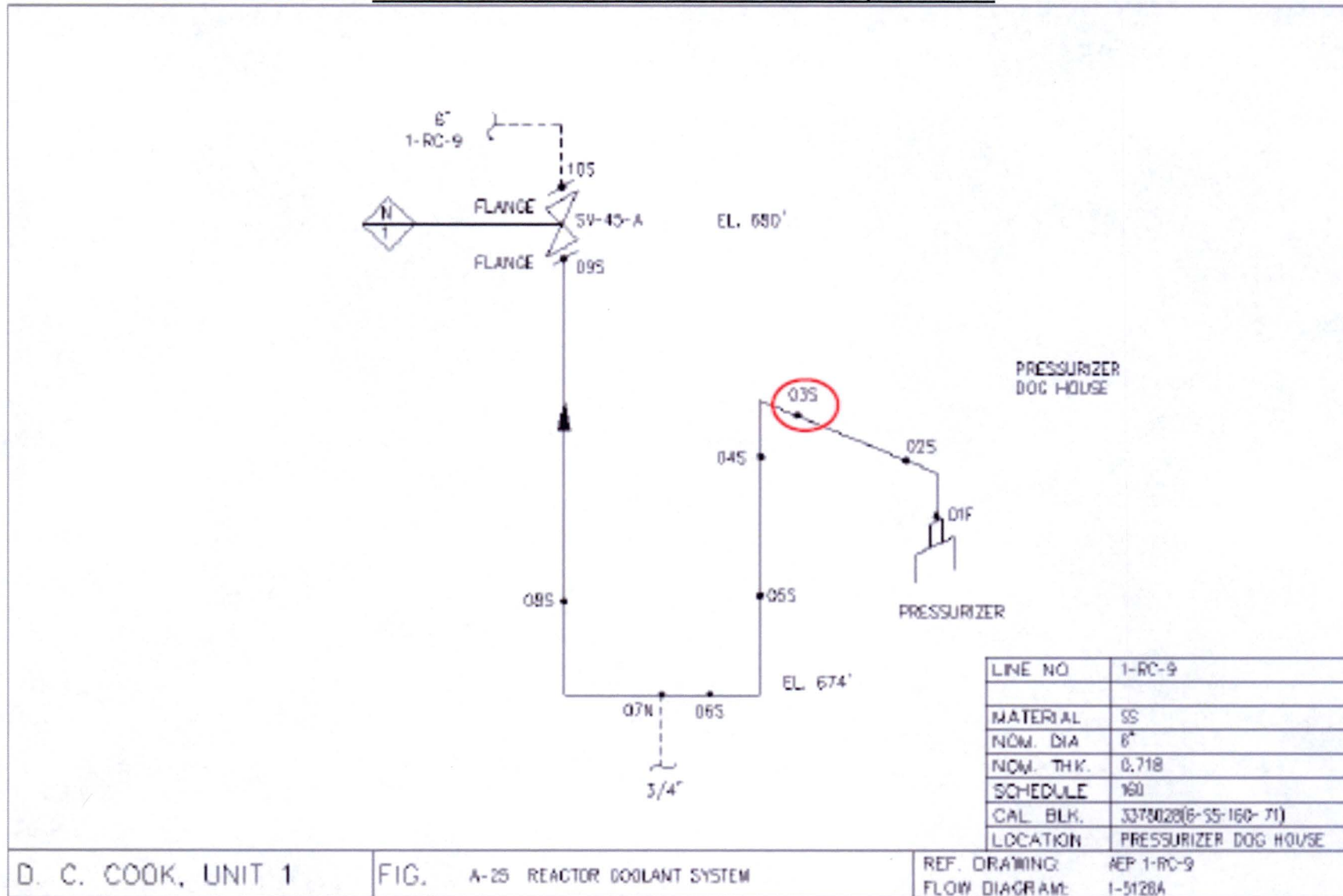


Figure 1.7-1 Weld 1-RC-9-03S (Extracted from Reference DRAWING A-25)

# 1.7 Weld 1-RC-9-03S – Reactor Coolant Pipe to Elbow

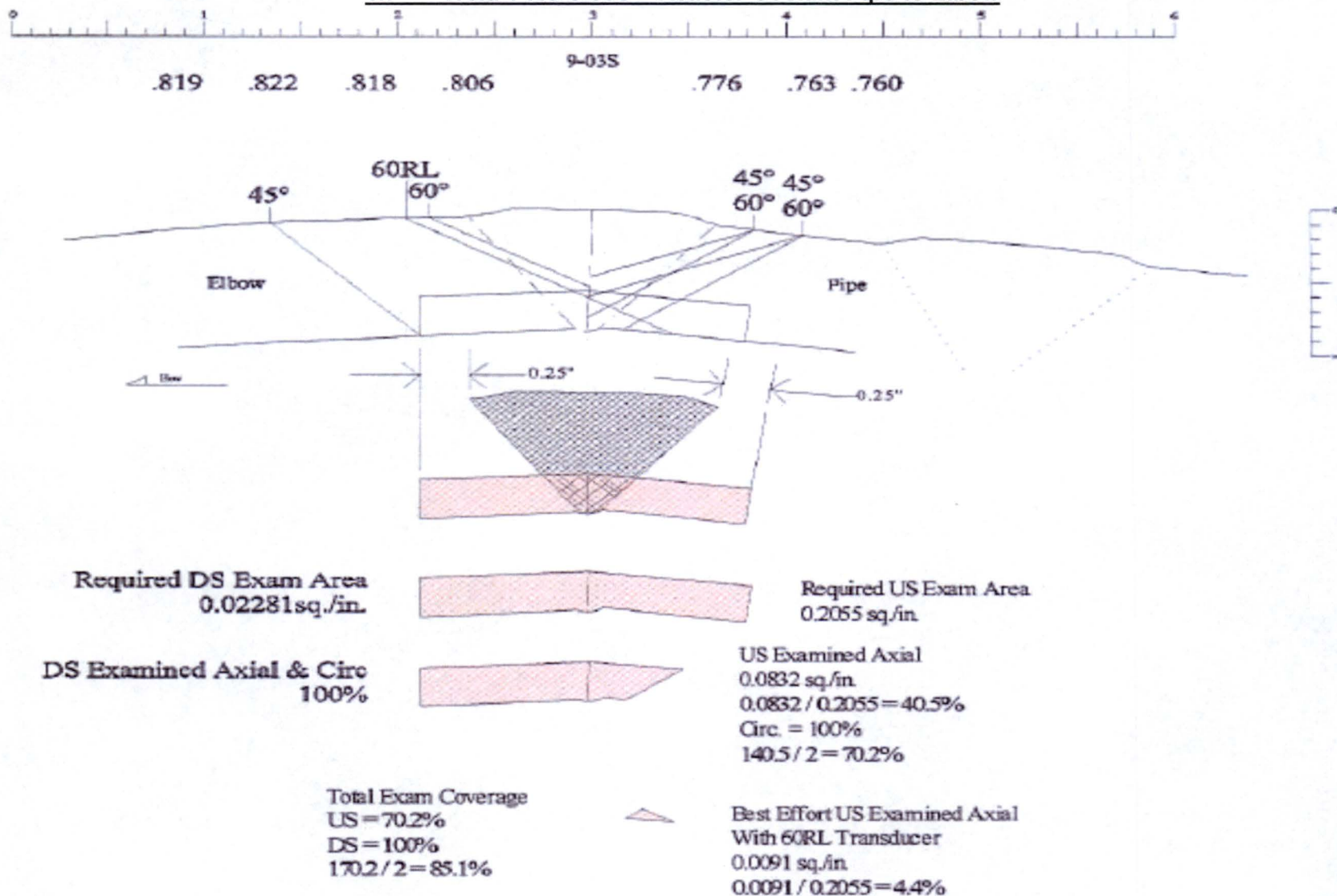
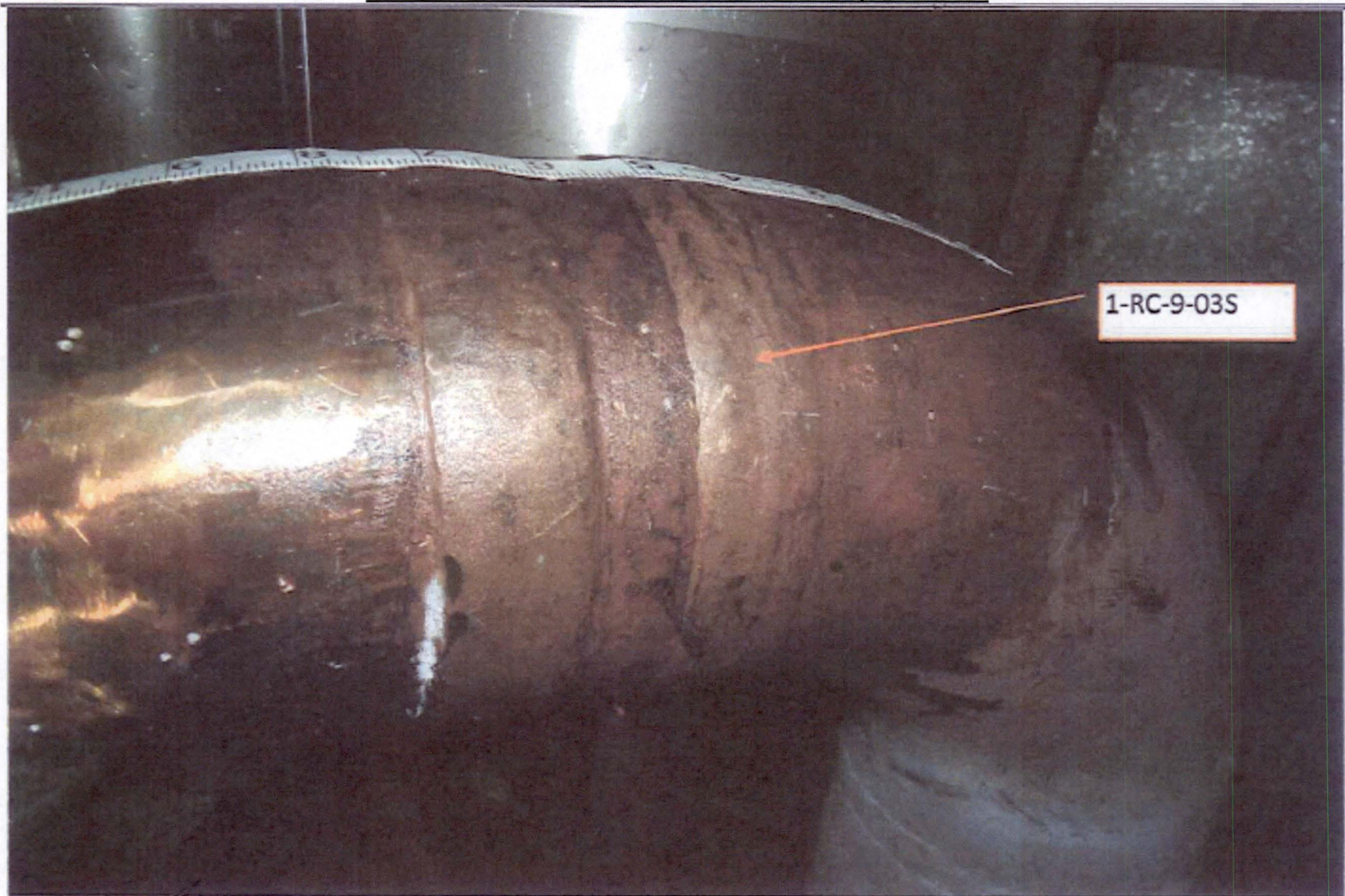


Figure 1.7-2 Weld 1-RC-9-03S Coverage Calculation



**1.7 Weld 1-RC-9-03S – Reactor Coolant Pipe to Elbow**



**Figure 1.7-3 Weld 1-RC-9-03S Component Photograph**

## **1.8     Weld 1-SI-33-26F – Safety Injection Elbow to Branch Connection**

Weld 1-SI-33-26F was UT examined in Inspection Period 1, during the U1C24 refueling outage in 2011. The NDE data came from UT Report No. 1C24\_UT05. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figure 1.8-2. A photograph of weld 1-SI-33-26F is provided in Figure 1.8-3.

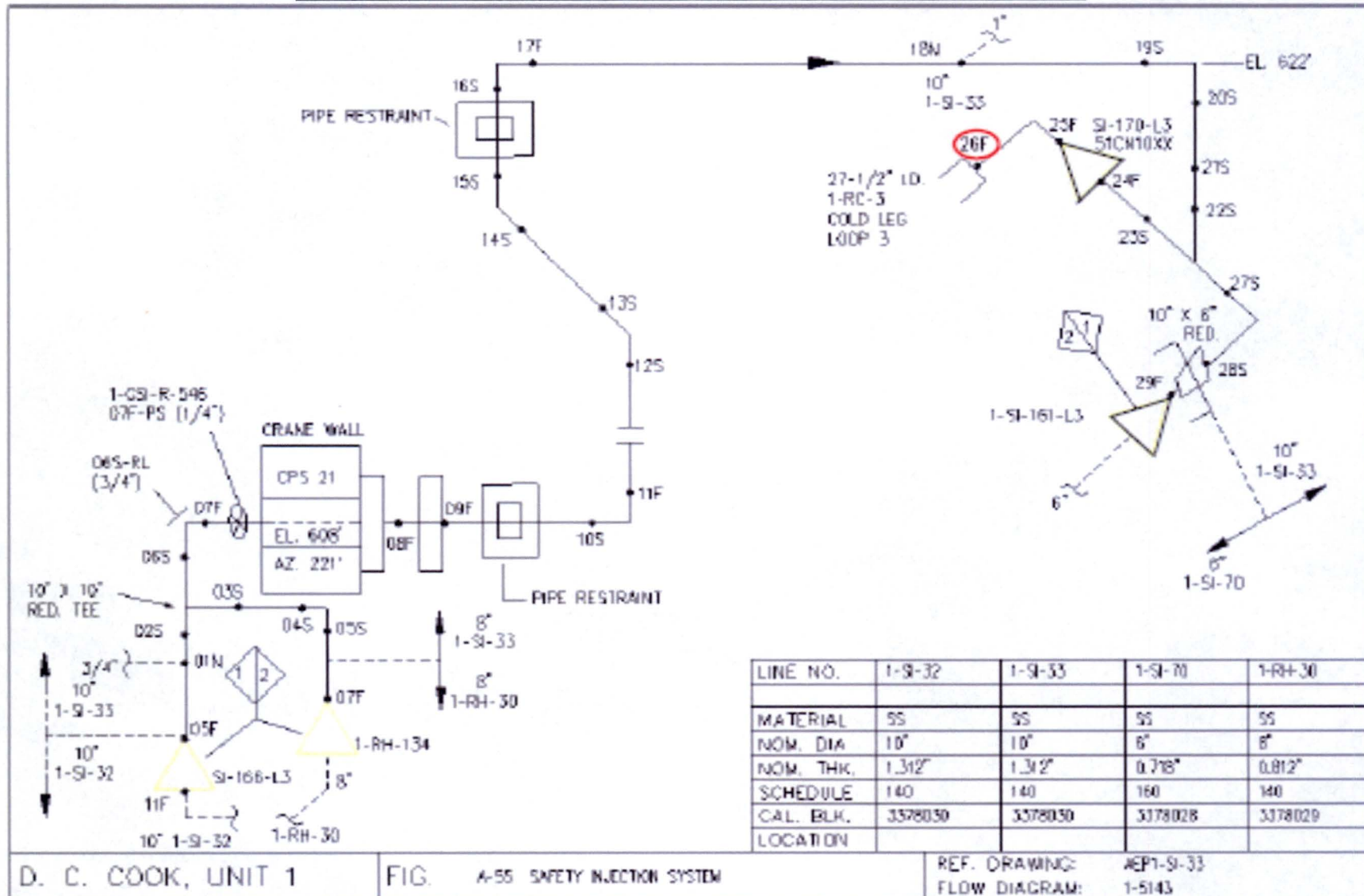
No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



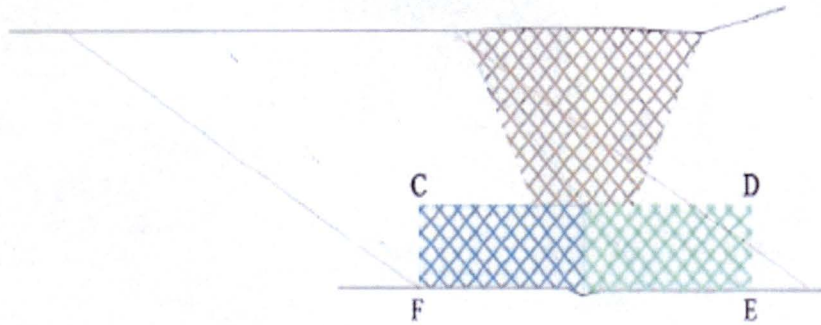
### **1.8 Weld 1-SI-33-26F – Safety Injection Elbow to Branch Connection**



**Figure 1.8-1 Weld 1-SI-33-26F (Extracted from Reference DRAWING A-55)**

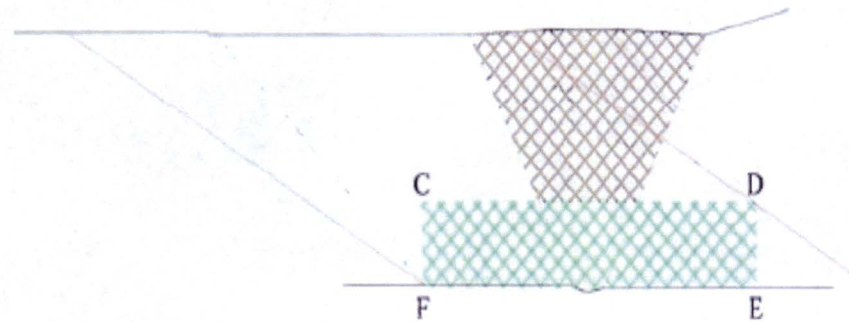


**1.8 Weld 1-SI-33-26F – Safety Injection Elbow to Branch Connection**



**CODE REQUIRED COVERAGE ACHIEVED: 50%**  
(Examination limited to Single Side Access only due to Branch Connection Configuration)

 0.31 sq. in. (50%)



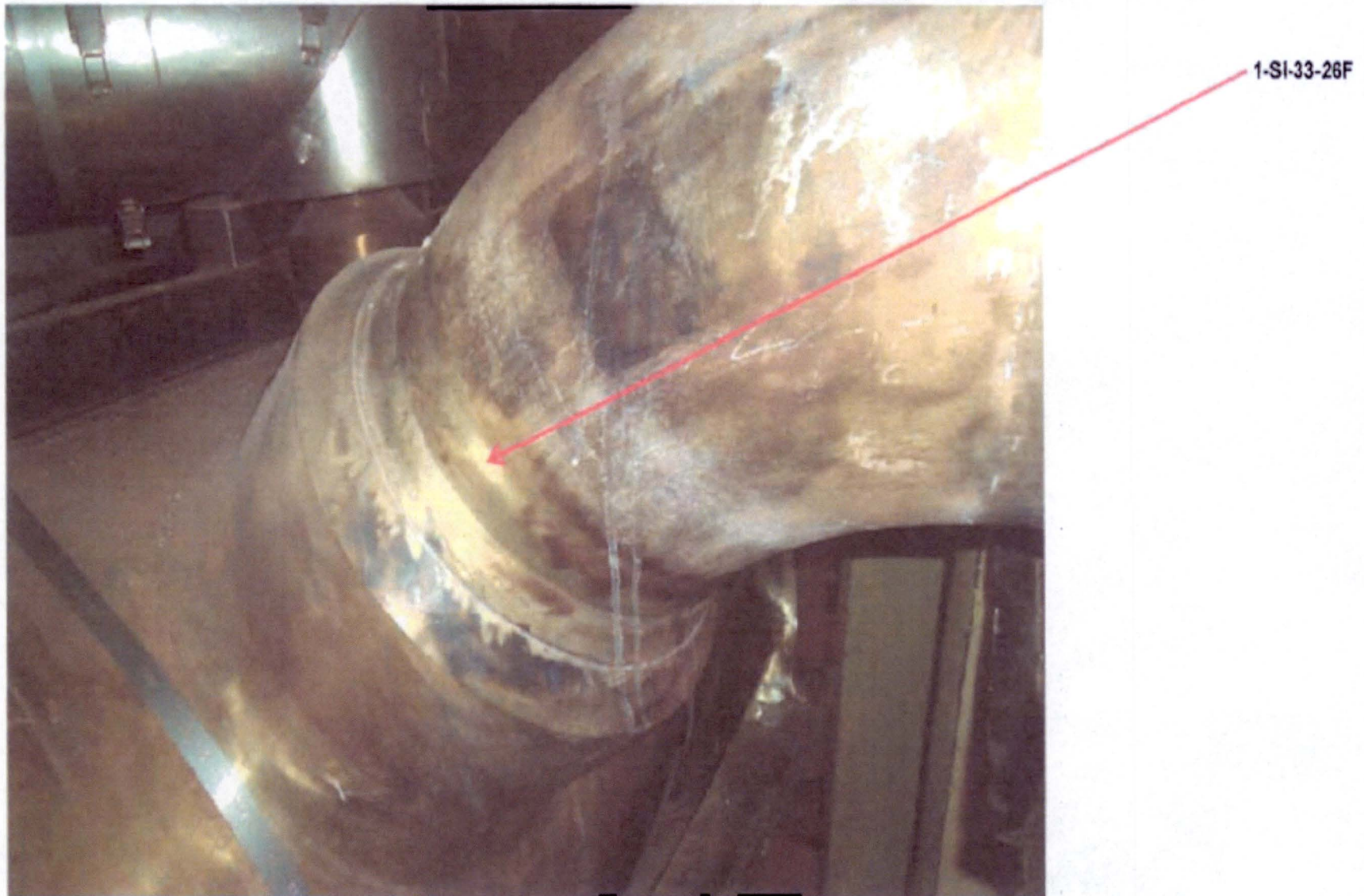
**AREA OF INTERROGATION: 100%**

 0.62 sq. in. (100%)

Not to Scale

**Figure 1.8-2 Weld 1-SI-33-26F Coverage Calculation**

**1.8 Weld 1-SI-33-26F – Safety Injection Elbow to Branch Connection**



**Figure 1.8-3 Weld 1-SI-33-26F Component Photograph**



## **1.9     Weld 1-RH-29-01F – Residual Heat Removal Branch Connection to Pipe**

Weld 1-RH-29-01F was UT examined in Inspection Period 1, during the U1C24 refueling outage in 2011. The NDE data came from UT Report No. 1C24\_UT03. Previous ISI UT data was reviewed.

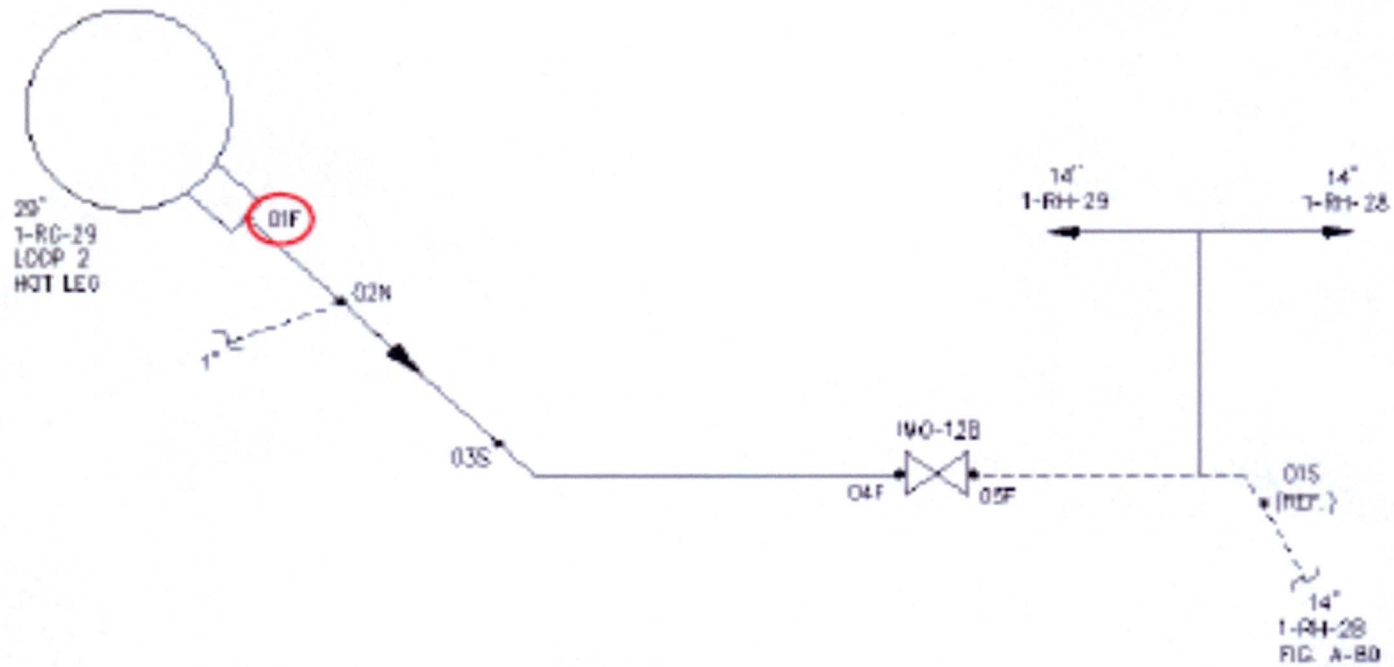
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figure 1.9-2. A photograph of weld 1-RH-29-01F is provided in Figure 1.9-3.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.9 Weld 1-RH-29-01F – Residual Heat Removal Branch Connection to Pipe



LINE NO	1-RH-29
MATERIAL	SS
NOM. DIA	14"
NOM. THK.	1.405"
SCHEDULE	160
CAL. BLK.	3378030(14-SS-160-1 408)
LOCATION	

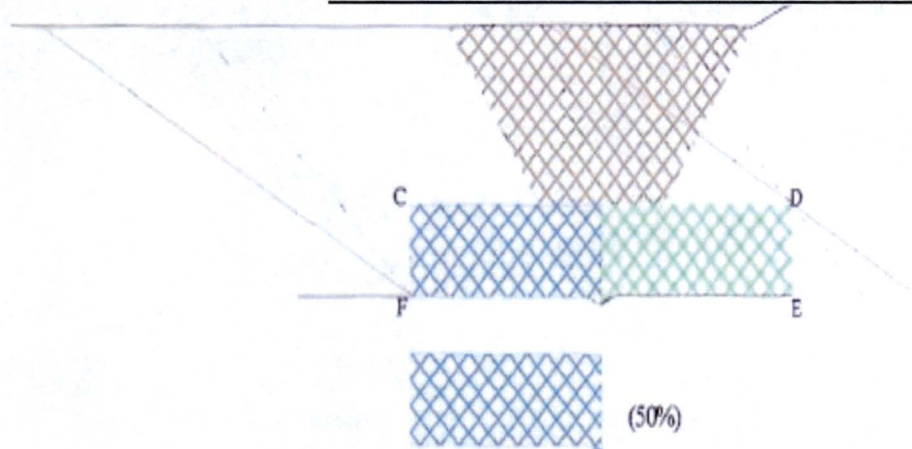
D. C. COOK, UNIT 1

FIG. A-81 RESIDUAL HEAT REMOVAL SYSTEM

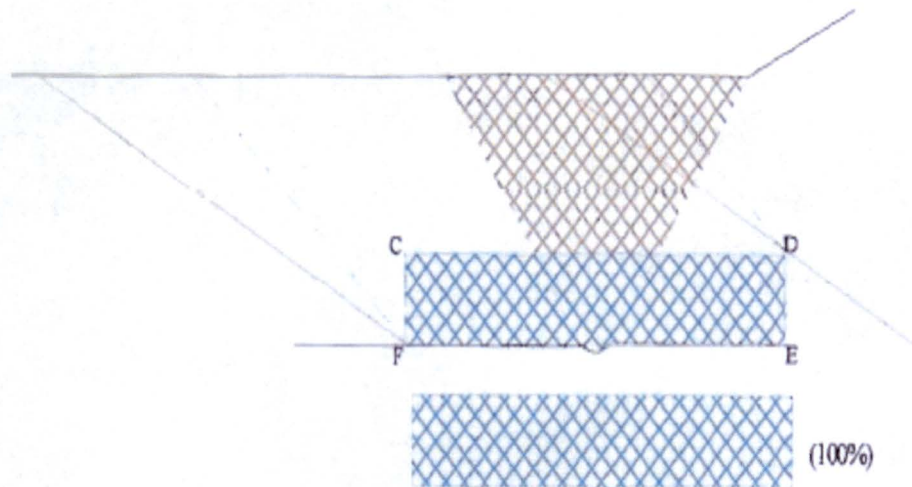
REF. DRAWING: AEP 1-RH-29  
FLOW DIAGRAM: 1-5128

Figure 1.9-1 Weld 1-RH-29-01F (Extracted from Reference DRAWING A-81)

**1.9 Weld 1-RH-29-01F – Residual Heat Removal Branch Connection to Pipe**



**CODE REQUIRED COVERAGE ACHIEVED : 50%**  
(Examination limited to Single Side Access only due to Branch Connection Configuration)

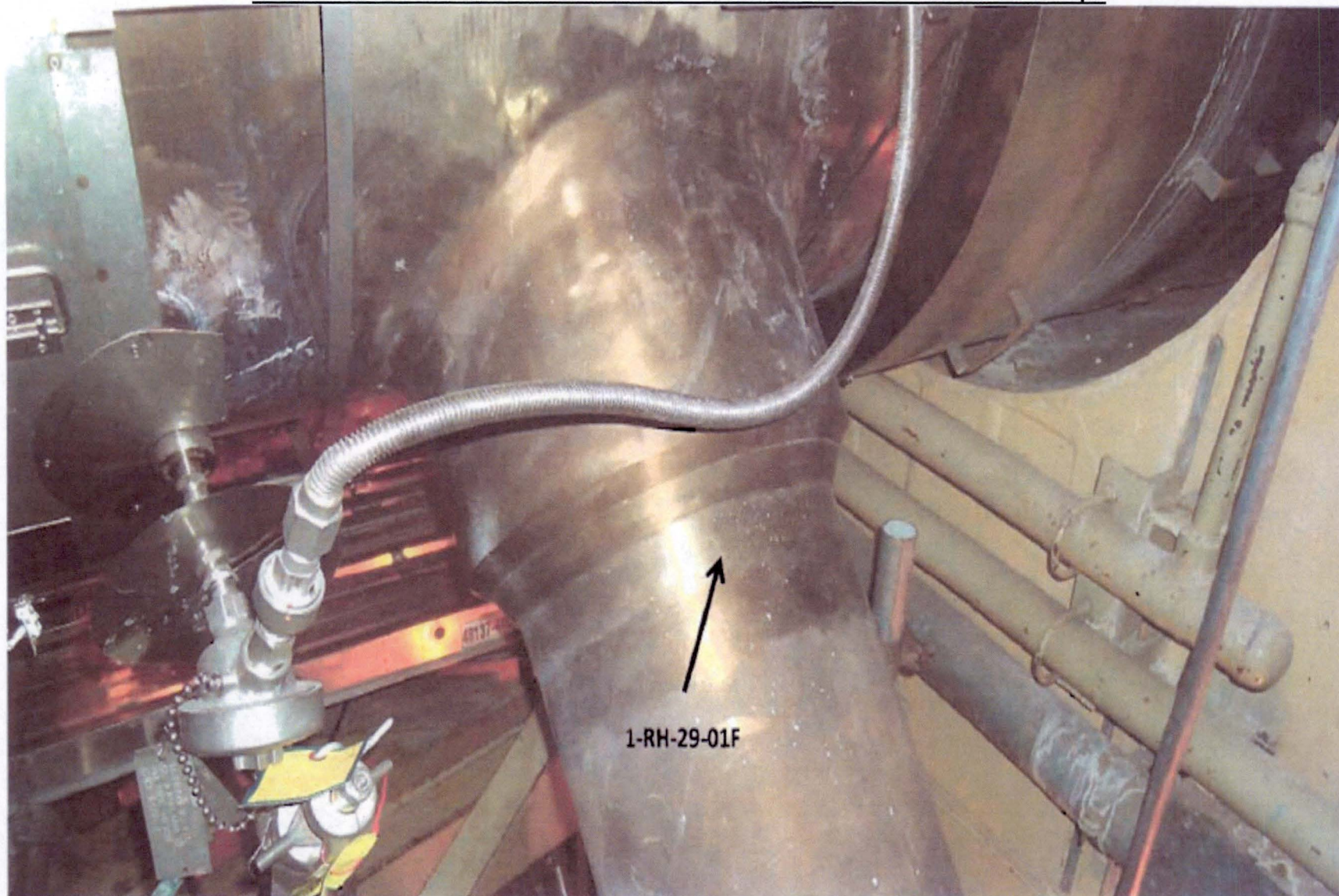


**AREA OF INTERROGATION : 100%**

**Figure 1.9-2 Weld 1-RH-29-01F Coverage Calculation**



**1.9 Weld 1-RH-29-01F – Residual Heat Removal Branch Connection to Pipe**



**Figure 1.9-3 Weld 1-RH-29-01F Component Photograph**



#### **1.10 Weld 1-RC-1-11N – Chemical and Volume Control Nozzle Branch Connection**

Weld 1-RC-1-11N was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-017. No previous ISI UT data was identified for review.

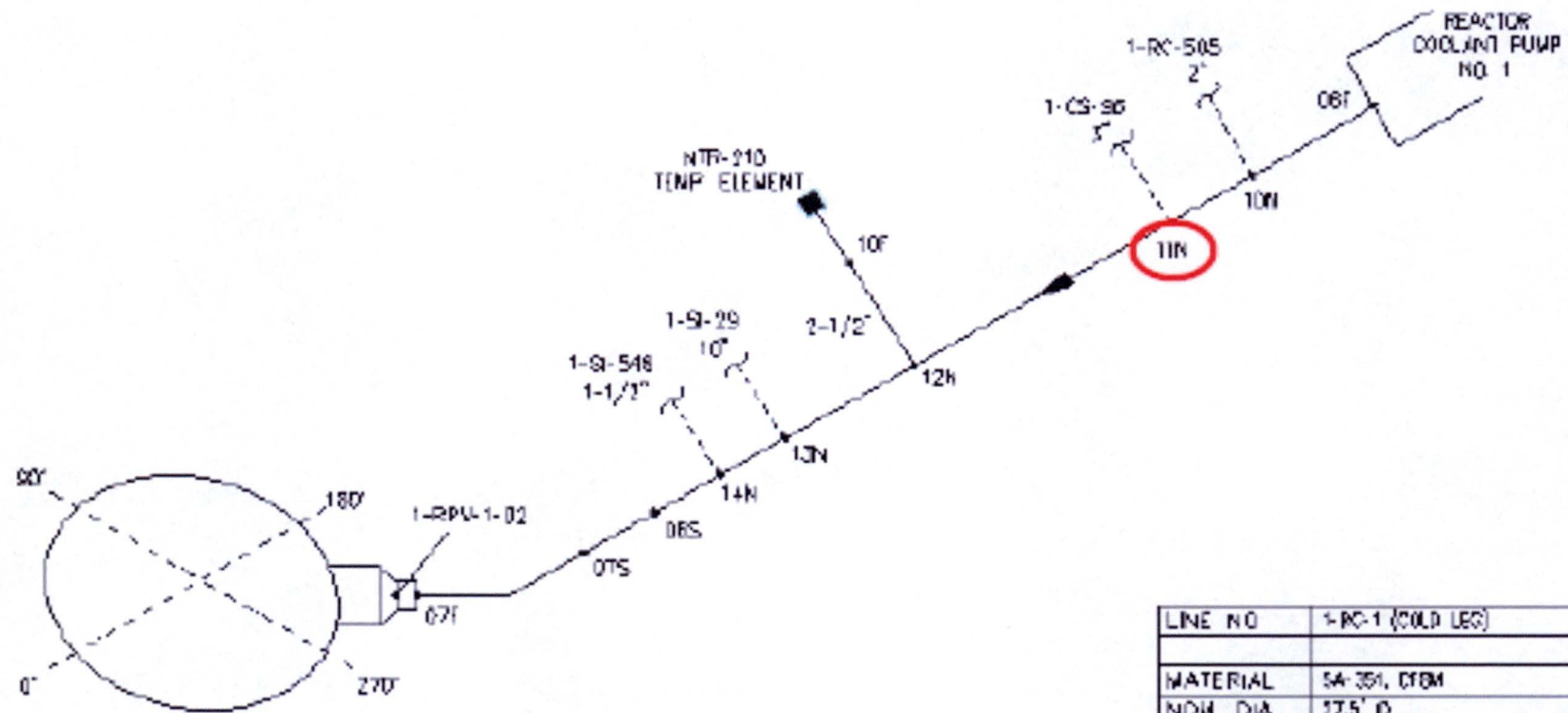
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.10-2, 1.10-3, and Table 1.10-1. A photograph of weld 1-RC-1-11N is provided in Figure 1.10-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.10 Weld 1-RC-1-11N – Chemical and Volume Control Nozzle Branch Connection



LINE NO	1-RC-1 (COLD LEG)
MATERIAL	SA-351, CF8M
NOM DIA	17.5" ID
NOM THK	1.55
SCHEDULE	11/4
CAL BLK	37-0055-X-1,D-9-000
LOCATION	

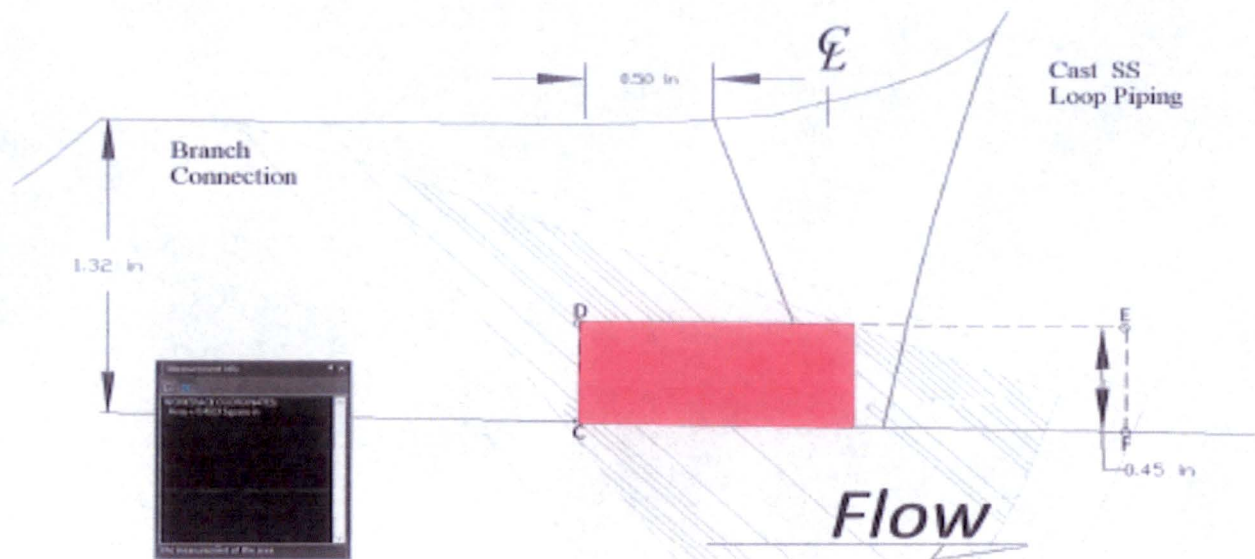
D. C. COOK, UNIT 1

FIG. A-9 REACTOR COOLANT SYSTEM

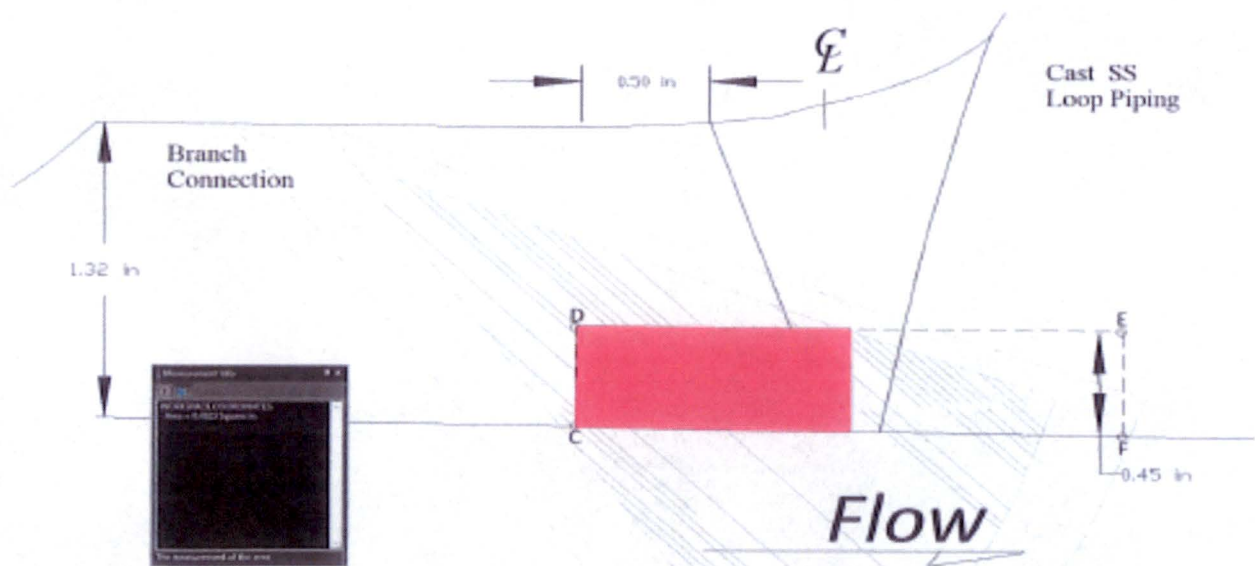
REF. DRAWING: AEP 1-RC-1  
FLOW DIAGRAM: 1-2-5128

Figure 1.10-1 Weld 1-RC-1-11N (Extracted from Reference DRAWING A-9)

**1.10 Weld 1-RC-1-11N – Chemical and Volume Control Nozzle Branch Connection**  
**PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT**



**Upstream Volume Achieved**



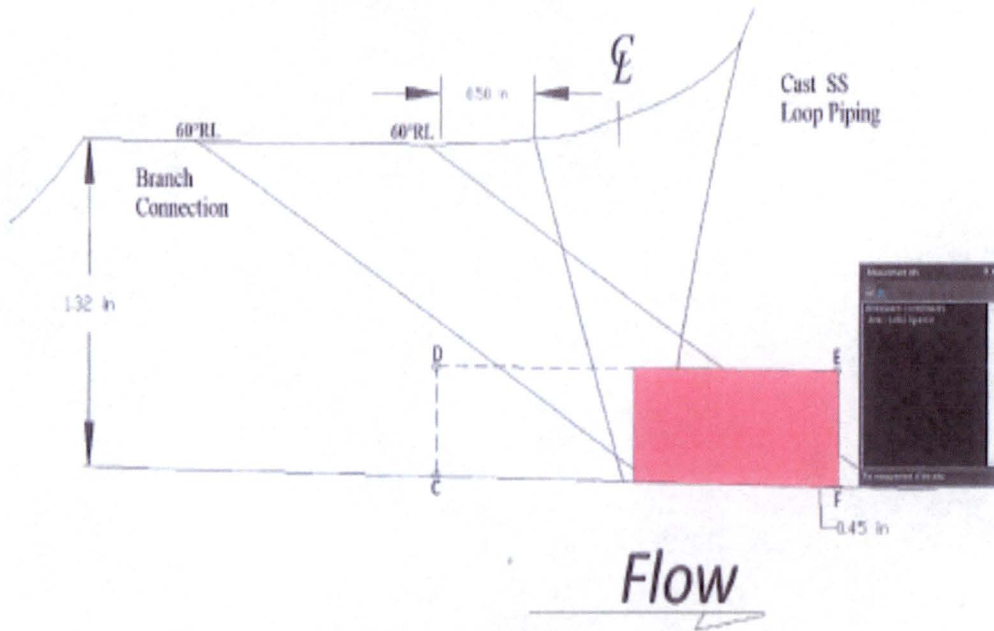
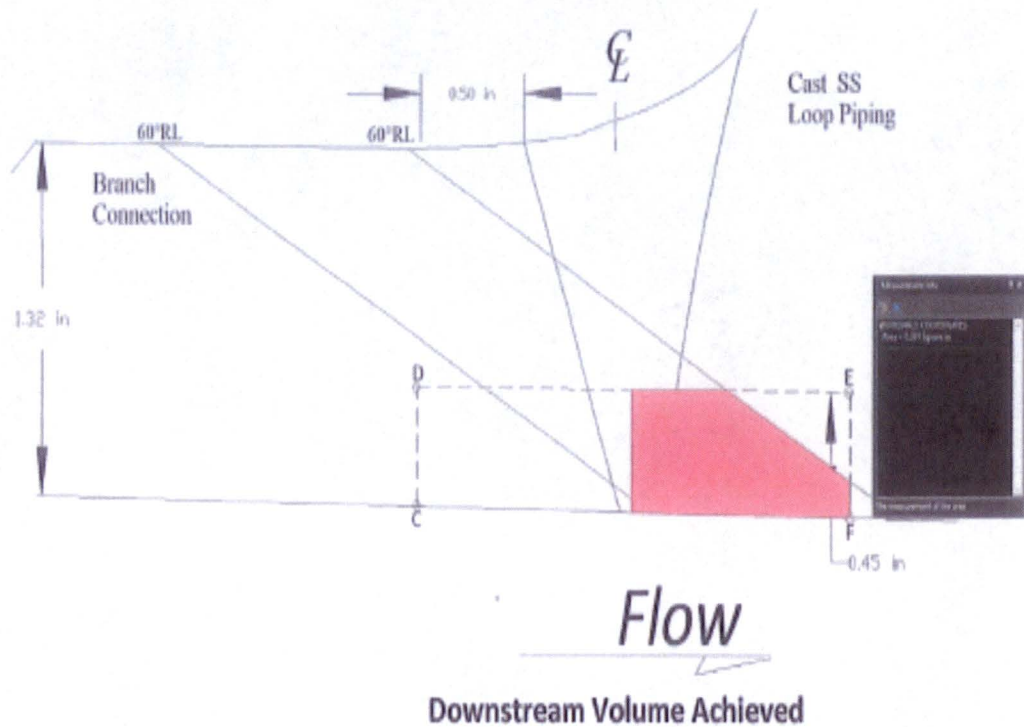
**Upstream Volume Required**

**Figure 1.10-2 Weld 1-RC-1-11N Coverage Calculation**



# 1.10 Weld 1-RC-1-11N – Chemical and Volume Control Nozzle Branch Connection

## CONVENTIONAL ULTRASONIC EXAMINATION COVERAGE ASSESSMENT



Downstream Volume Required  
Figure 1.10-3 Weld 1-RC-1-11N Coverage Calculation

**1.10 Weld 1-RC-1-11N – Chemical and Volume Control Nozzle Branch Connection**

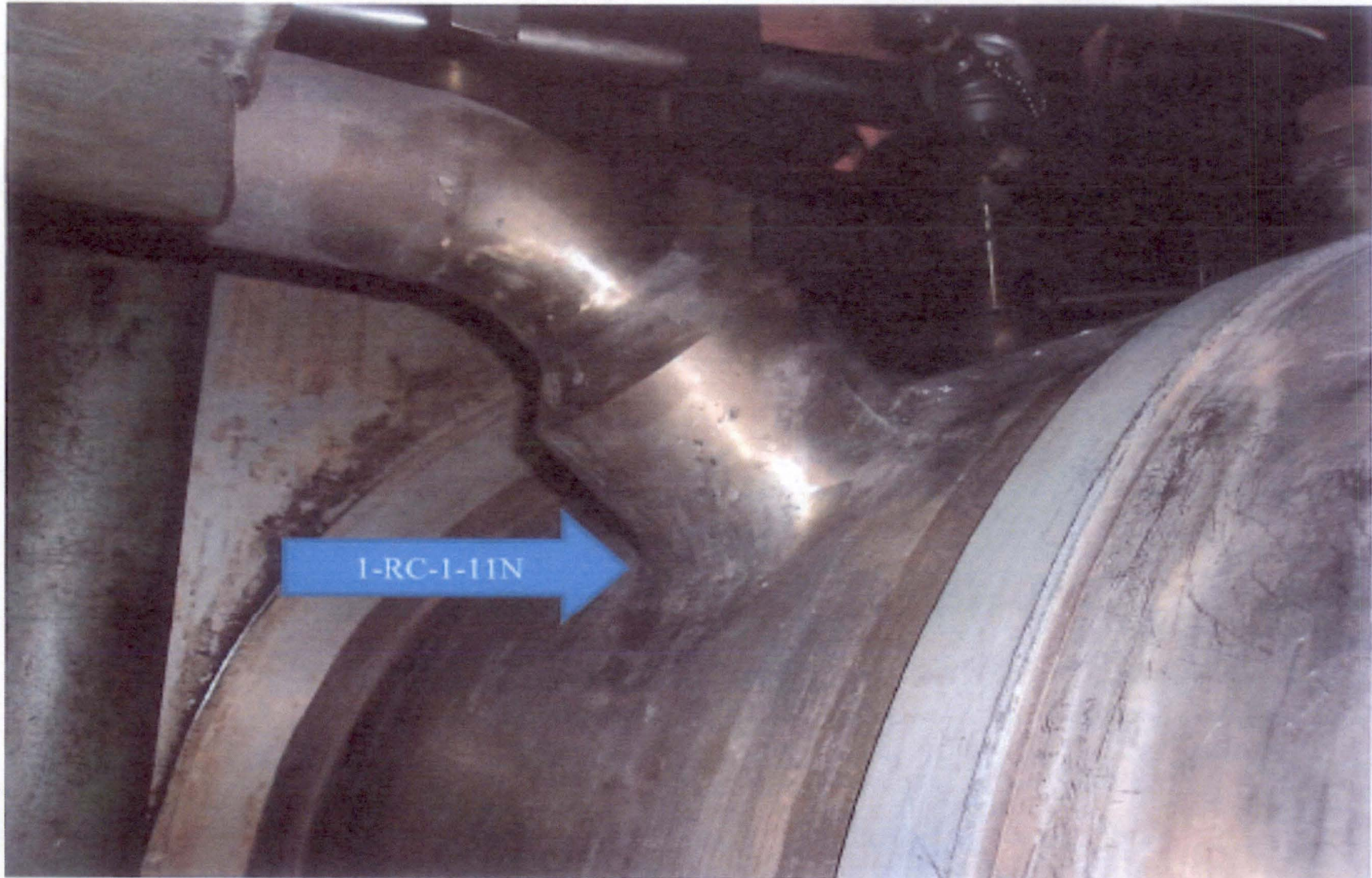
Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	17.5"	0.4923 in <sup>2</sup>	0.4923 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	17.5"	0.4923 in <sup>2</sup>	0.3910 in <sup>2</sup>	79.4% (Note 1)
Clockwise	17.5"	0.4923 in <sup>2</sup>	0.24615 in <sup>2</sup>	50%
Counterclockwise	17.5"	0.4923 in <sup>2</sup>	0.24615 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.10-1 Weld 1-RC-1-11N Coverage Calculation Results**



1.10 Weld 1-RC-1-11N – Chemical and Volume Control Nozzle Branch Connection



Component Photo

Figure 1.10-4 Weld 1-RC-1-11N Component Photograph



### **1.11 Weld 1-RC-1-14N – Reactor Coolant Nozzle Branch Connection**

Weld 1-RC-1-14N was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-018. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.11-2, 1.11-3, and Table 1.11-1. A photograph of weld 1-RC-1-14N is provided in Figure 1.11-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.11 Weld 1-RC-1-14N – Reactor Coolant Nozzle Branch Connection

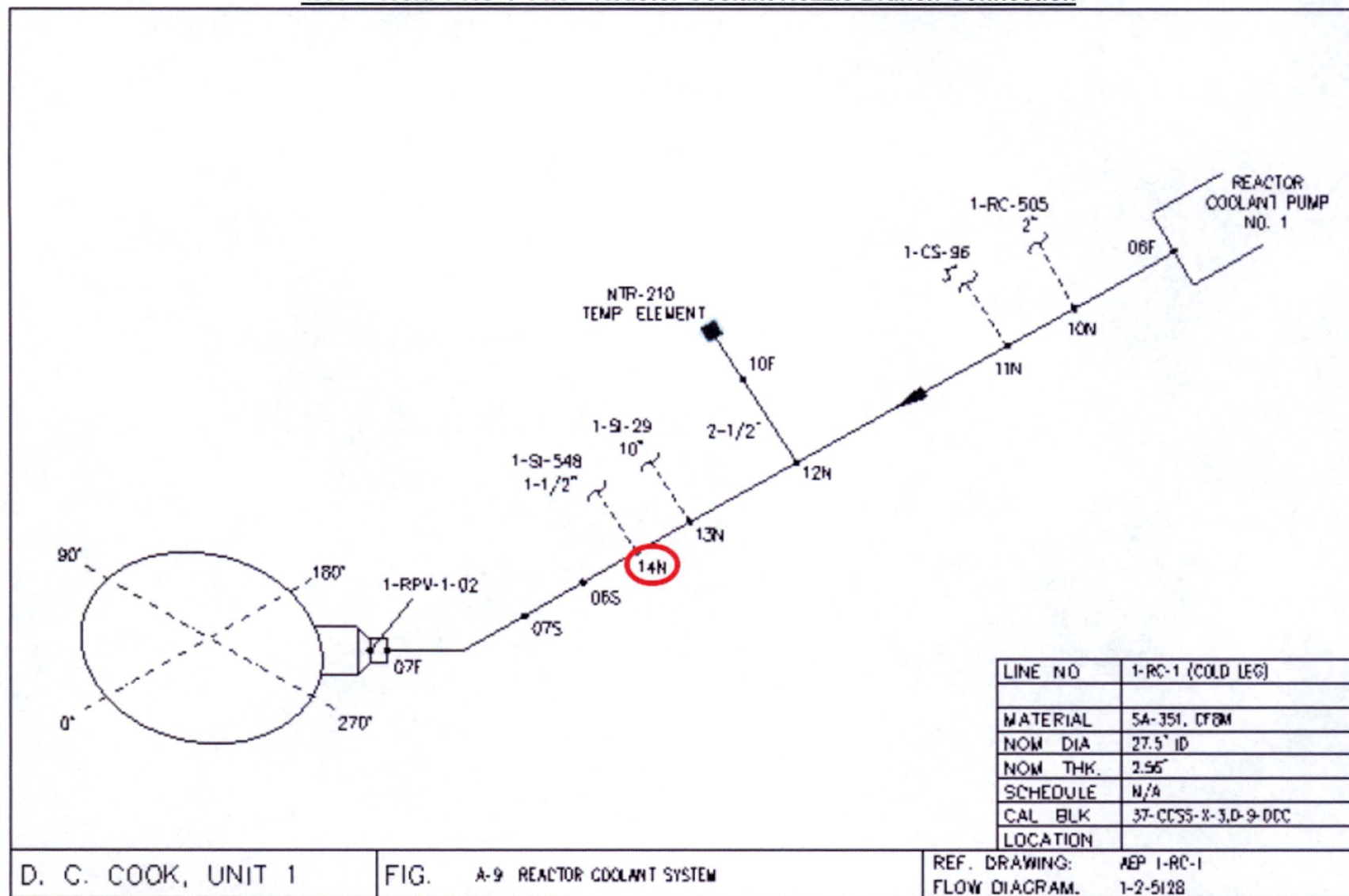
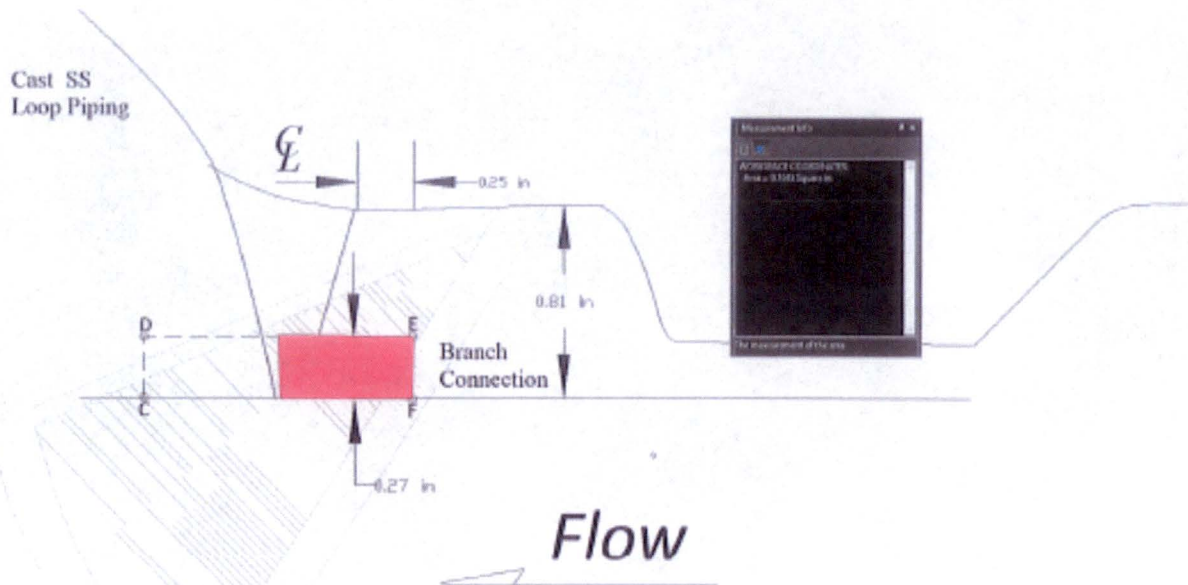


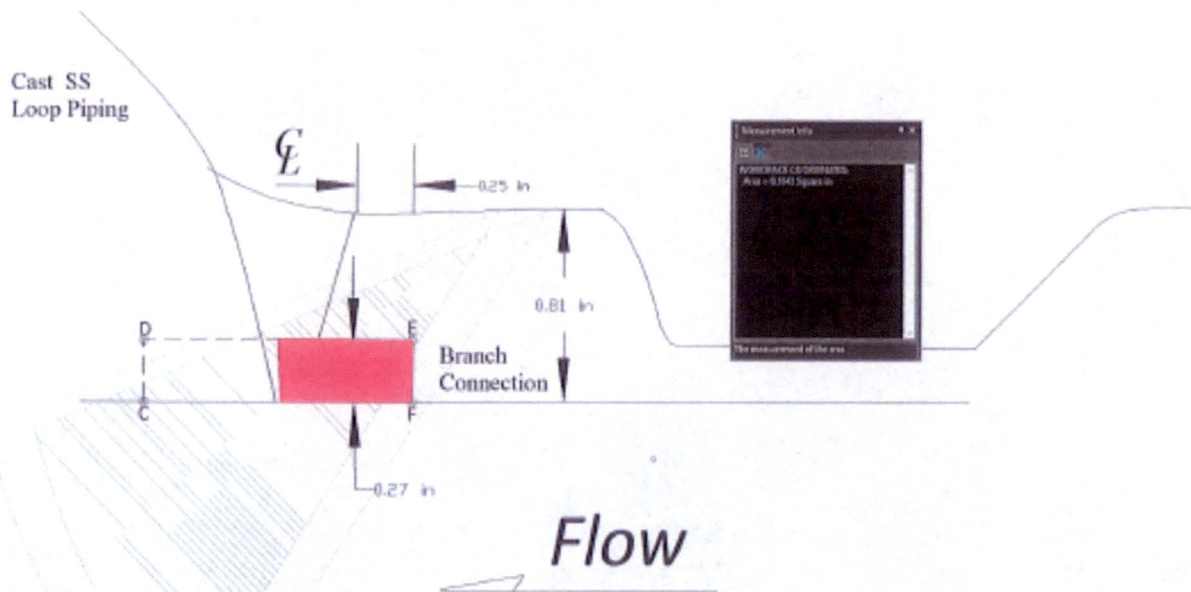
Figure 1.11-1 Weld 1-RC-1-14N (Extracted from Reference DRAWING A-9)

### 1.11 Weld 1-RC-1-14N – Reactor Coolant Nozzle Branch Connection

#### PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT



Upstream Volume Achieved



Upstream Volume Required

Figure 1.11-2 Weld 1-RC-1-14N Coverage Calculation



### 1.11 Weld 1-RC-1-14N – Reactor Coolant Nozzle Branch Connection

#### CONVENTIONAL ULTRASONIC EXAMINATION COVERAGE ASSESSMENT

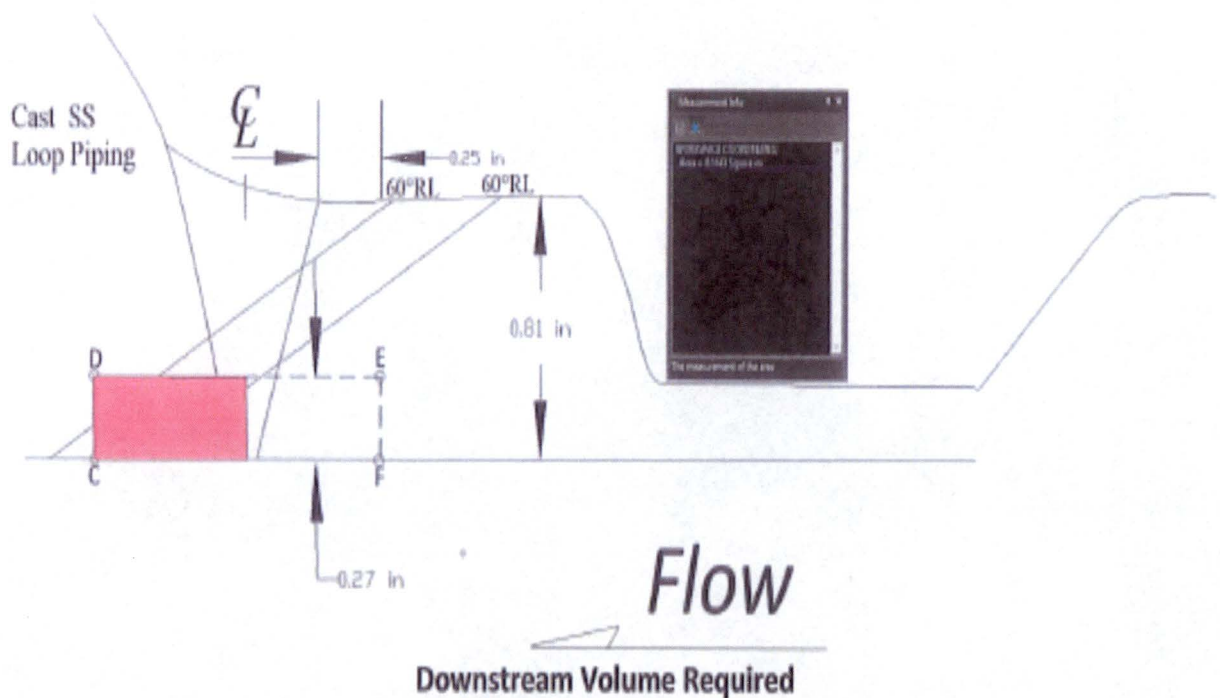
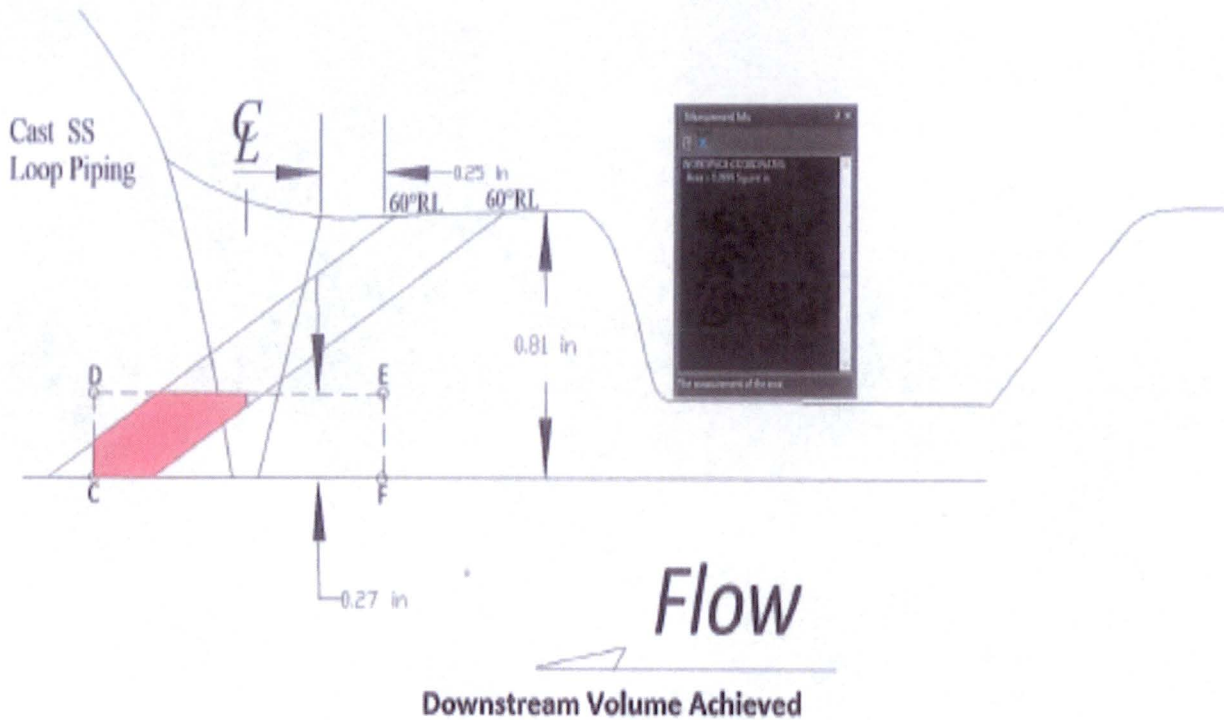


Figure 1.11-3 Weld 1-RC-1-14N Coverage Calculation

**1.11 Weld 1-RC-1-14N – Reactor Coolant Nozzle Branch Connection**

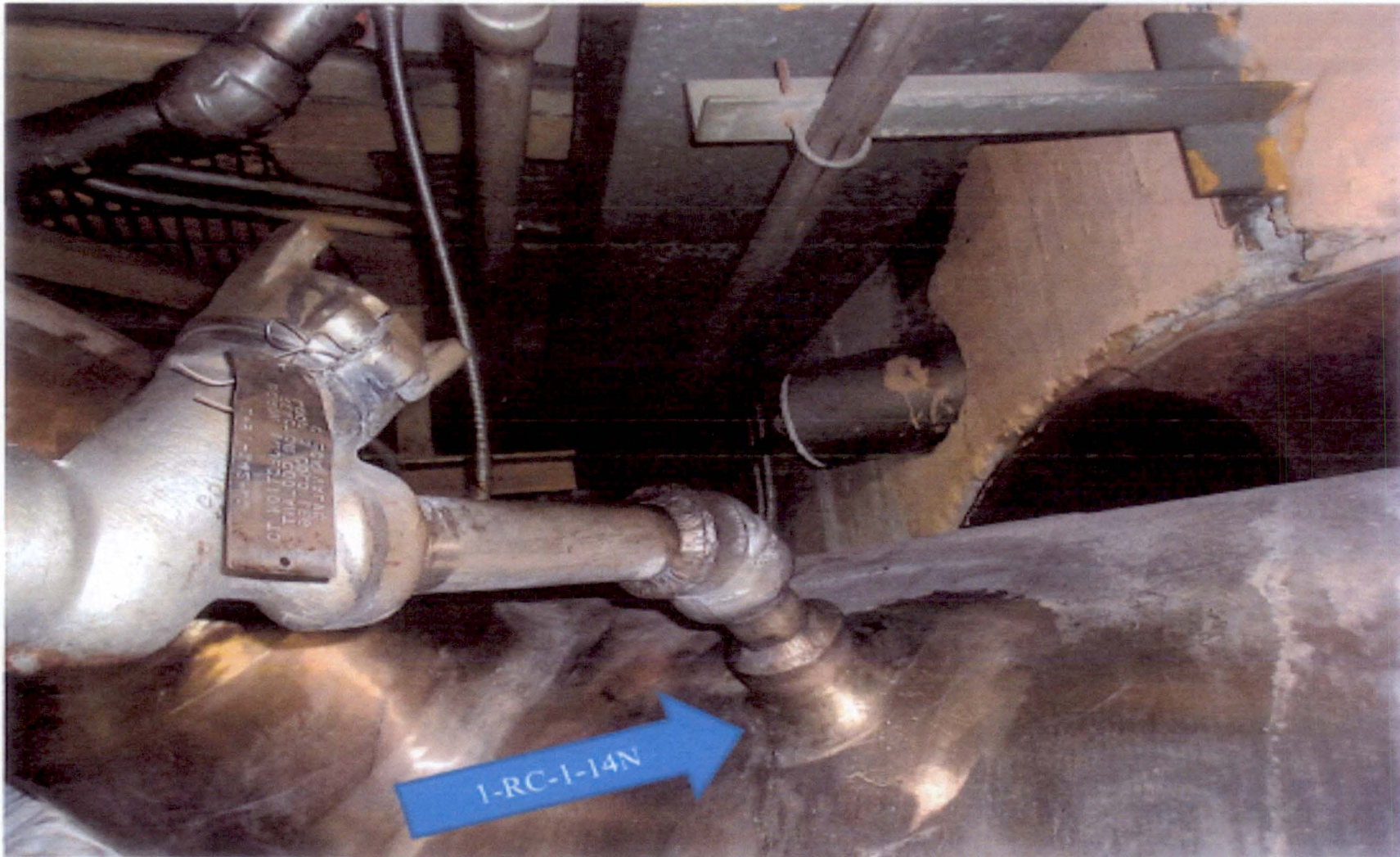
Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	10.1"	0.1643 in <sup>2</sup>	0.1643 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	10.1"	0.1643 in <sup>2</sup>	0.0999 in <sup>2</sup>	60.8% (Note 1)
Clockwise	10.1"	0.1643 in <sup>2</sup>	0.8215 in <sup>2</sup>	50%
Counterclockwise	10.1"	0.1643 in <sup>2</sup>	0.8215 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.11-1 Weld 1-RC-1-14N Coverage Calculation Results**



**1.11 Weld 1-RC-1-14N – Reactor Coolant Nozzle Branch Connection**



**Component Photo**

**Figure 1.11-4 Weld 1-RC-1-14N Component Photograph**



### **1.12    Weld 1-RC-11-12S – Reactor Coolant Elbow to Pipe**

Weld 1-RC-11-12S was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-020. No previous ISI UT data was identified for review.

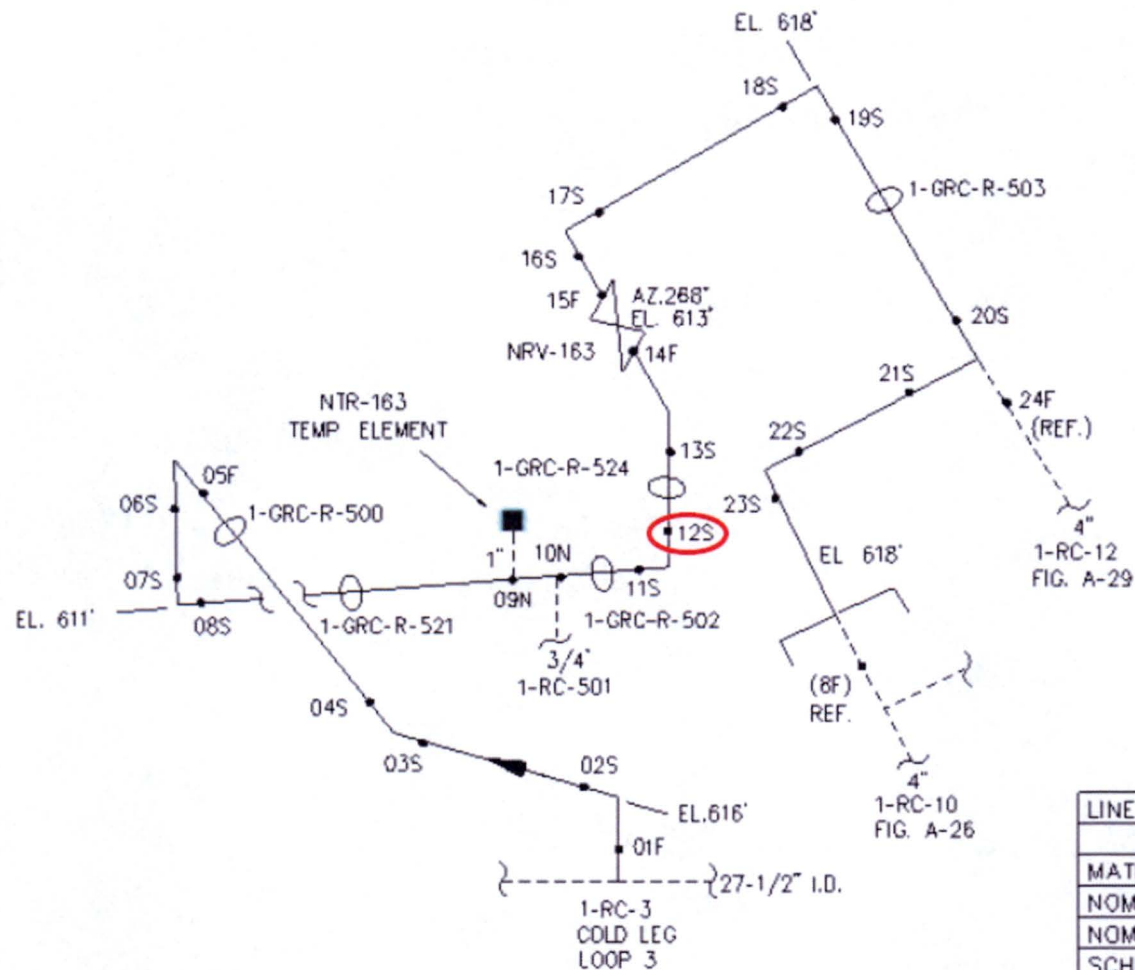
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to an adjacent non-removable clamp. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.12-2, 1.12-3, and Table 1.12-1. A photograph of weld 1-RC-11-12S is provided in Figure 1.12-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.12 Weld 1-RC-11-12S – Reactor Coolant Elbow to Pipe



LINE NO	1-RC-11
MATERIAL	SS
NOM. DIA	4"
NOM. THK.	0.438
SCHEDULE	120
CAL. BLK.	3378027(4-SS-120-430)
LOCATION	

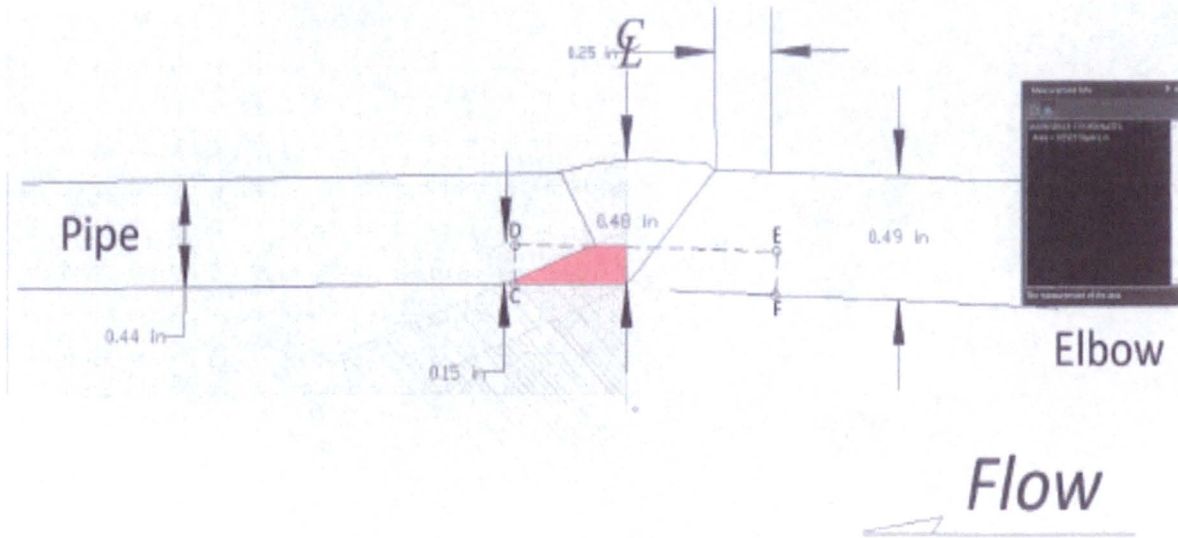
D. C. COOK, UNIT 1

FIG. A-28 REACTOR COOLANT SYSTEM

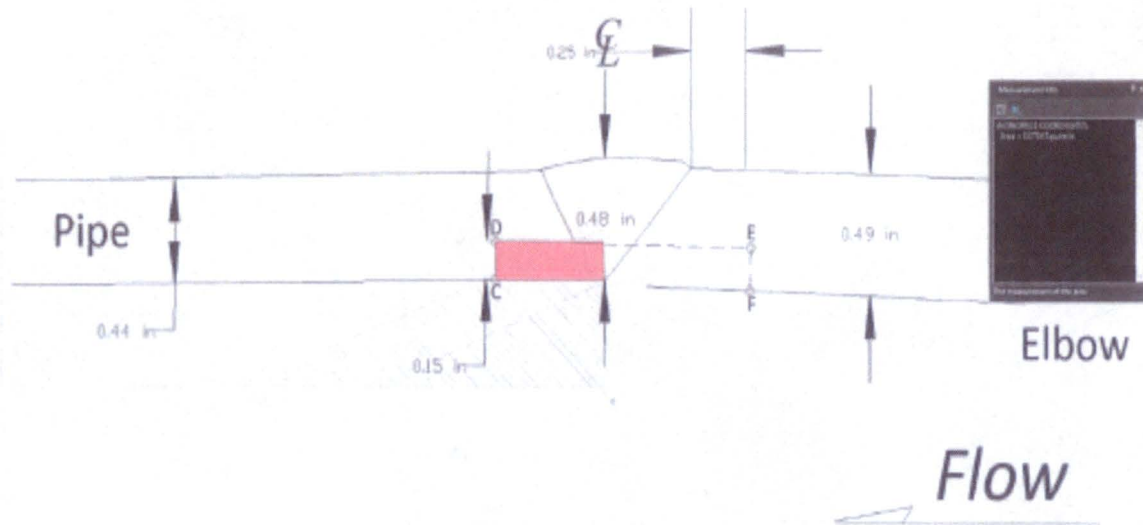
REF. DRAWING: AEP 1-RC-11  
FLOW DIAGRAM: 1-5128

Figure 1.12-1 Weld 1-RC-11-12S (Extracted from Reference DRAWING A-28)

## PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT



### Downstream Volume Achieved

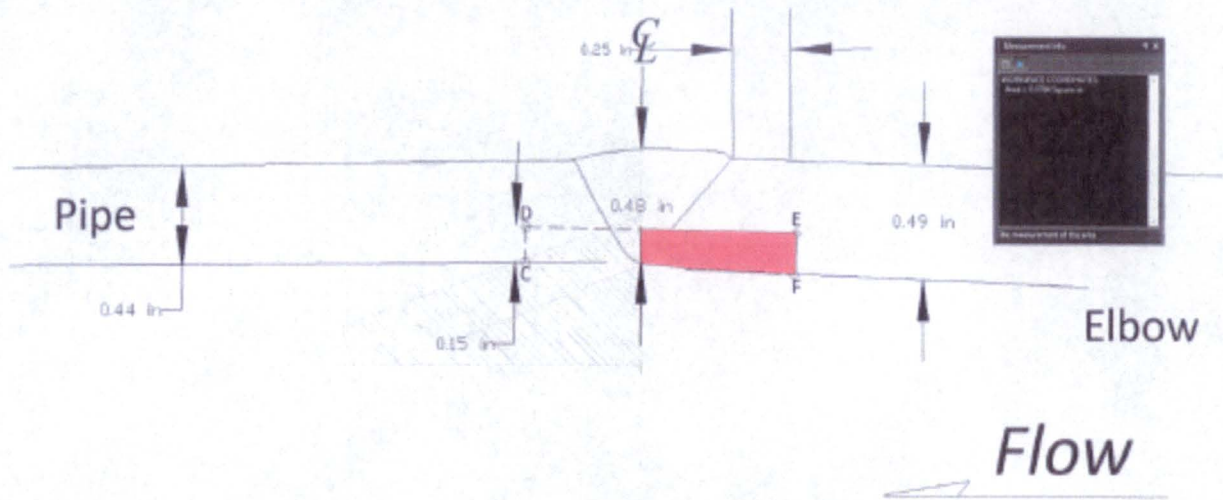


### Downstream Volume Required

### Figure 1.12-2 Weld 1-RC-11-12S Coverage Calculation



### 1.12 Weld 1-RC-11-12S – Reactor Coolant Elbow to Pipe



Upstream Volume Achieved

Figure 1.12-3 Weld 1-RC-11-12S Coverage Calculation

**1.12 Weld 1-RC-11-12S – Reactor Coolant Elbow to Pipe**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	14.25"	0.0784 in <sup>2</sup>	0.1462 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	14.25"	0.0784 in <sup>2</sup>	0.0525 in <sup>2</sup>	66.9% (Note 1)
Clockwise	14.25"	0.1568 in <sup>2</sup>	0.0784 in <sup>2</sup>	50%
Counterclockwise	14.25"	0.1568 in <sup>2</sup>	0.0784 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Table 1.12-1 Weld 1-RC-11-12S Coverage Calculation Results**



**1.12 Weld 1-RC-11-12S – Reactor Coolant Elbow to Pipe**



**Component Photo**

**Figure 1.12-4 Weld 1-RC-11-12S Component Photograph**



### **1.13    Weld 1-SI-29-20S – Safety Injection Elbow to Tee**

Weld 1-SI-29-20S was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-044. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **61.45%** as described in Figures 1.13-2, 1.13-3, and Table 1.13-1. A photograph of weld 1-SI-29-20S is provided in Figure 1.13-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.13 Weld 1-SI-29-20S – Safety Injection Elbow to Tee

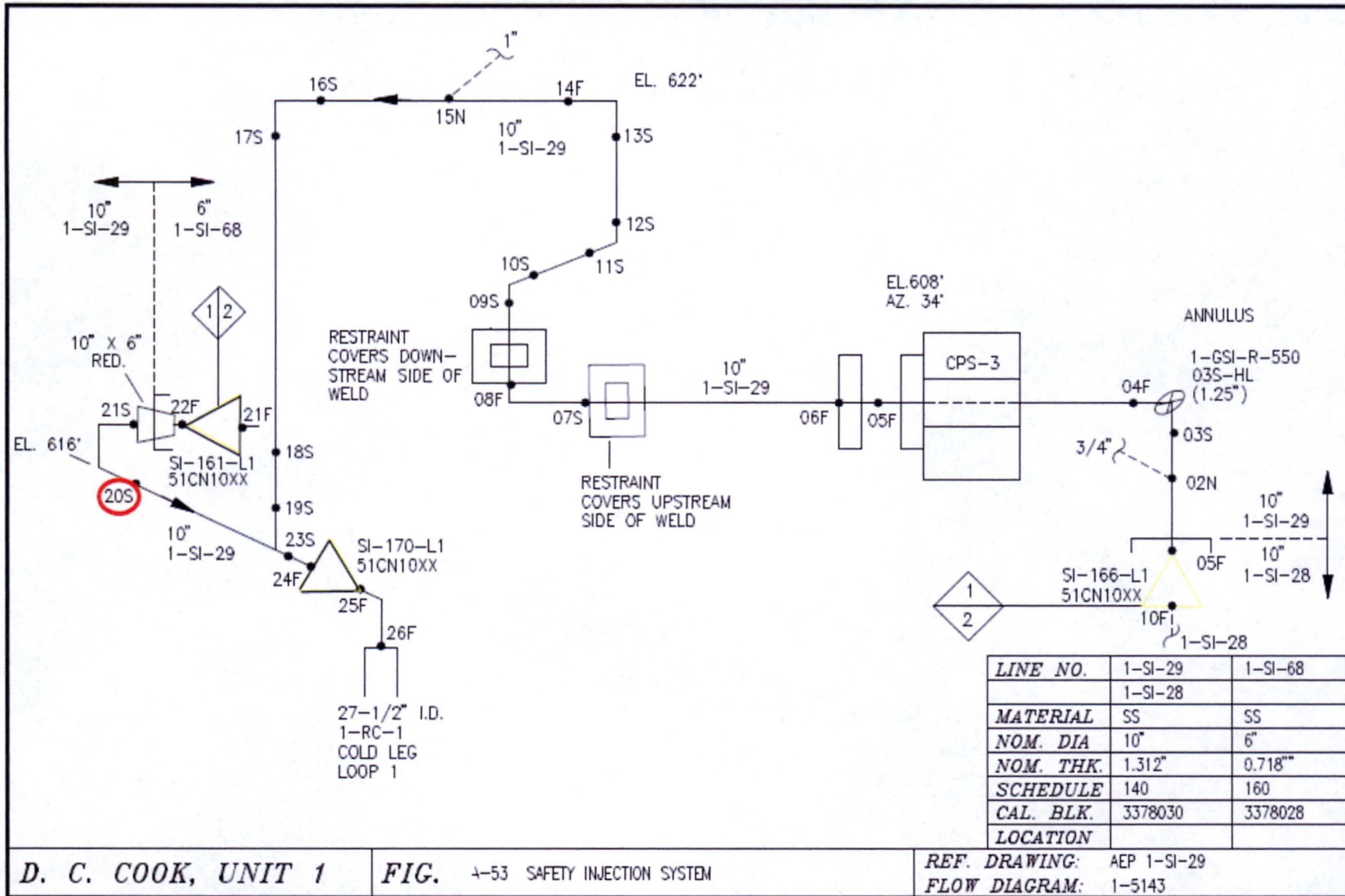


Figure 1.13-1 Weld 1-SI-29-20S (Extracted from Reference DRAWING A-53)

### 1.13 Weld 1-SI-29-20S – Safety Injection Elbow to Tee

#### PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT

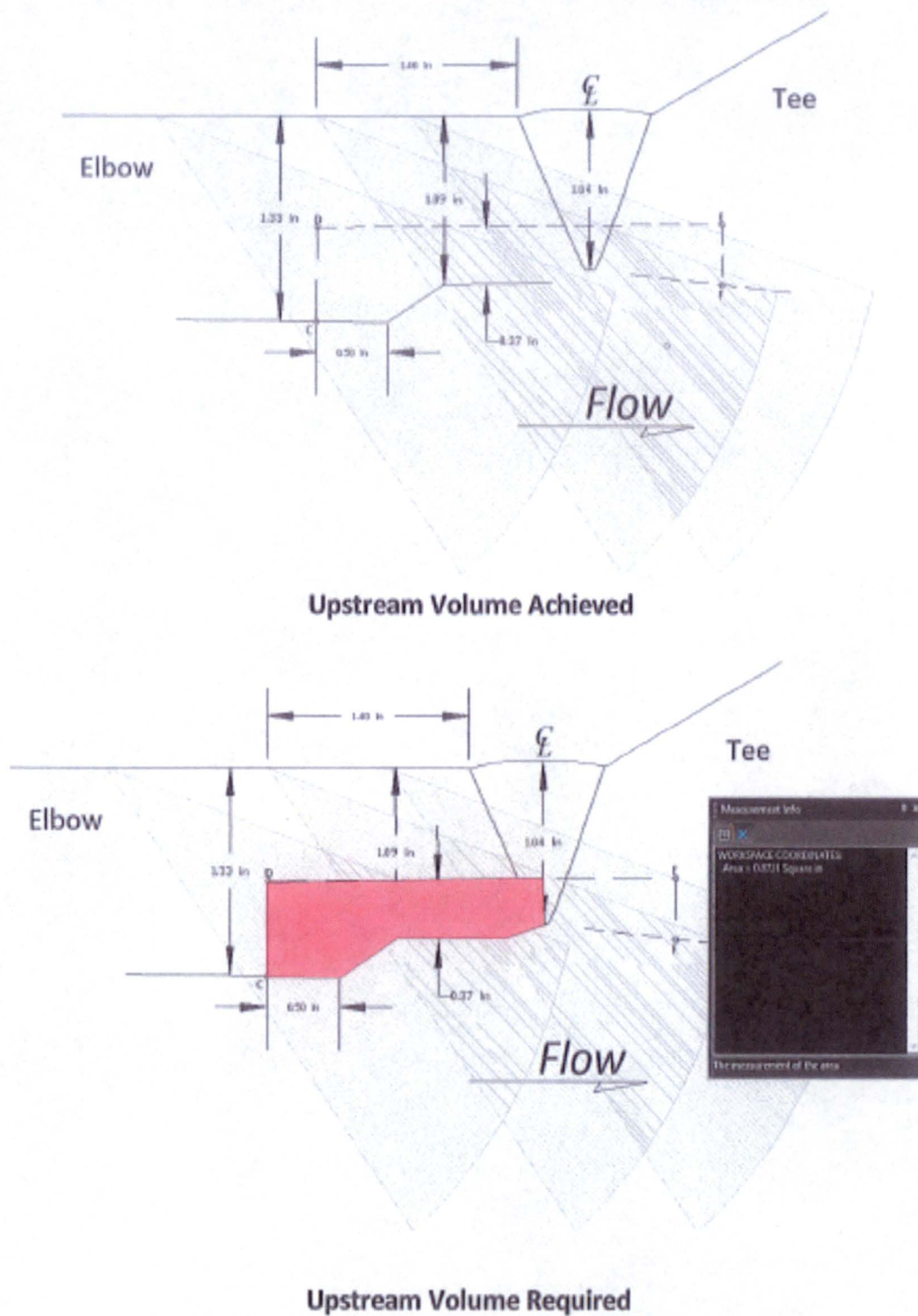


Figure 1.13-2 Weld 1-SI-29-20S Coverage Calculation



### 1.13 Weld 1-SI-29-20S – Safety Injection Elbow to Tee

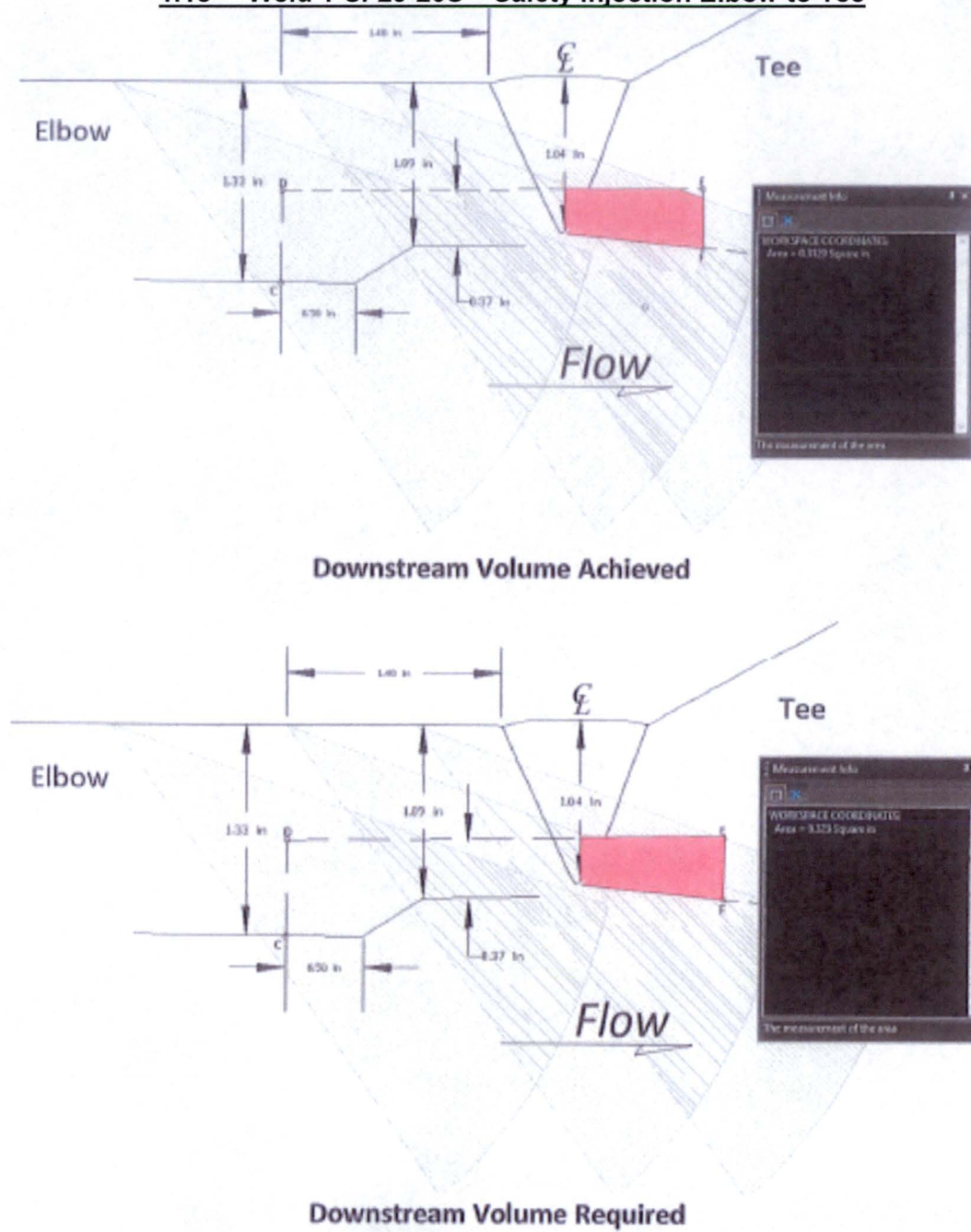


Figure 1.13-3 Weld 1-SI-29-20S Coverage Calculation

**1.13 Weld 1-SI-29-20S – Safety Injection Elbow to Tee**

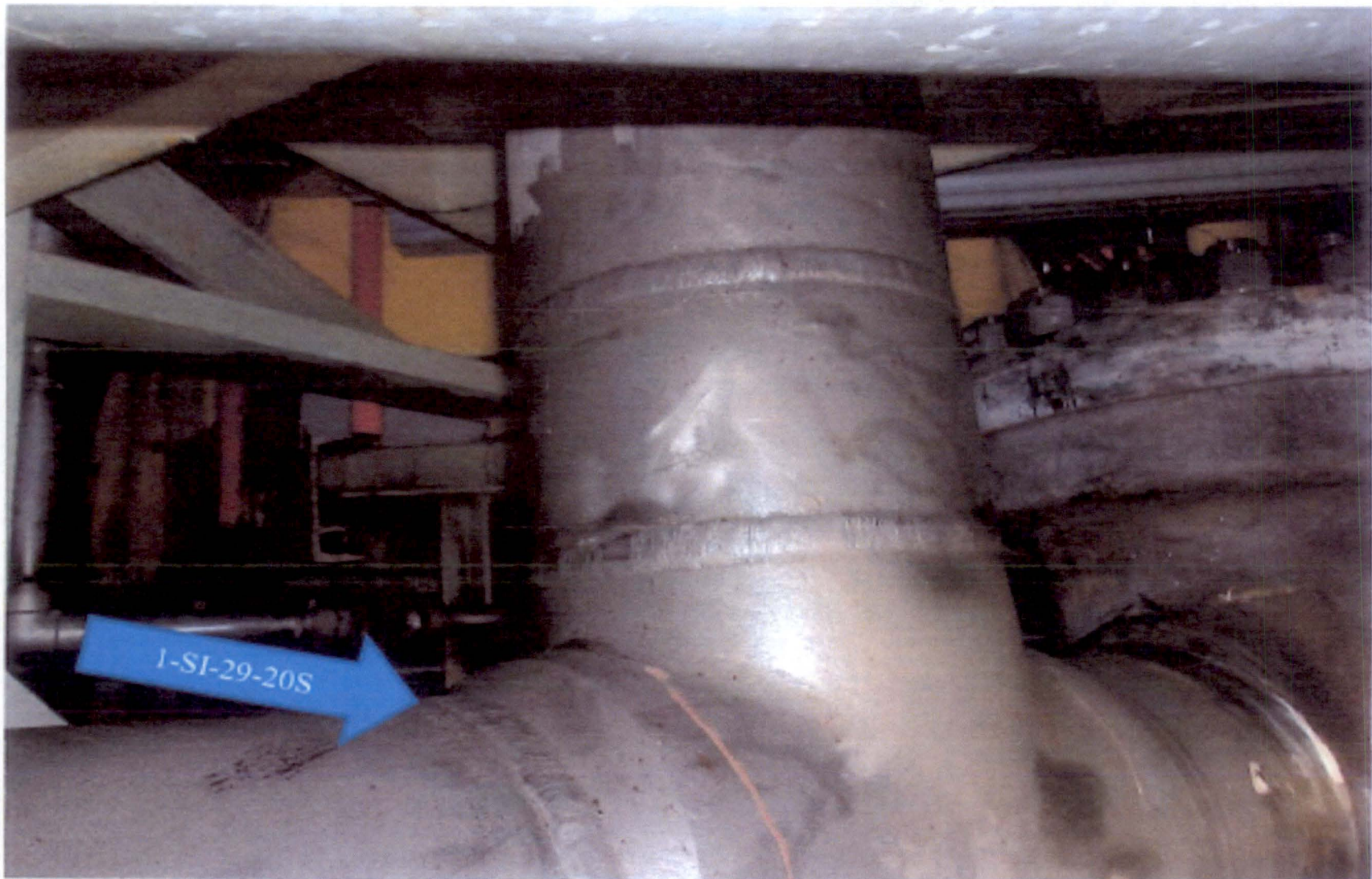
Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	34.25"	0.8731 in <sup>2</sup>	0.8731 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	34.25"	0.323 in <sup>2</sup>	0.3129 in <sup>2</sup>	99.65% (Note 1)
Clockwise	34.25"	1.1961 in <sup>2</sup>	0.8731 in <sup>2</sup>	72.9%
Counterclockwise	34.25"	1.1961 in <sup>2</sup>	0.8731 in <sup>2</sup>	72.9%
Code Required Coverage Achieved:				61.45%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.13-1 Weld 1-SI-29-20S Coverage Calculation Results**



1.13 Weld 1-SI-29-20S – Safety Injection Elbow to Tee



Component Photo

Figure 1.13-4 Weld 1-SI-29-20S Component Photograph



#### **1.14 Weld 1-SI-29-23S – Safety Injection Tee to Pipe**

Weld 1-SI-29-23S was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-045. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.14-2, 1.14-3, and Table 1.14-1. A photograph of weld 1-SI-29-23S is provided in Figure 1.14-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.14 Weld 1-SI-29-23S – Safety Injection Tee to Pipe

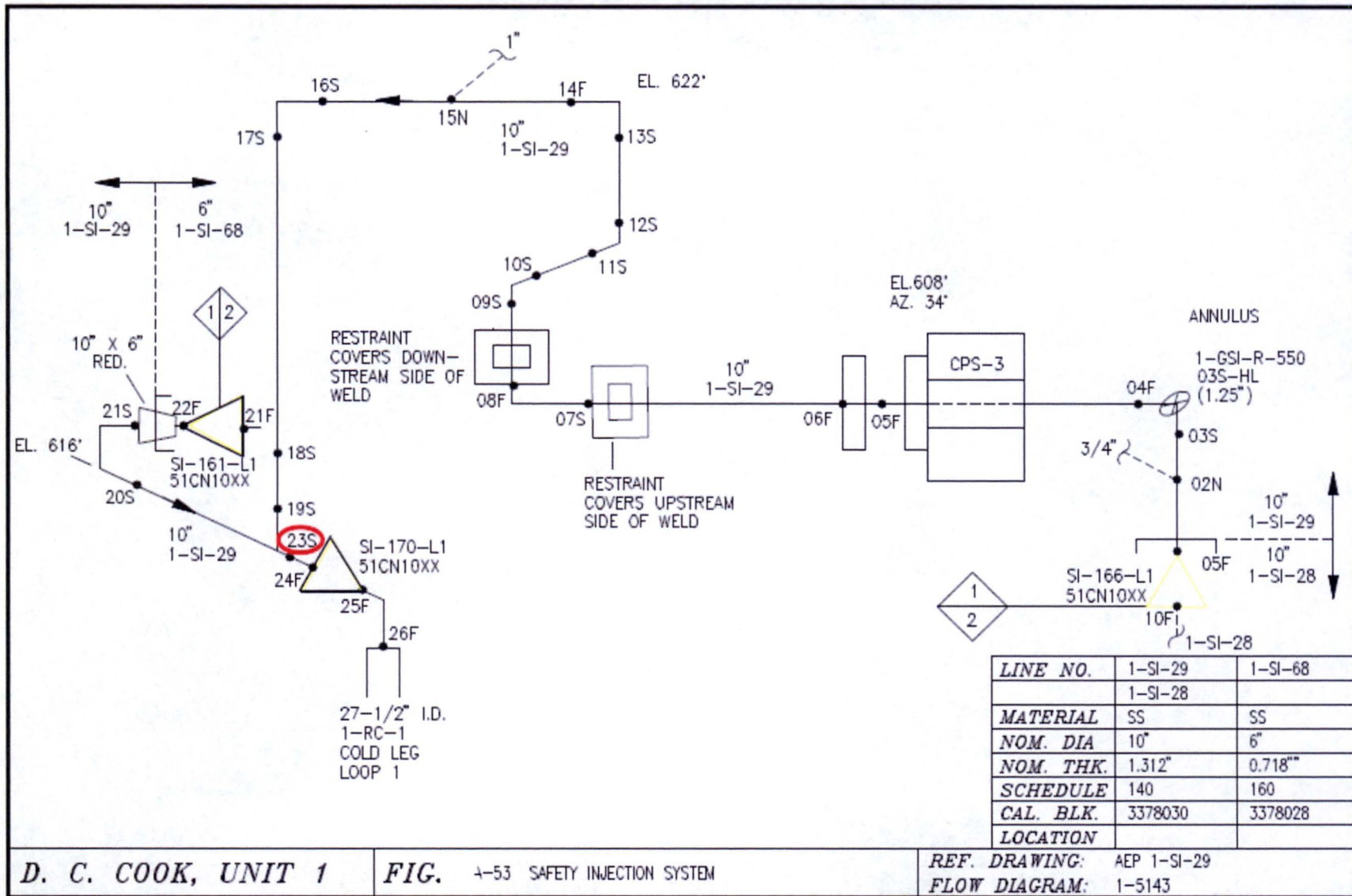
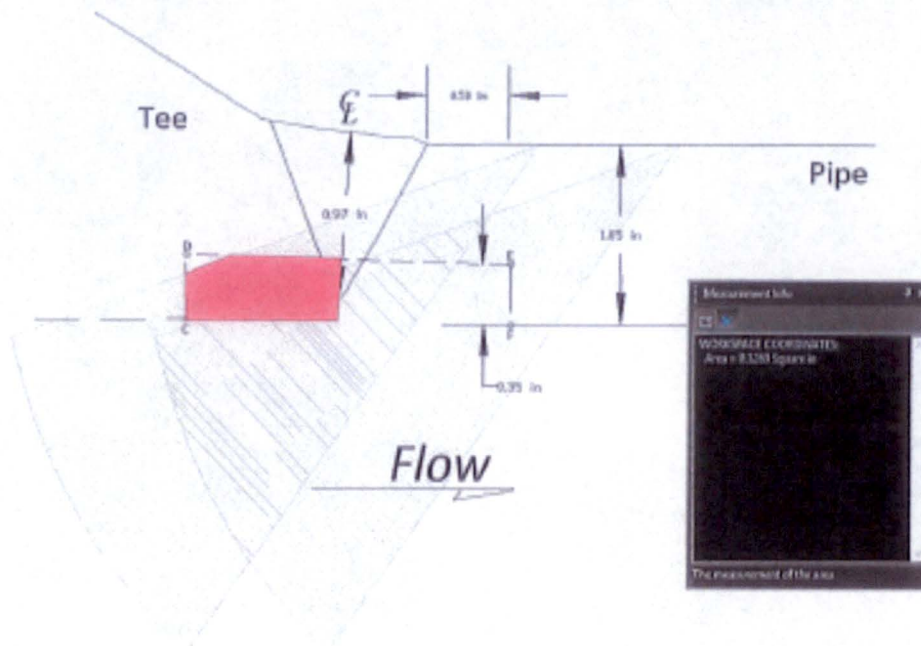
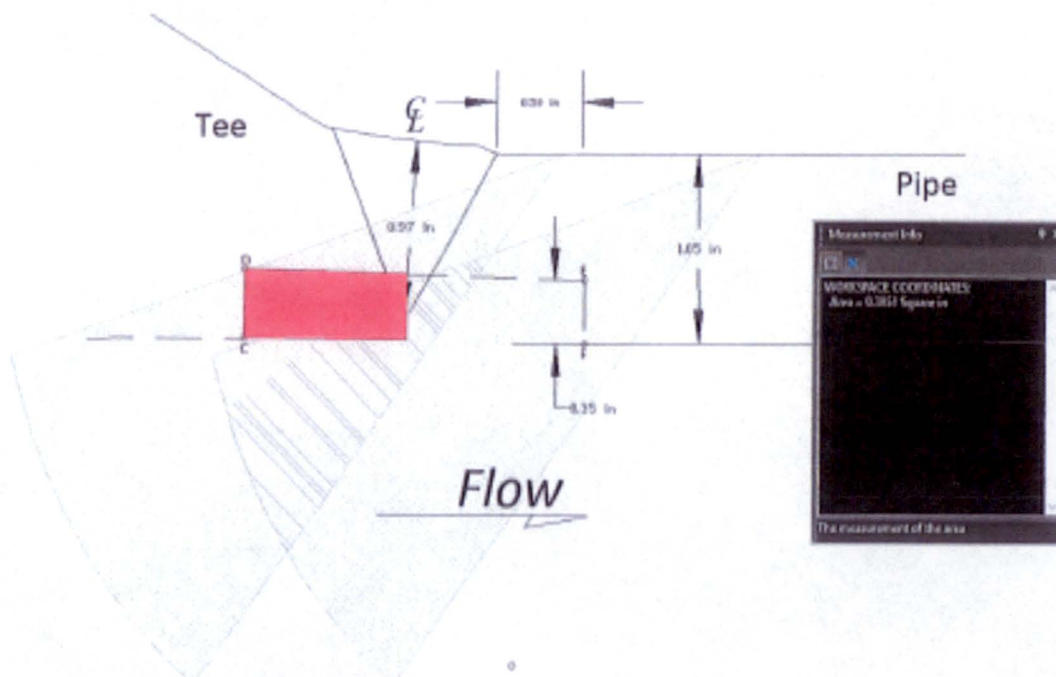


Figure 1.14-1 Weld 1-SI-29-23S (Extracted from Reference DRAWING A-53)

**1.14 Weld 1-SI-29-23S – Safety Injection Tee to Pipe**  
**PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT**



**Upstream Volume Achieved**

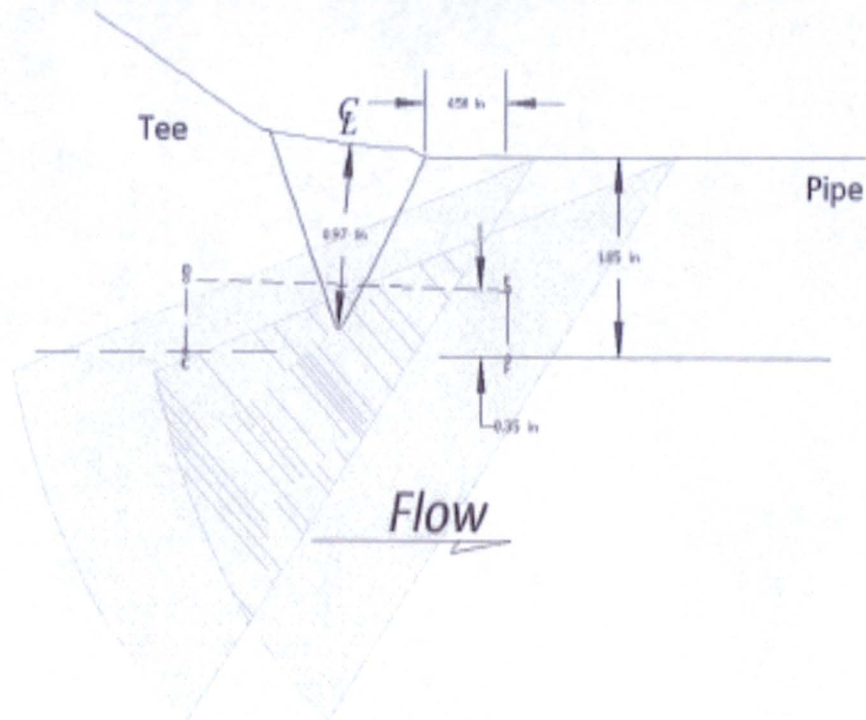


**Upstream Volume Required**

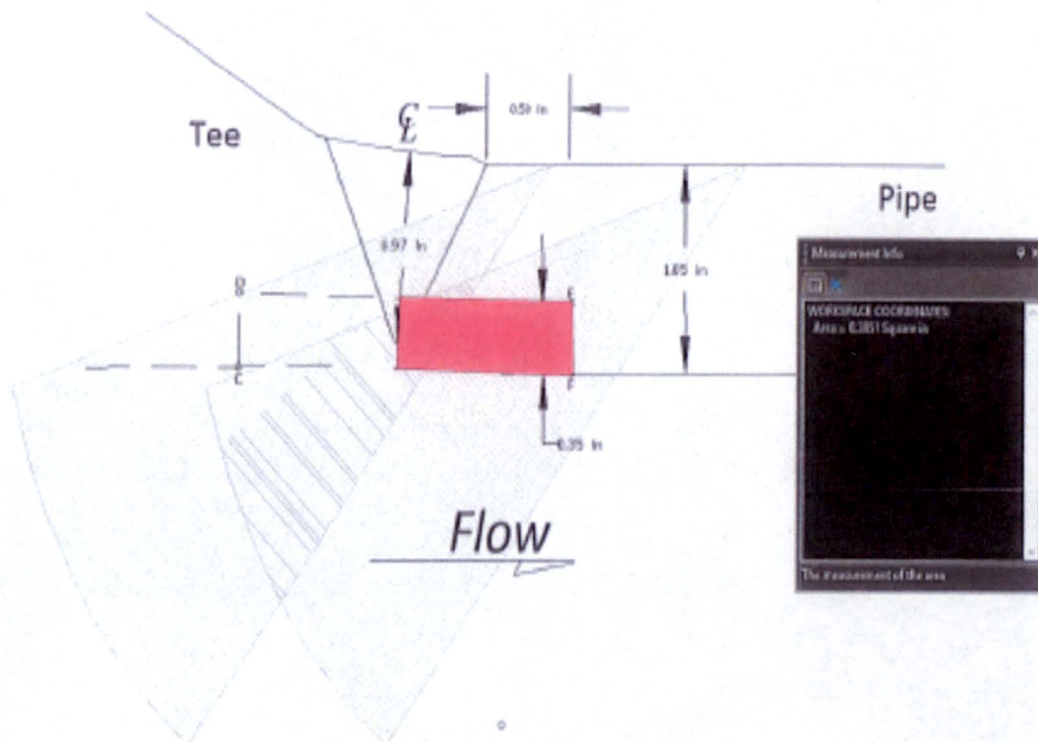
**Figure 1.14-2 Weld 1-SI-29-23S Coverage Calculation**



**1.14 Weld 1-SI-29-23S – Safety Injection Tee to Pipe**



**Downstream Volume Achieved**



**Downstream Volume Required**

**Figure 1.14-3 Weld 1-SI-29-23S Coverage Calculation**

**1.14 Weld 1-SI-29-23S – Safety Injection Tee to Pipe**

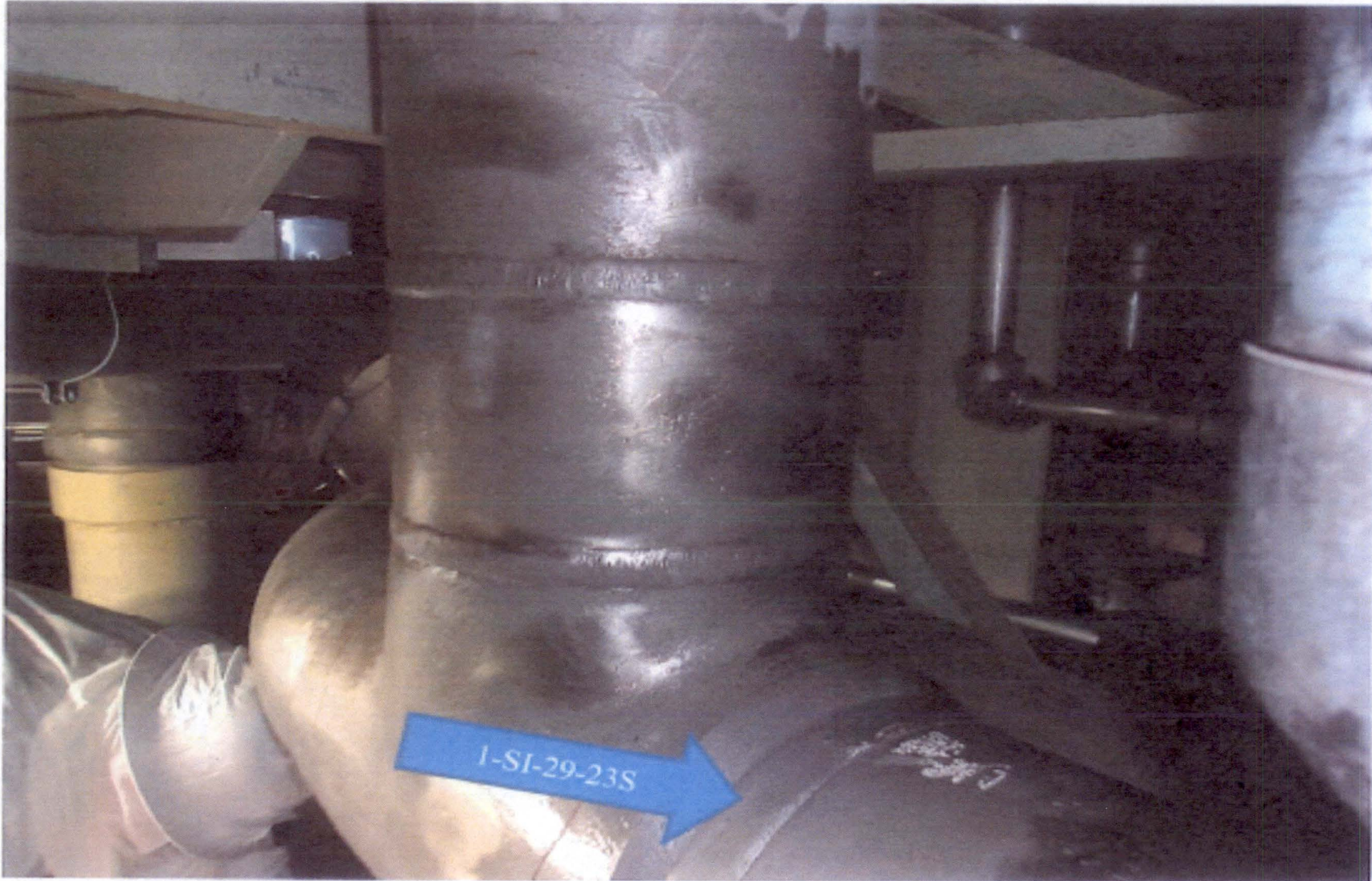
Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Downstream Axial	34.25"	0.3851 in <sup>2</sup>	0.3851 in <sup>2</sup>	100%
Downstream Axial for Upstream Volume	34.25"	0.3851 in <sup>2</sup>	0.3269 in <sup>2</sup>	84.88% (Note 1)
Clockwise	34.25"	0.7702 in <sup>2</sup>	0.3851 in <sup>2</sup>	50%
Counterclockwise	34.25"	0.7702 in <sup>2</sup>	0.3851 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.14-1 Weld 1-SI-29-23S Coverage Calculation Results**



**1.14 Weld 1-SI-29-23S – Safety Injection Tee to Pipe**



**Component Photo**

**Figure 1.14-4 Weld 1-SI-29-23S Component Photograph**



### **1.15 Weld 1-SI-29-26F Safety Injection Elbow to Branch Connection**

Weld 1-SI-29-26F was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-046. Previous ISI UT data was reviewed.

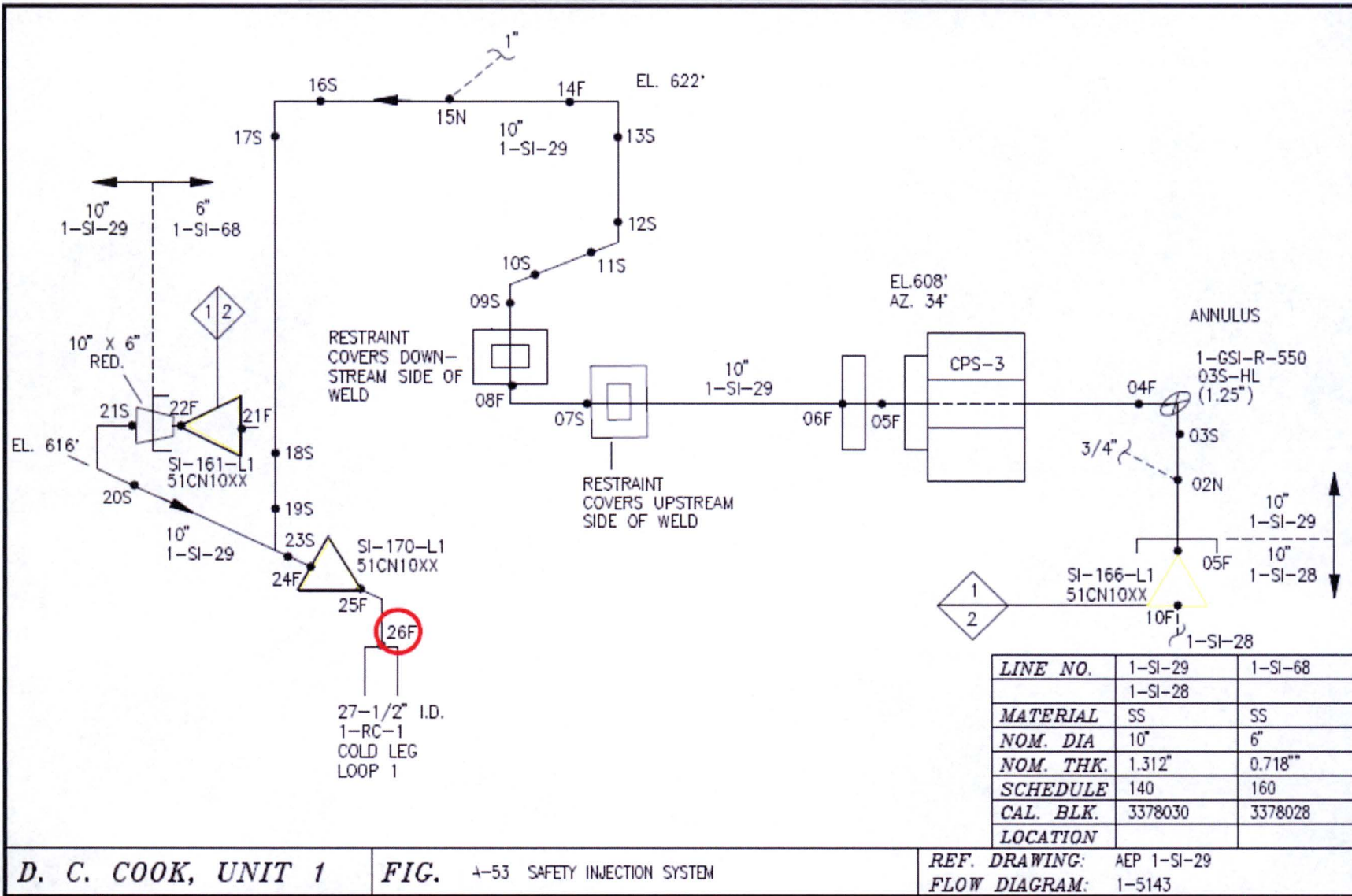
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.15-2, 1.15-3, and Table 1.15-1. A photograph of weld 1-SI-29-26F is provided in Figure 1.15-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

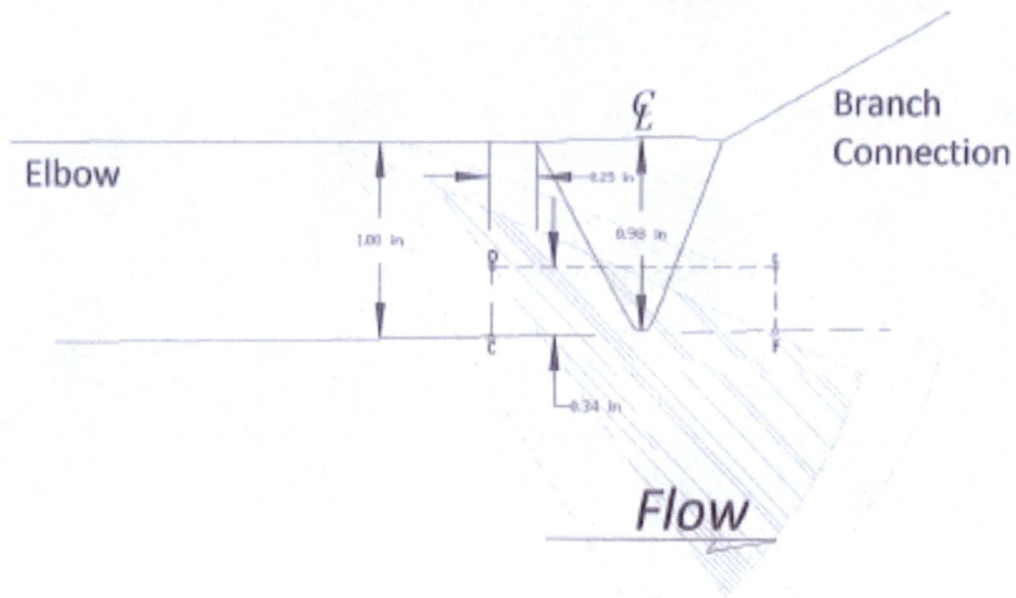
The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.15 Weld 1-SI-29-26F Safety Injection Elbow to Branch Connection

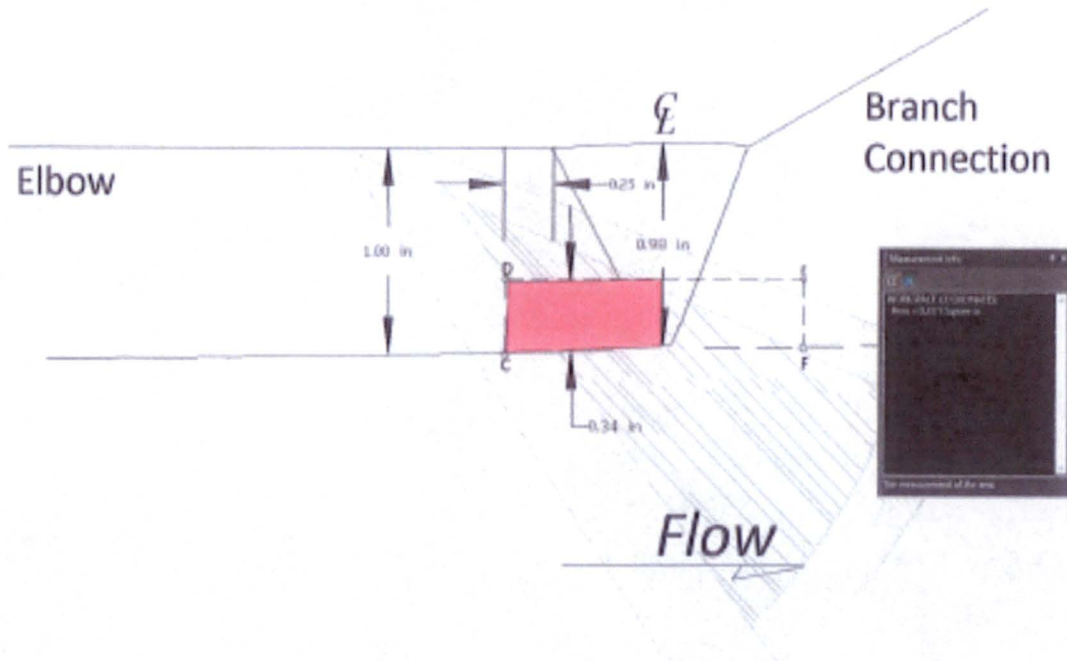


**Figure 1.15-1 Weld 1-SI-29-26F (Extracted from Reference DRAWING A-53)**

### PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT



### Upstream Volume Achieved

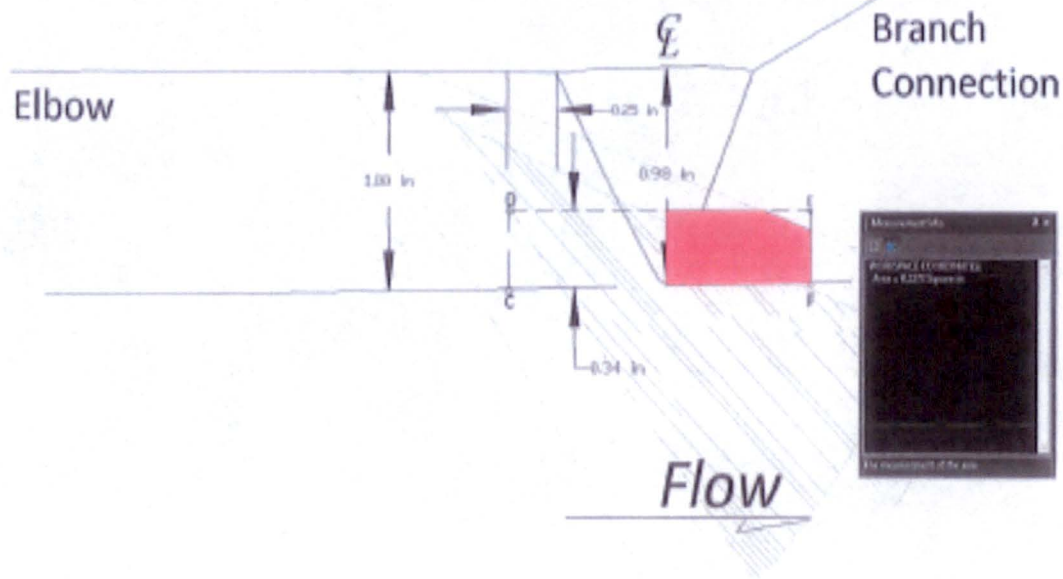


### Upstream Volume Required

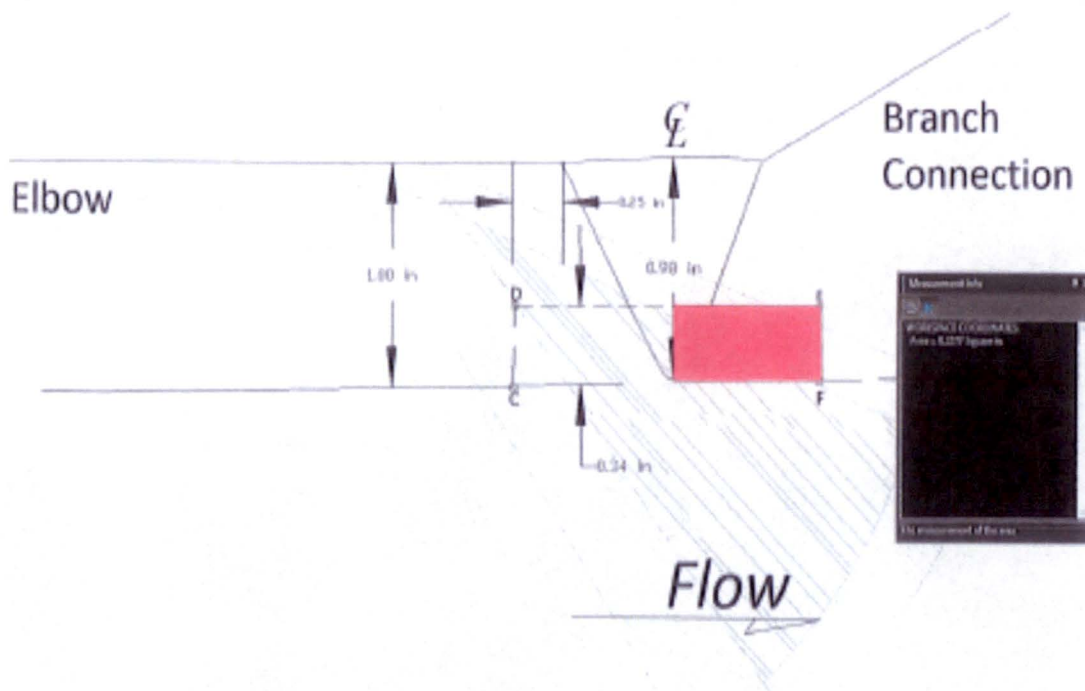
### Figure 1.15-2 Weld 1-SI-29-26F Coverage Calculation



### 1.15 Weld 1-SI-29-26F Safety Injection Elbow to Branch Connection



**Downstream Volume Achieved**



**Downstream Volume Required**

**Figure 1.15-3 Weld 1-SI-29-26F Coverage Calculation**

**1.15 Weld 1-SI-29-26F Safety Injection Elbow to Branch Connection**

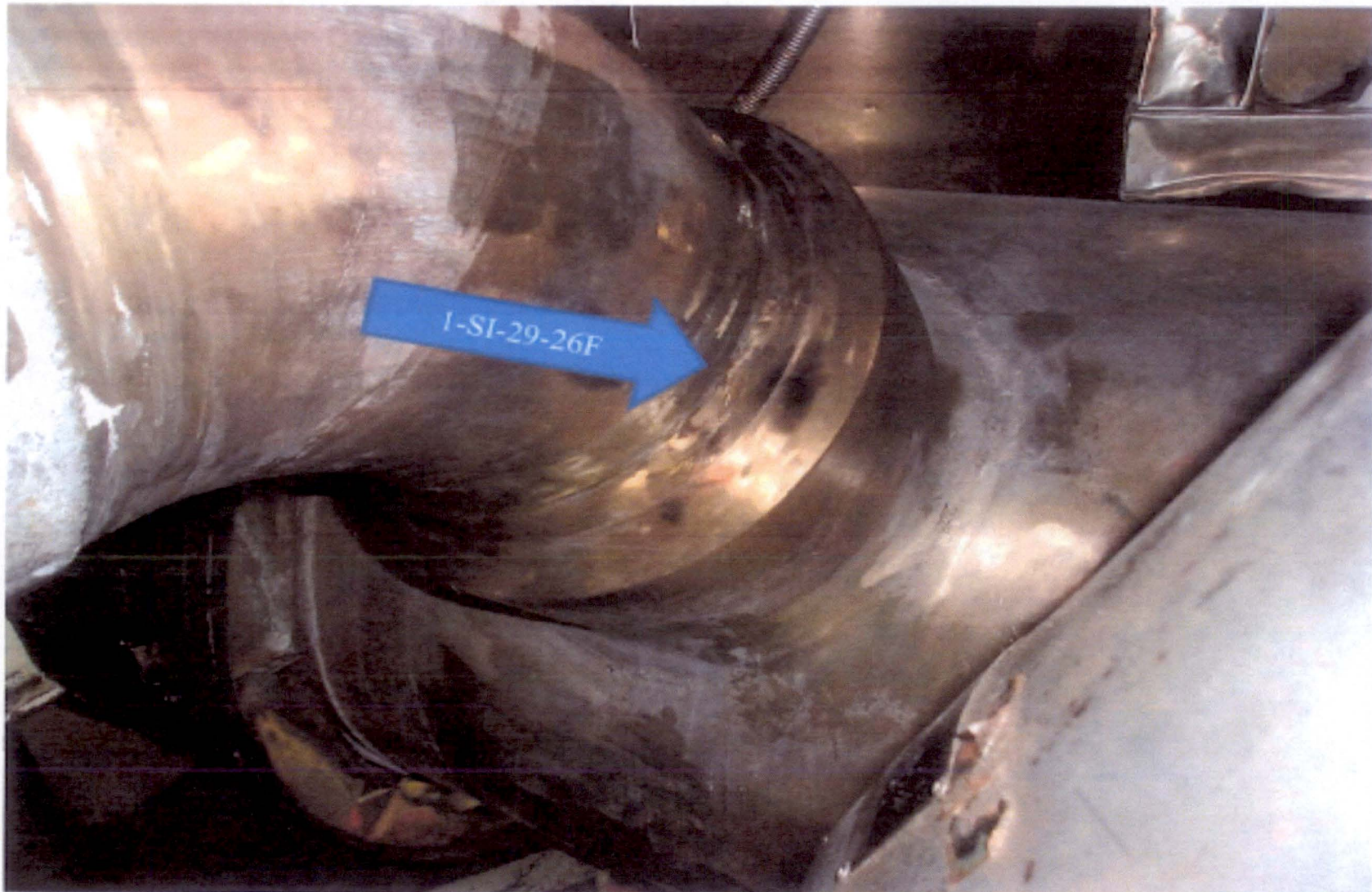
Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	34.25"	0.2377 in <sup>2</sup>	0.2377 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	34.25"	0.2377 in <sup>2</sup>	0.2272 in <sup>2</sup>	95.6% (Note 1)
Clockwise	34.25"	1.1961 in <sup>2</sup>	0.8731 in <sup>2</sup>	50%
Counterclockwise	34.25"	1.1961 in <sup>2</sup>	0.8731 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.15-1 Weld 1-SI-29-26F Coverage Calculation Results**



1.15 Weld 1-SI-29-26F Safety Injection Elbow to Branch Connection



Component Photo

Figure 1.15-4 Weld 1-SI-29-26F Component Photograph



### **1.16 Weld 1-SI-31-21S Safety Injection Elbow to Tee**

Weld 1-SI-31-21S was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-051. Previous ISI UT data was reviewed.

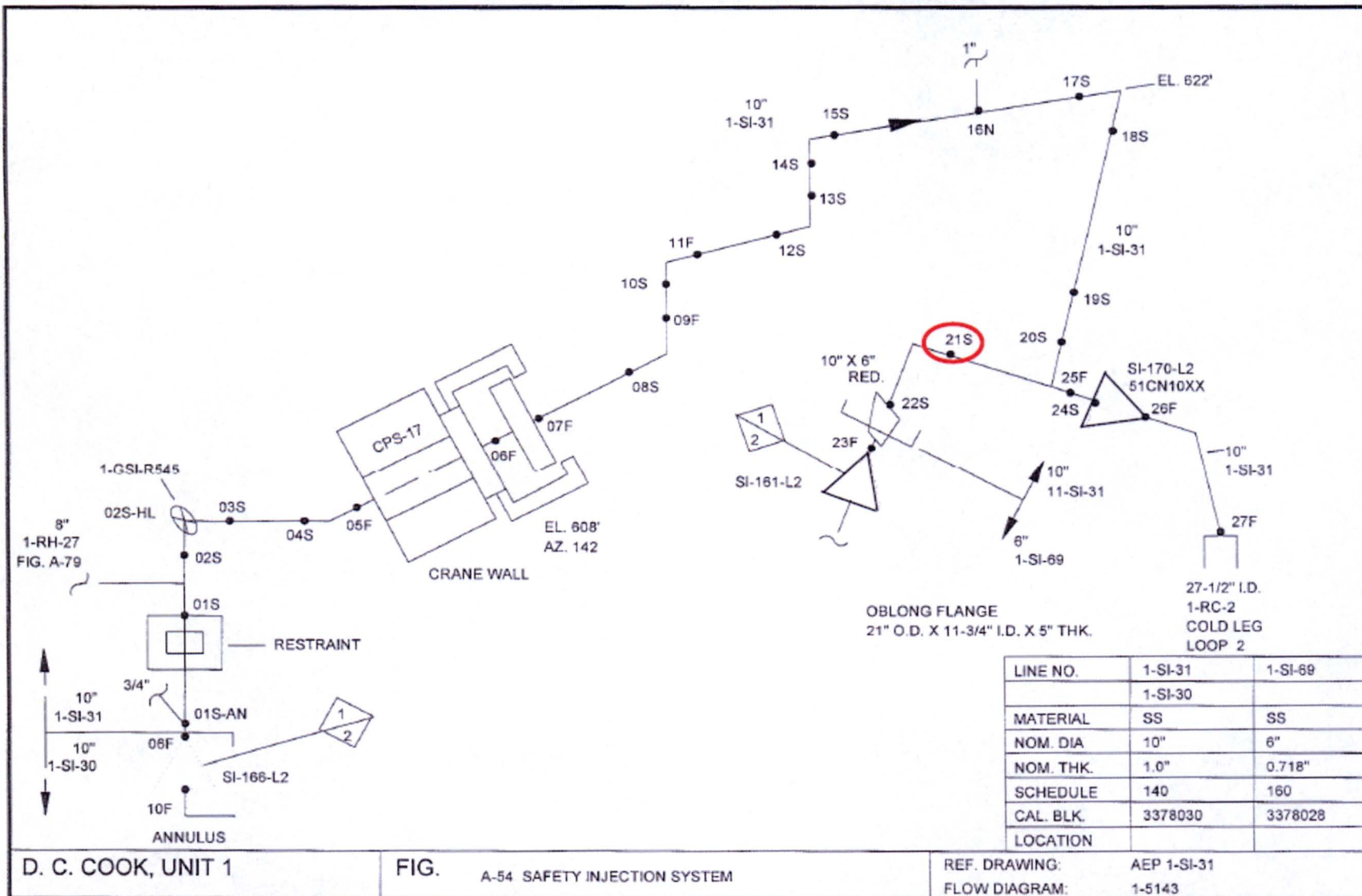
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.16-2, 1.16-3, and Table 1.16-1. A photograph of weld 1-SI-31-21S is provided in Figure 1.16-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.16 Weld 1-SI-31-21S Safety Injection Elbow to Tee



**Figure 1.16-1 Weld 1-SI-31-21S (Extracted from Reference DRAWING A-54)**

1.16 Weld 1-SI-31-21S Safety Injection Elbow to Tee

PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT

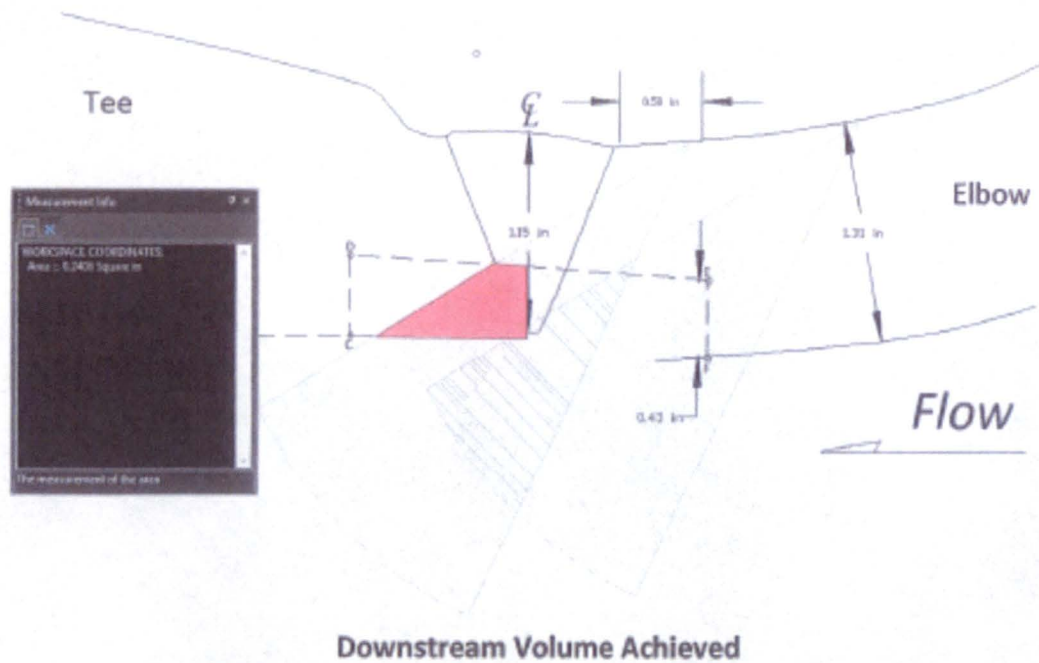
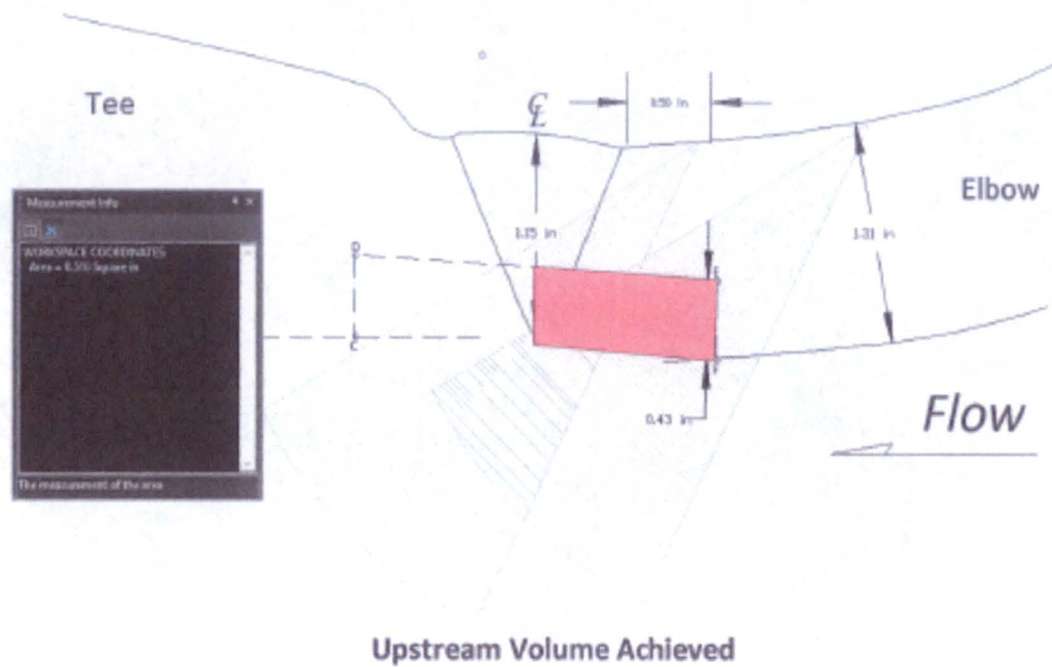
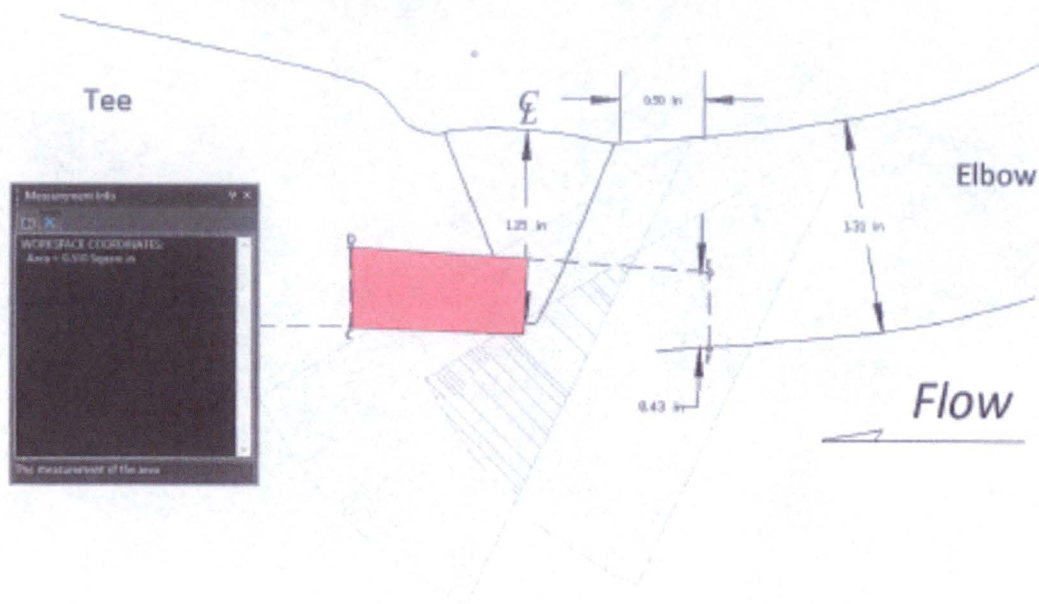


Figure 1.16-2 Weld 1-SI-31-21S Coverage Calculation



**1.16 Weld 1-SI-31-21S Safety Injection Elbow to Tee**



**Downstream Volume Required**

**Figure 1.16-3 Weld 1-SI-31-21S Coverage Calculation**

**1.16 Weld 1-SI-31-21S Safety Injection Elbow to Tee**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	34.25"	0.510 in <sup>2</sup>	0.510 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	34.25"	0.510 in <sup>2</sup>	0.2406 in <sup>2</sup>	47.17% (Note 1)
Clockwise	34.25"	1.020 in <sup>2</sup>	0.510 in <sup>2</sup>	50%
Counterclockwise	34.25"	1.020 in <sup>2</sup>	0.510 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.16-1 Weld 1-SI-31-21S Coverage Calculation Results**



1.16 Weld 1-SI-31-21S Safety Injection Elbow to Tee



Component Photo

Figure 1.16-4 Weld 1-SI-31-21S Component Photograph



### **1.17 Weld 1-SI-31-24S Safety Injection Tee to Pipe**

Weld 1-SI-31-24S was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-052. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.17-2, 1.17-3, and Table 1.17-1. A photograph of weld 1-SI-31-24S is provided in Figure 1.17-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.17 Weld 1-SI-31-24S Safety Injection Tee to Pipe

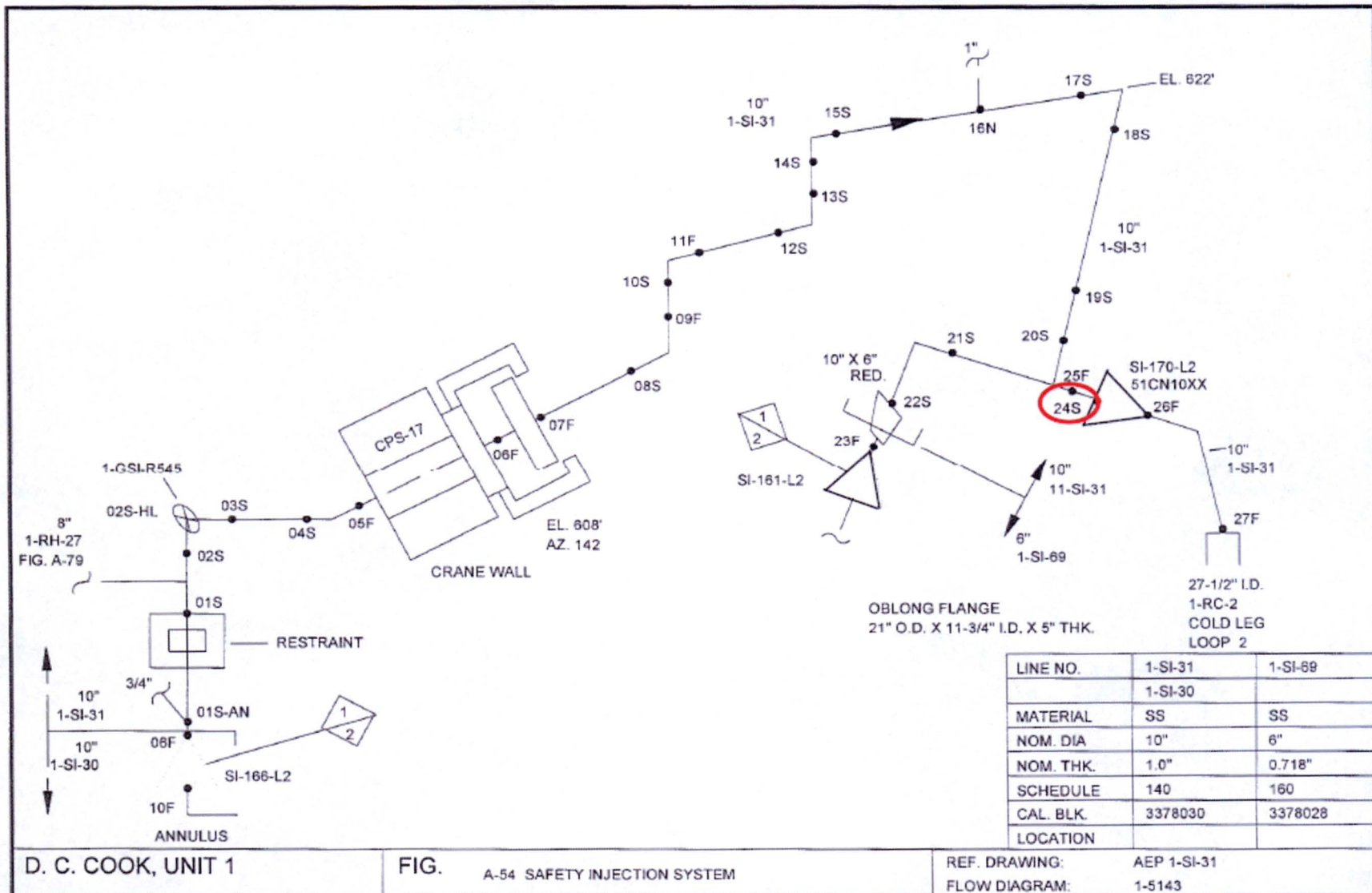


Figure 1.17-1 Weld 1-SI-31-24S (Extracted from Reference DRAWING A-54)

### 1.17 Weld 1-SI-31-24S Safety Injection Tee to Pipe

#### PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT

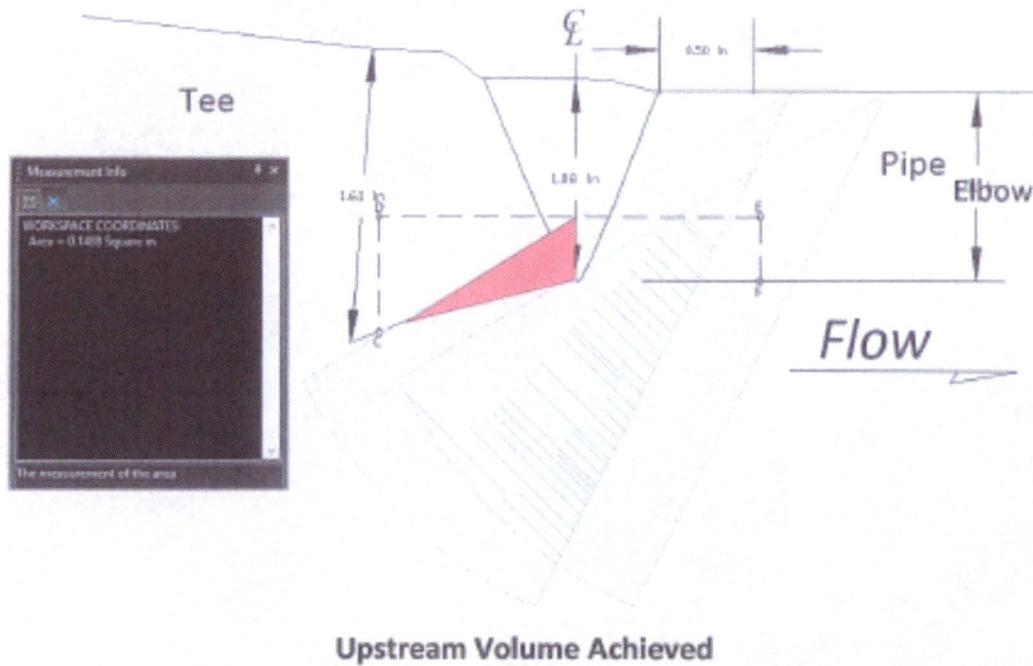
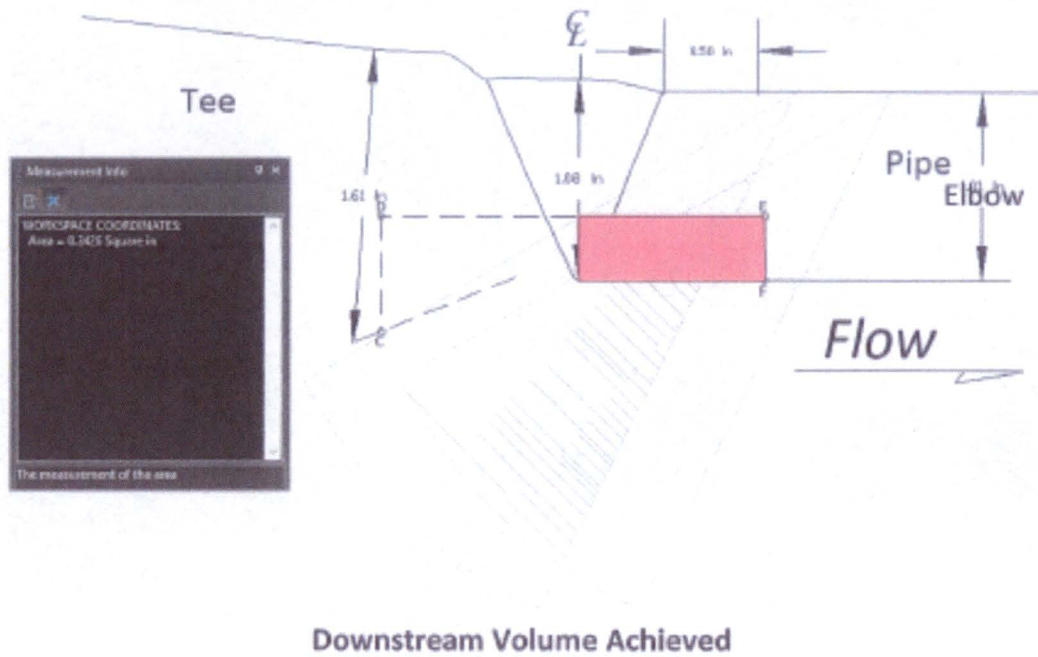
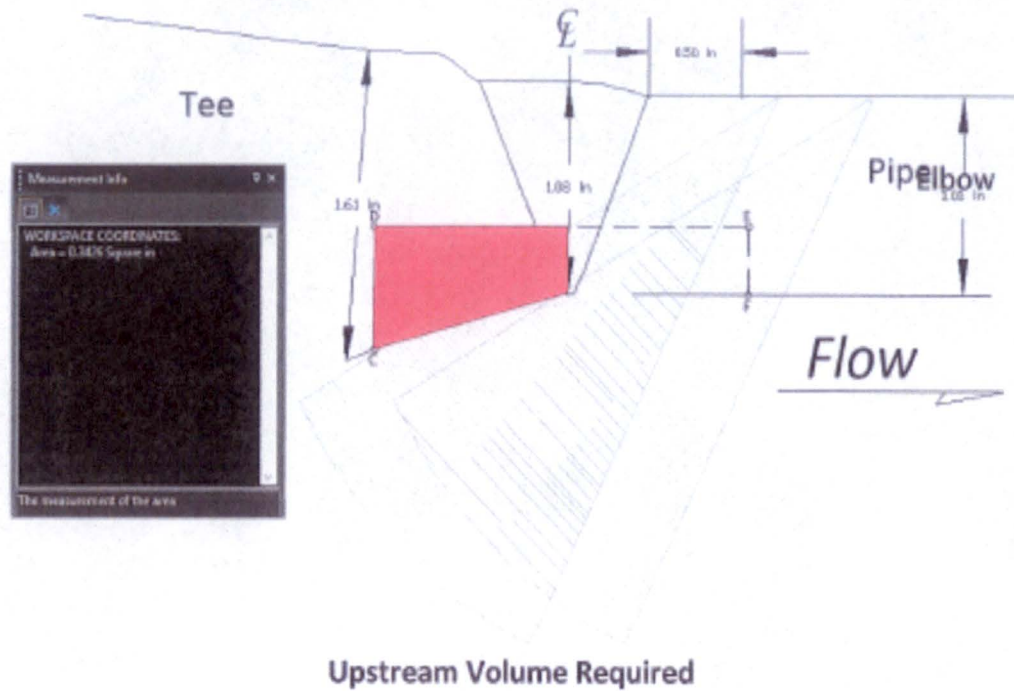


Figure 1.17-2 Weld 1-SI-31-24S Coverage Calculation



### **1.17 Weld 1-SI-31-24S Safety Injection Tee to Pipe**



### Figure 1.17-3 Weld 1-SI-31-24S Coverage Calculation

**1.17 Weld 1-SI-31-24S Safety Injection Tee to Pipe**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Downstream Axial	34.25"	0.3426 in <sup>2</sup>	0.3426 in <sup>2</sup>	100%
Downstream Axial for Upstream Volume	34.25"	0.3426 in <sup>2</sup>	0.1484 in <sup>2</sup>	43.33% (Note 1)
Clockwise	34.25"	0.6852 in <sup>2</sup>	0.3426 in <sup>2</sup>	50%
Counterclockwise	34.25"	0.6852 in <sup>2</sup>	0.3426 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.17-1 Weld 1-SI-31-24S Coverage Calculation Results**



1.17 Weld 1-SI-31-24S Safety Injection Tee to Pipe



Component Photo

Figure 1.17-4 Weld 1-SI-31-24S Component Photograph



### **1.18 Weld 1-SI-31-27F Safety Injection Elbow to Branch Connection**

Weld 1-SI-31-27F was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-053. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.18-2, 1.18-3, and Table 1.18-1. A photograph of weld 1-SI-31-27F is provided in Figure 1.18-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.18 Weld 1-SI-31-27F Safety Injection Elbow to Branch Connection

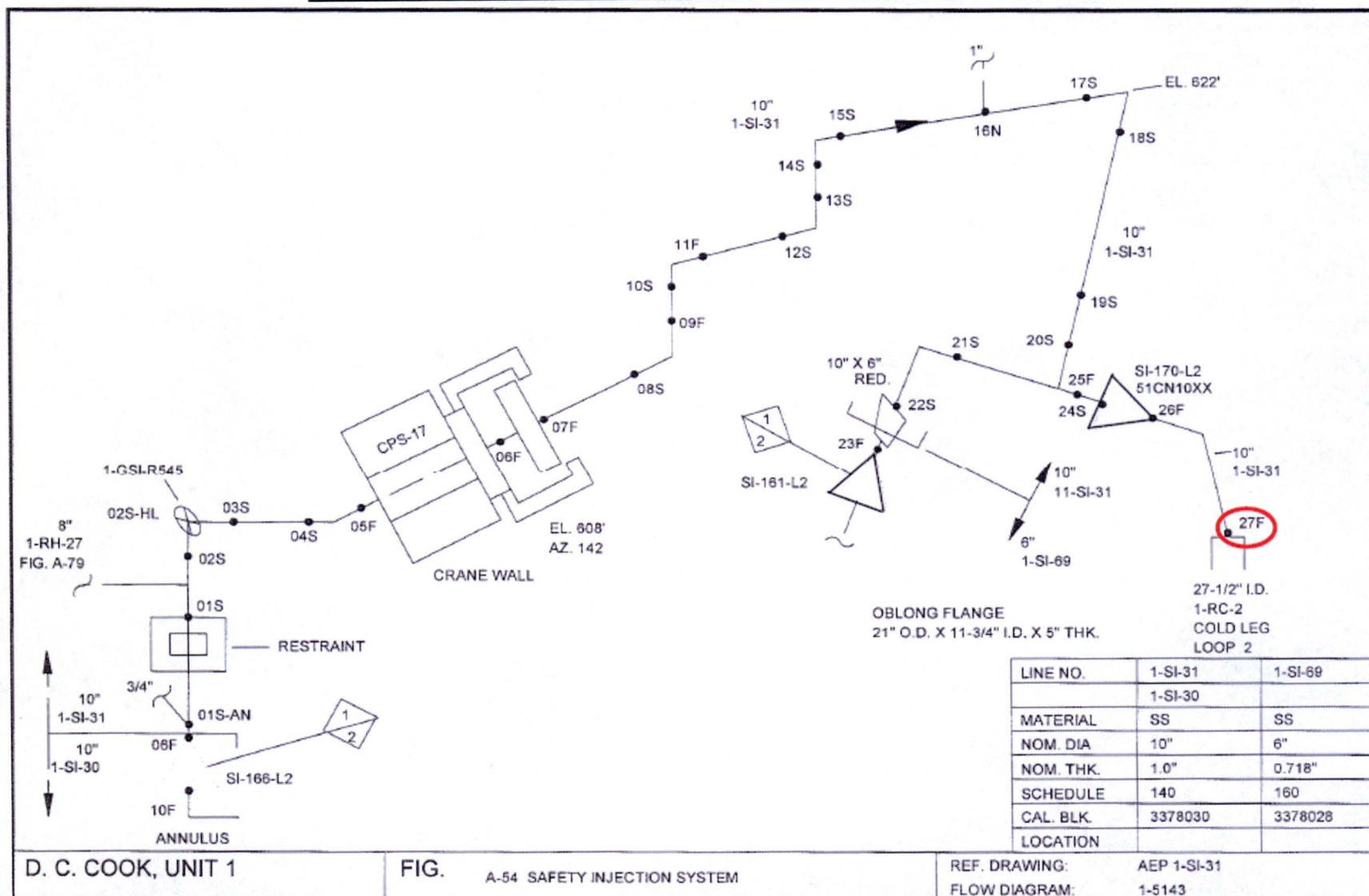


Figure 1.18-1 Weld 1-SI-31-27F (Extracted from Reference DRAWING A-54)

### 1.18 Weld 1-SI-31-27F Safety Injection Elbow to Branch Connection

#### PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT

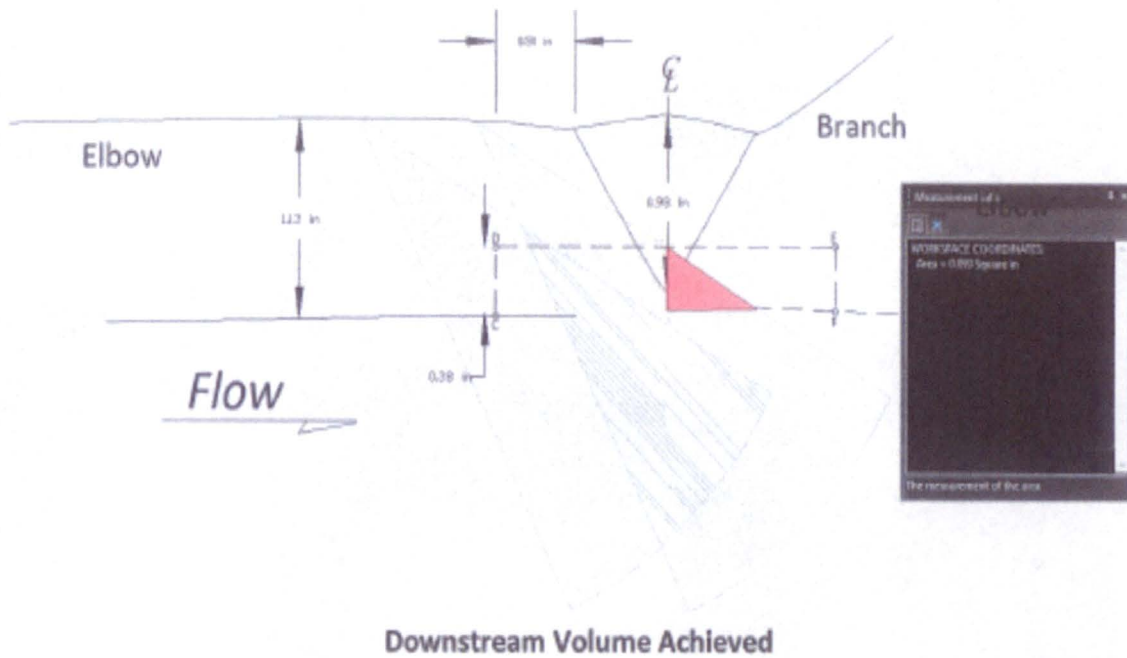
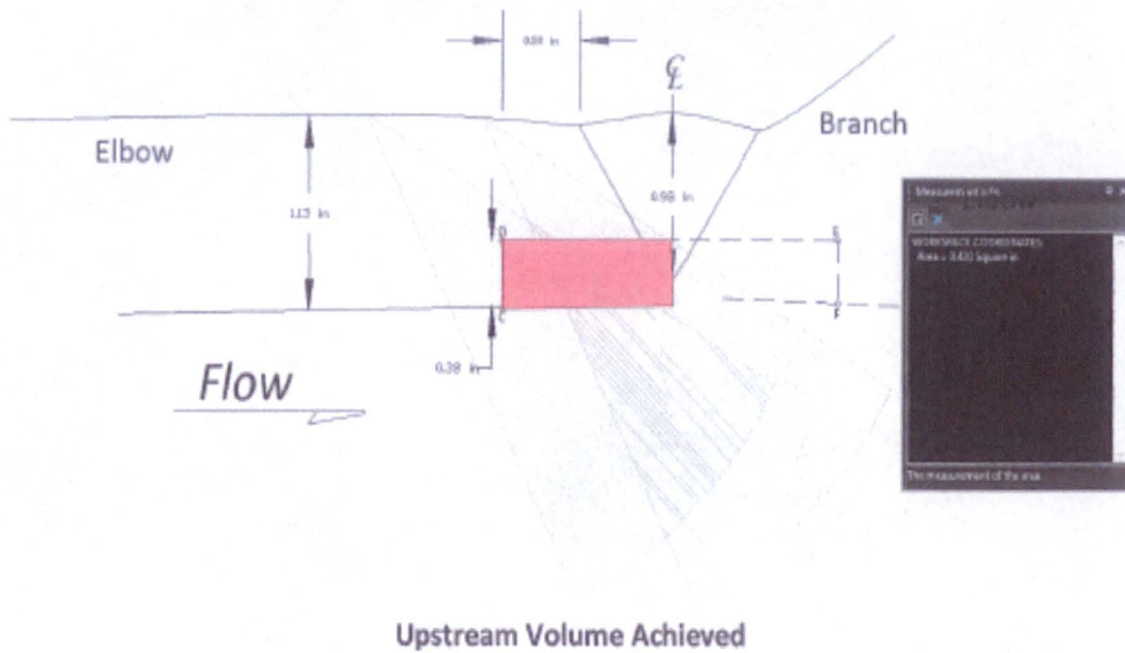


Figure 1.18-2 Weld 1-SI-31-27F Coverage Calculation



### 1.18 Weld 1-SI-31-27F Safety Injection Elbow to Branch Connection

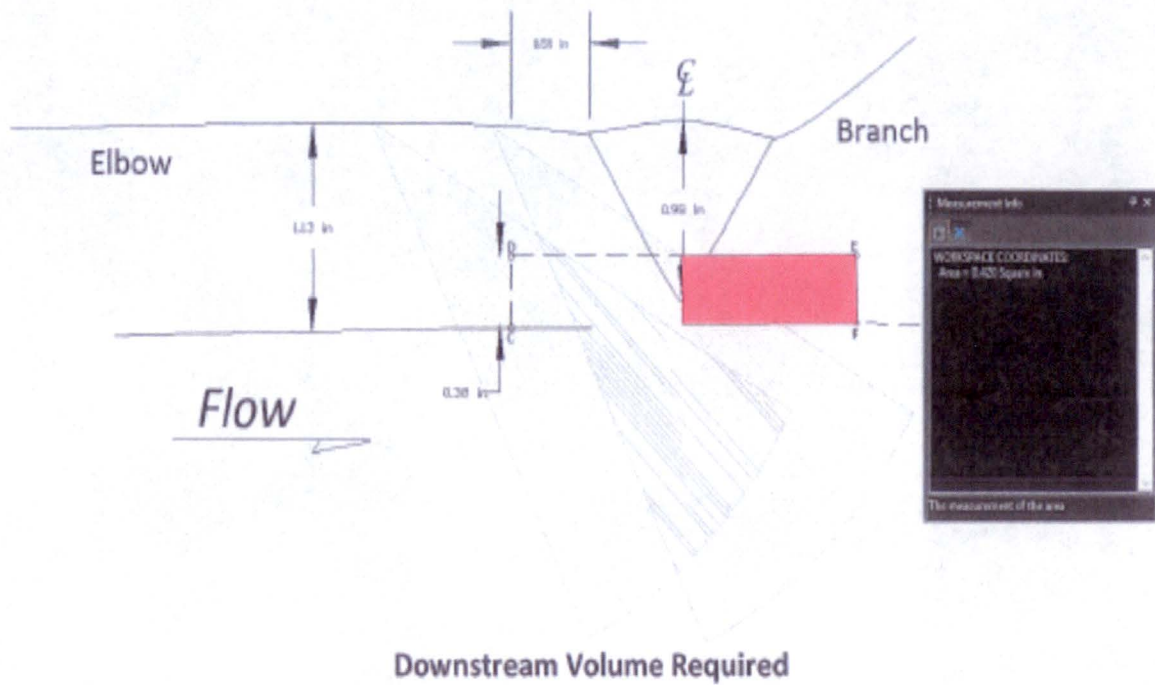


Figure 1.18-3 Weld 1-SI-31-27F Coverage Calculation

**1.18 Weld 1-SI-31-27F Safety Injection Elbow to Branch Connection**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	34.25"	0.420 in <sup>2</sup>	0.420 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	34.25"	0.420 in <sup>2</sup>	0.099 in <sup>2</sup>	23.57% (Note 1)
Clockwise	34.25"	0.840 in <sup>2</sup>	0.420 in <sup>2</sup>	50%
Counterclockwise	34.25"	0.840 in <sup>2</sup>	0.420 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.18-1 Weld 1-SI-31-27F Coverage Calculation Results**



1.18 Weld 1-SI-31-27F Safety Injection Elbow to Branch Connection



Component Photo

Figure 1.18-4 Weld 1-SI-31-27F Component Photograph



### **1.19 Weld 1-SI-51-22F Safety Injection Elbow to Tee**

Weld 1-SI-51-22F was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-056. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.19-2, 1.19-3, and Table 1.19-1. A photograph of weld 1-SI-51-22F is provided in Figure 1.19-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.19 Weld 1-SI-51-22F Safety Injection Elbow to Tee

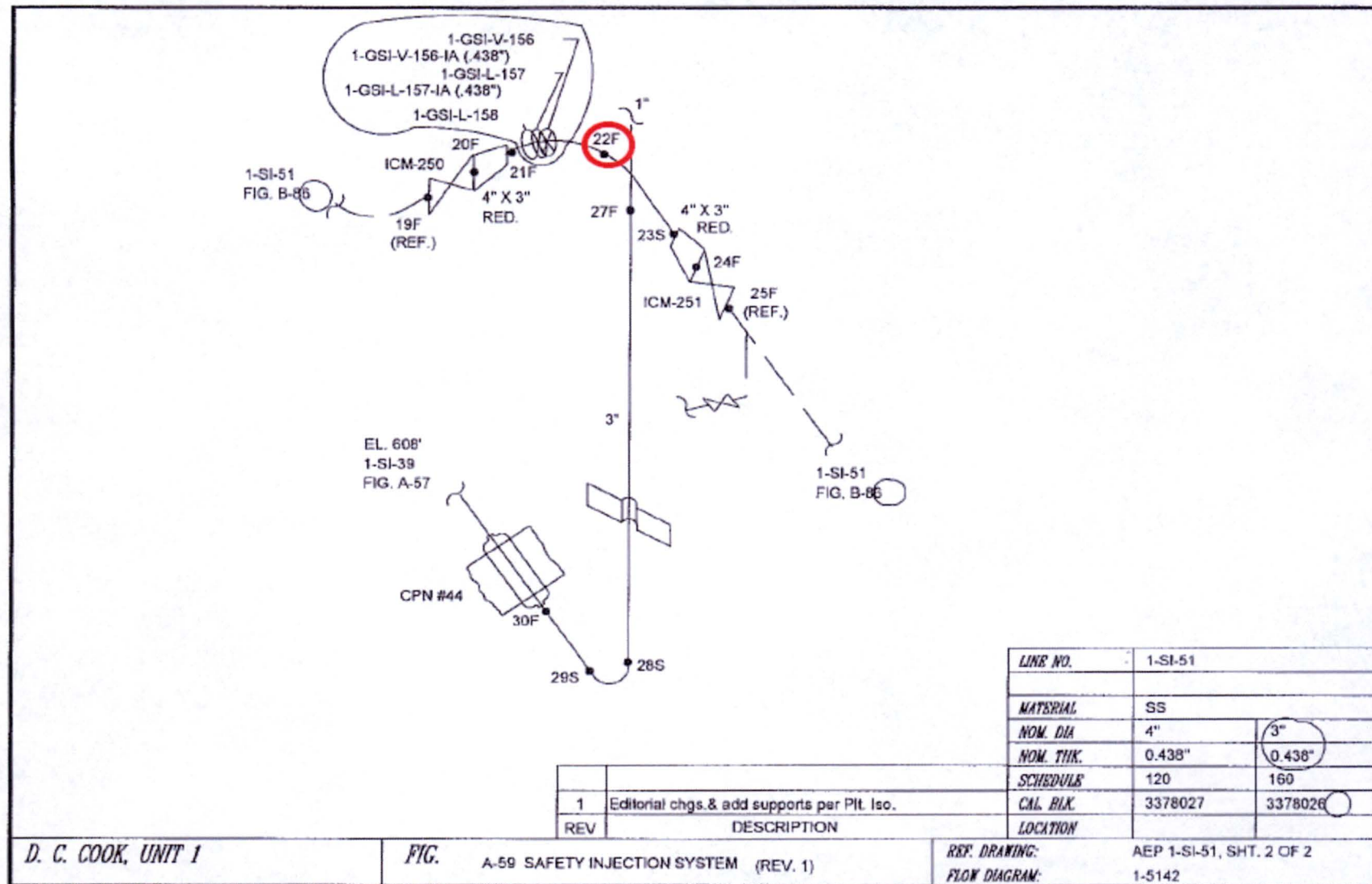
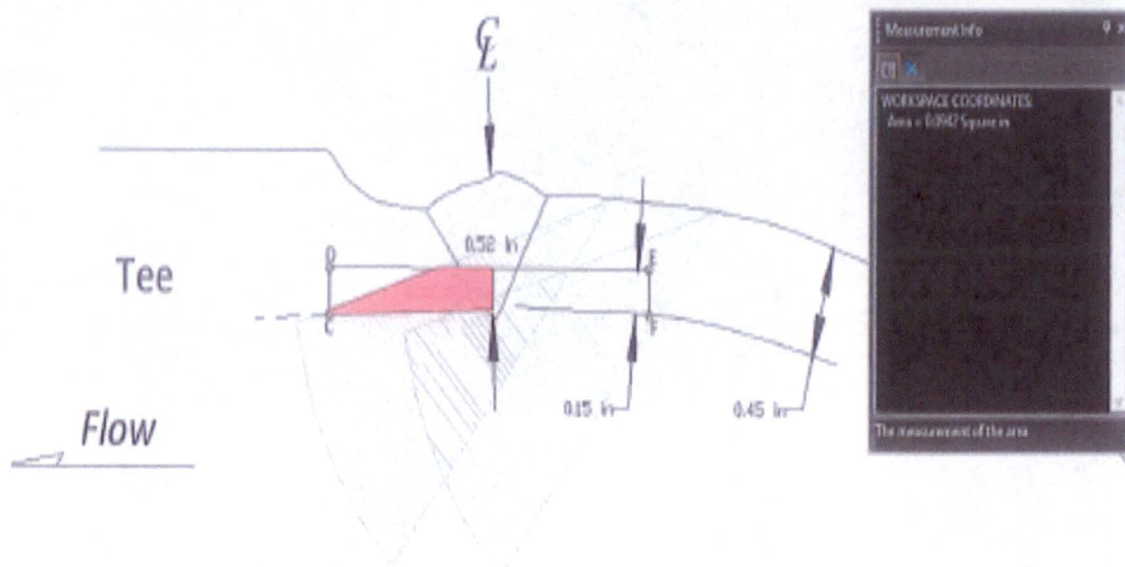
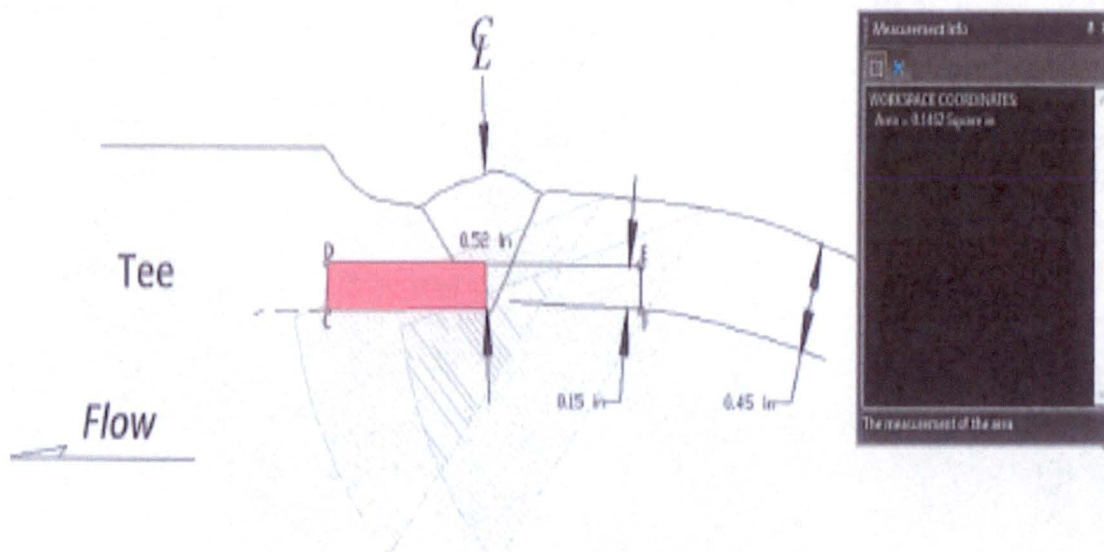


Figure 1.19-1 Weld 1-SI-51-22F (Extracted from Reference DRAWING A-59)

**1.19 Weld 1-SI-51-22F Safety Injection Elbow to Tee**  
**PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT**



**Downstream Volume Achieved**

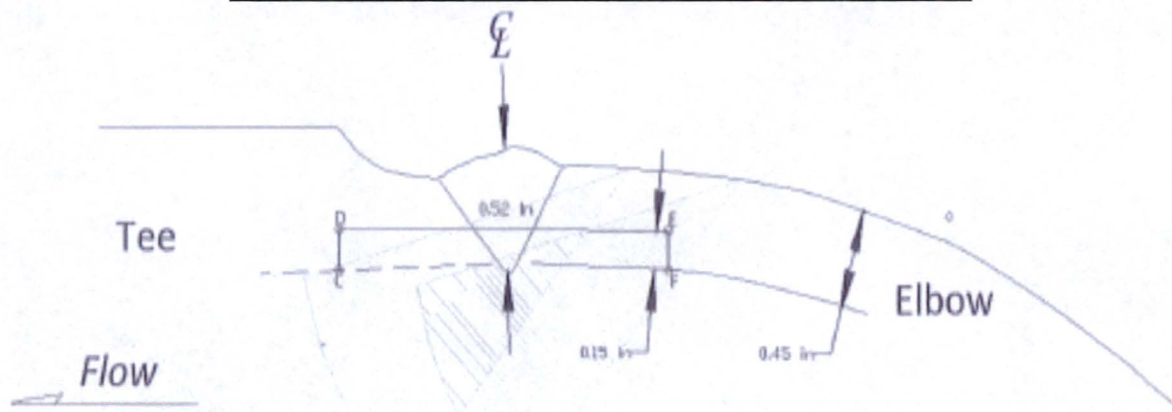


**Downstream Volume Required**

**Figure 1.19-2 Weld 1-SI-51-22F Coverage Calculation**



**1.19 Weld 1-SI-51-22F Safety Injection Elbow to Tee**



**Upstream Volume Achieved**

**Figure 1.19-3 Weld 1-SI-51-22F Coverage Calculation**

**1.19 Weld 1-SI-51-22F Safety Injection Elbow to Tee**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	11.0"	0.1462 in <sup>2</sup>	0.1462 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	11.0"	0.1462 in <sup>2</sup>	0.0942 in <sup>2</sup>	64.4% (Note 1)
Clockwise	11.0"	0.2924 in <sup>2</sup>	0.1462 in <sup>2</sup>	50%
Counterclockwise	11.0"	0.2924 in <sup>2</sup>	0.1462 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Table 1.19-1 Weld 1-SI-51-22F Coverage Calculation Results**



1.19 Weld 1-SI-51-22F Safety Injection Elbow to Tee



Component Photo

Figure 1.19-4 Weld 1-SI-51-22F Component Photograph



## **1.20 Weld 1-SI-51-27F Safety Injection Tee to Pipe**

Weld 1-SI-51-27F was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-057. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.20-2, 1.20-3, and Table 1.20-1. A photograph of weld 1-SI-51-27F is provided in Figure 1.20-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

## 1.20 Weld 1-SI-51-27F Safety Injection Tee to Pipe

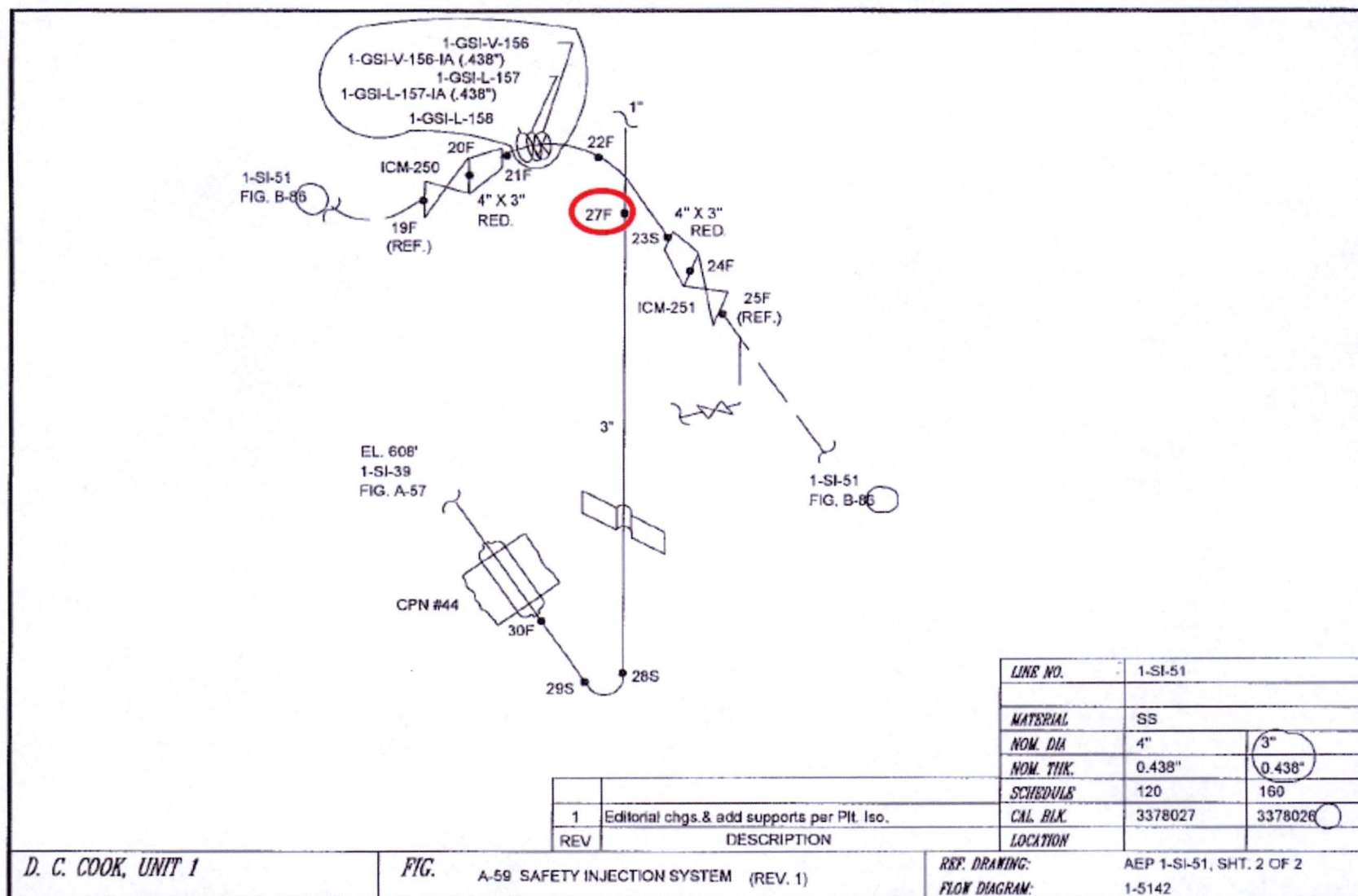


Figure 1.20-1 Weld 1-SI-51-27F (Extracted from Reference DRAWING A-59)

**1.20 Weld 1-SI-51-27F Safety Injection Tee to Pipe**  
**PHASED ARRAY ULTRASONIC EXAMINATION COVERAGE ASSESSMENT**

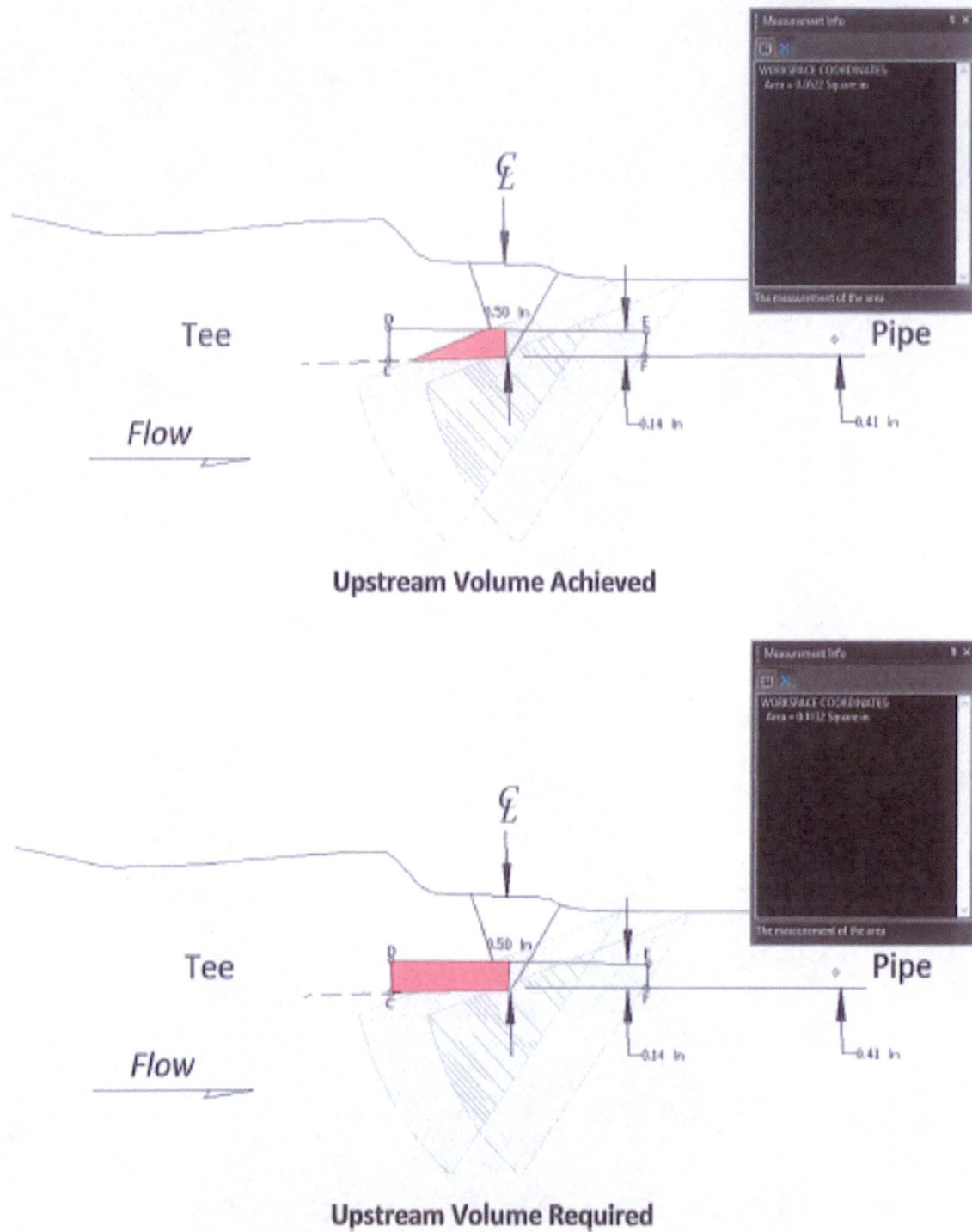
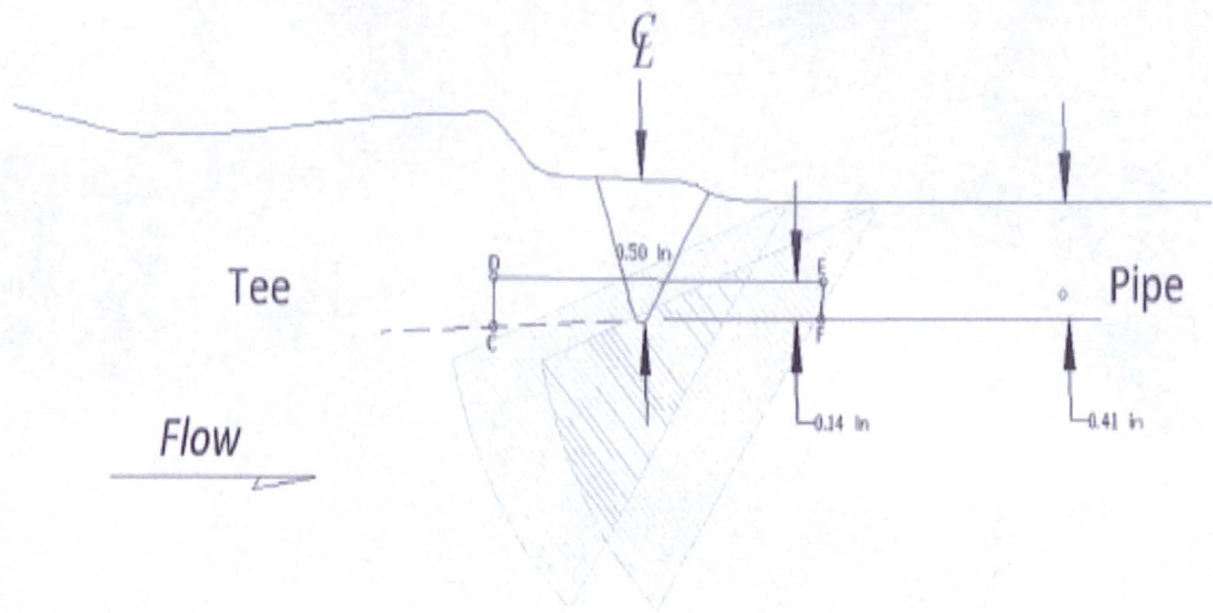


Figure 1.20-2 Weld 1-SI-51-27F Coverage Calculation



### 1.20 Weld 1-SI-51-27F Safety Injection Tee to Pipe



### Downstream Volume Achieved

### Figure 1.20-3 Weld 1-SI-51-27F Coverage Calculation

**1.20 Weld 1-SI-51-27F Safety Injection Tee to Pipe**

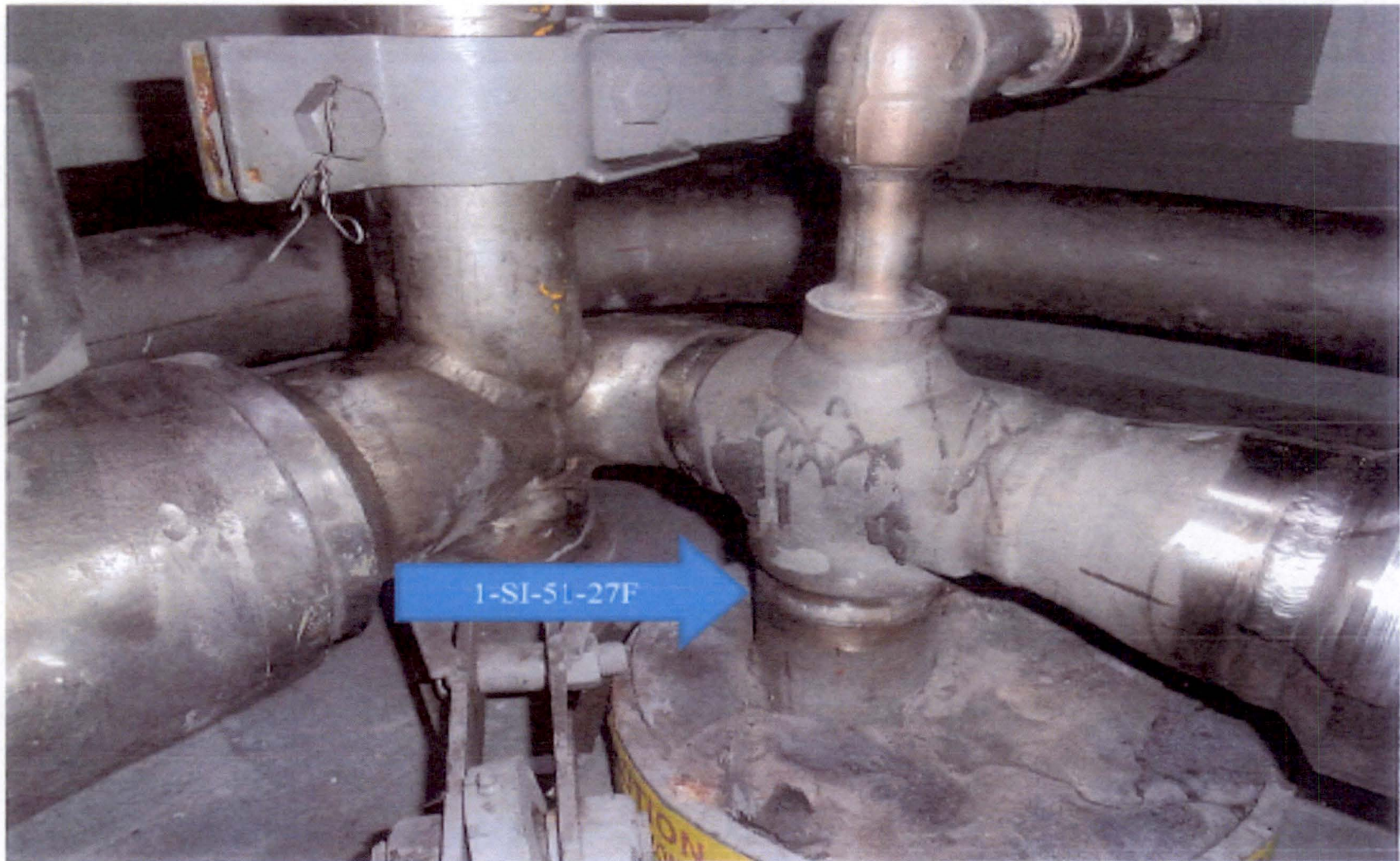
Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Downstream Axial	11.0"	0.1132 in <sup>2</sup>	0.1132 in <sup>2</sup>	100%
Downstream Axial for Upstream Volume	11.0"	0.1132 in <sup>2</sup>	0.0522 in <sup>2</sup>	46.1% (Note 1)
Clockwise	11.0"	0.2264 in <sup>2</sup>	0.1132 in <sup>2</sup>	50%
Counterclockwise	11.0"	0.2264 in <sup>2</sup>	0.1132 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.20-1 Weld 1-SI-51-27F Coverage Calculation Results**



1.20 Weld 1-SI-51-27F Safety Injection Tee to Pipe



**Component Photo**

**Figure 1.20-4 Weld 1-SI-51-27F Component Photograph**



### **1.21 Weld 1-CS-96-60F Chemical and Volume Control Elbow to Branch Connection**

Weld 1-CS-96-60F was UT examined in Inspection Period 3, during the U1C29 refueling outage in 2019. The NDE data came from UT Report No. U1-VE-19-007. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figures 1.21-2, 1.21-3, and Table 1.21-1. A photograph of weld 1-CS-96-60F is provided in Figure 1.21-4.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.21 Weld 1-CS-96-60F Chemical and Volume Control Elbow to Branch Connection

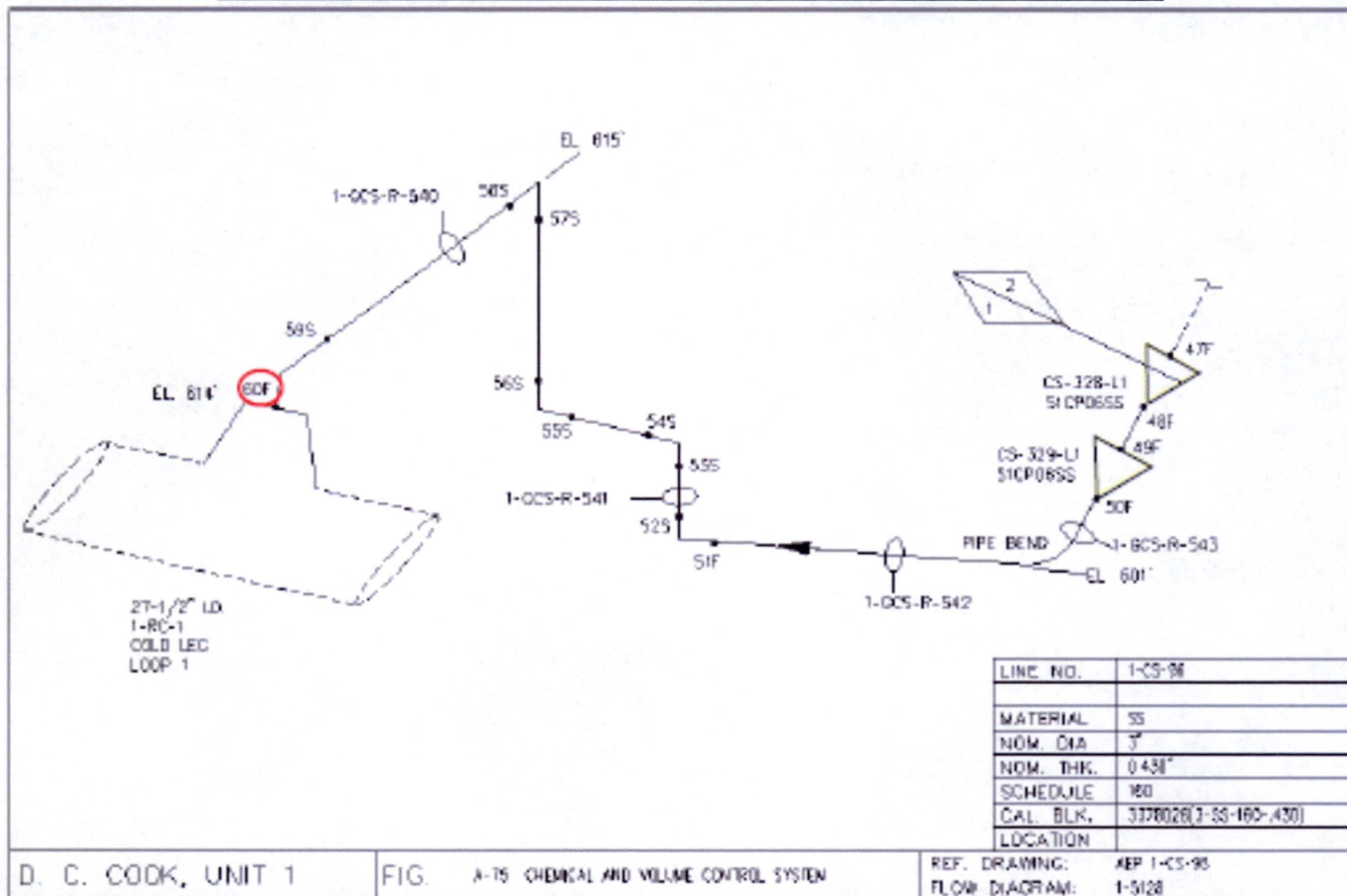
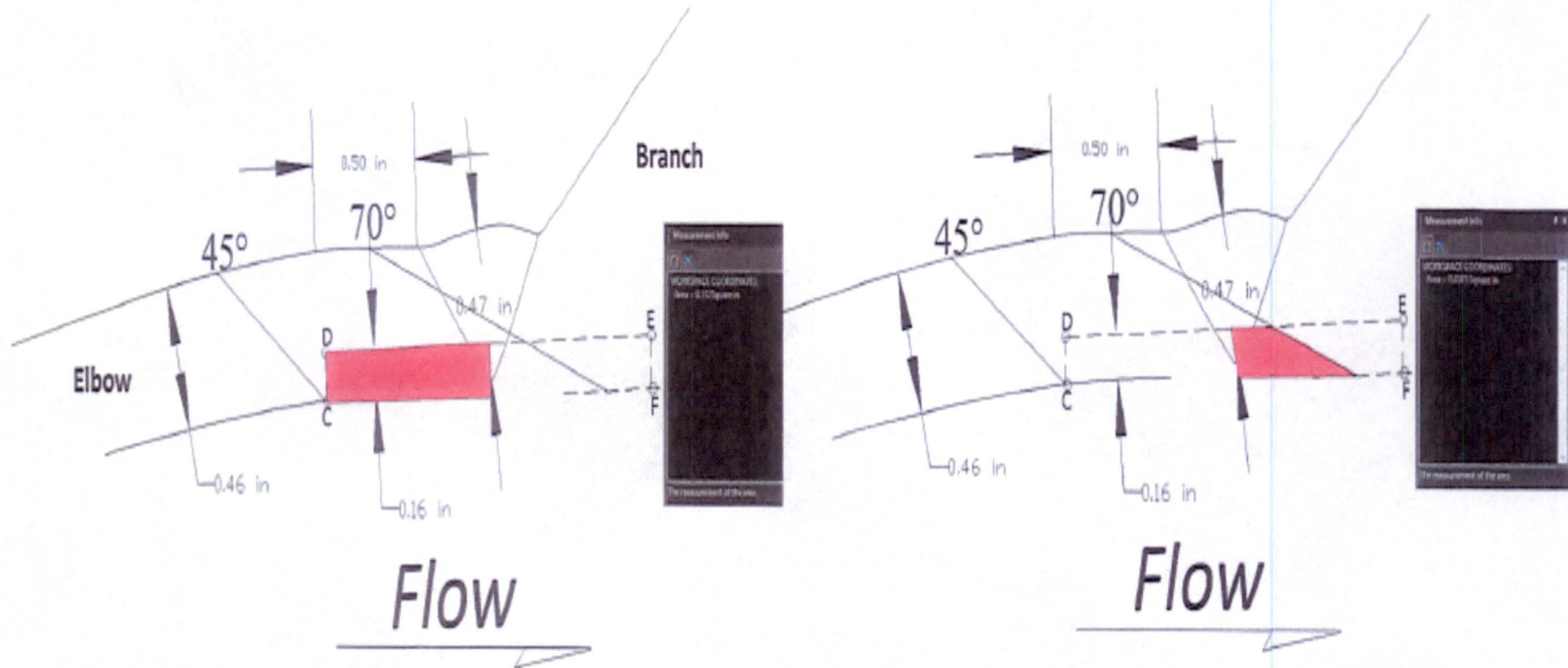


Figure 1.21-1 Weld 1-CS-96-60F (Extracted from Reference DRAWING A-75)

**1.21 Weld 1-CS-96-60F Chemical and Volume Control Elbow to Branch Connection**



Upstream Required Volume and Achieved Volume

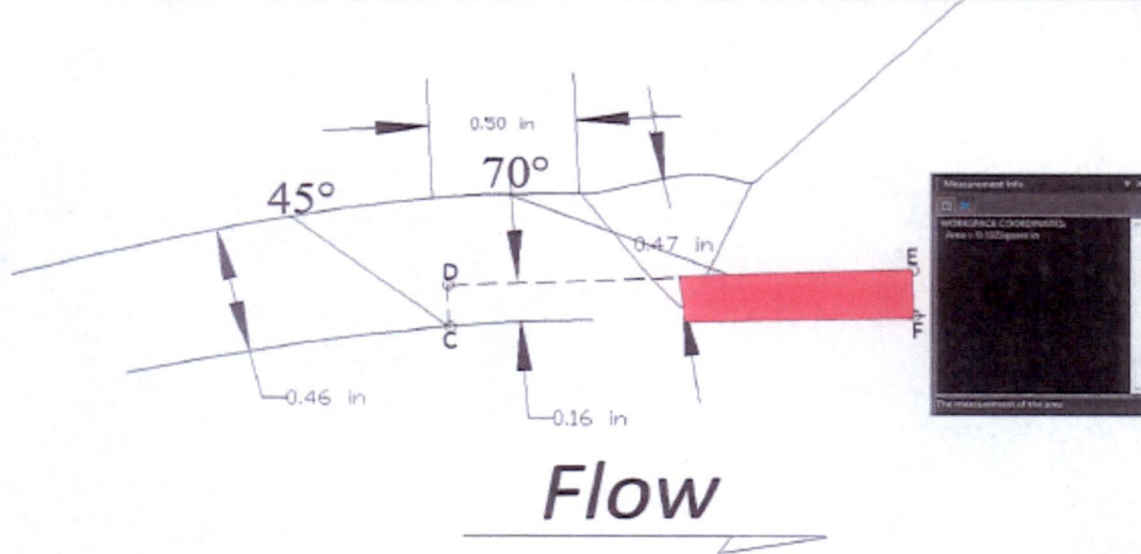
Downstream Far Side Achieved Volume from US Side

**Coverage Plot**

**Figure 1.21-2 Weld 1-CS-96-60F Coverage Calculation**



**1.21 Weld 1-CS-96-60F Chemical and Volume Control Elbow to Branch Connection**



**Figure 1.21-3 Weld 1-CS-96-60F Coverage Calculation**

**1.21 Weld 1-CS-96-60F Chemical and Volume Control Elbow to Branch Connection**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	11.25"	0.132 in <sup>2</sup>	0.132 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	11.25"	0.132 in <sup>2</sup>	0.0585 in <sup>2</sup>	44.31% (Note 1)
Clockwise	11.25"	0.264 in <sup>2</sup>	0.132 in <sup>2</sup>	50%
Counterclockwise	11.25"	0.264 in <sup>2</sup>	0.132 in <sup>2</sup>	50%
Code Required Coverage Achieved:				50%
Note 1- Far side volume coverage is considered "Best Effort" and is not included in coverage calculations of Code required volume				

**Coverage Calculation Results**

**Table 1.21-1 Weld 1-CS-96-60F Coverage Calculation Results**



1.21 Weld 1-CS-96-60F Chemical and Volume Control Elbow to Branch Connection

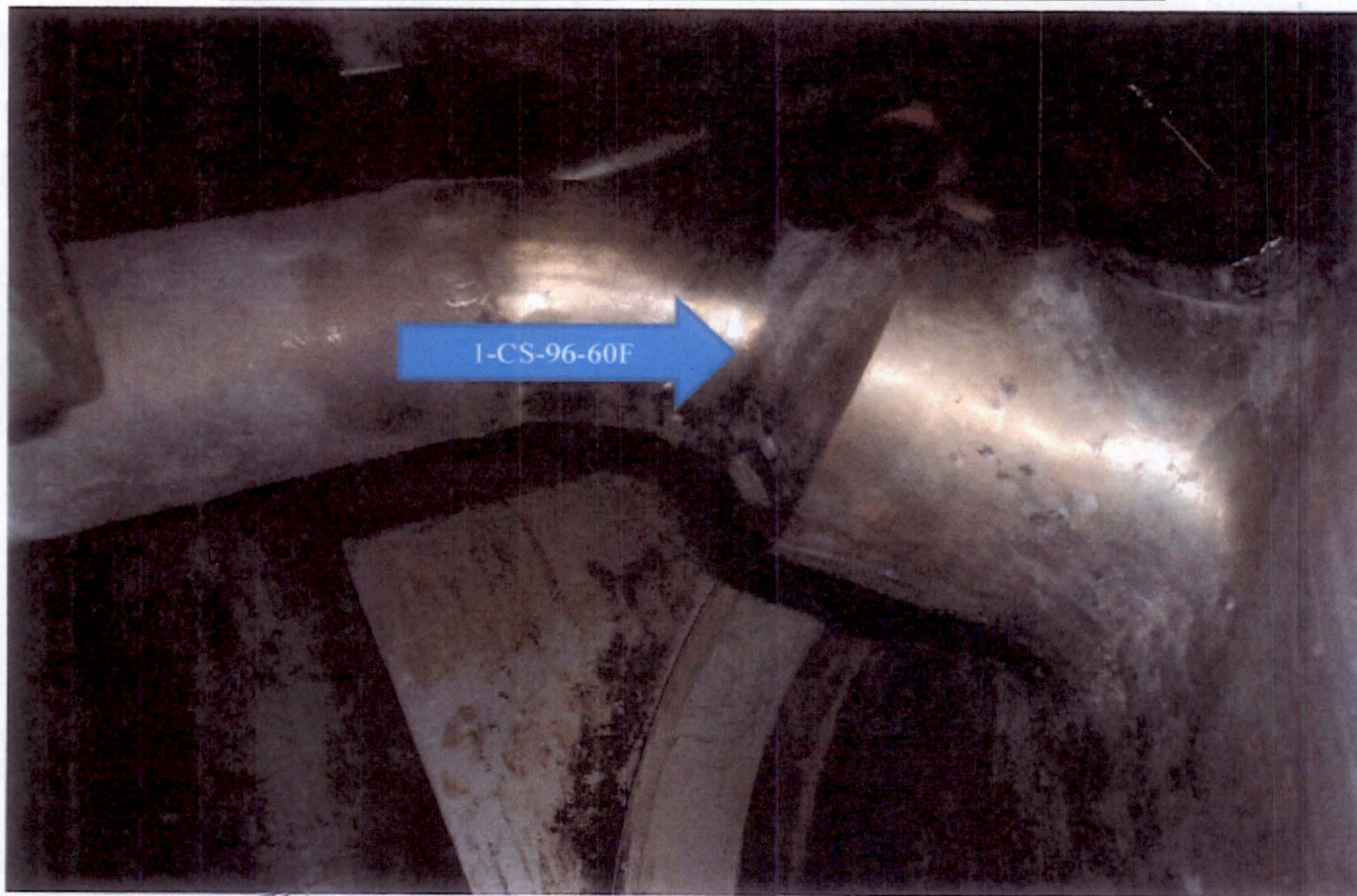


Figure 1.21-4 Weld 1-CS-96-60F Component Photograph



### **1.22 Weld 2-RC-17-06N – Reactor Coolant 3-IN Nozzle (Branch Connection)**

Weld 2-RC-17-06N was UT examined in Inspection Period 2, during the U2C21 refueling outage in 2013. The NDE data came from UT Report No. U2-VE-13-014. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figure 1.22-2. A photograph of weld 2-RC-17-06N is provided in Figure 1.22-3.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.22 Weld 2-RC-17-06N – Reactor Coolant 3-IN Nozzle (Branch Connection)

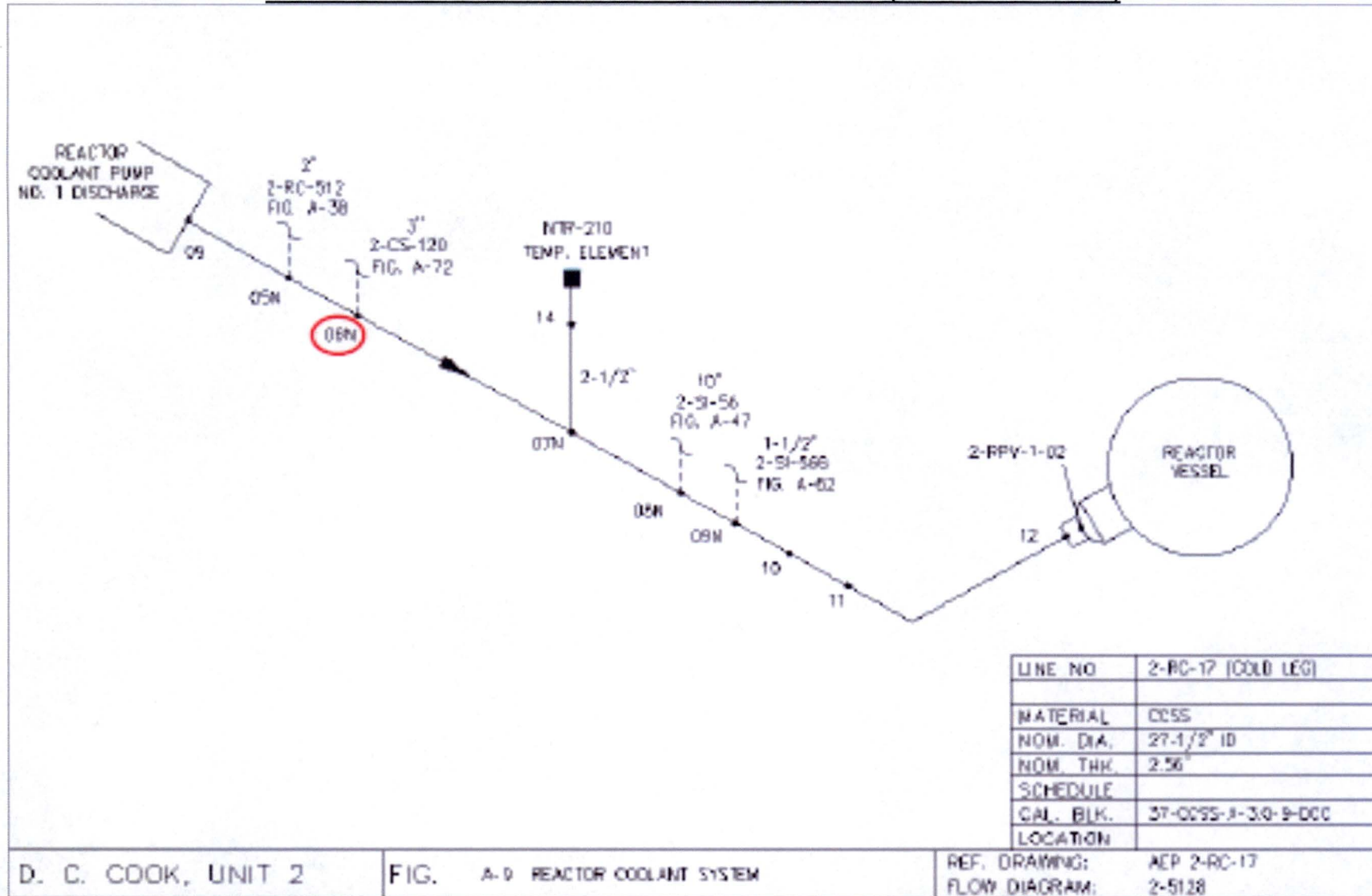


Figure 1.22-1 Weld 2-RC-17-06N (Extracted from Reference DRAWING 2A-9)

## 1.22 Weld 2-RC-17-06N – Reactor Coolant 3-IN Nozzle (Branch Connection)

3" BRANCH CONNECTION

One Sided Exam from Nozzle 50% Coverage

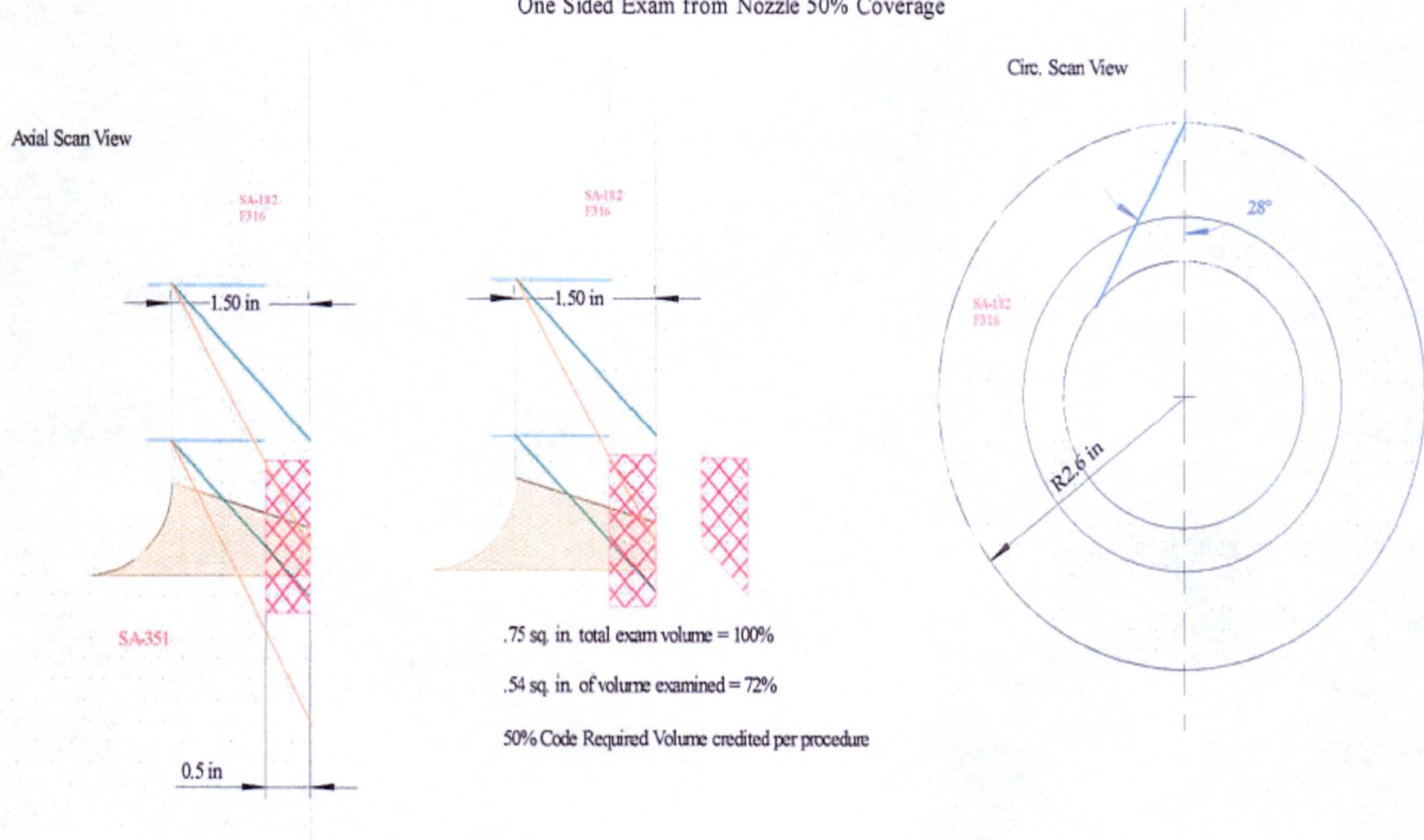
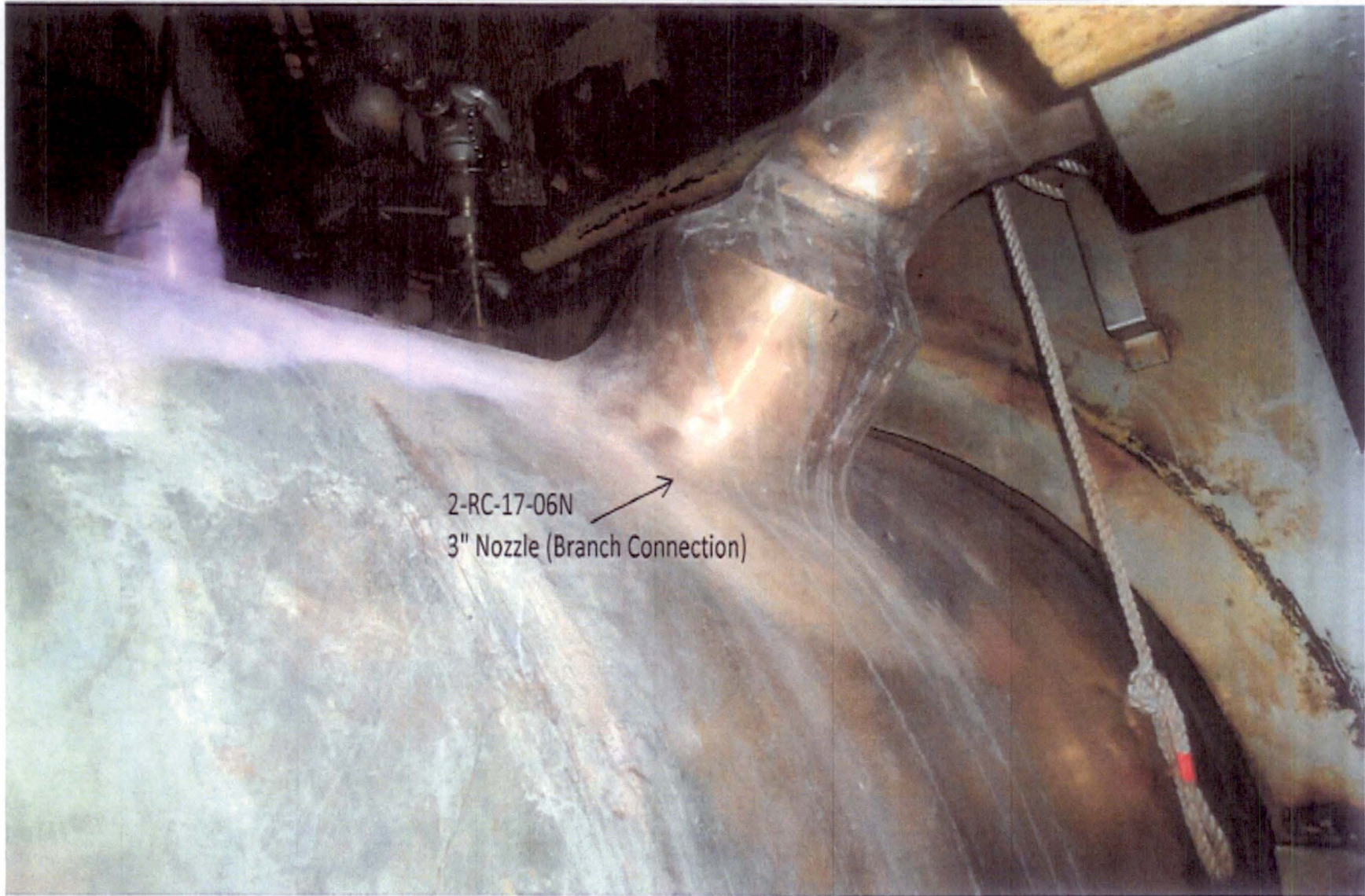


Figure 1.22-2 Weld 2-RC-17-06N Coverage Calculation



**1.22 Weld 2-RC-17-06N – Reactor Coolant 3-IN Nozzle (Branch Connection)**



2-RC-17-06N  
3" Nozzle (Branch Connection)

**Figure 1.22-3 Weld 2-RC-17-06N Component Photograph**

### **1.23 Weld 2-RC-17-09N – Reactor Coolant 1-1/2-IN Nozzle (Branch Connection)**

Weld 2-RC-17-09N was UT examined in Inspection Period 2, during the U2C21 refueling outage in 2013. The NDE data came from UT Report No. U2-VE-13-012. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the branch connection. The examination resulted in total UT coverage of **50.0%** as described in Figure 1.23-2. A photograph of weld 2-RC-17-09N is provided in Figure 1.23-3.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



### 1.23 Weld 2-RC-17-09N – Reactor Coolant 1-1/2-IN Nozzle (Branch Connection)

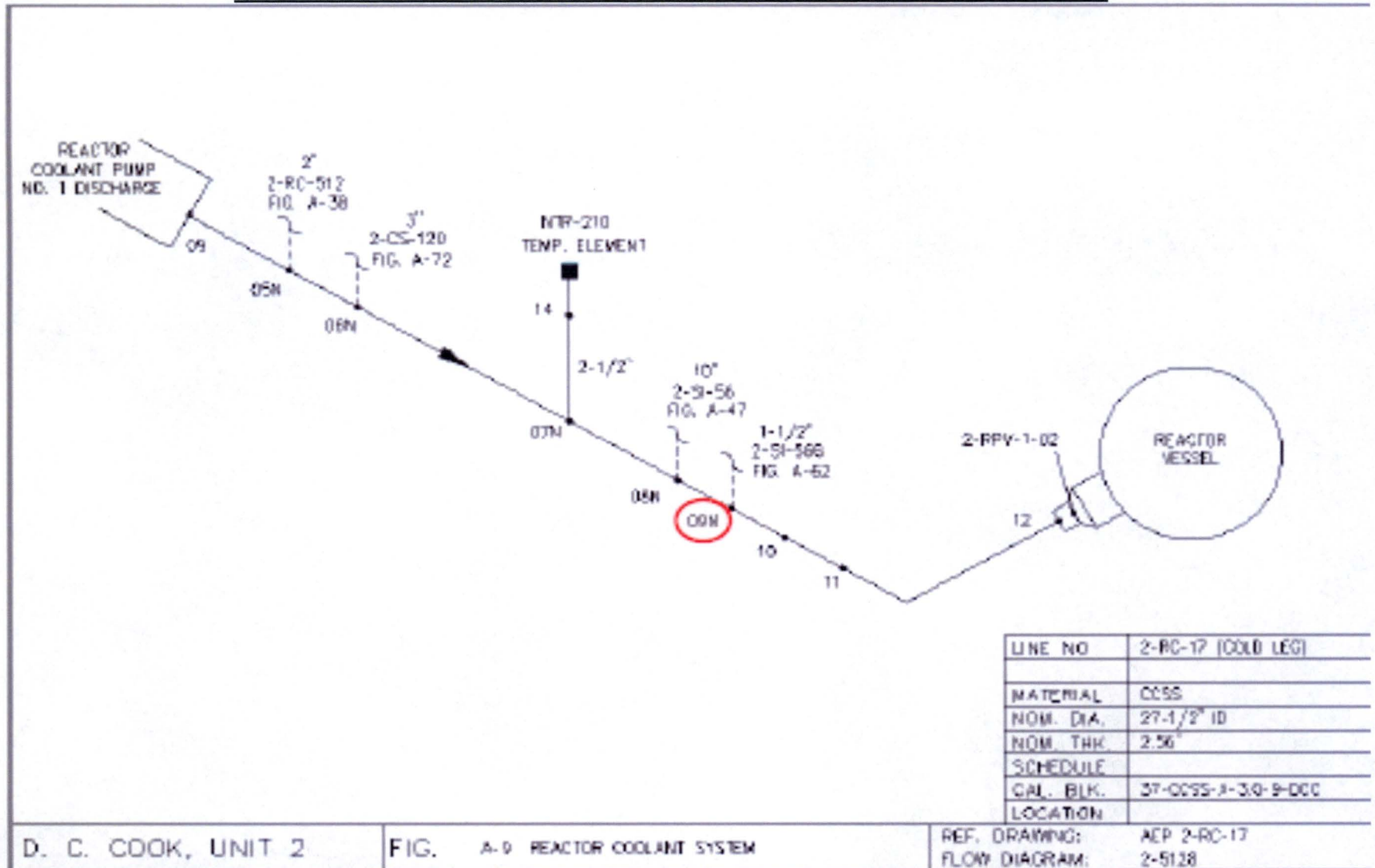


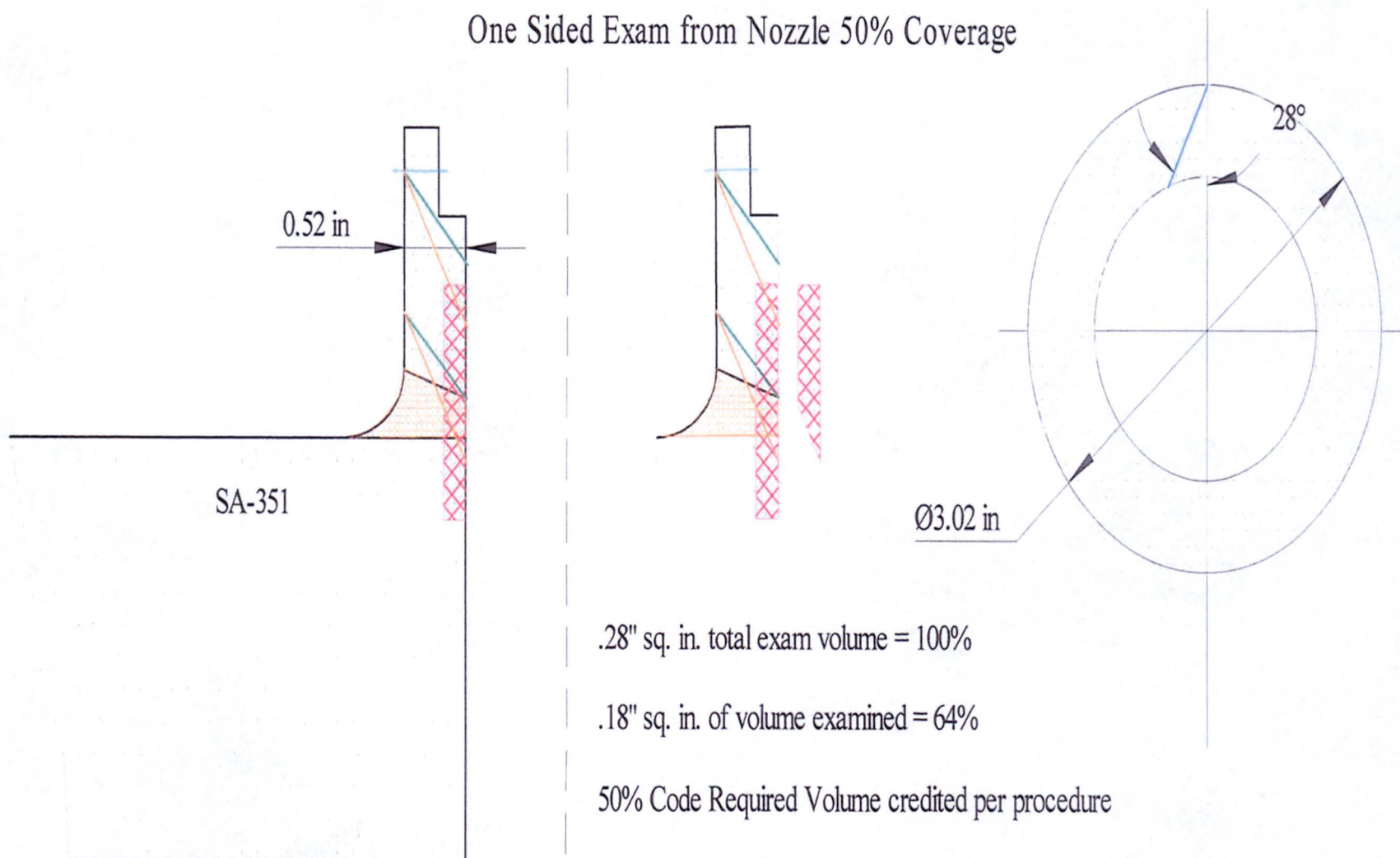
Figure 1.23-1 Weld 2-RC-17-09N (Extracted from Reference DRAWING 2A-9)



**1.23 Weld 2-RC-17-09N – Reactor Coolant 1-1/2-IN Nozzle (Branch Connection)**

**1 1/2" BRANCH CONNECTION**

One Sided Exam from Nozzle 50% Coverage



**Figure 1.23-2 Weld 2-RC-17-09N (Radial Scans) Coverage Calculation**

1.23 Weld 2-RC-17-09N – Reactor Coolant 1-1/2-IN Nozzle (Branch Connection)



Figure 1.23-3 Weld 2-RC-17-09N Component Photograph



#### **1.24 Weld 2-SI-63-17 – Safety Injection Pipe to Valve**

Weld 2-SI-63-17 was UT examined in Inspection Period 2, during the U2C23 refueling outage in 2016. The NDE data came from UT Report No. U2-VE-16-010. Previous ISI UT data was not documented as reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the pipe to valve. The examination resulted in total UT coverage of **70.0%** as described in Figure 1.24-2. A photograph of weld 2-SI-63-17 is provided in Figure 1.24-3.

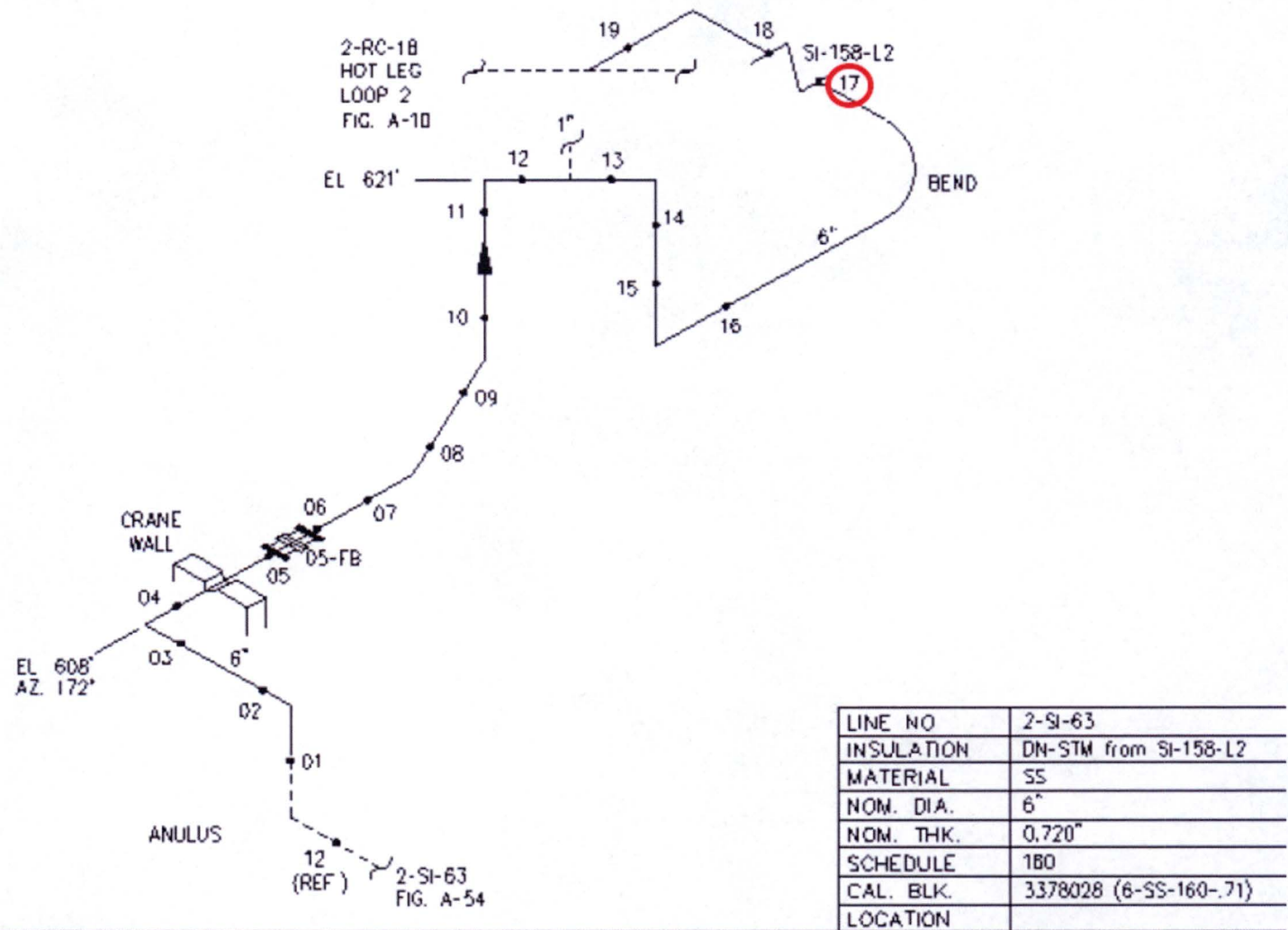
No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



# 1.24 Weld 2-SI-63-17 – Safety Injection Pipe to Valve

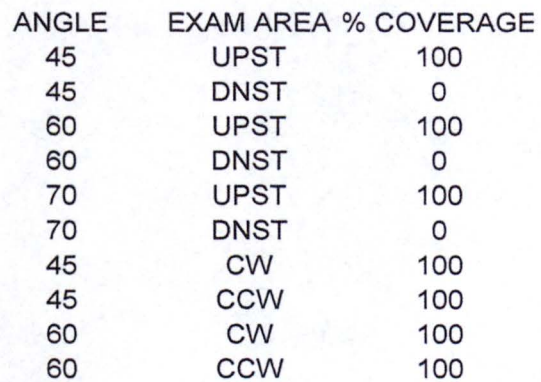


D. C. COOK, UNIT 2

FIG. A-56 SAFETY INJECTION SYSTEM

REF. DRAWING: AEP 2-SI-63  
FLOW DIAGRAM: 2-5143

Figure 1.24-1 Weld 2-SI-63-17 (Extracted from Reference DRAWING 2A-56)



### Figure 1.24-2 2-SI-63-17 Coverage Calculation



1.24 Weld 2-SI-63-17 – Safety Injection Pipe to Valve

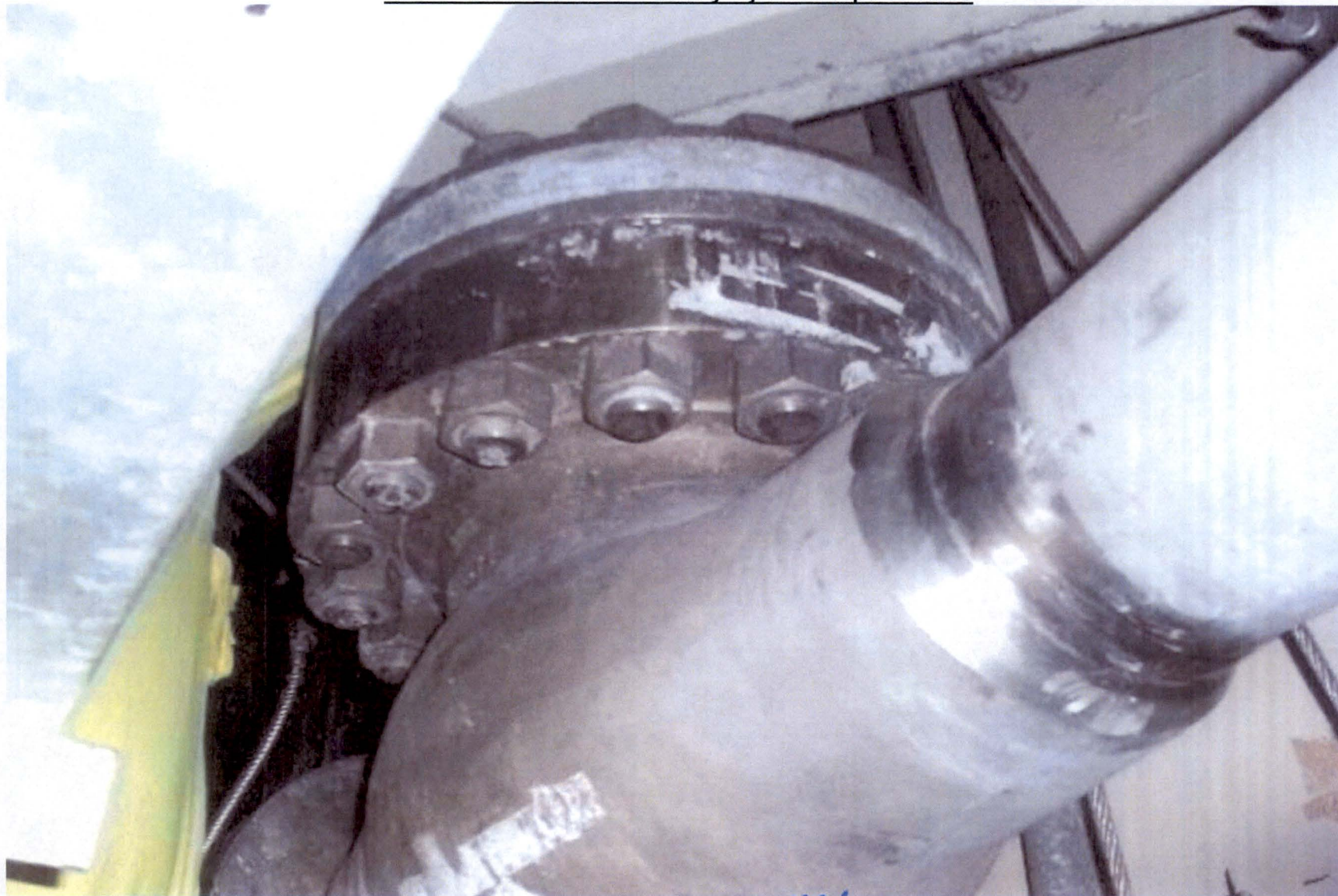


Figure 1.24-3 Weld 2-SI-63-17 Component Photograph



### **1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe**

Weld 2-RH-33-01 was UT examined in Inspection Period 3, during the U2C24 refueling outage in 2018. The NDE data came from UT Report No. U2-VE-18-029. Previous ISI UT data was reviewed.

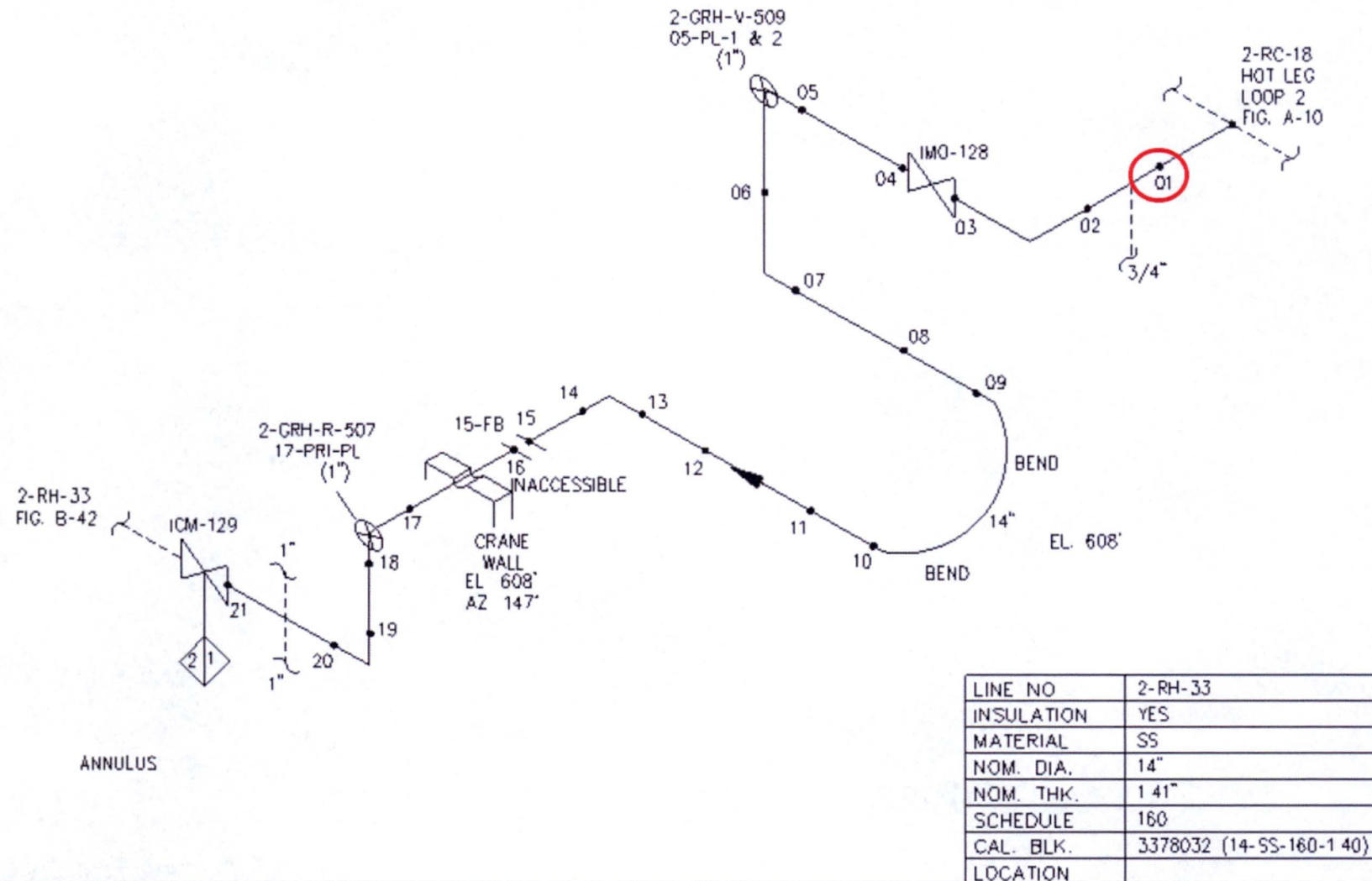
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the geometric configuration of the tee. The examination resulted in total UT coverage of **50.0%** as described in Table 1.25-1 and as shown in Figures 1.25-2, 1.25-3 and 1.25-4. A photograph of weld 2-RH-33-01 is provided in Figure 1.25-5.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Request for Alternative ISIR-4-01 (Code Case N-716) as approved by the Nuclear Regulatory Commission (NRC) under the Safety Evaluation in ADAMS Accession No. ML072620553.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe



D. C. COOK, UNIT 2

FIG. A-77 RESIDUAL HEAT REMOVAL SYSTEM

REF. DRAWING: AEP 2-RH-33  
FLOW DIAGRAM: 2-5143

Figure 1.25-1 Weld 2-RH-33-01 (Extracted from Reference DRAWING 2A-77)

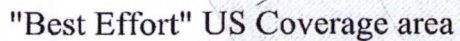
**1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe**

SCAN	LENGTH OF WELD	VOLUME DIMENSIONS	VOLUME EXAMINED	REQUIRED EXAMINATION VOLUME-COMplete EXAM	PERCENTAGE OF EXAMINATION VOLUME
Axial US Scan	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	0.0 in <sup>3</sup>	21.7427 in <sup>3</sup>	0.0%
Axial US Scan (from DS scan side)	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	21.7427 in <sup>3</sup>	21.7427 in <sup>3</sup>	100% "Best Effort"
Axial DS Scan	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	21.7427 in <sup>3</sup>	21.7427 in <sup>3</sup>	100%
US CW Scan	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	0.0 in <sup>3</sup>	21.7427 in <sup>3</sup>	0.0%
US CCW Scan	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	0.0 in <sup>3</sup>	21.7427 in <sup>3</sup>	0.0%
DS CS Scan	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	21.7427 in <sup>3</sup>	21.7427 in <sup>3</sup>	100%
DS CCW Scan	0" to 44.5"	44.5"x0.4886 in <sup>2</sup>	21.7427 in <sup>3</sup>	21.7427 in <sup>3</sup>	100%
Code Coverage Achieved (Best Effort Axial US Scan Coverage is not included)			65.2281 in <sup>3</sup>	130.4562 in <sup>3</sup>	50.0%

**Table 1.25-1 Weld 2-RH-33-01 Coverage Calculation Results**

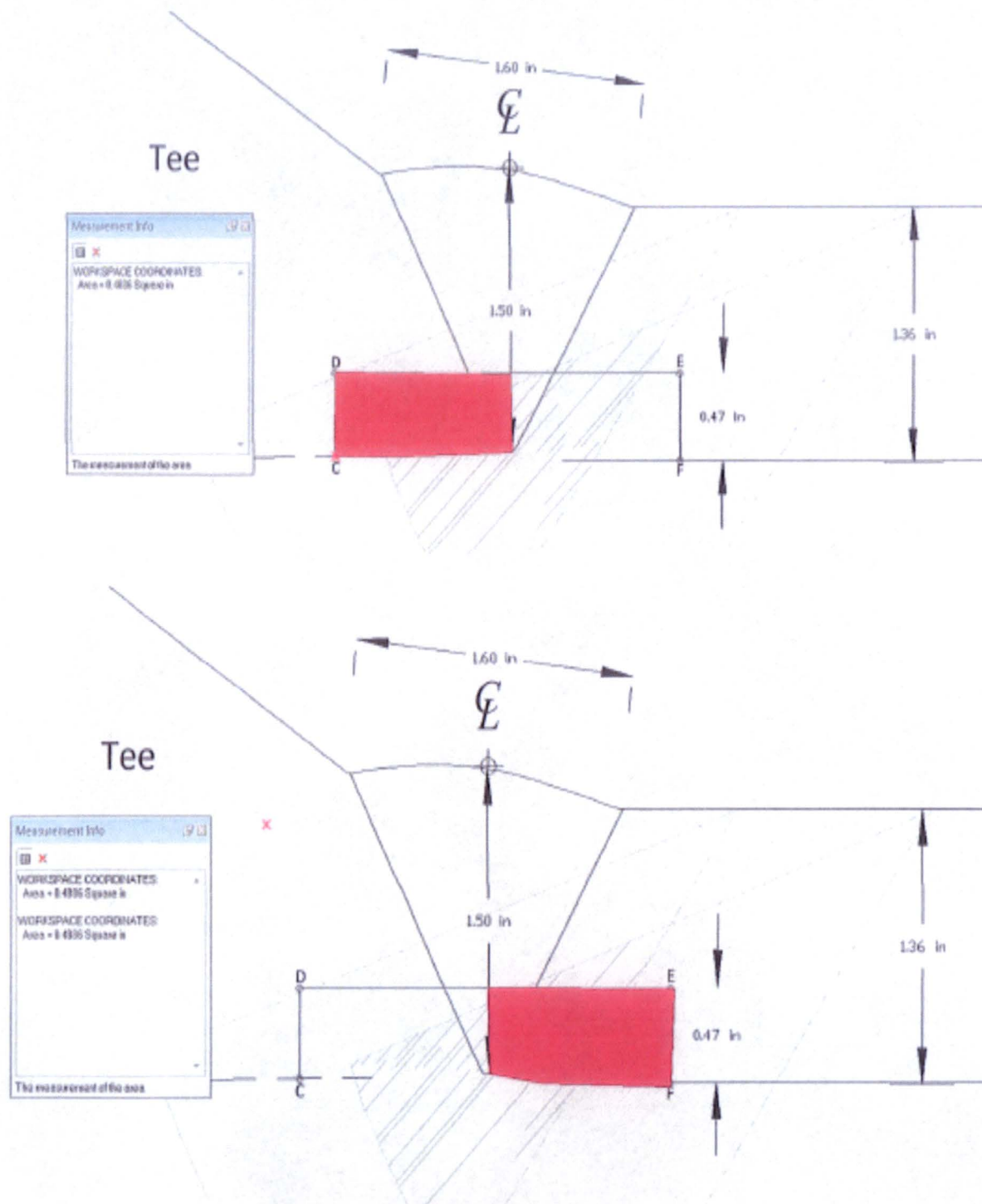


### **1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe**



**Figure 1.25-2 Weld 2-RH-33-01 Phased Array UT Examination Coverage Assessment**

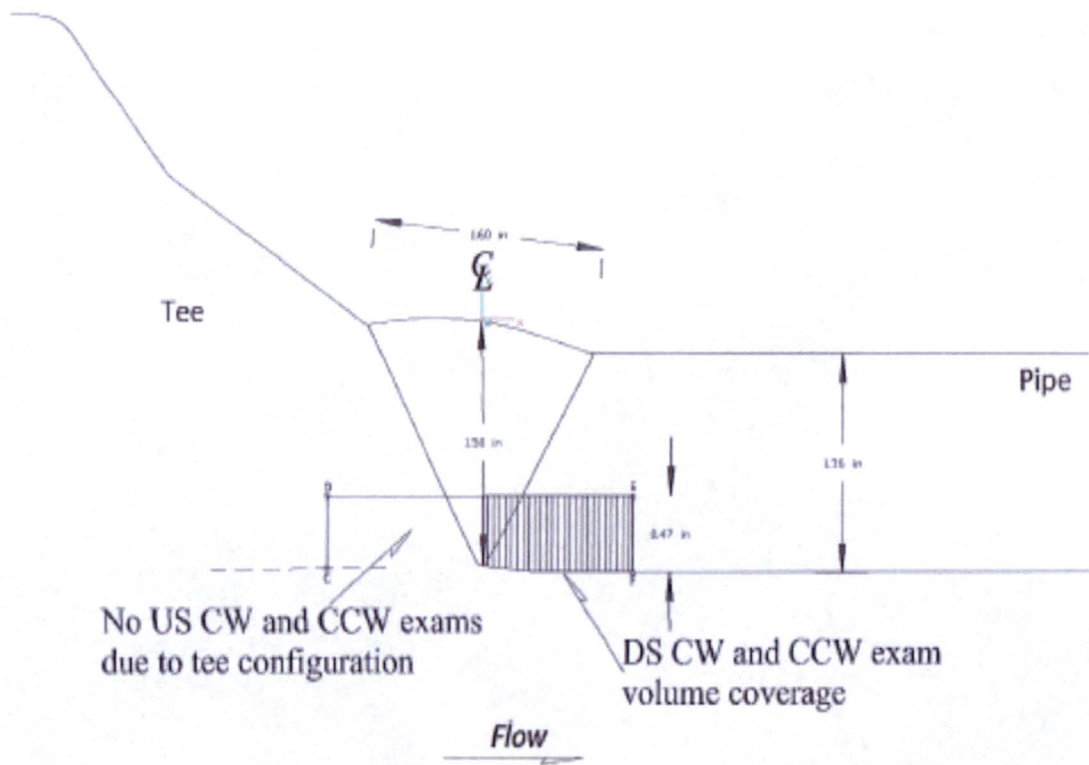
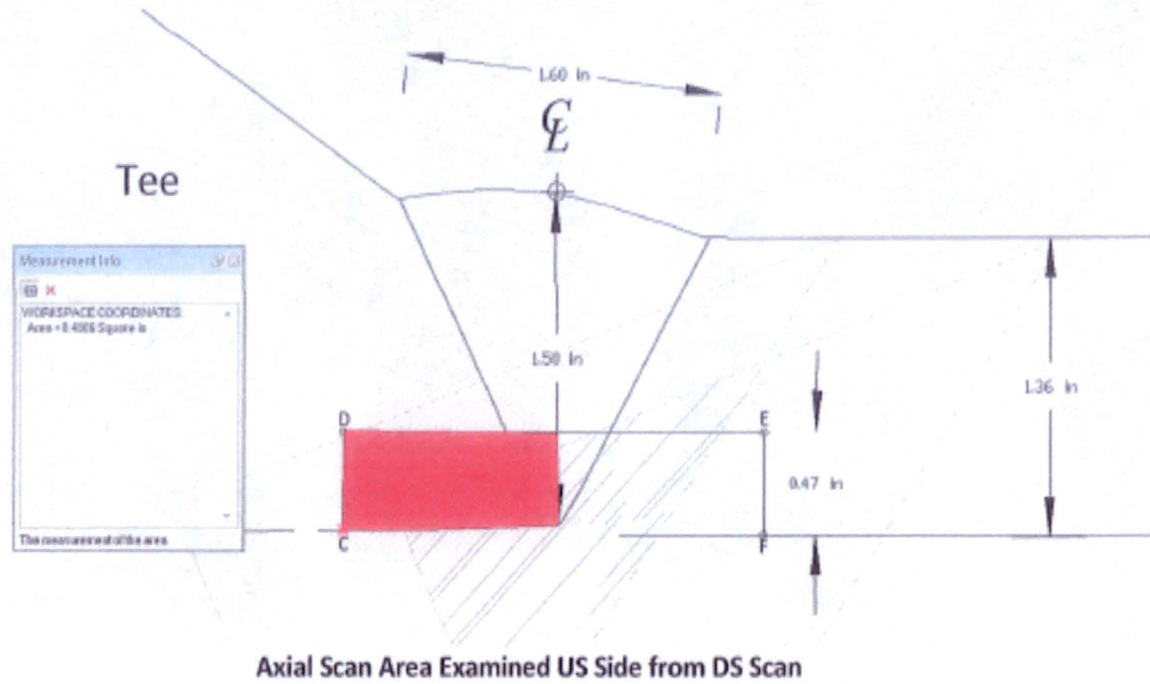
### 1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe



US and DS Code Required Volume Dimensions

Figure 1.25-3 Weld 2-RH-33-01 Phased Array UT Examination Coverage Assessment

### 1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe



DS CW and CCW Coverage Achieved from 0" to 44.5"

Figure 1.25-4 Weld 2-RH-33-01 Phased Array UT Examination Coverage Assessment



1.25 Weld 2-RH-33-01 – Residual Heat Removal Tee to Pipe

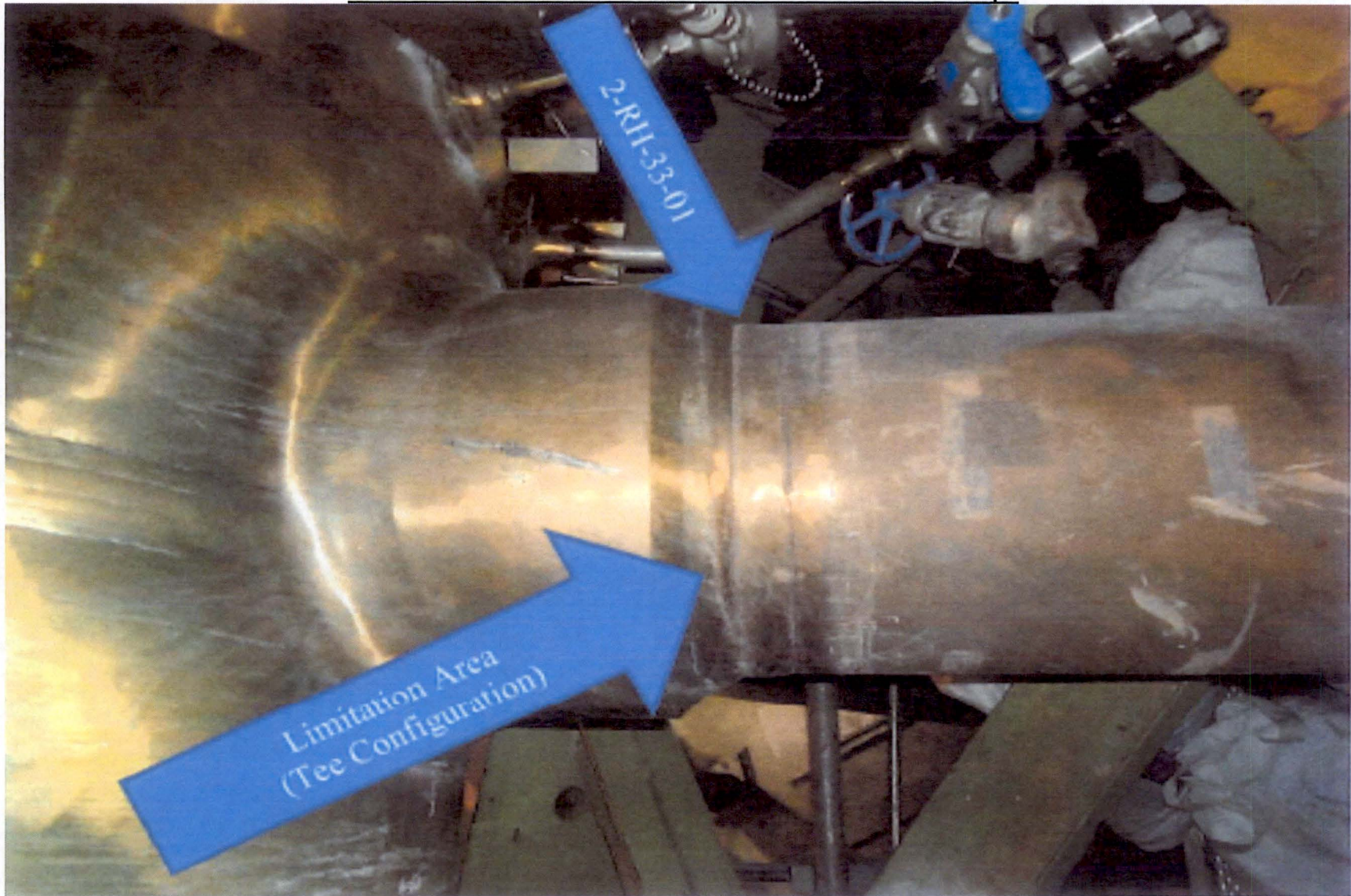


Figure 1.25-5 Weld 2-RH-33-01 Component Photograph

### **1.26 Weld 2-RPV-D – RPV Lower Shell to Lower Head Weld**

Weld 2-RPV-D was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-028. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-1(a). The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to six core support pads. The examination resulted in total UT coverage of **80.56%** as described in Table 1.26-1 and as shown in Figures 1.26-2, 1.26-3, and 1.26-4.

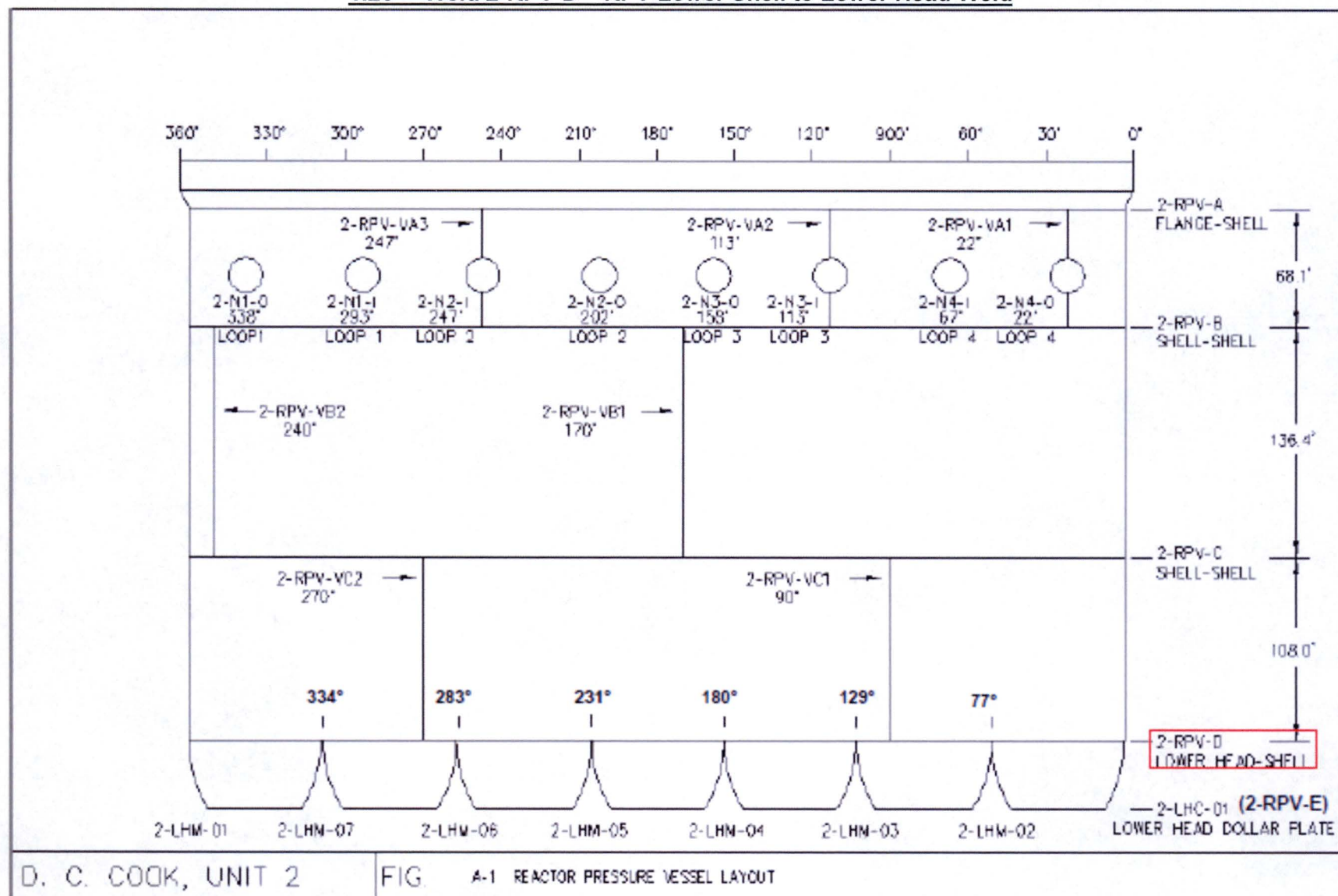
No recordable indications were detected during this examination.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head and Shell that could interfere with the angle beam examinations performed on weld 2-RPV-D.



# **1.26 Weld 2-RPV-D – RPV Lower Shell to Lower Head Weld**



**Figure 1.26-1 Weld 2-RPV-D (Extracted from Reference DRAWING 2A-1)**



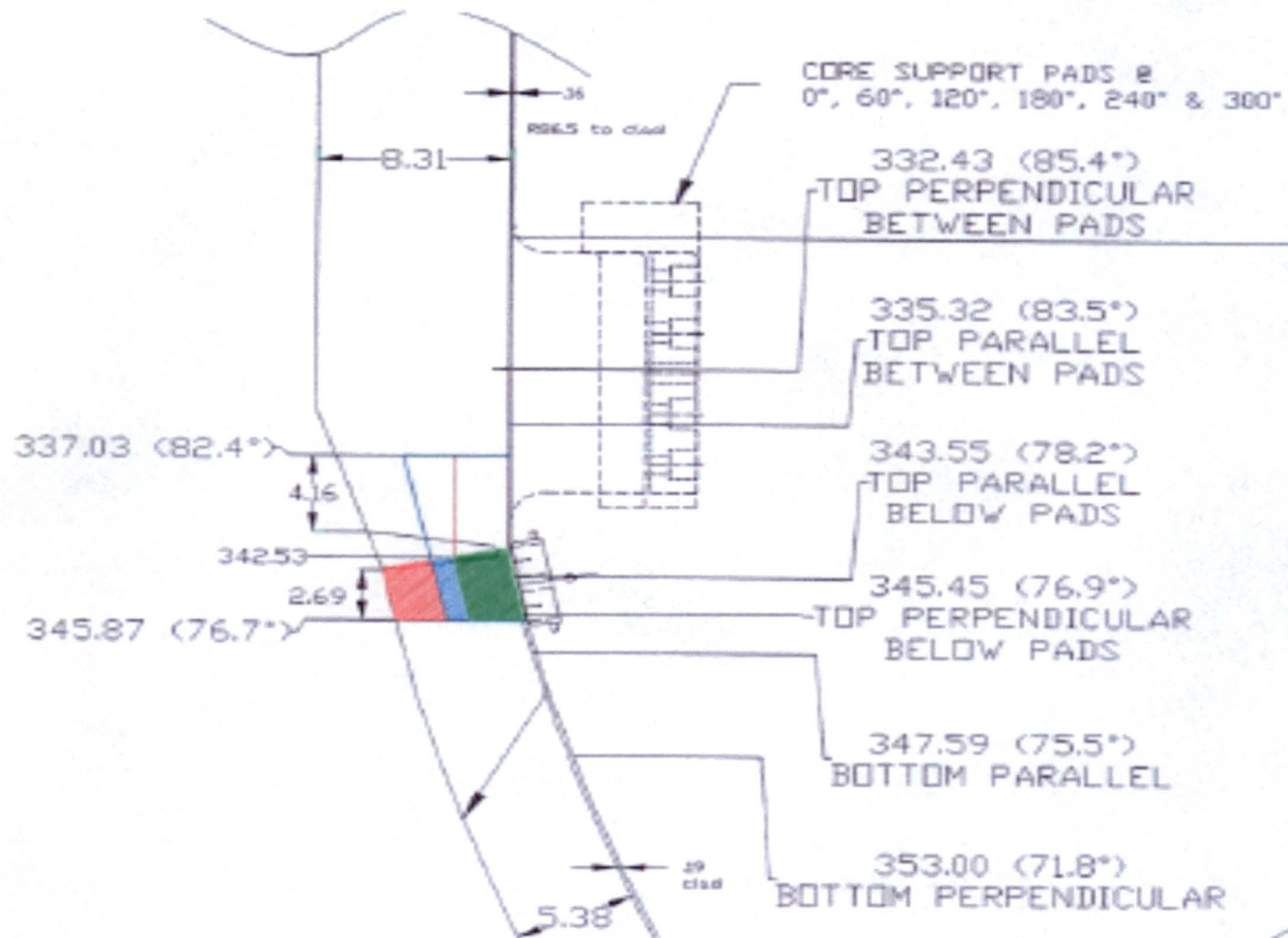
**1.26 Weld 2-RPV-D – RPV Lower Shell to Lower Head Weld**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	30.29%	14.76%	32.75%	77.8%
UP/DN	29.78%	15.58%	37.96%	83.32%
UT Coverage = 80.56%	Limitations: 6 Core Support Pads			

**Table 1.26-1 Weld 2-RPV-D Coverage Calculation Results**

**1.26 Weld 2-RPV-D – RPV Lower Shell to Lower Head Weld**

**WELD ID: 2-RPV-D (W4)**



**Figure 1.26-2 Parallel scan limitation under core support pads at 0°, 60°, 180°, 240°, 300°, and 360°**

1.26 Weld 2-RPV-D – RPV Lower Shell to Lower Head Weld

ADDITIONAL COVERAGE PROVIDED BY 45° DUAL (PROBE 7) AND 45° SHEAR (PROBE 8)

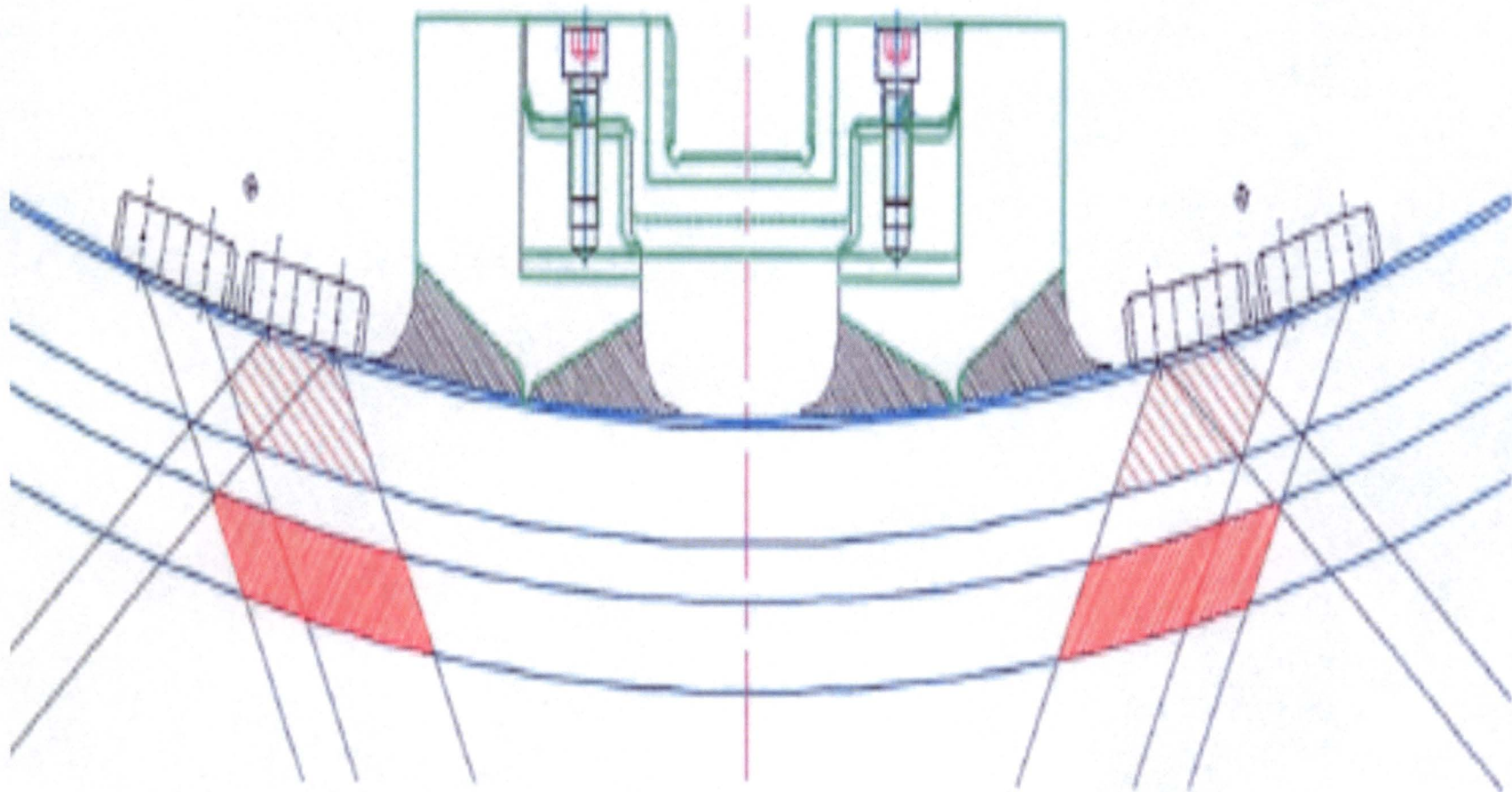


Figure 1.26-3 Parallel scan limitation to core support pads at 0°, 60°, 180°, 240°, 300°, and 360°



**1.26 Weld 2-RPV-D – RPV Lower Shell to Lower Head Weld**

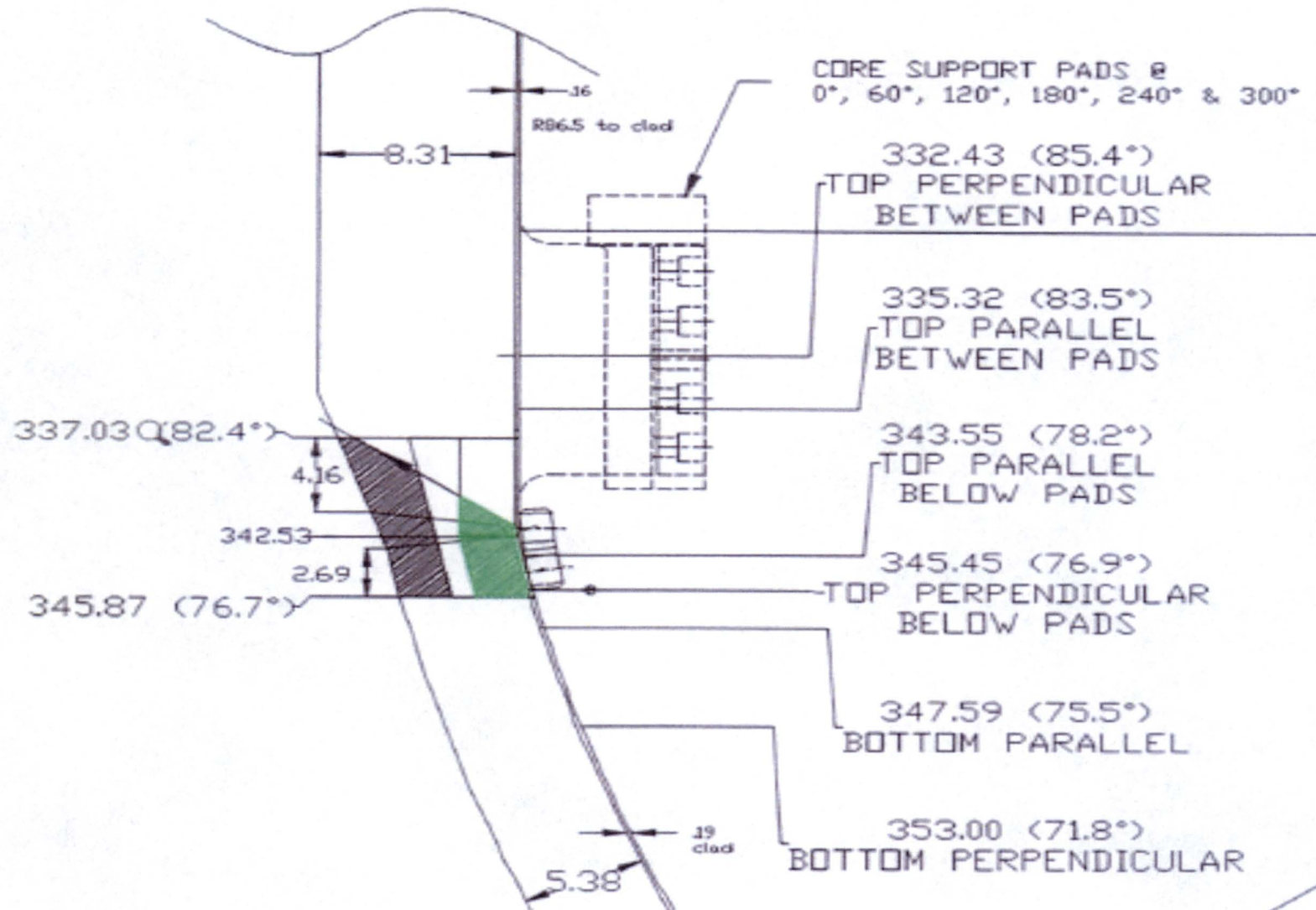


Figure 1.26-4 Perpendicular scan limitation under core support pads at 0°, 60°, 180°, 240°, 300°, and 360°

### **1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld**

Weld 2-RPV-E was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-029. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is A-B-C-D. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **47.61%** as described in Table 1.27-1 and as shown in Figures 1.27-2 and 1.27-3.

One recordable indication was detected during this examination. The indication was acceptable per ASME Section XI, 2004 Edition, IWB-3510-1 as shown in Figures 1.27-4 and 1.27-5.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-RPV-E.

# 1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld

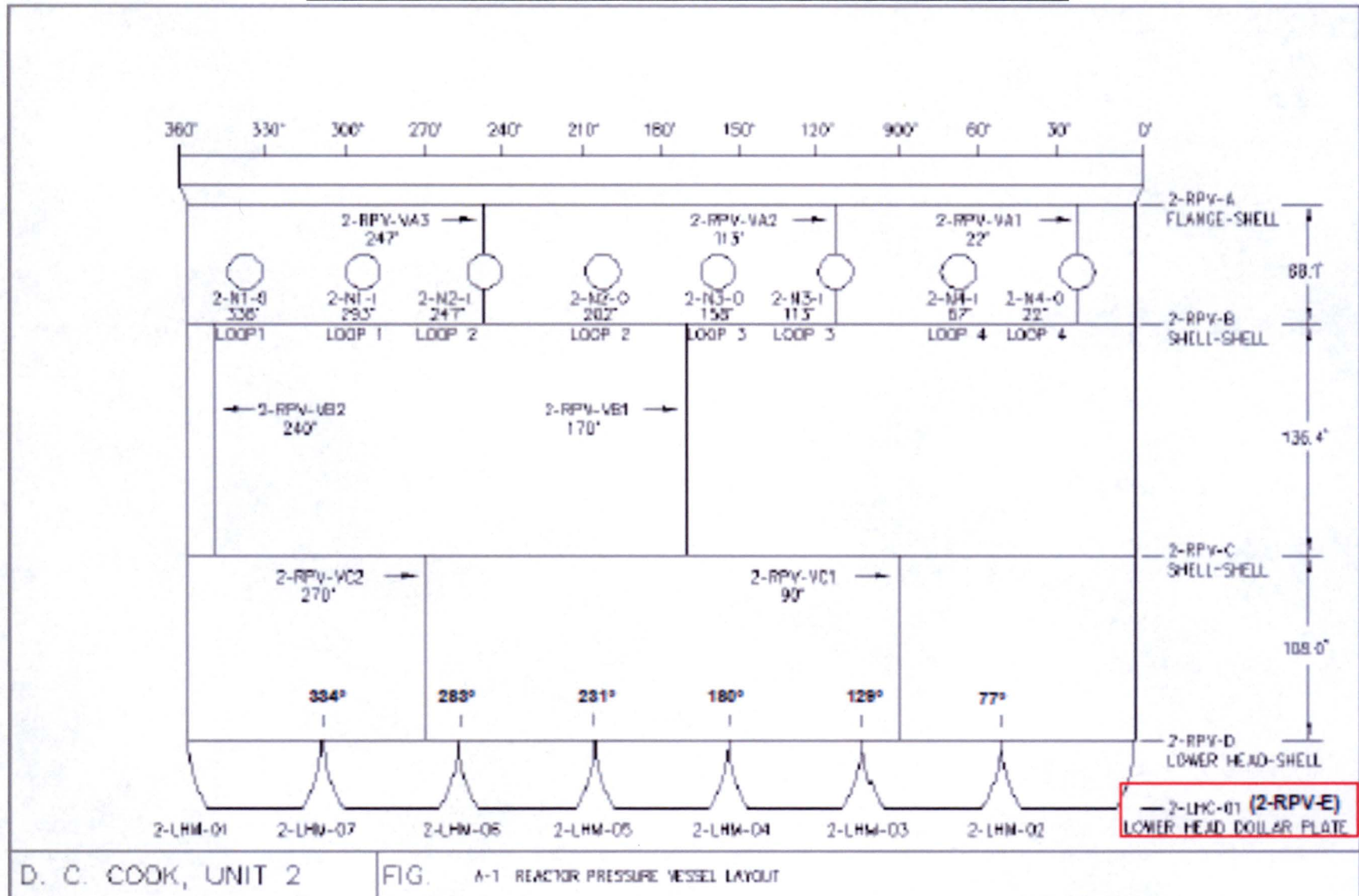


Figure 1.27-1 Weld 2-RPV-E (2-LHC-01) (Extracted from Reference DRAWING 2A-1)



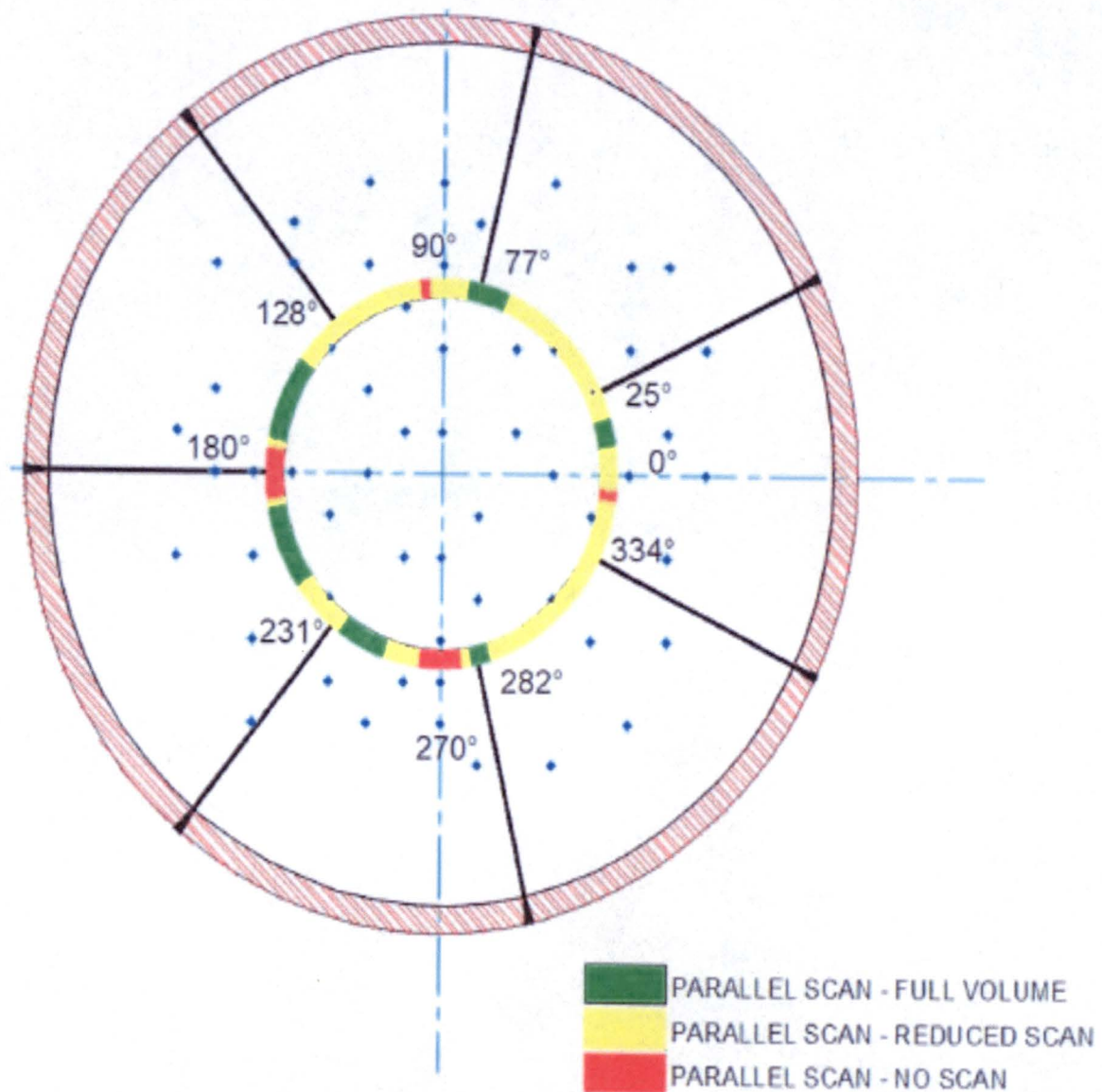
**1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	18.08%	7.29%	17.34%	42.71%
UP/DN	22.23%	8.96%	21.31%	52.5%
UT Coverage = 47.61%	Limitations: Bottom Mounted Instrumentation Tubes			

**Table 1.27-1 Weld 2-RPV-E (2-LHC-01) Coverage Calculation Results**

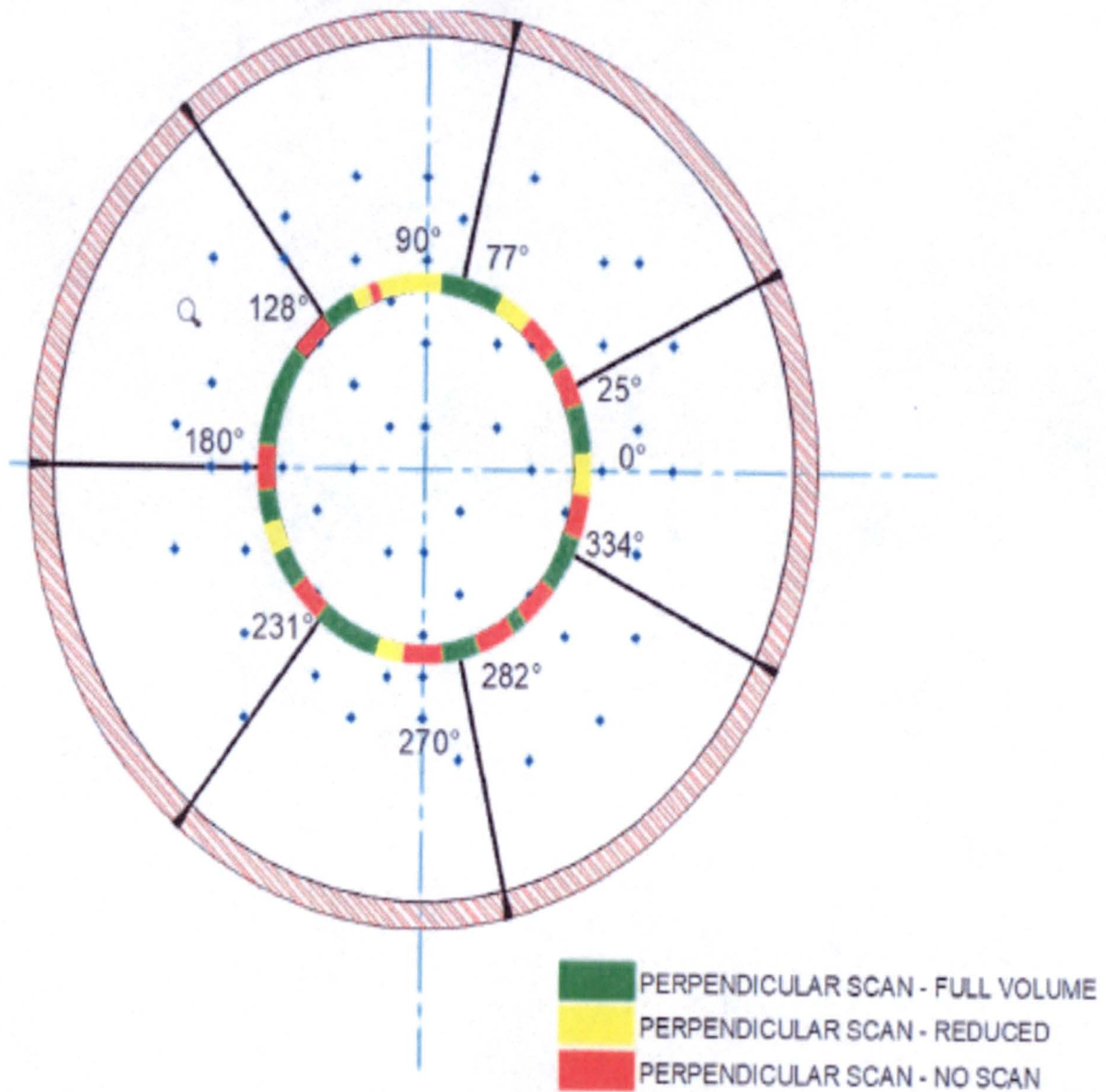
**1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld**

WELD ID: 2-RPV-E (W5)



**Figure 1.27-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**


**1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld**



**Figure 1.27-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**



1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld

						PLANT <u>D.C. Cook</u>										UNIT <u>2</u>						
INDICATION ASSESSMENT						PROCEDURE <u>PDI-ISI-254</u>										REV. <u>9</u>						
						ANALYST <u>C.S. Wyffels</u> <i>C. Wyffels</i>										LEVEL <u>III</u>		DATE <u>10/26/19</u>				
FILE / CHANNEL	WELD NO.	INDICATION NO.	BEAM ANGLE	BEAM DIRECTION	CLASSIFICATION VOLUMETRIC / PLANAR	APPLICABLE "t"	FLAW DEPTH		LENGTH (L)	SURF. / SUB.	S. DIM. (Nearest ID/OD)	Y VALUE (S / a)	2a DIM.		a / L VALUE (0.50 MAX)	a / t%	ALLOWABLE a / t%	P E A K				NOTES
							MIN	MAX					a DIM.	a DIM.				MAX AMP	X (SWP#)	Y/B	Z/B	
W5-PAR-212-237-A/2	2-RPV-E	1	45	CW	P	5.38	0.781	0.906	0.6	SUB	0.59 (ID)	1	0.125* 0.0825	0.104	1.16	2.5	62	27.14° (4)	220.8°	0.91	(1)	

**NOTES** (1) Allowable Per ASME XI 2004 Edition; IWB-3510-1

\* Procedure default throughwall sized used

Calibration Data Sheet No. LS-2  
 Acquisition Log Sheet No. W5  
 Analysis Log Sheet No. W5

Calculator accuracy is maintained for all flaw related calculations. IWA-3200 is applied to the "ALLOWABLE a/t%"

Figure 1.27-4 2-RPV-E (2-LHC-01) Indication Assessment



1.27 Weld 2-RPV-E (2-LHC-01) – RPV Lower Head Dollar Plate Weld

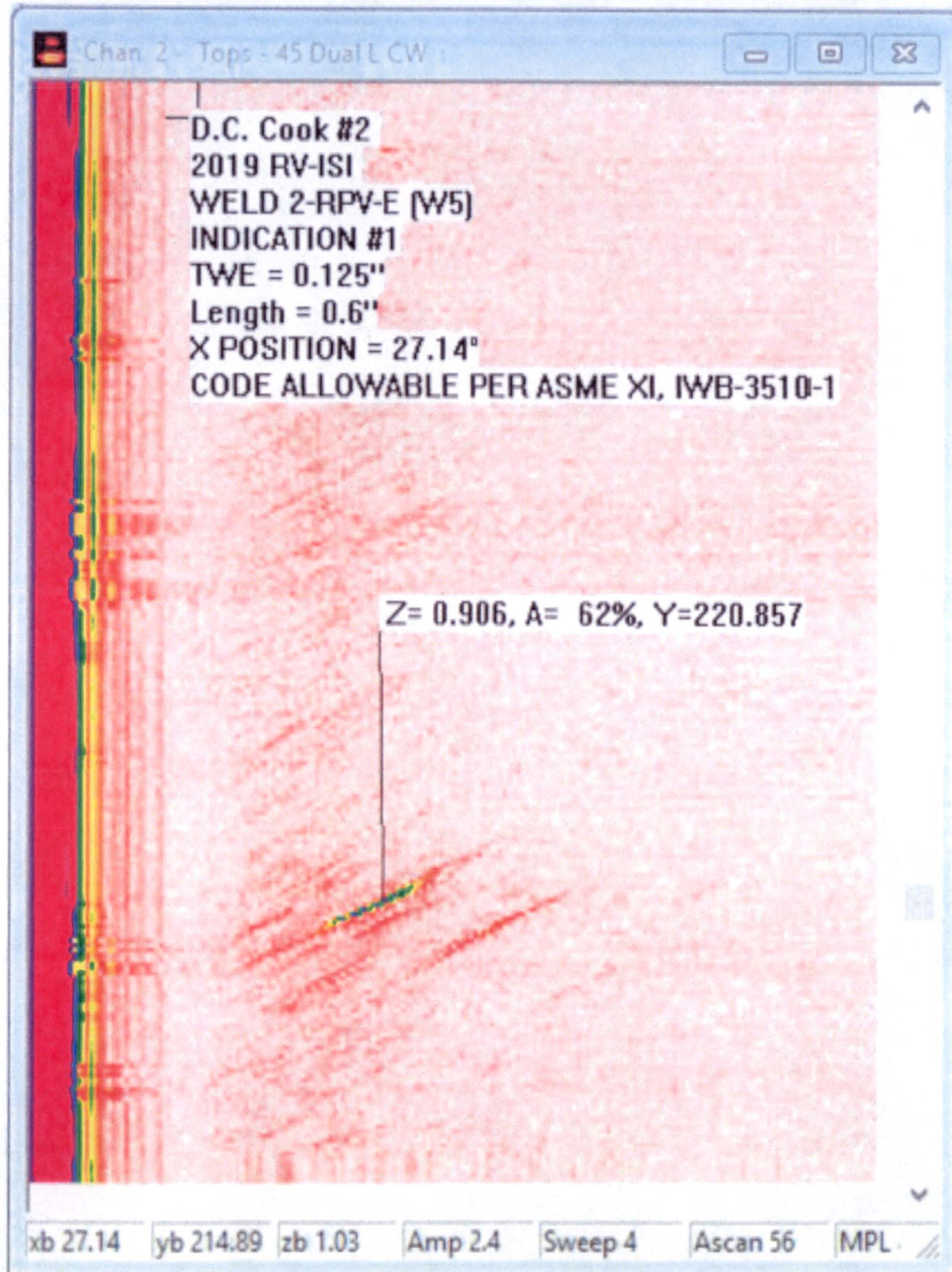


Figure 1.27-5 2-RPV-E (2-LHC-01) Indication Plot

### **1.28 Weld 2-LHM-01 – RPV Lower Head Meridional Weld at 26 Degrees**

Weld 2-LHM-01 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-038. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **66.3%** as described in Table 1.28-1 and as shown in Figures 1.28-2 and 1.28-3.

No recordable indications were detected during this examination.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-01.



### 1.28 Weld 2-LHM-01 – RPV Lower Head Meridional Weld at 26 Degrees

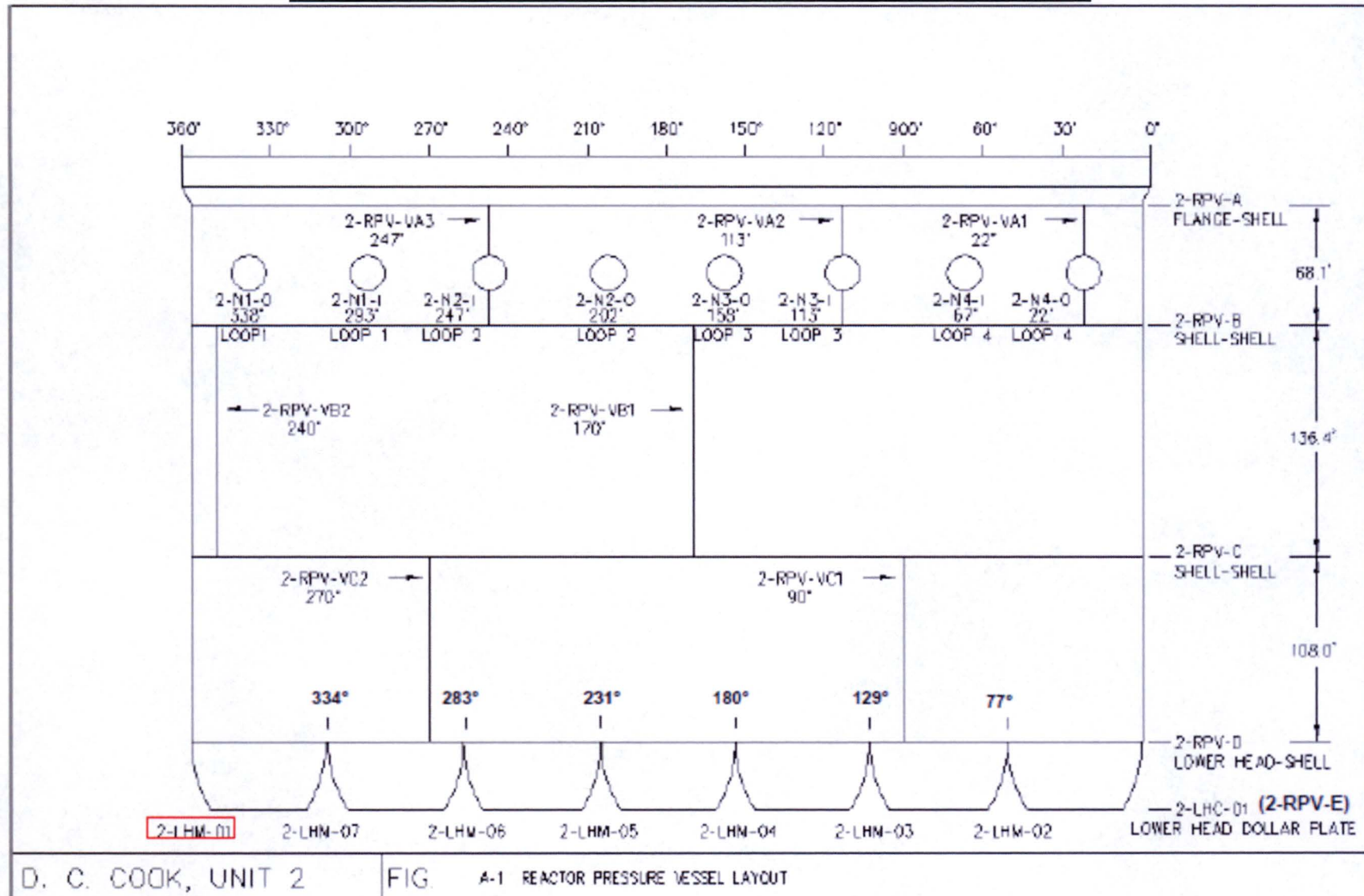


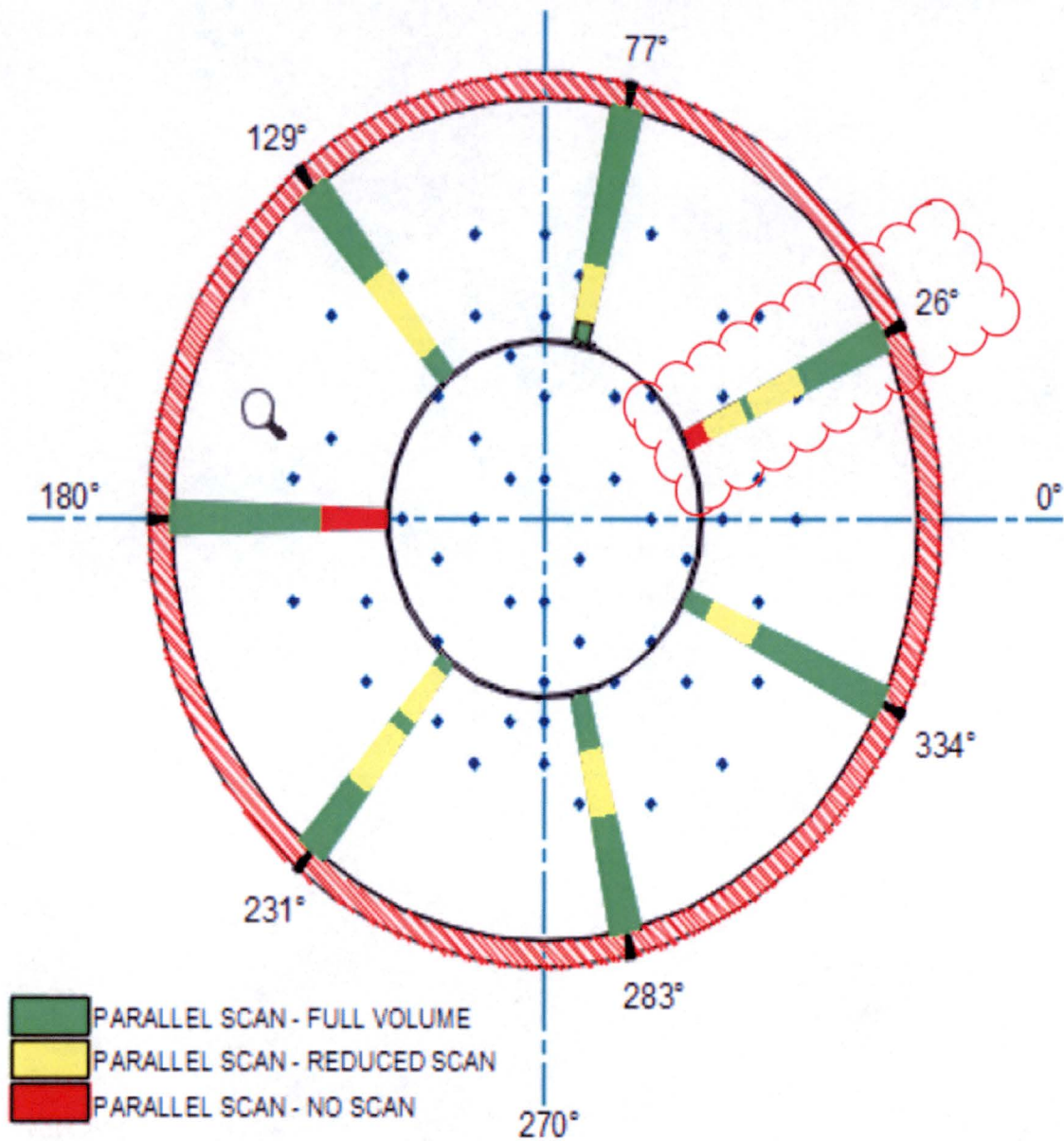
Figure 1.28-1 Weld 2-LHM-01 (Extracted from Reference DRAWING 2A-1)

**1.28 Weld 2-LHM-01 – RPV Lower Head Meridional Weld at 26 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	30.19%	12.23%	28.94%	71.37%
UP/DN	25.91%	10.49%	24.83%	61.23%
UT Coverage = 66.3%	Limitations: Bottom Mounted Instrumentation Tubes			

**Table 1.28-1 Weld 2-LHM-01 Coverage Calculation Results**

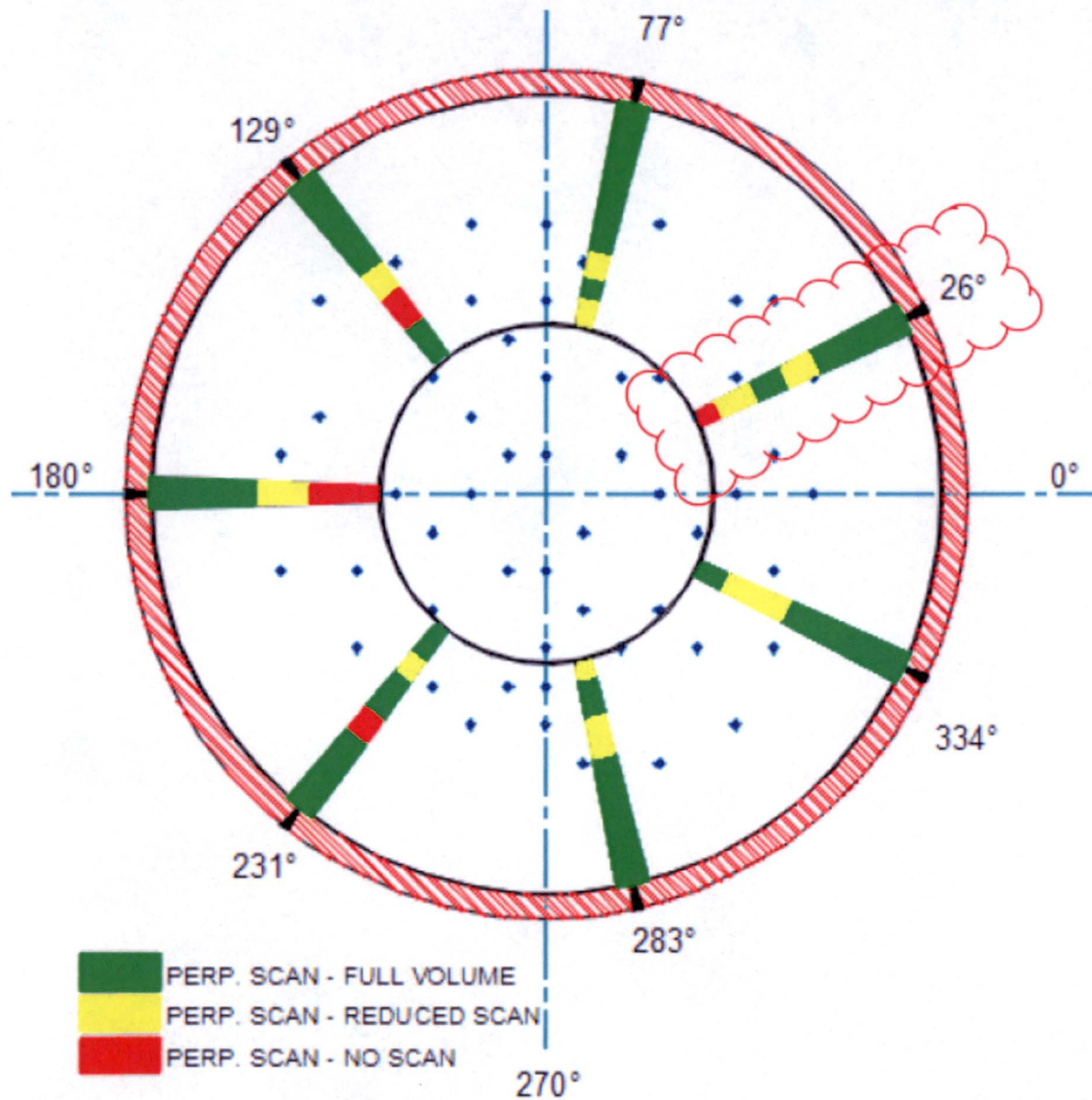
**1.28 Weld 2-LHM-01 – RPV Lower Head Meridional Weld at 26 Degrees**



**Figure 1.28-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**



**1.28 Weld 2-LHM-01 – RPV Lower Head Meridional Weld at 26 Degrees**



**Figure 1.28-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**

### **1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees**

Weld 2-LHM-02 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-039. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **83.44%** as described in Table 1.29-1 and as shown in Figures 1.29-2 and 1.29-3.

One recordable indication was detected during this examination. The indication was acceptable per ASME Section XI, 2004 Edition, IWB-3510-1 as shown in Figures 1.29-4 and 1.29-5.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-02.

### 1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees

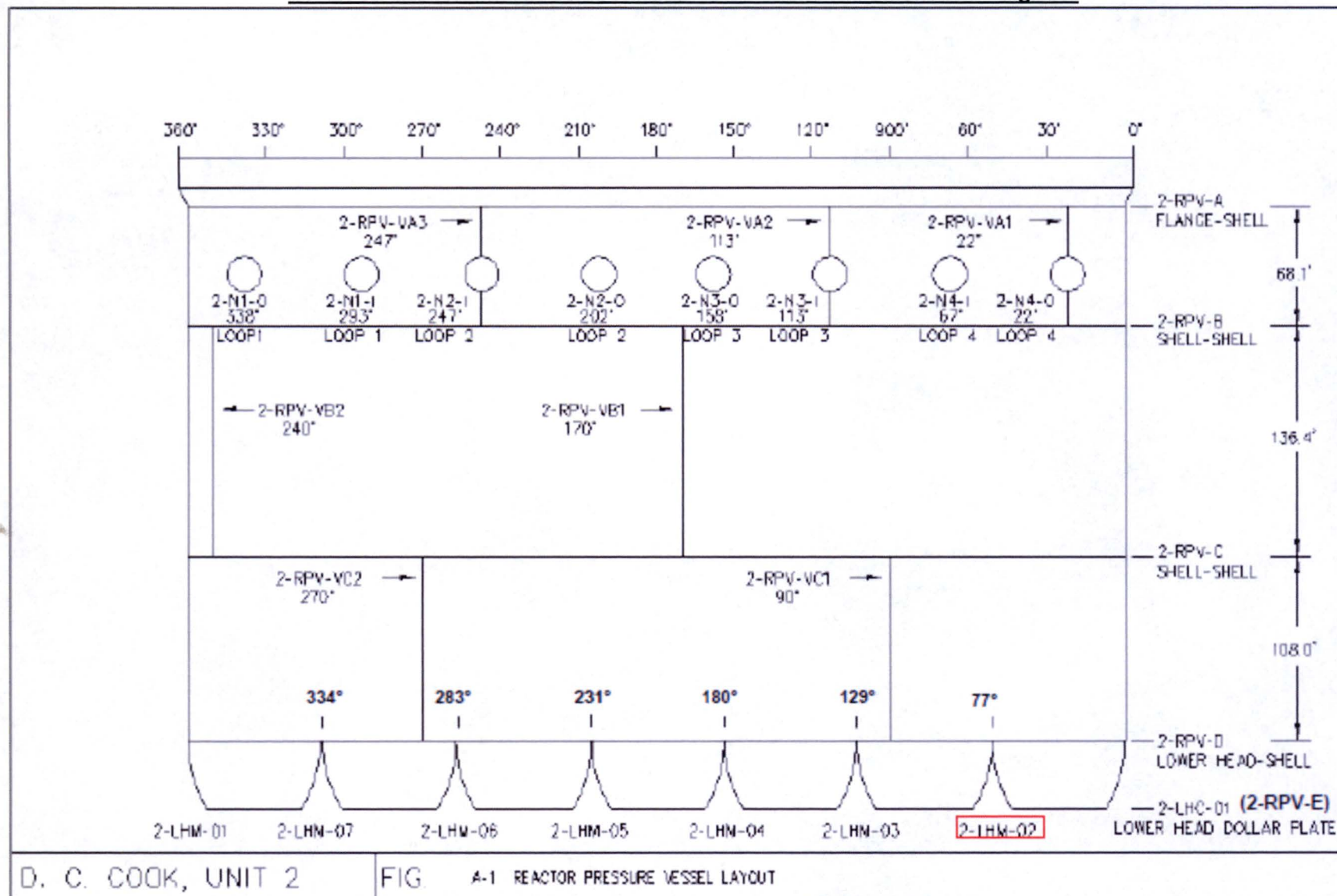


Figure 1.29-1 Weld 2-LHM-02 (Extracted from Reference DRAWING 2A-1)

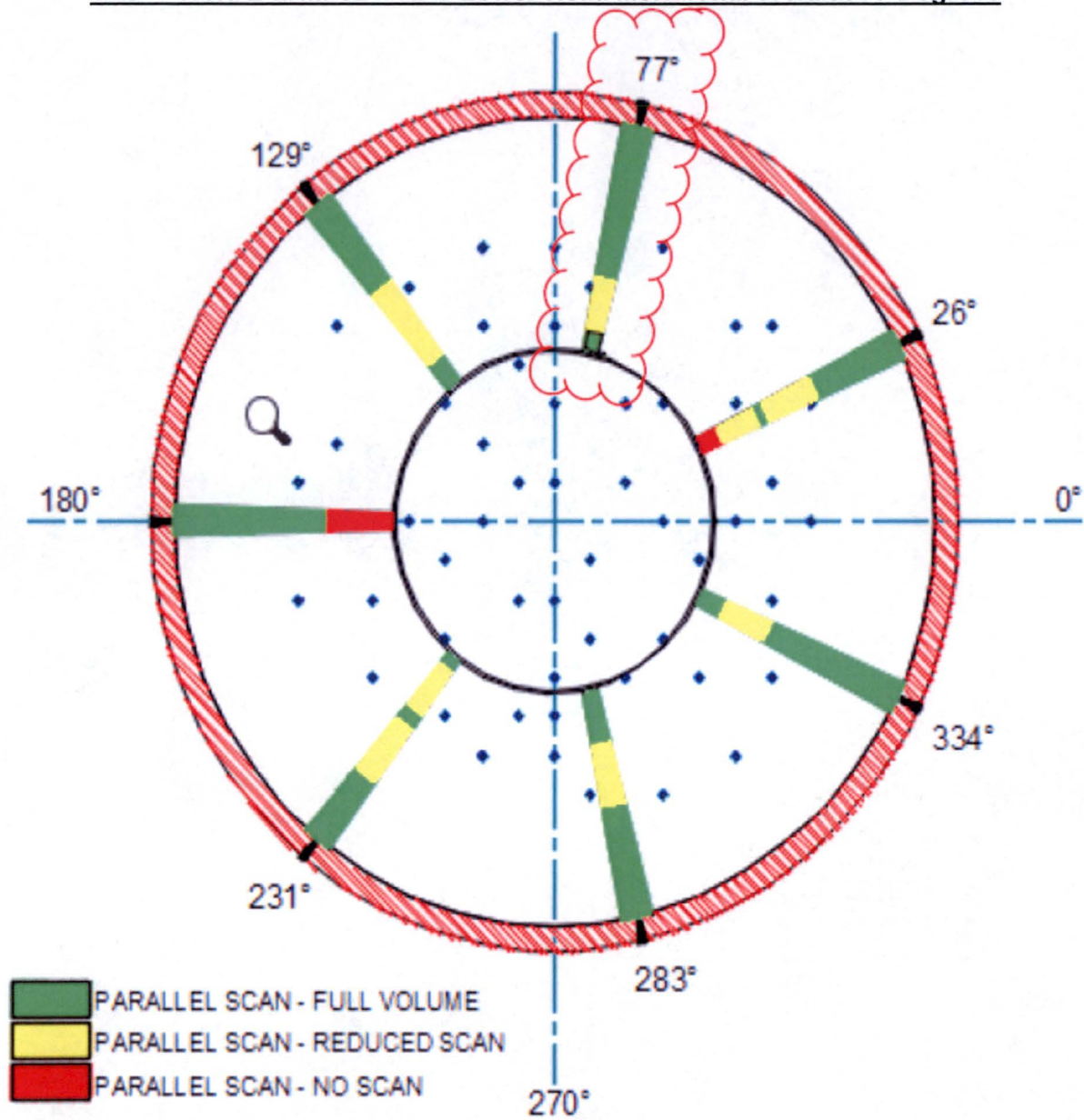


**1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	45.74%	14.47%	34.26%	84.47%
UP/DN	34.87%	14.12%	33.42%	82.41%
UT Coverage = 83.44%	Limitations: Bottom Mounted Instrumentation Tubes			

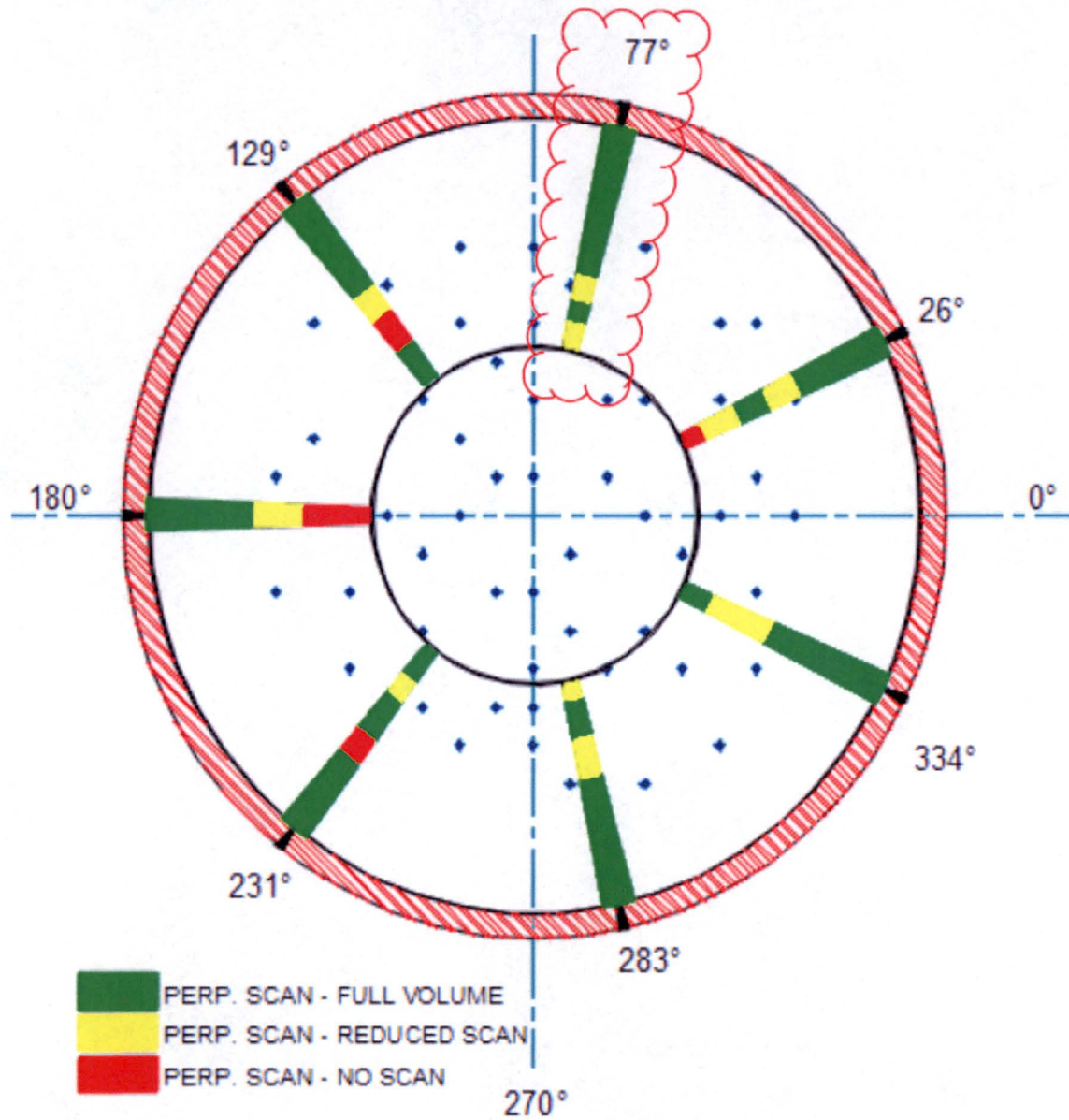
**Table 1.29-1 Weld 2-LHM-02 Coverage Calculation Results**

**1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees**



**Figure 1.29-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**

**1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees**



**Figure 1.29-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**



### 1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees

INDICATION ASSESSMENT					PLANT		D.C. Cook										UNIT		2			
					PROCEDURE		PDI-ISI-254										REV.		9			
					ANALYST		C.S. Wyffels <i>C. S. Wyffels</i>										LEVEL		III			
																	DATE		10/26/19			
FILE / CHANNEL	WELD NO.	INDICATION NO.	BEAM ANGLE	BEAM DIRECTION	CLASSIFICATION VOLUMETRIC / PLANAR	APPLICABLE "t"	FLAW DEPTH		LENGTH (L)	SURF. / SUB.	S. DIM. (Nearest ID/OD)	Y VALUE (S / a)	2a DIM.		a / L VALUE (0.50 MAX)	a / t%	ALLOWABLE a / t%	P	E	A	K	NOTES
							MIN	MAX														
W-14-PRP-044-051/2	2-LHM-02	1	45	CW	P	5.38	1.198		1.1	SUB	1.01	1	0.125*		0.057	1.16	2.2	100	47.51*			(1)
							1.323				(ID)		0.0625									

NOTES
(1) Allowable Per ASME XI 2004 Edition; IWB-3510-1
\* Procedure default throughwall sized used

Calibration Data Sheet No.
Acquisition Log Sheet No.
Analysis Log Sheet No.

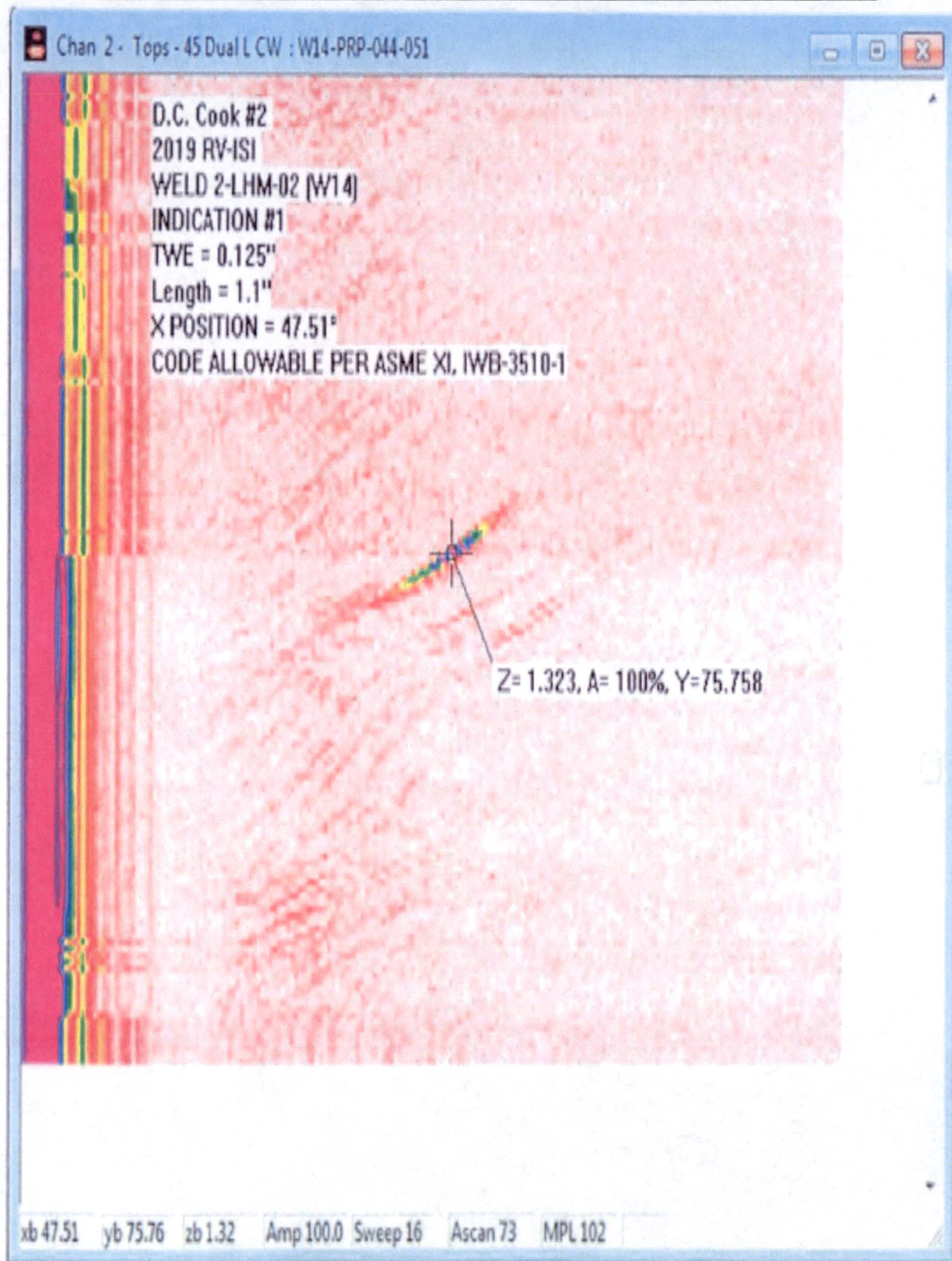
LS-2
W14
W14

Calculator accuracy is maintained for all flaw related calculations. IWA-3200 is applied to the "ALLOWABLE a/t%"

### Figure 1.29-4 Weld 2-LHM-02 Indication Assessment



**1.29 Weld 2-LHM-02 – RPV Lower Head Meridional Weld at 77 Degrees**



**Figure 1.29-5 Weld 2-LHM-02 Indication Plot**

### **1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees**

Weld 2-LHM-03 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-040. Previous ISI UT data was reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **73.09%** as described in Table 1.30-1 and as shown in Figures 1.30-2, and 1.30-3.

One recordable indication was detected during this examination. The indication was acceptable per ASME Section XI, 2004 Edition, IWB-3510-1 as shown in Figures 1.30-4 and 1.30-5.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-03.



### 1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees

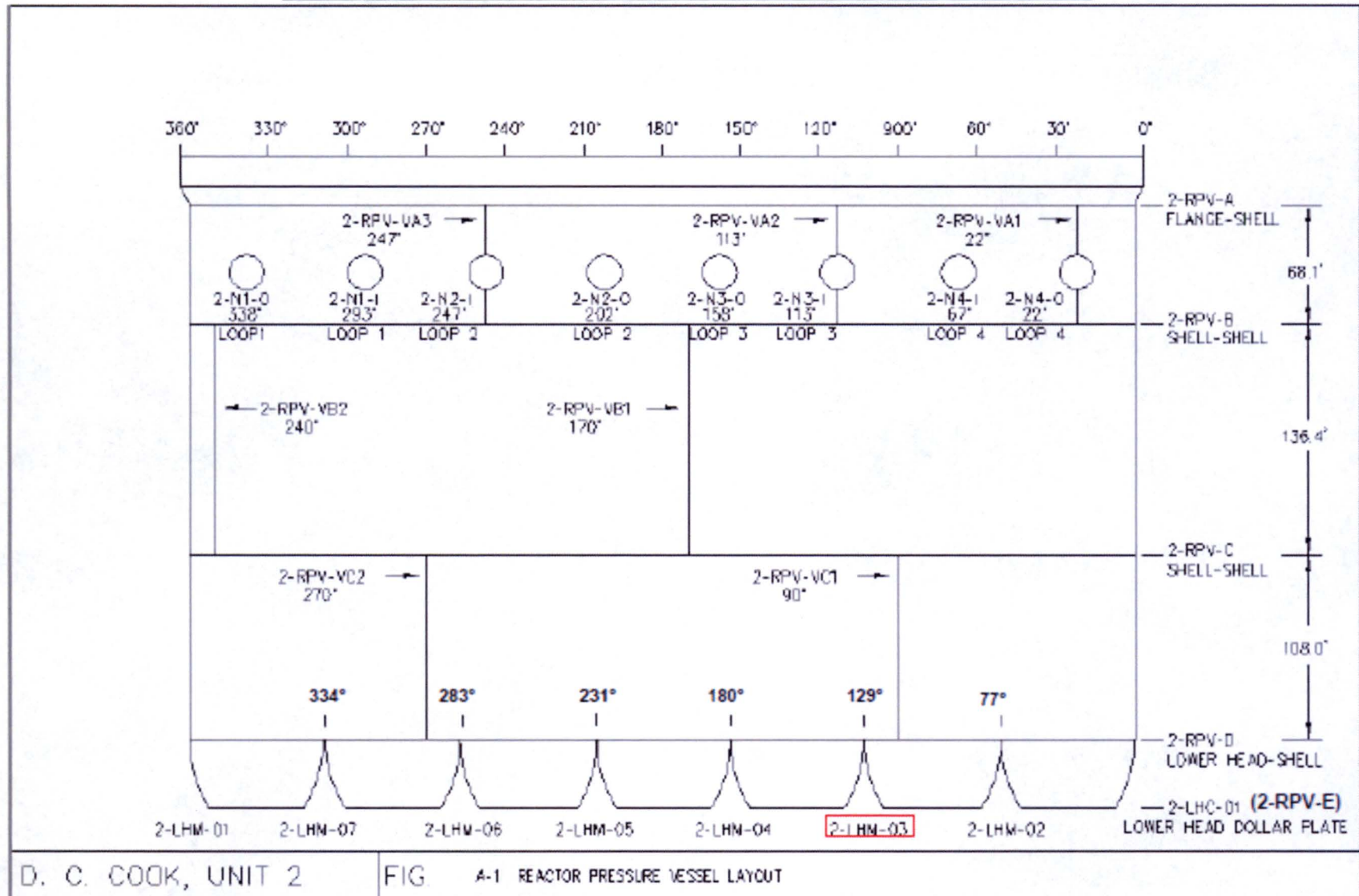


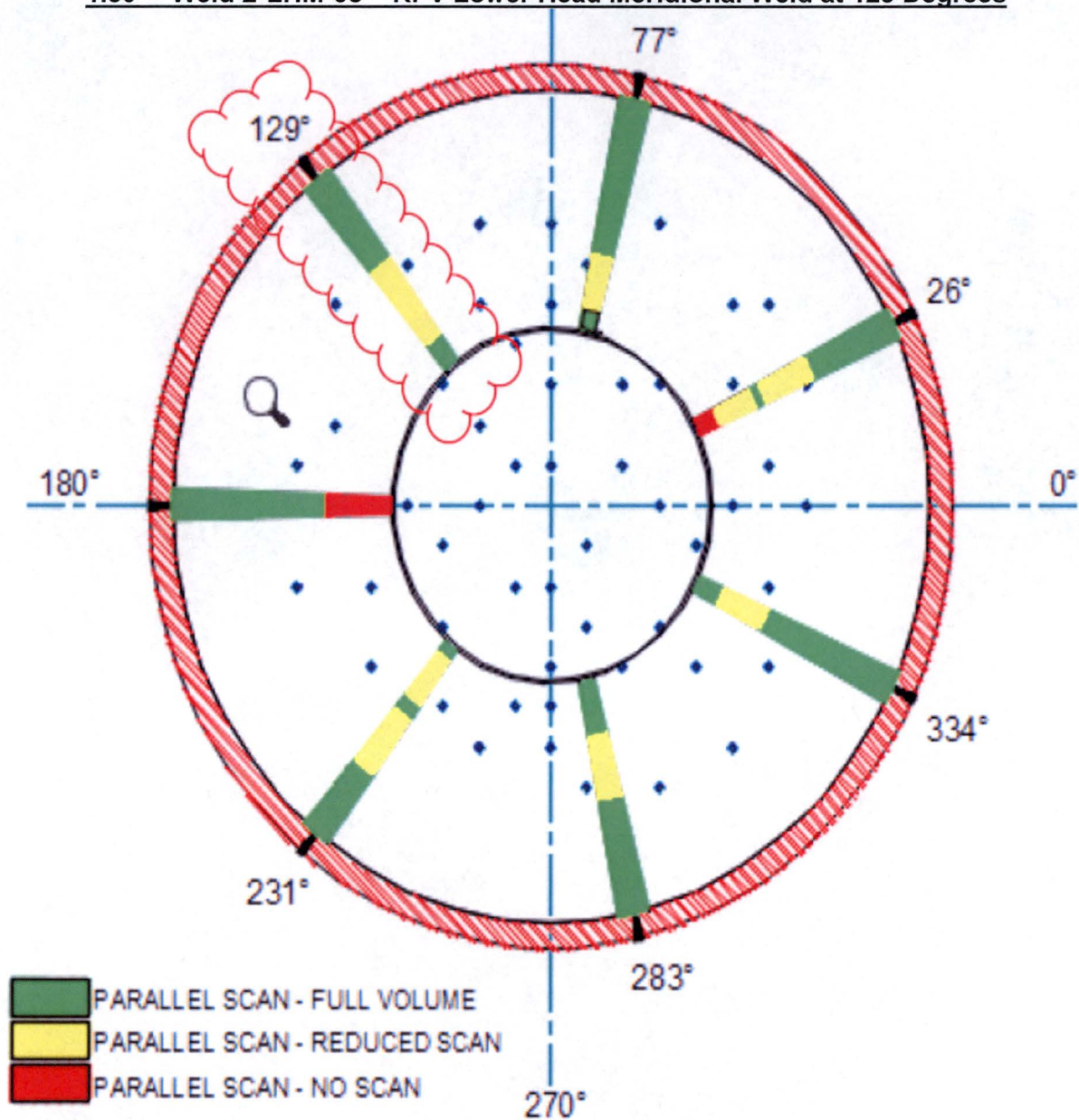
Figure 1.30-1 Weld 2-LHM-03 (Extracted from Reference DRAWING 2A-1)

**1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	32.25%	13.06%	30.91%	78.23%
UP/DN	29.6%	11.99%	28.37%	69.95%
UT Coverage = 73.09%	Limitations: Bottom Mounted Instrumentation Tubes			

**Table 1.30-1 Weld 2-LHM-03 Coverage Calculation Results**

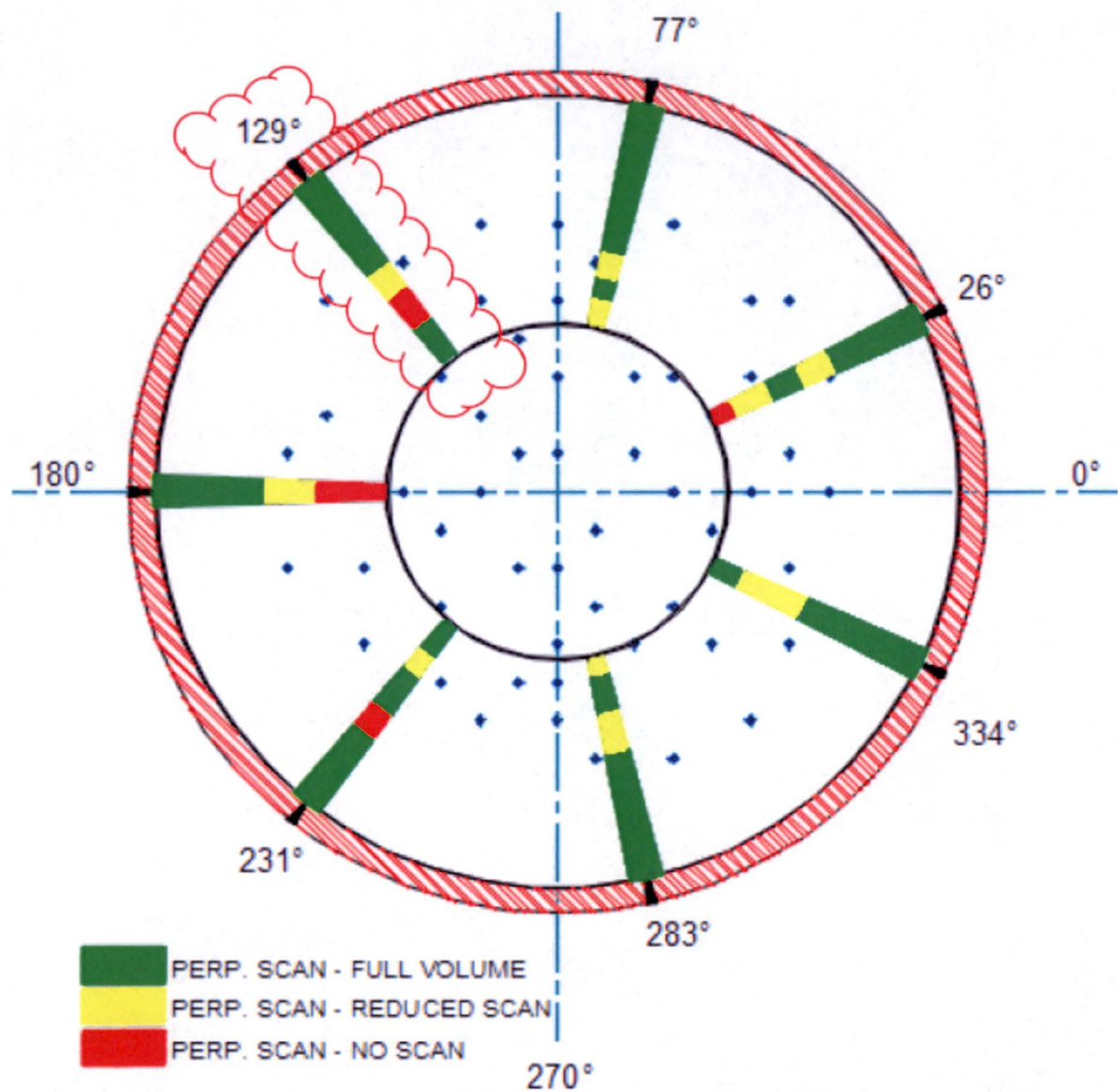
**1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees**



**Figure 1.30-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**



**1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees**



**Figure 1.30-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**

1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees

INDICATION ASSESSMENT					PLANT D.C. Cook										UNIT 2							
					PROCEDURE PDI-ISI-254										REV. 9							
					ANALYST C.S. Wyffels <i>C.S. Wyffels</i>										LEVEL III		DATE 10/26/19					
FILE / CHANNEL	WELD NO.	INDICATION NO.	BEAM ANGLE	BEAM DIRECTION	CLASSIFICATION VOLUMETRIC / PLANAR	APPLICABLE "t"	FLAW DEPTH		LENGTH (L)	SURF. / SUB.	S. DIM. (Nearest ID/OD)	Y VALUE (S / a)	2a DIM.		a / L VALUE (0.59 MAX)	a / t%	ALLOWABLE a / t%	P E A K				NOTES
							MIN	MAX					a DIM.	a DIM.				MAX AMP	X (SWF#)	YB	ZB	
W15-PRP-044 076/2	2-LHM-03	1	45	CW	P	5.38	1.238	1.363	0.6	SUB	1.05 (ID)	1	0.125* 0.0625	0.104	1.16	2.5	94	52.29* (77)	128.4*	1.36	(1)	

NOTES
(1) Allowable Per ASME XI 2004 Edition; IWB-3510-1  
\* Procedure default throughwall sized used

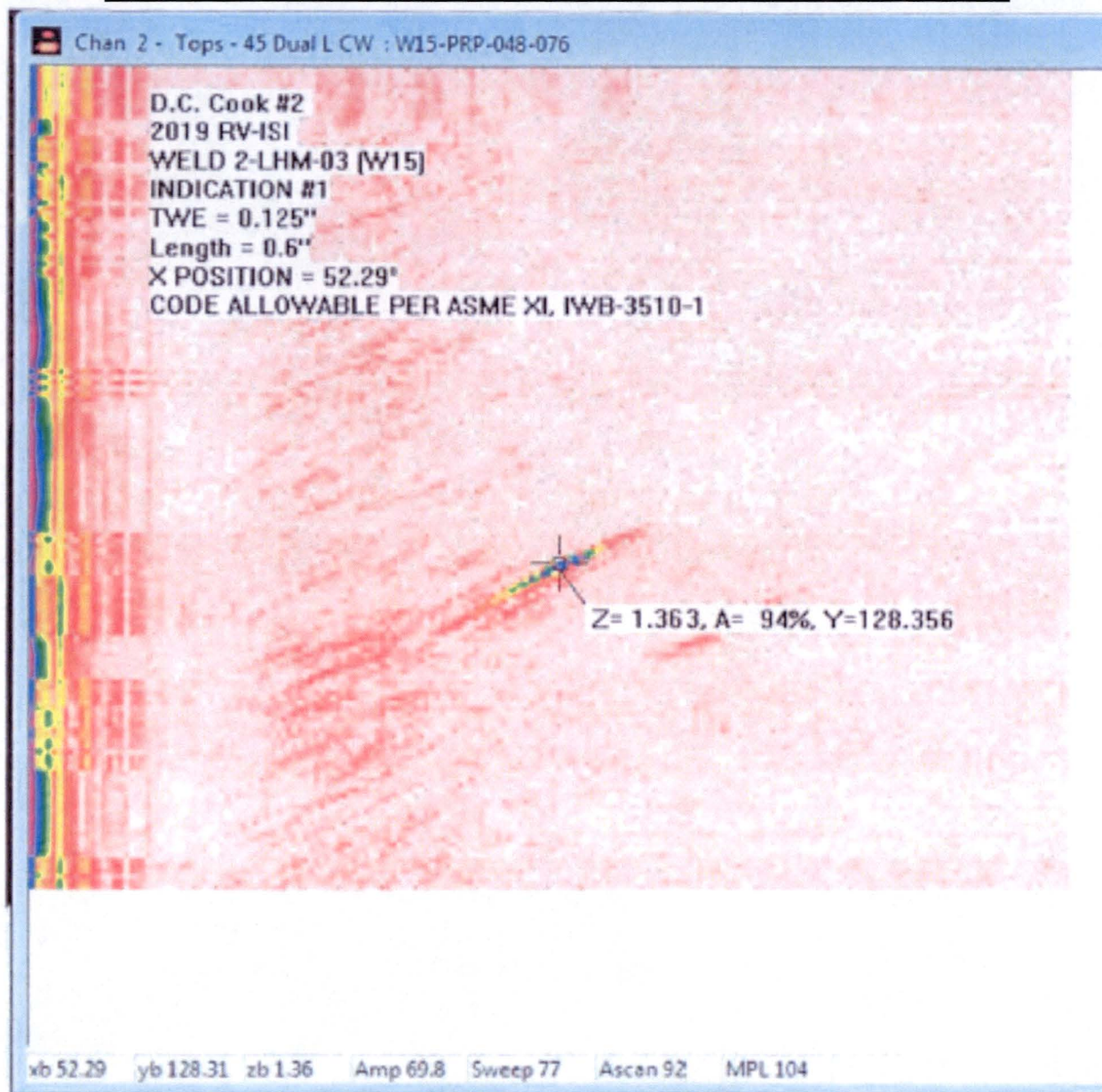
Calibration Data Sheet No. LS-2  
Acquisition Log Sheet No. W15  
Analysis Log Sheet No. W15

Calculator accuracy is maintained for all flaw related calculations. IWA-3200 is applied to the "ALLOWABLE a/t%"

Figure 1.30-4 Weld 2-LHM-03 Indication Assessment



**1.30 Weld 2-LHM-03 – RPV Lower Head Meridional Weld at 129 Degrees**



**Figure 1.30-5 Weld 2-LHM-03 Indication Plot**



### **1.31 Weld 2-LHM-04– RPV Lower Head Meridional Weld at 180 Degrees**

Weld 2-LHM-04 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-041. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **71.03%** as described in Table 1.31-1 and as shown in Figures 1.31-2, and 1.31-3.

No recordable indications were detected during this examination.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-04.

### 1.31 Weld 2-LHM-04- RPV Lower Head Meridional Weld at 180 Degrees

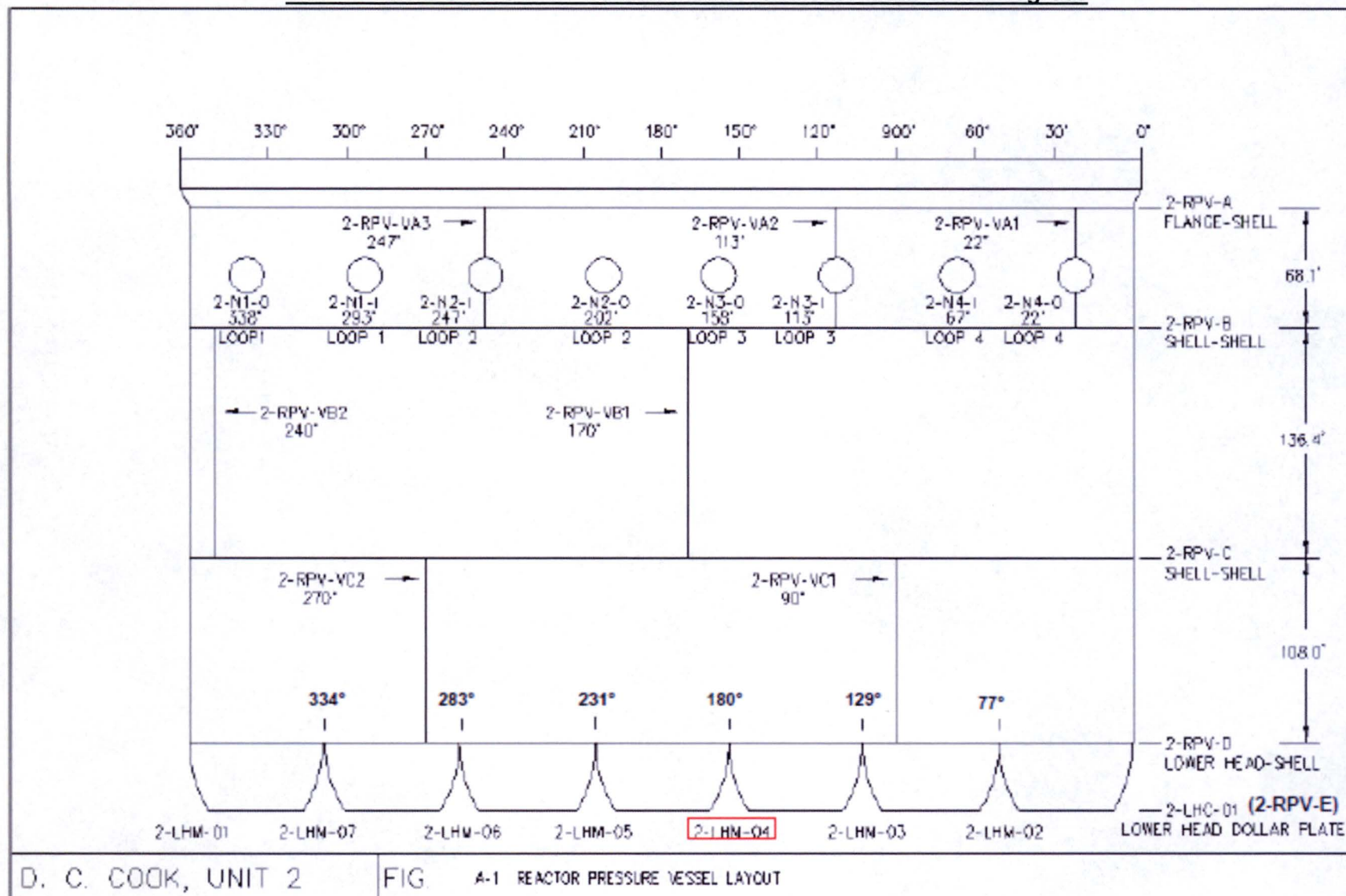


Figure 1.31-1 Weld 2-LHM-04 (Extracted from Reference DRAWING 2A-1)

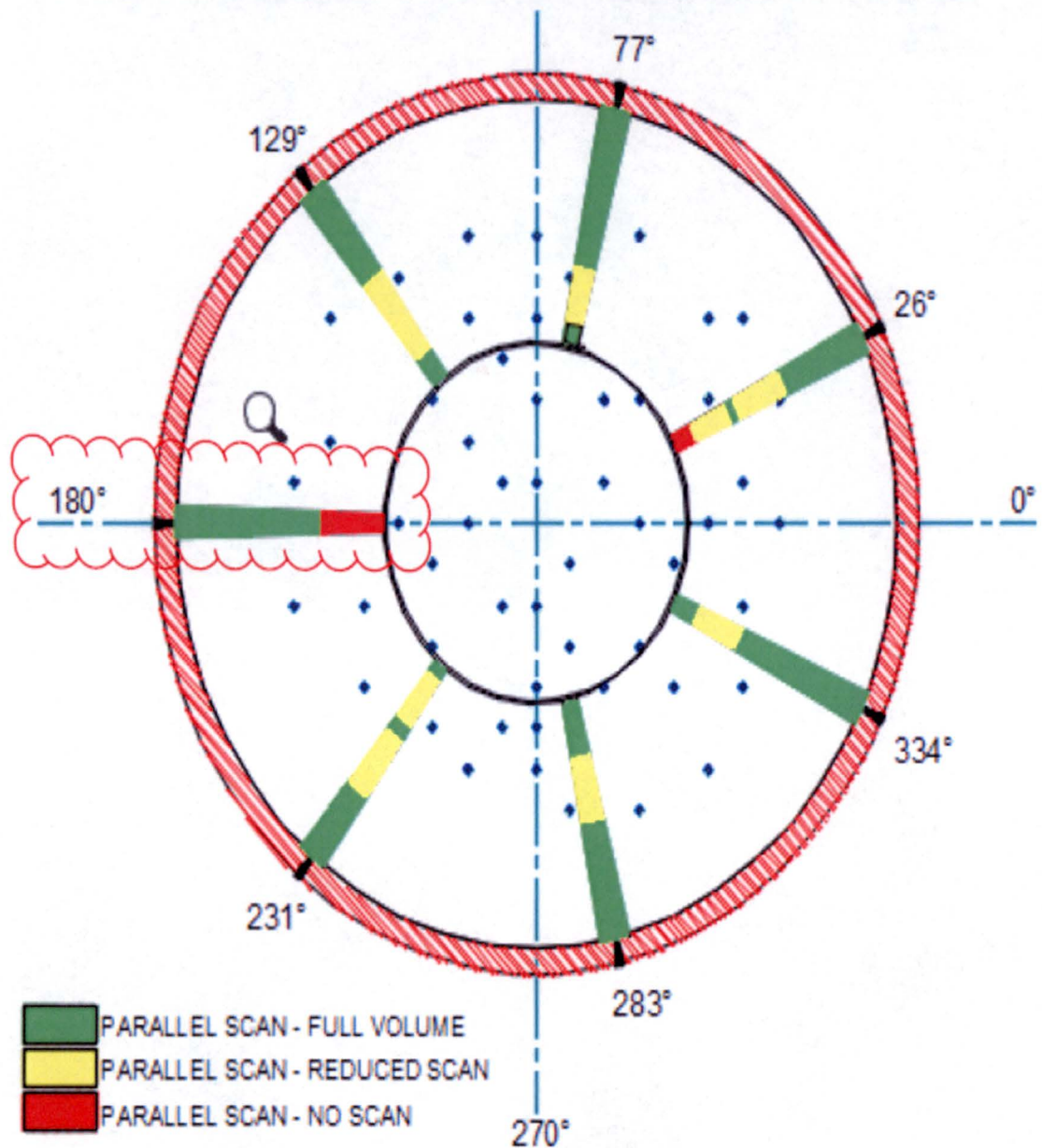
**1.31 Weld 2-LHM-04– RPV Lower Head Meridional Weld at 180 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	30.8%	12.47%	29.52%	72.79%
UP/DN	29.31%	11.87%	21.1%	69.28%
UT Coverage = 71.03%	Limitations: Bottom Mounted Instrumentation Tubes			

**Table 1.31-1 Weld 2-LHM-04 Coverage Calculation Results**

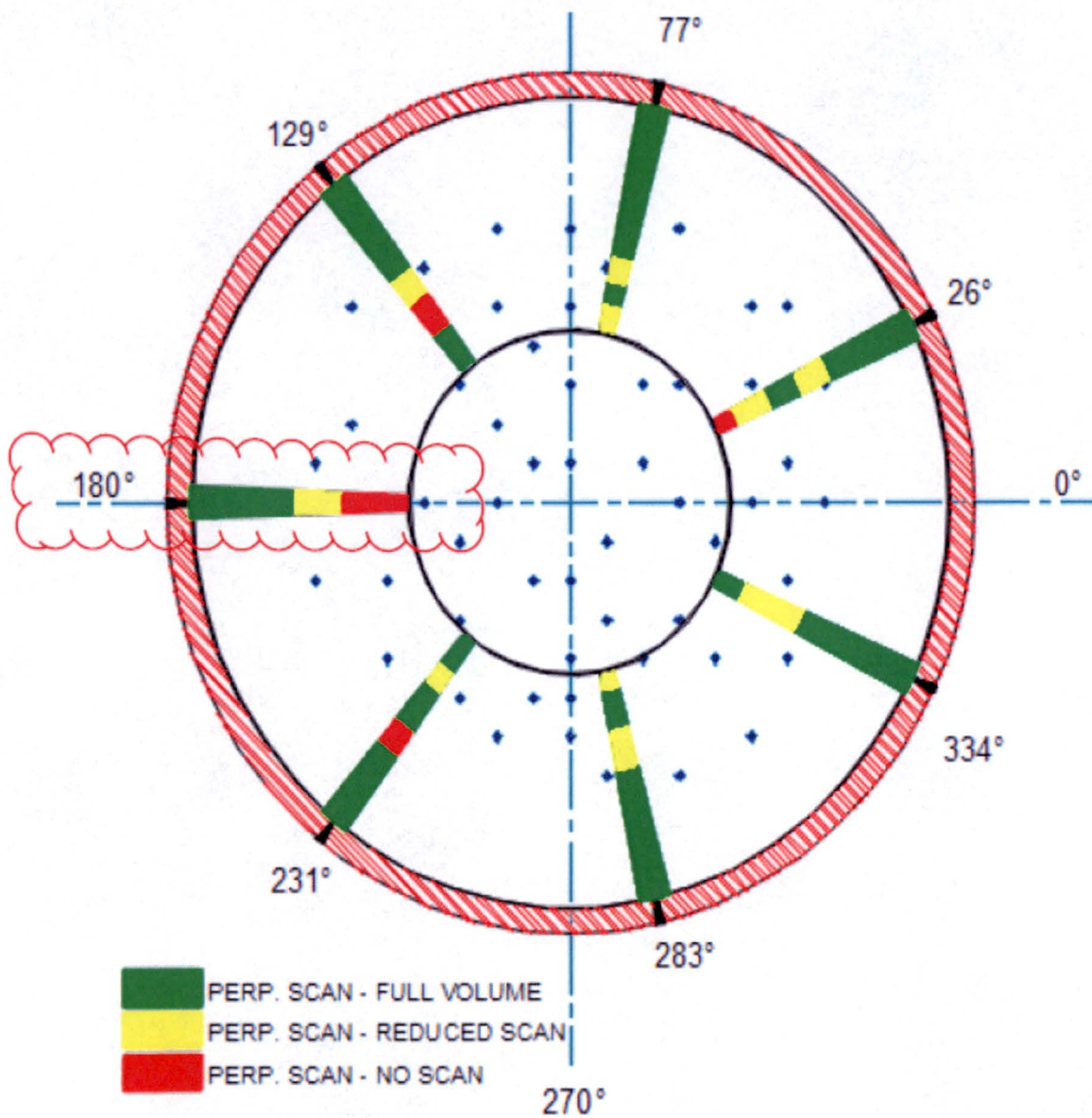


**1.31 Weld 2-LHM-04– RPV Lower Head Meridional Weld at 180 Degrees**



**Figure 1.31-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**

**1.31 Weld 2-LHM-04– RPV Lower Head Meridional Weld at 180 Degrees**



**Figure 1.31-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**

### **1.32 Weld 2-LHM-05 – RPV Lower Head Meridional Weld at 231 Degrees**

Weld 2-LHM-05 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-042. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **67.15%** as described in Table 1.32-1 and as shown in Figures 1.32-2, and 1.32-3.

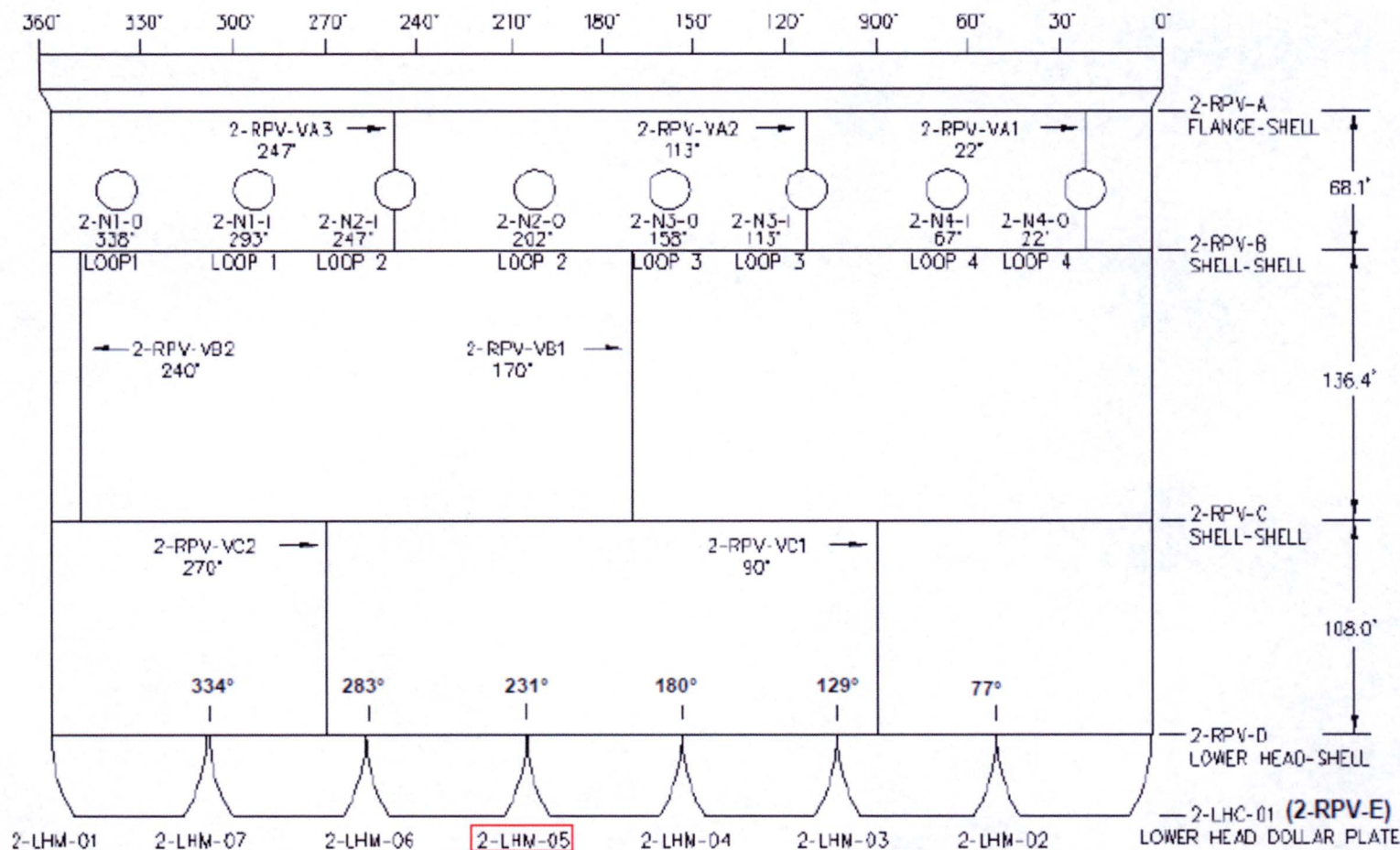
No recordable indications were detected during this examination.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations exist on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-05.



### 1.32 Weld 2-LHM-05 – RPV Lower Head Meridional Weld at 231 Degrees



D. C. COOK, UNIT 2

FIG. A-1 REACTOR PRESSURE VESSEL LAYOUT

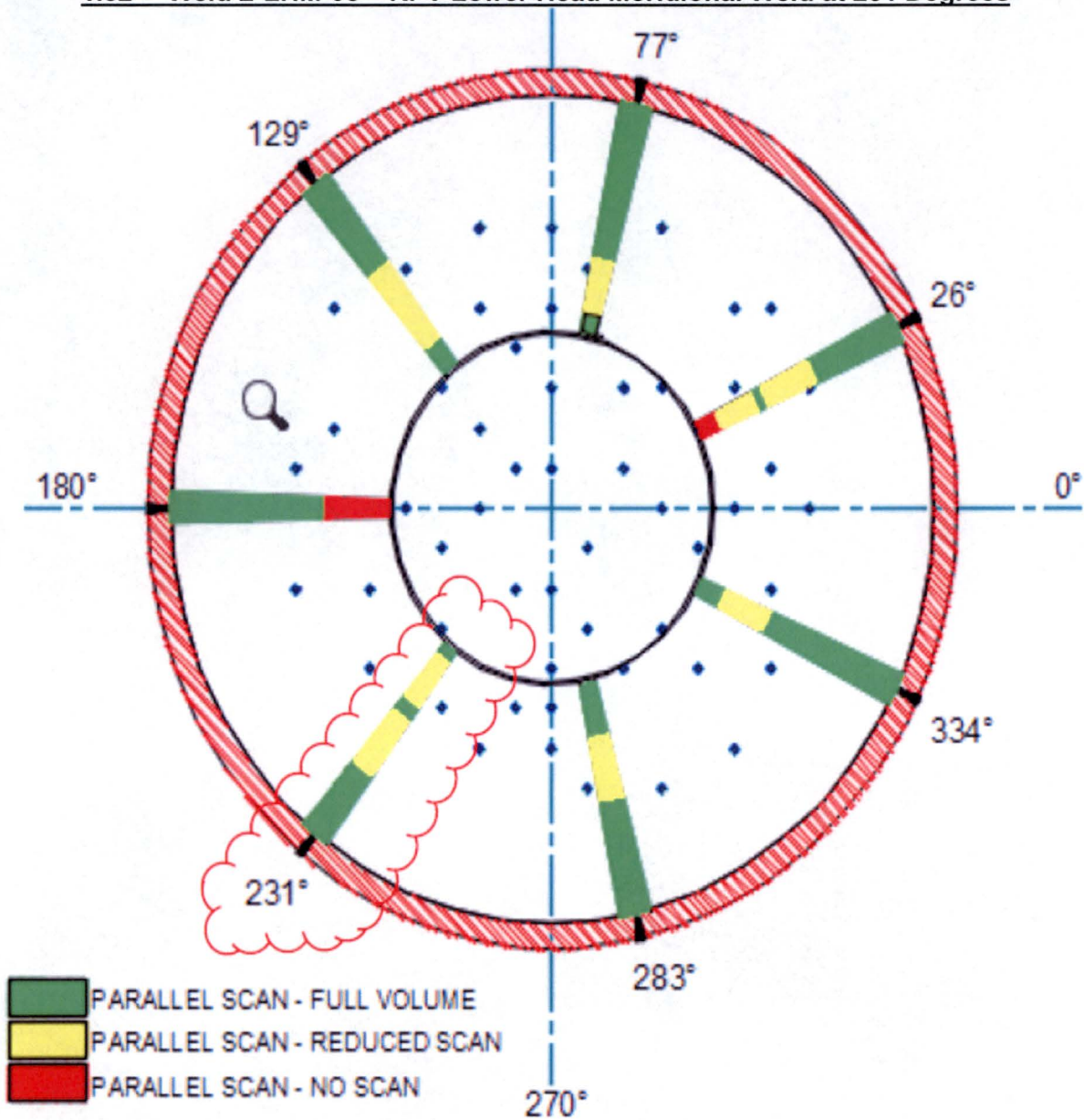
Figure 1.32-1 Weld 2-LHM-05 (Extracted from Reference DRAWING 2A-1)

**1.32 Weld 2-LHM-05 – RPV Lower Head Meridional Weld at 231 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	30.42%	12.32%	29.16%	71.89%
UP/DN	26.40%	10.69%	25.31%	62.41%
UT Coverage = 67.15%	Limitations: Bottom Mounted Instrumentation Tubes			

**Table 1.32-1 Weld 2-LHM-05 Coverage Calculation Results**

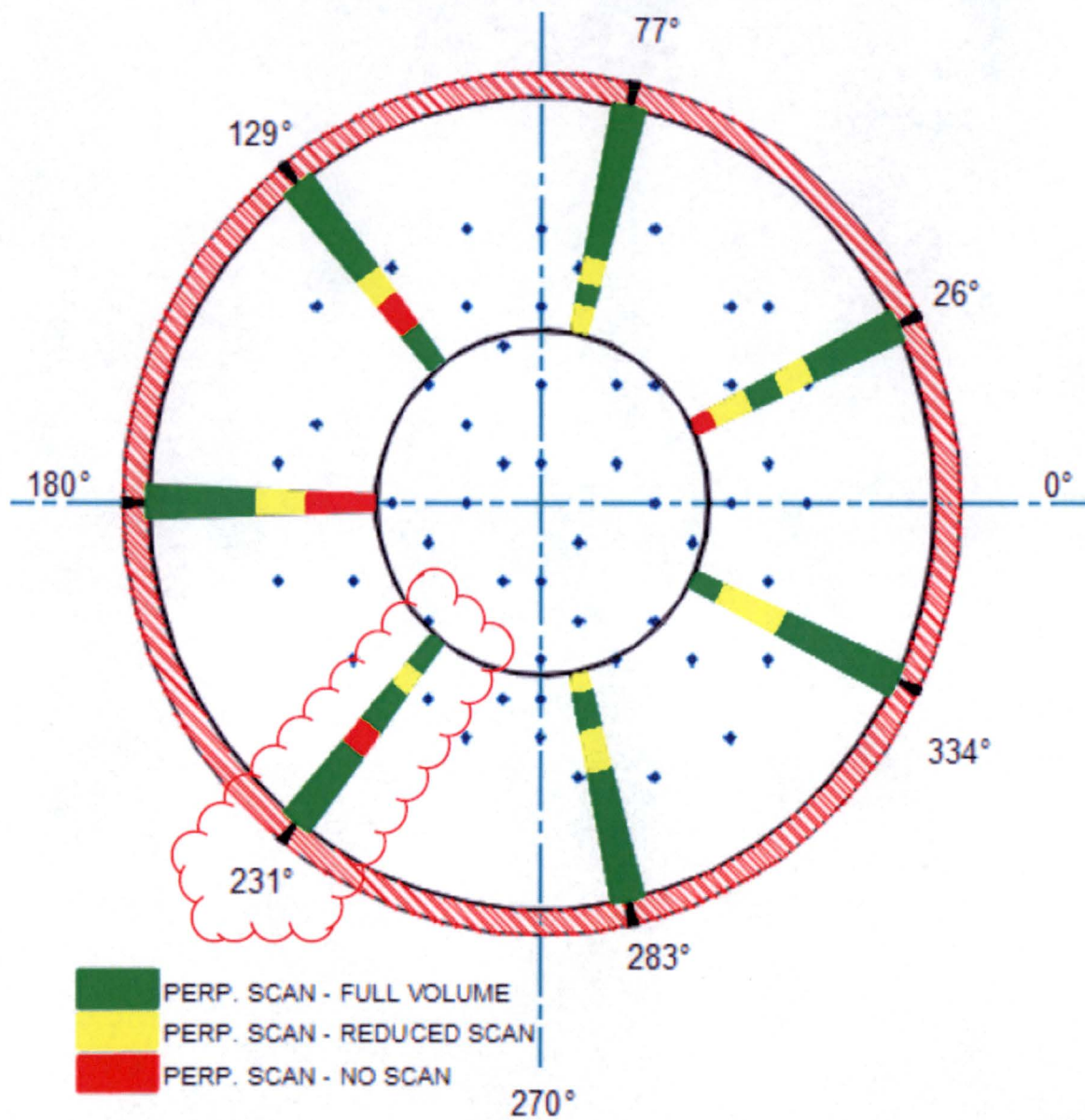
**1.32 Weld 2-LHM-05 – RPV Lower Head Meridional Weld at 231 Degrees**



**Figure 1.32-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**



**1.32 Weld 2-LHM-05 – RPV Lower Head Meridional Weld at 231 Degrees**



**Figure 1.32-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**

### **1.33 Weld 2-LHM-06– RPV Lower Head Meridional Weld at 283 Degrees**

Weld 2-LHM-06 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-043. No previous ISI UT data was identified for review.

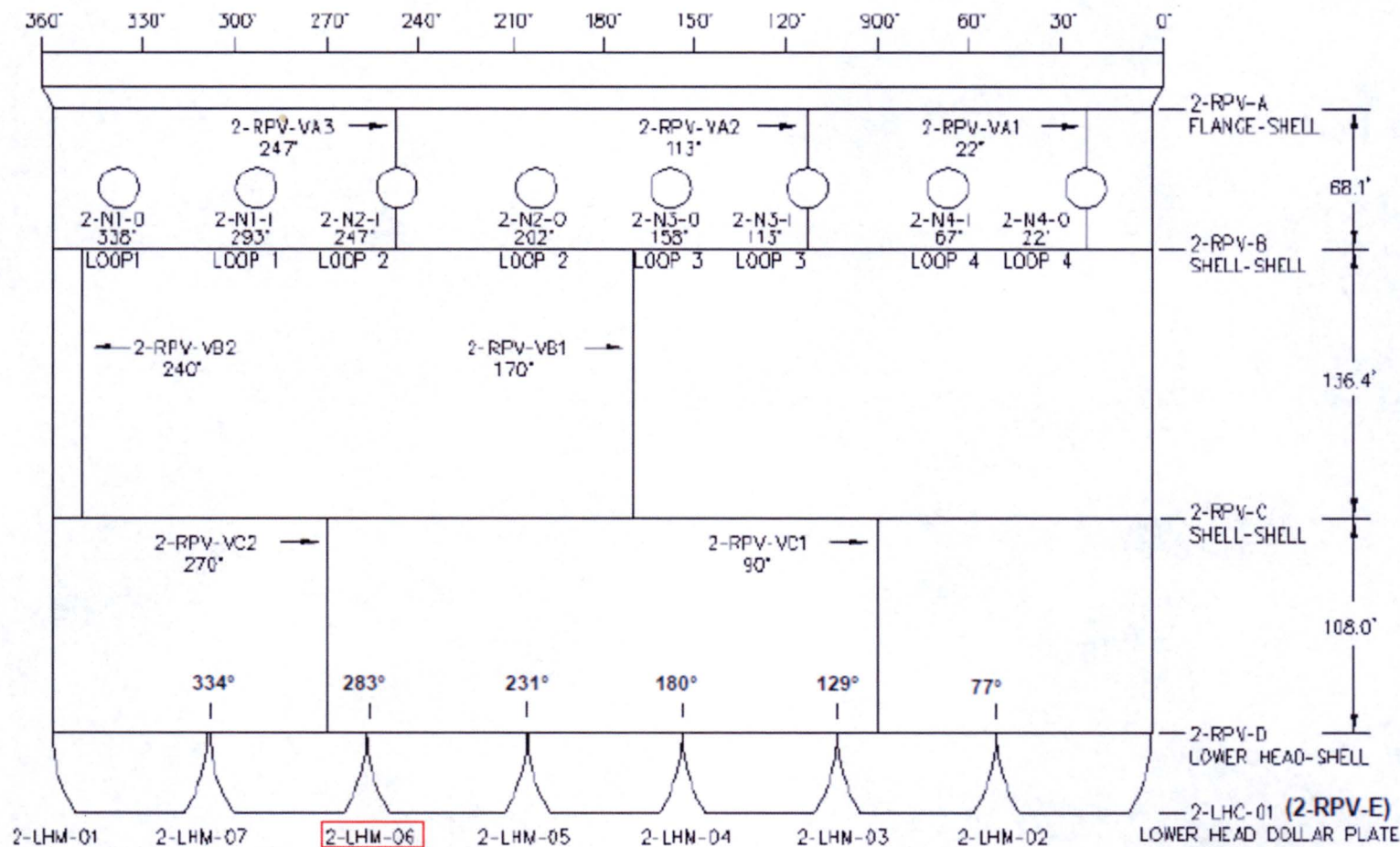
The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **83.69%** as described in Table 1.33-1 and as shown in Figures 1.33-2, and 1.33-3.

No recordable indications were detected during this examination.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-06.

### 1.33 Weld 2-LHM-06- RPV Lower Head Meridional Weld at 283 Degrees



D. C. COOK, UNIT 2

FIG. A-1 REACTOR PRESSURE VESSEL LAYOUT

Figure 1.33-1 Weld 2-LHM-06 (Extracted from Reference DRAWING 2A-1)

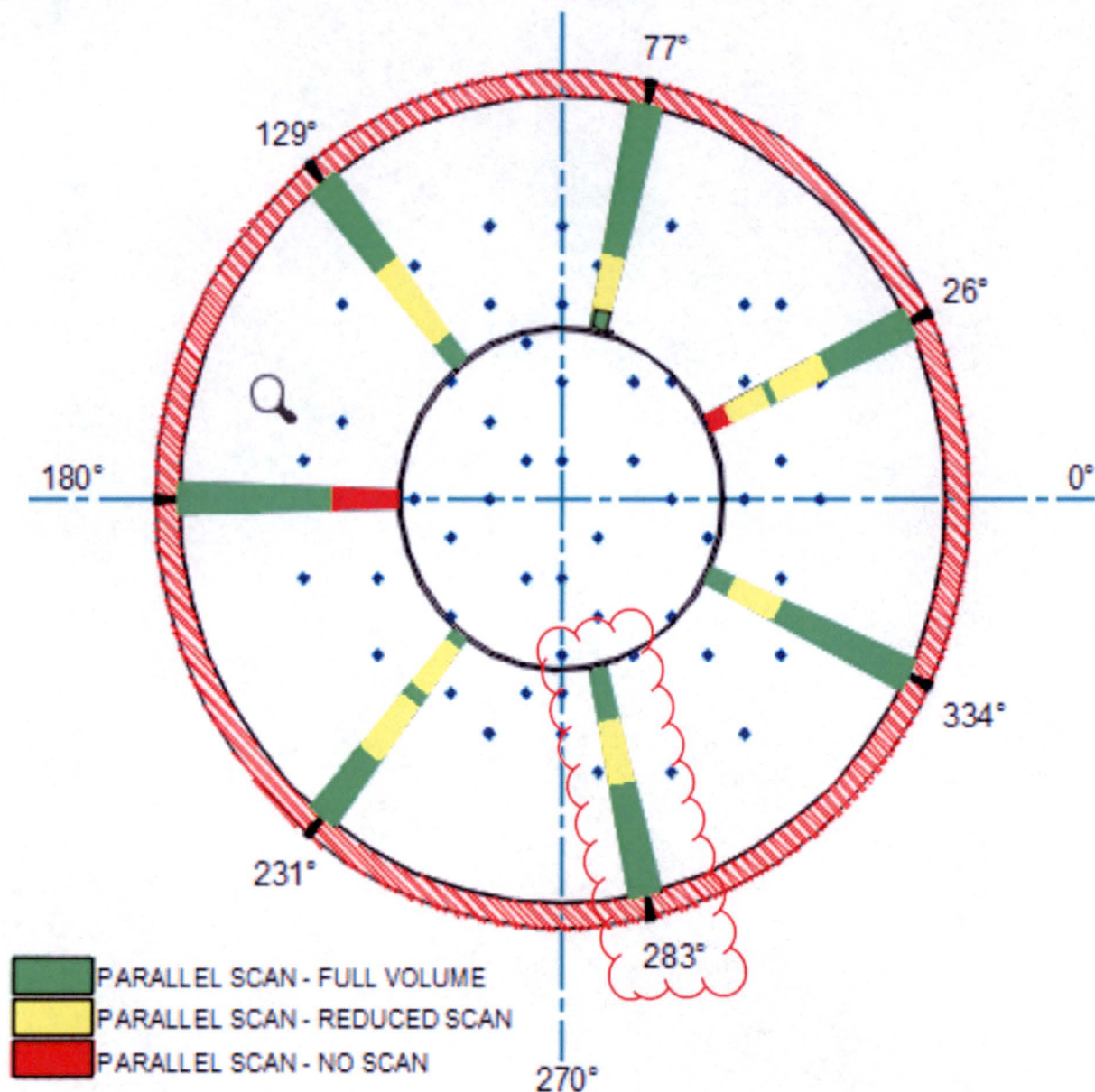


**1.33 Weld 2-LHM-06– RPV Lower Head Meridional Weld at 283 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	34.8%	14.09%	33.36%	82.26%
UP/DN	36.02%	14.59%	34.53%	85.13%
UT Coverage = 83.69%	Limitations: Bottom Mounted Instrumentation Tubes			

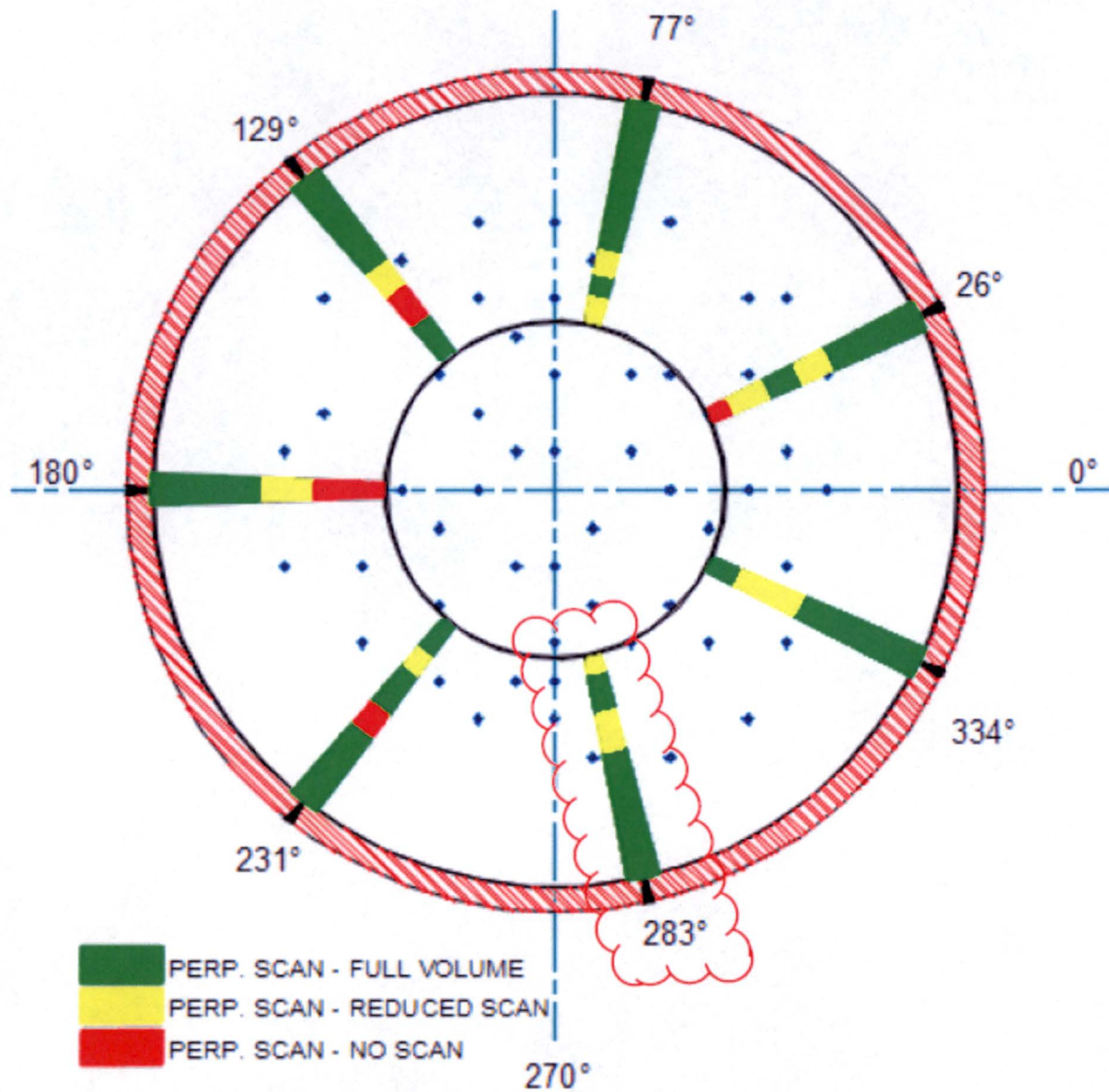
**Table 1.33-1 Weld 2-LHM-06 Coverage Calculation Results**

**1.33 Weld 2-LHM-06– RPV Lower Head Meridional Weld at 283 Degrees**



**Figure 1.33-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**

**1.33 Weld 2-LHM-06– RPV Lower Head Meridional Weld at 283 Degrees**



**Figure 1.33-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**



### **1.34 Weld 2-LHM-07 – RPV Lower Head Meridional Weld at 334 Degrees**

Weld 2-LHM-07 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-044. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-3. The corresponding CRV as shown on that Figure is E-F-G-H. The UT examination was limited due to Bottom Mounted Instrumentation Tubes. The examination resulted in total UT coverage of **84.46%** as described in Table 1.34-1 and as shown in Figures 1.34-2 and 1.34-3.

No recordable indications were detected during this examination.

Section XI Appendix VIII, Supplements 4 and 6 were used for this UT examination. The examination satisfied the requirements of Appendix VIII with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

**Note:** No laminations were reported on the RPV Head that could interfere with the angle beam examinations performed on weld 2-LHM-07.

### 1.34 Weld 2-LHM-07 – RPV Lower Head Meridional Weld at 334 Degrees

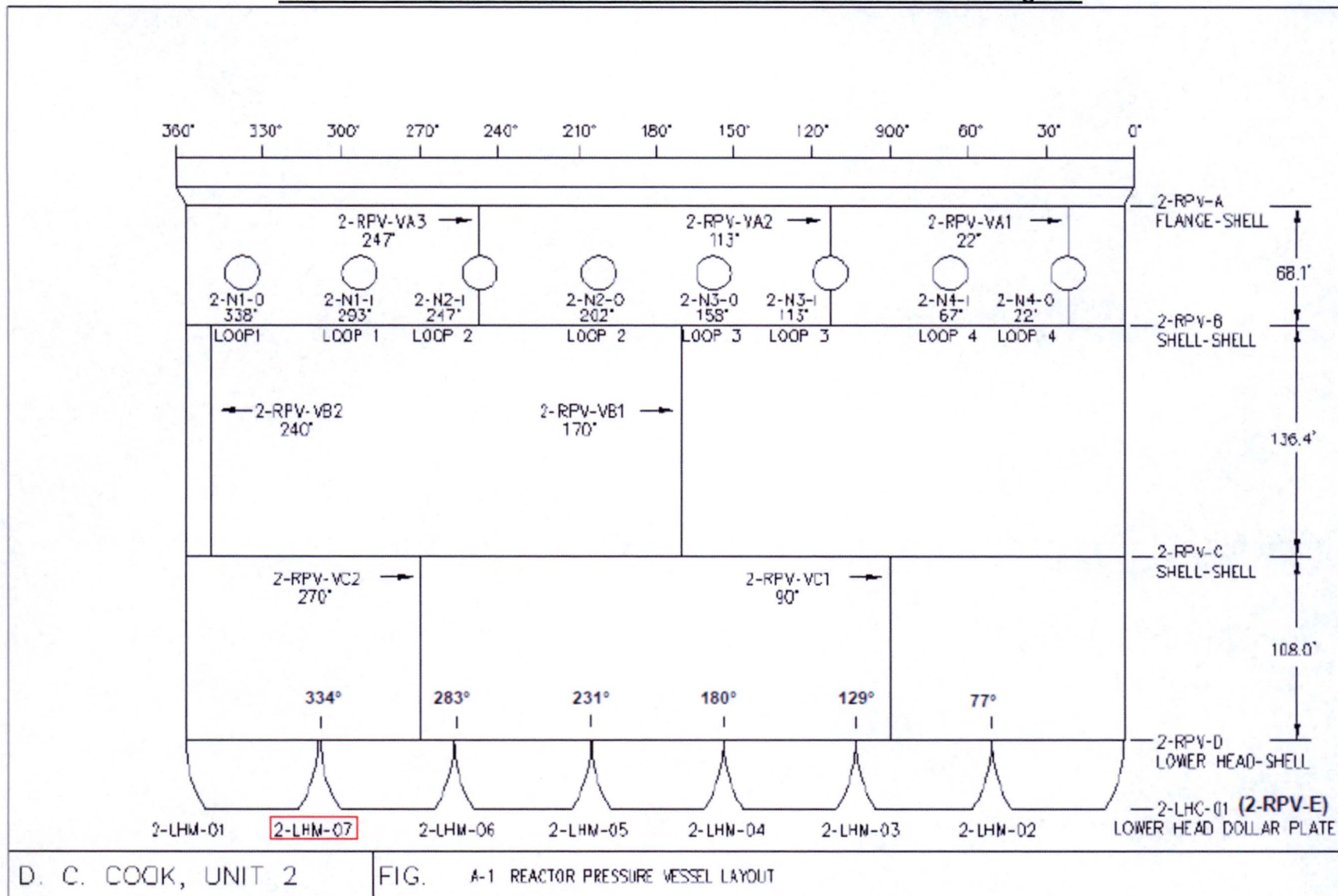


Figure 1.34-1 Weld 2-LHM-07 (Extracted from Reference DRAWING 2A-1)

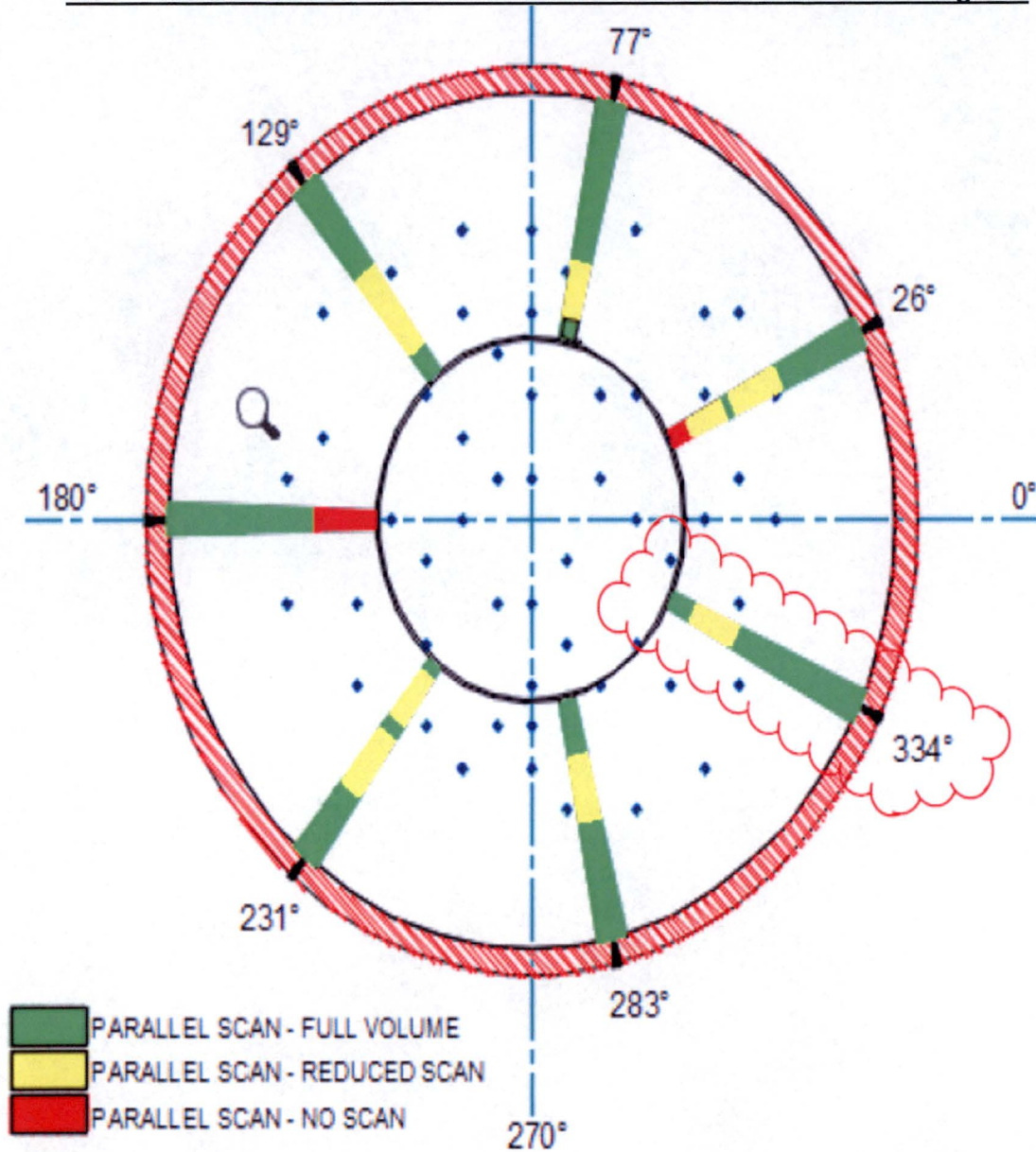
**1.34 Weld 2-LHM-07 – RPV Lower Head Meridional Weld at 334 Degrees**

Beam Direction	45° Dual	45° Single	46° Shear	Total
	Exam Volume	Exam Volume	Exam Volume	
CCW/CW	34.7%	14.05%	33.26%	82.0%
UP/DN	36.77%	14.89%	35.25%	86.92%
UT Coverage = 84.46%	Limitations: Bottom Mounted Instrumentation Tubes			

**Table 1.34-1 Weld 2-LHM-07 Coverage Calculation Results**

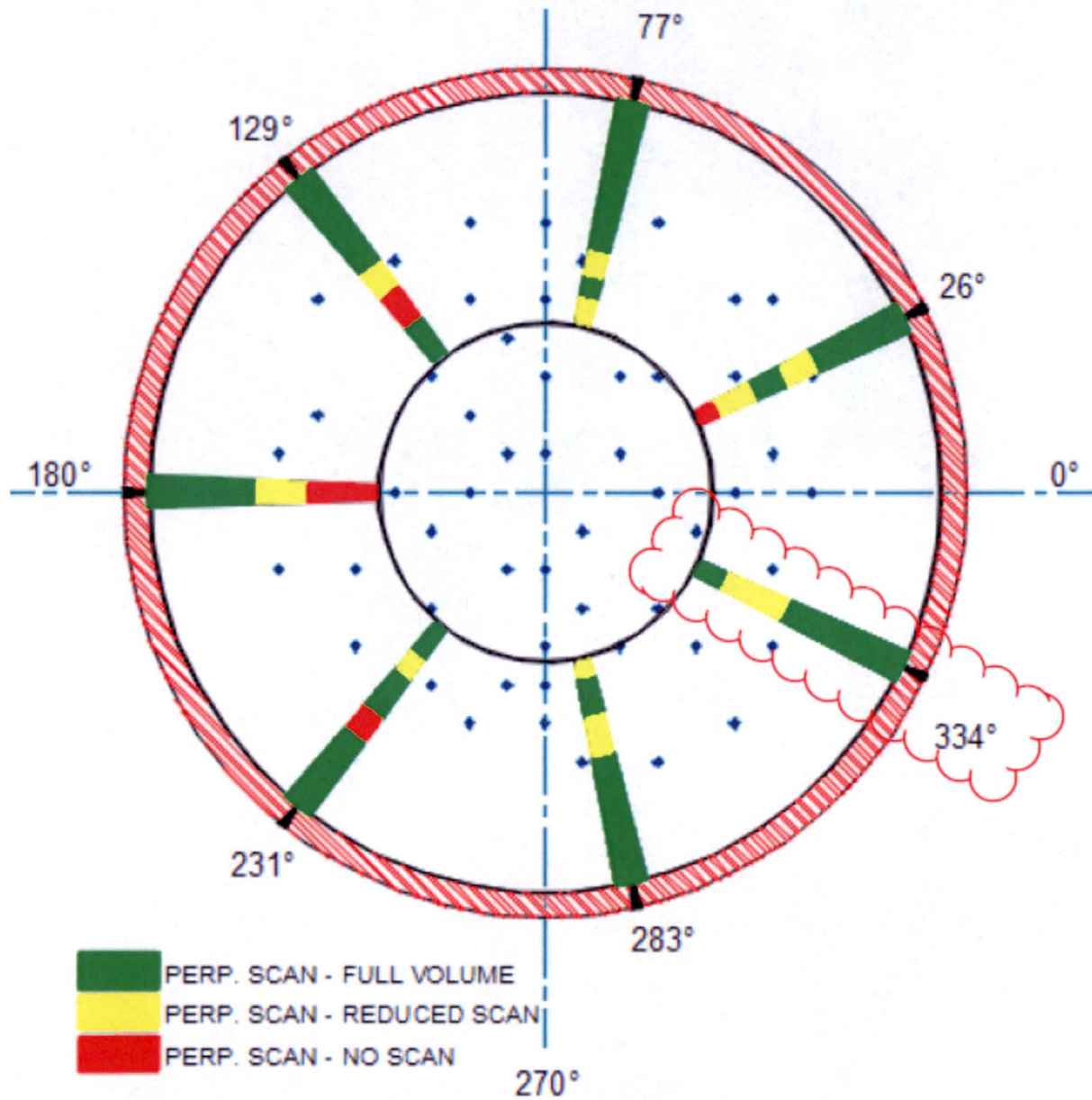


**1.34 Weld 2-LHM-07 – RPV Lower Head Meridional Weld at 334 Degrees**



**Figure 1.34-2 Parallel scan limitation: Bottom Mounted Instrumentation Tubes**

**1.34 Weld 2-LHM-07 – RPV Lower Head Meridional Weld at 334 Degrees**



**Figure 1.34-3 Perpendicular scan limitation: Bottom Mounted Instrumentation Tubes**

### **1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection**

Weld 2-SI-58-23 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-014. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50%** as described in Figures 1.35-2, 1.35-3, 1.35-4, 1.35-5, and Table 1.35-1. A photograph of weld 2-SI-58-23 is provided in Figure 1.35-6.

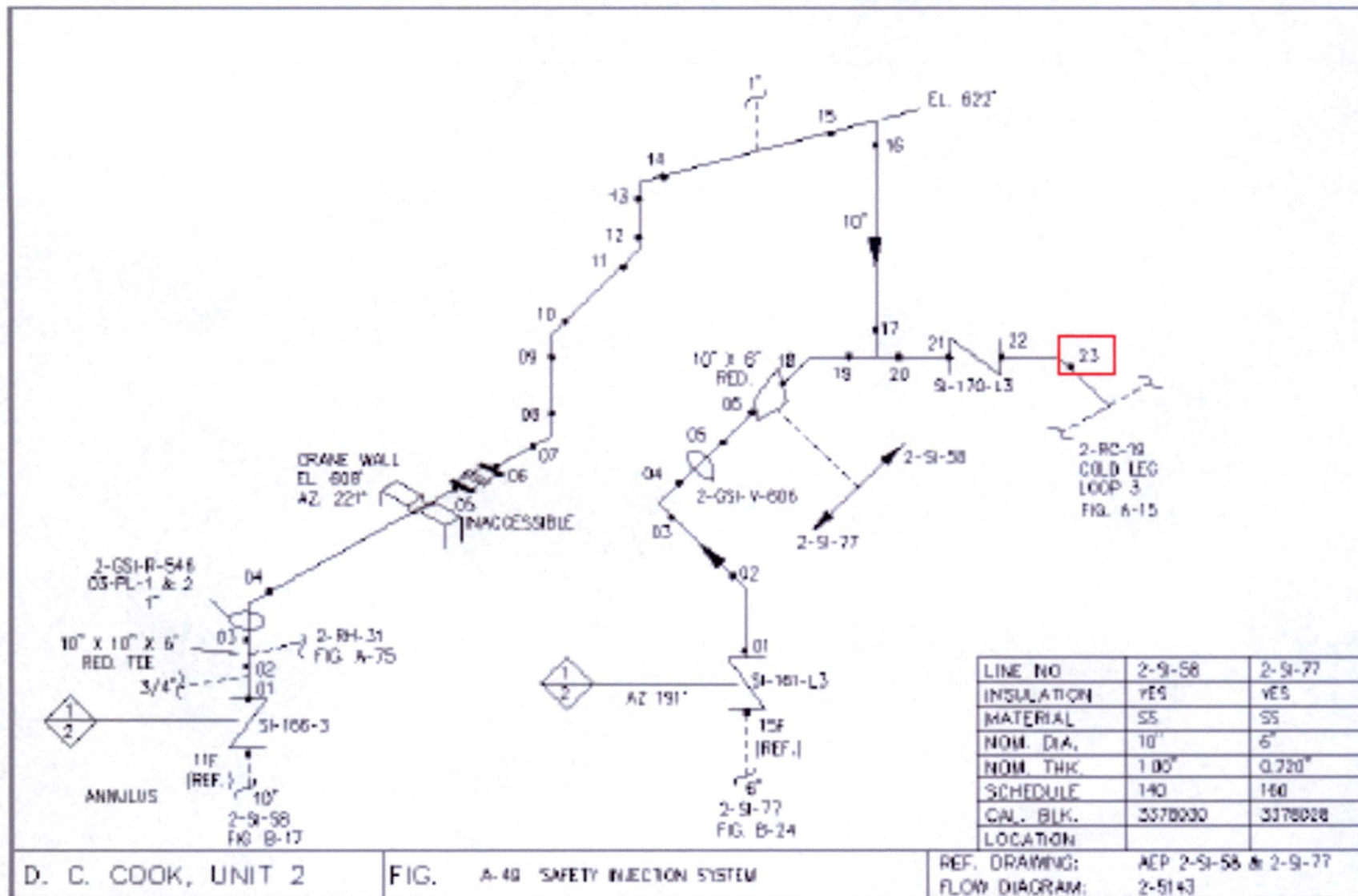
No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



### 1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection



**Figure 1.35-1 Weld 2-SI-58-23 (Extracted from Reference DRAWING 2A-49)**

1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection

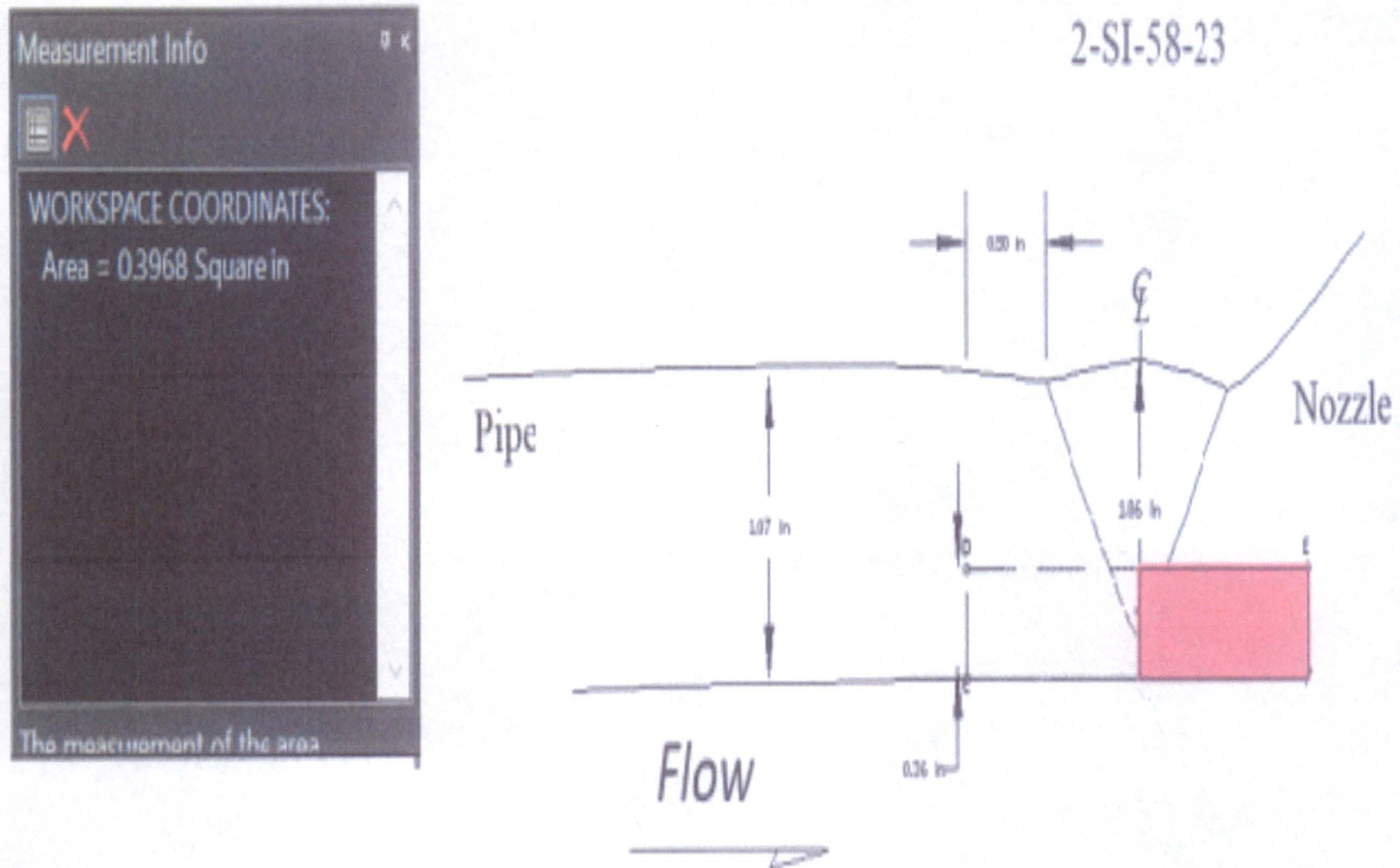
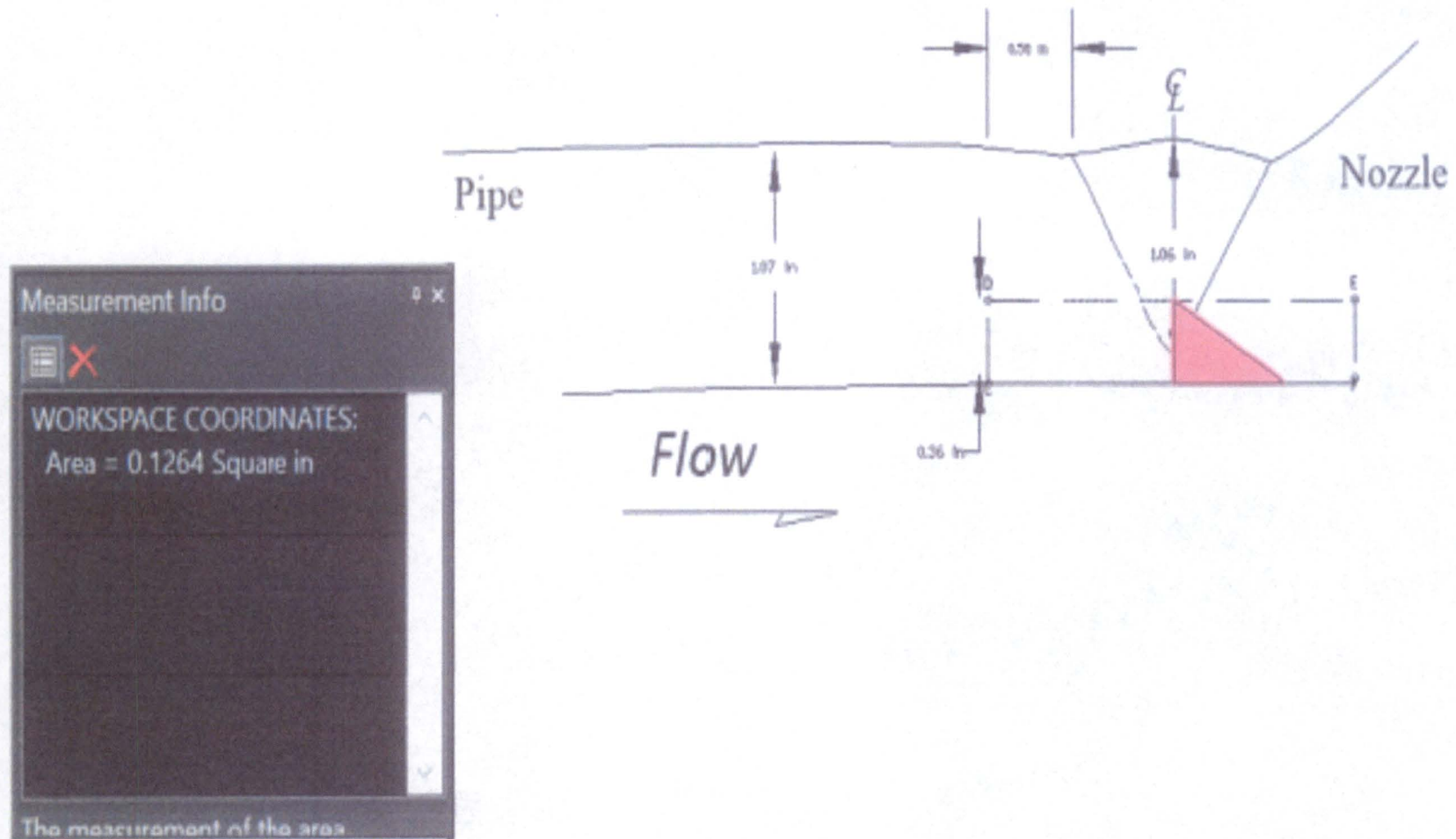


Figure 1.35-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required

**1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection**

2-SI-58-23



**Figure 1.35-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**



**1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection**

2-SI-58-23

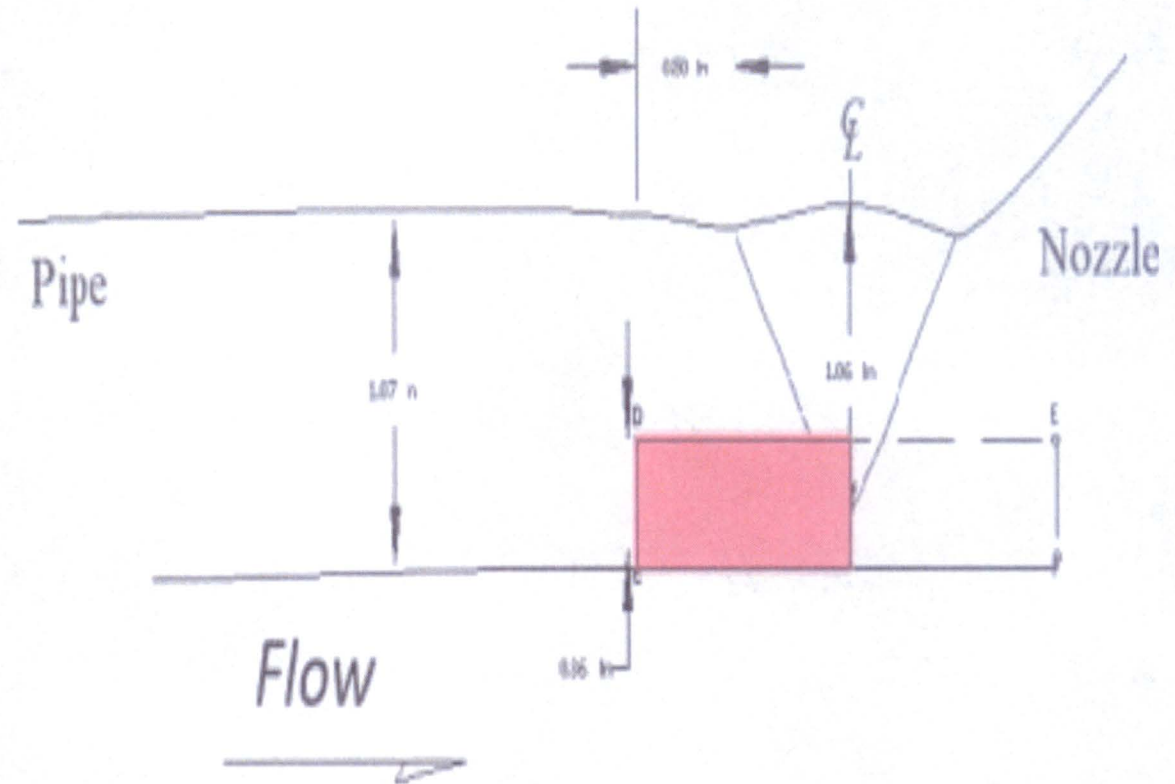


Figure 1.35-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required

1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection

2-SI-58-23

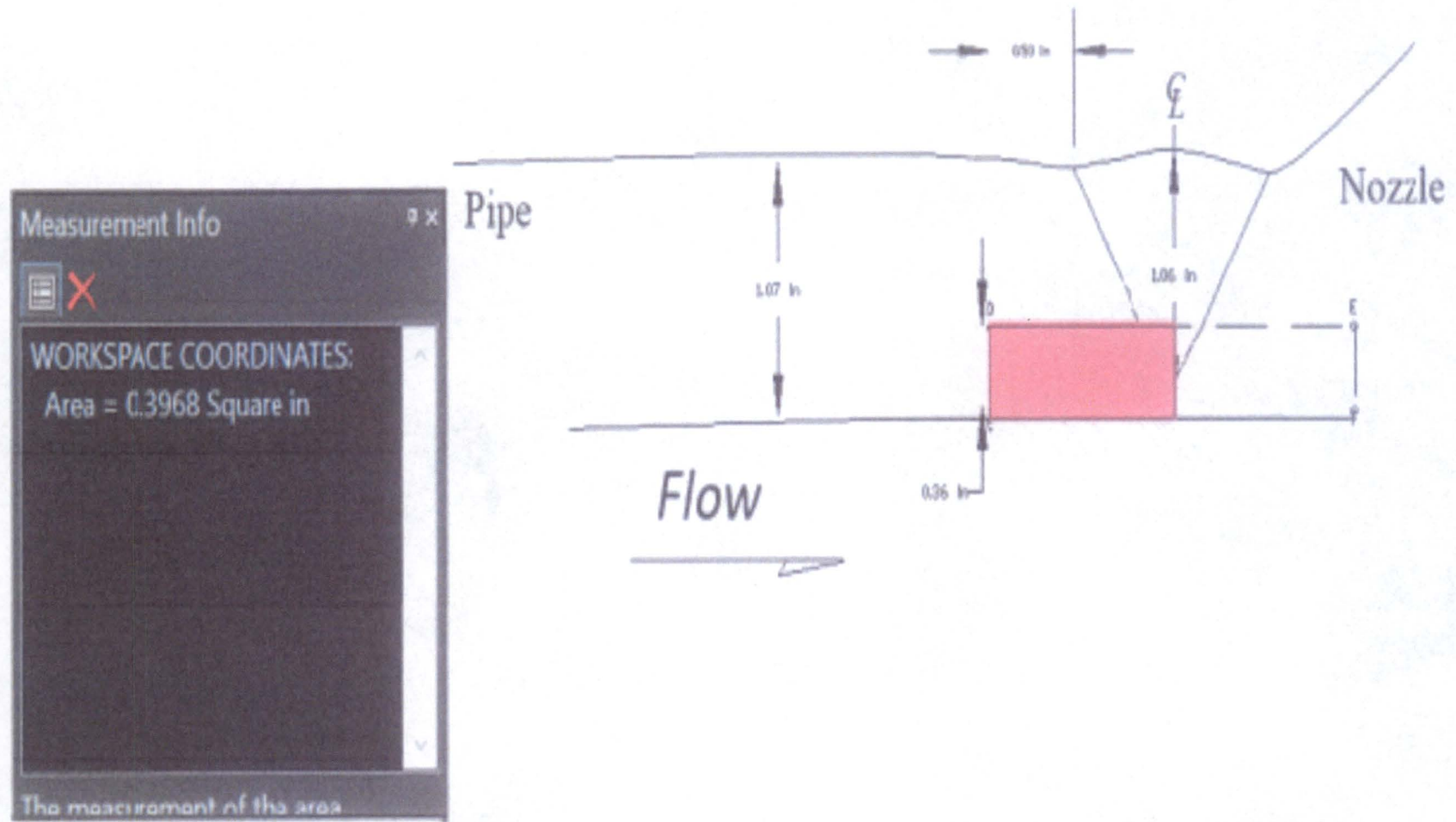


Figure 1.35-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved

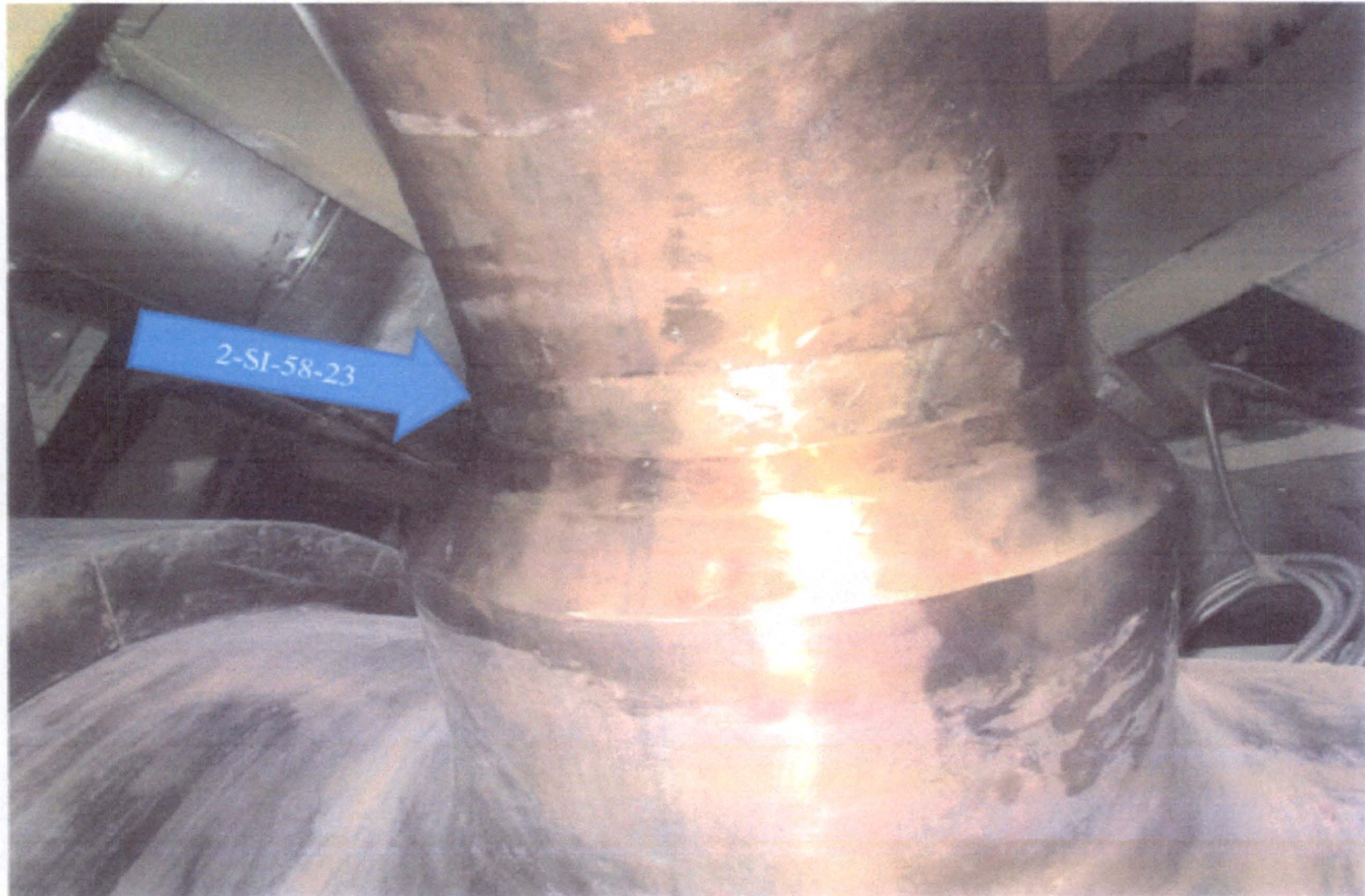
**1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection**

<b>Examination Performed</b>	<b>Length of Exam</b>	<b>Required Exam Area</b>	<b>Achieved Exam Area</b>	<b>Coverage Achieved</b>
<b>Upstream Axial</b>	<b>34.0"</b>	<b>0.3968 in<sup>2</sup></b>	<b>0.3968 in<sup>2</sup></b>	<b>100%</b>
<b>Upstream Axial for Downstream Volume</b>	<b>34.0"</b>	<b>0.3968 in<sup>2</sup></b>	<b>0.1264 in<sup>2</sup></b>	<b>31.8% (Note 1)</b>
<b>Clockwise</b>	<b>34.0"</b>	<b>0.7936 in<sup>2</sup></b>	<b>0.3968 in<sup>2</sup></b>	<b>50%</b>
<b>Counterclockwise</b>	<b>34.0"</b>	<b>0.7936 in<sup>2</sup></b>	<b>0.3968 in<sup>2</sup></b>	<b>50%</b>
<b>Code Required Coverage Achieved</b>				<b>50%</b>
<b>Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume</b>				

**Table 1.35-1 Weld 2-SI-58-23 Coverage Calculation Results**



**1.35 Weld 2-SI-58-23 Safety Injection Elbow to Branch Connection**



**Figure 1.35-6 Weld 2-SI-58-23 Component Photograph**

### **1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**

Weld 2-SI-59-24 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-015. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the valve. The examination resulted in total UT coverage of **50%** as described in Figures 1.36-2, 1.36-3, 1.36-4, 1.36-5, and Table 1.36-1. A photograph of weld 2-SI-59-24 is provided in Figure 1.36-6.

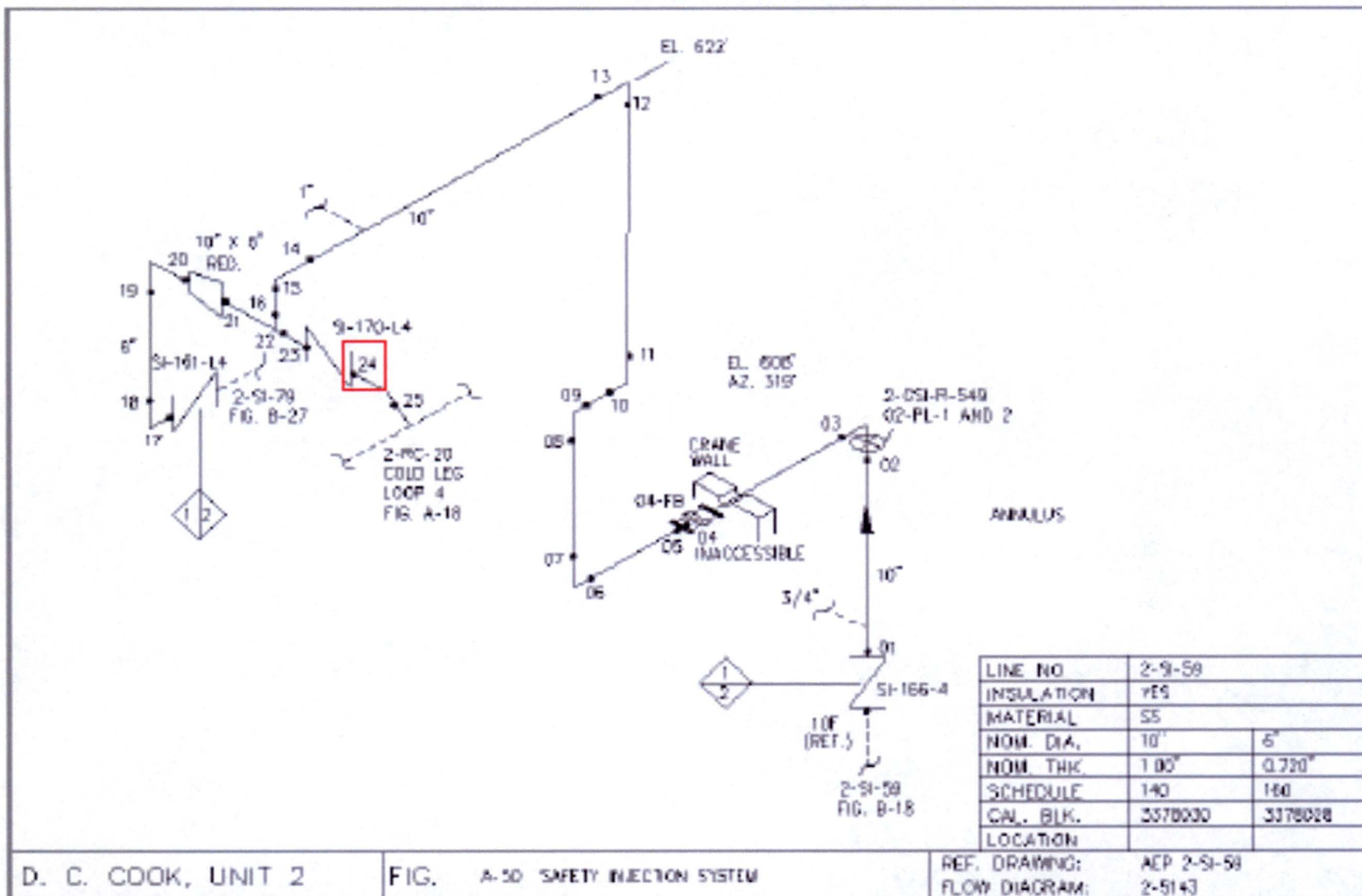
No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



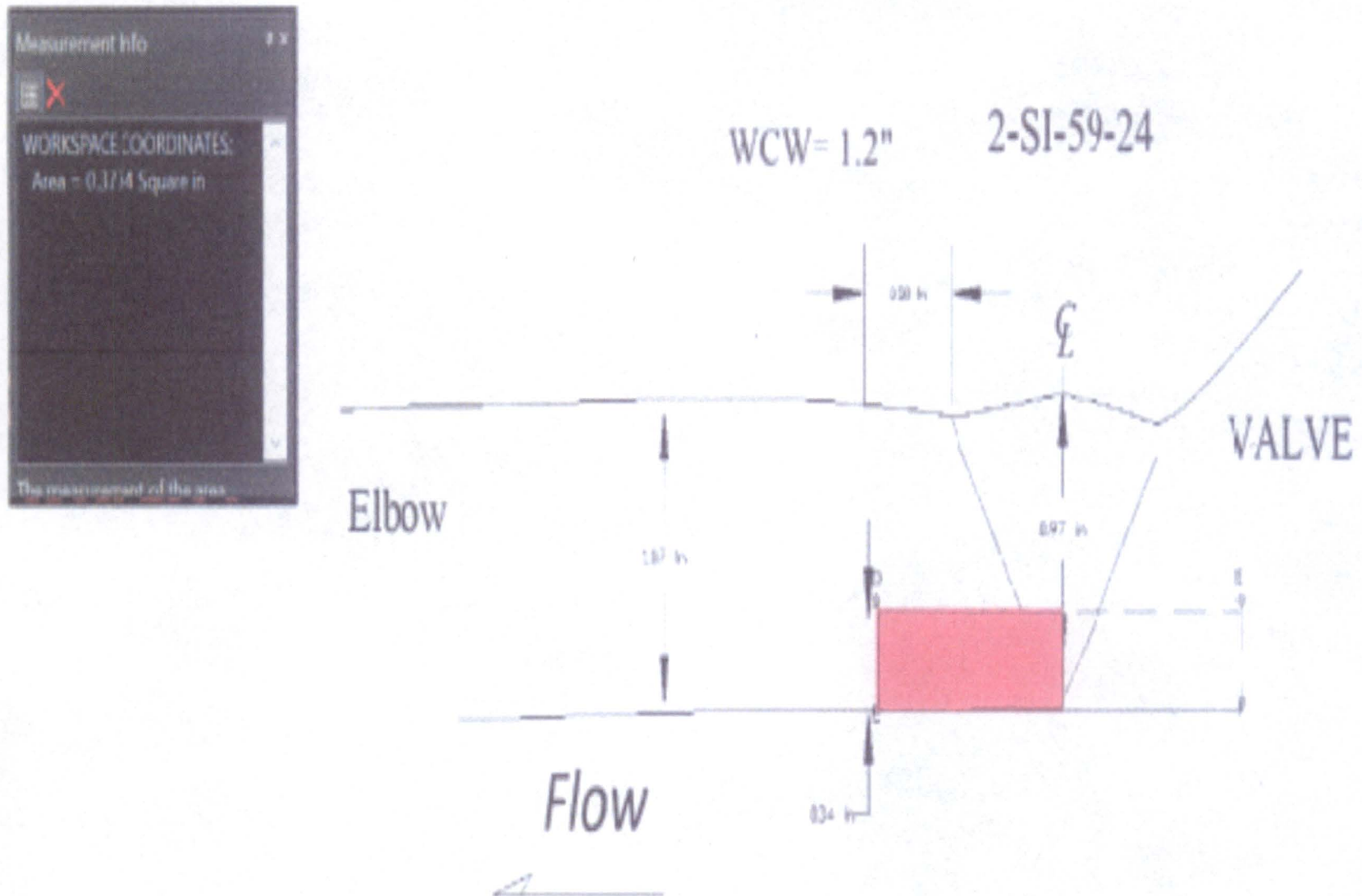
### 1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow



**Figure 1.36-1 Weld 2-SI-59-24 (Extracted from Reference DRAWING 2A-50)**

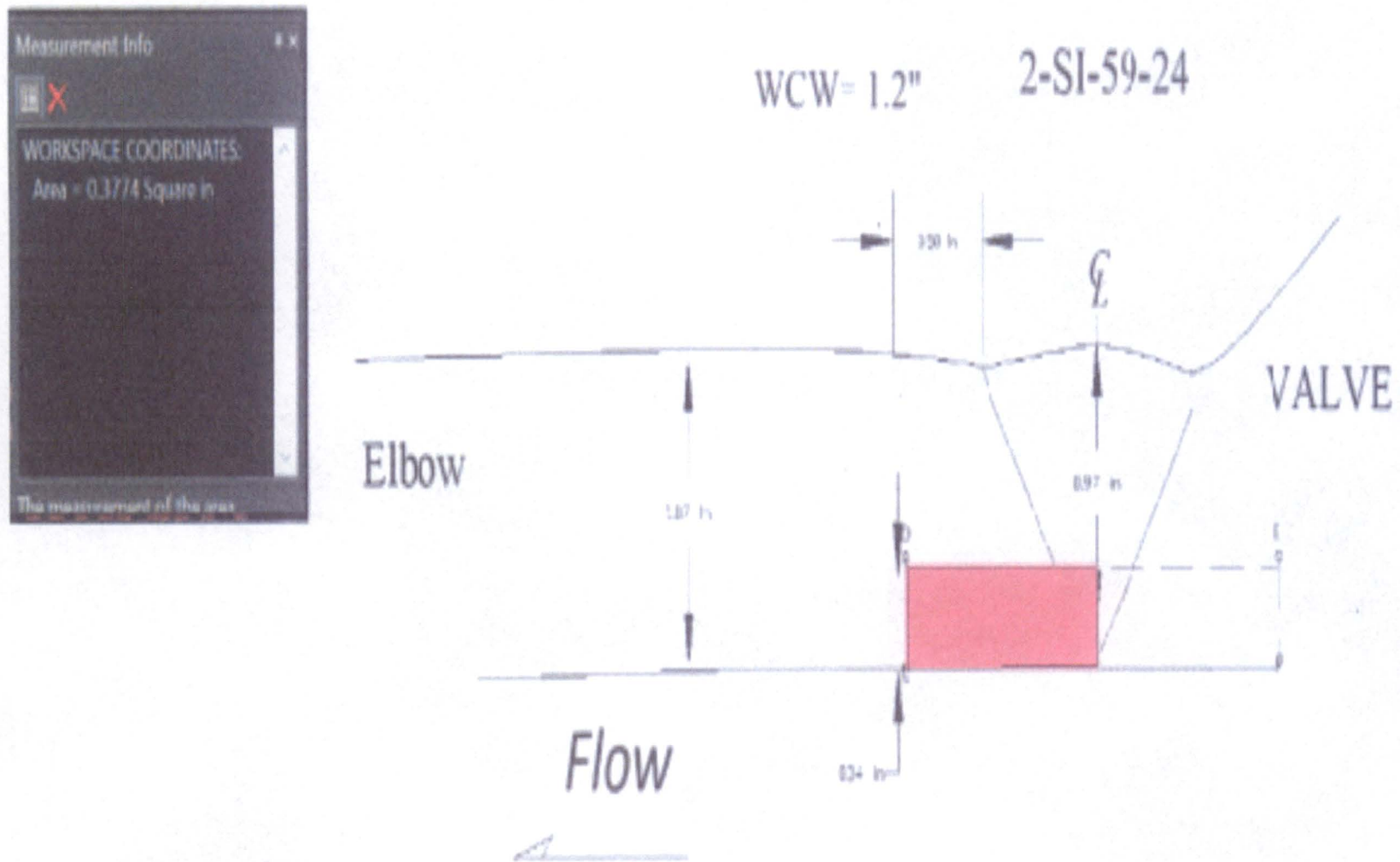


**1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**



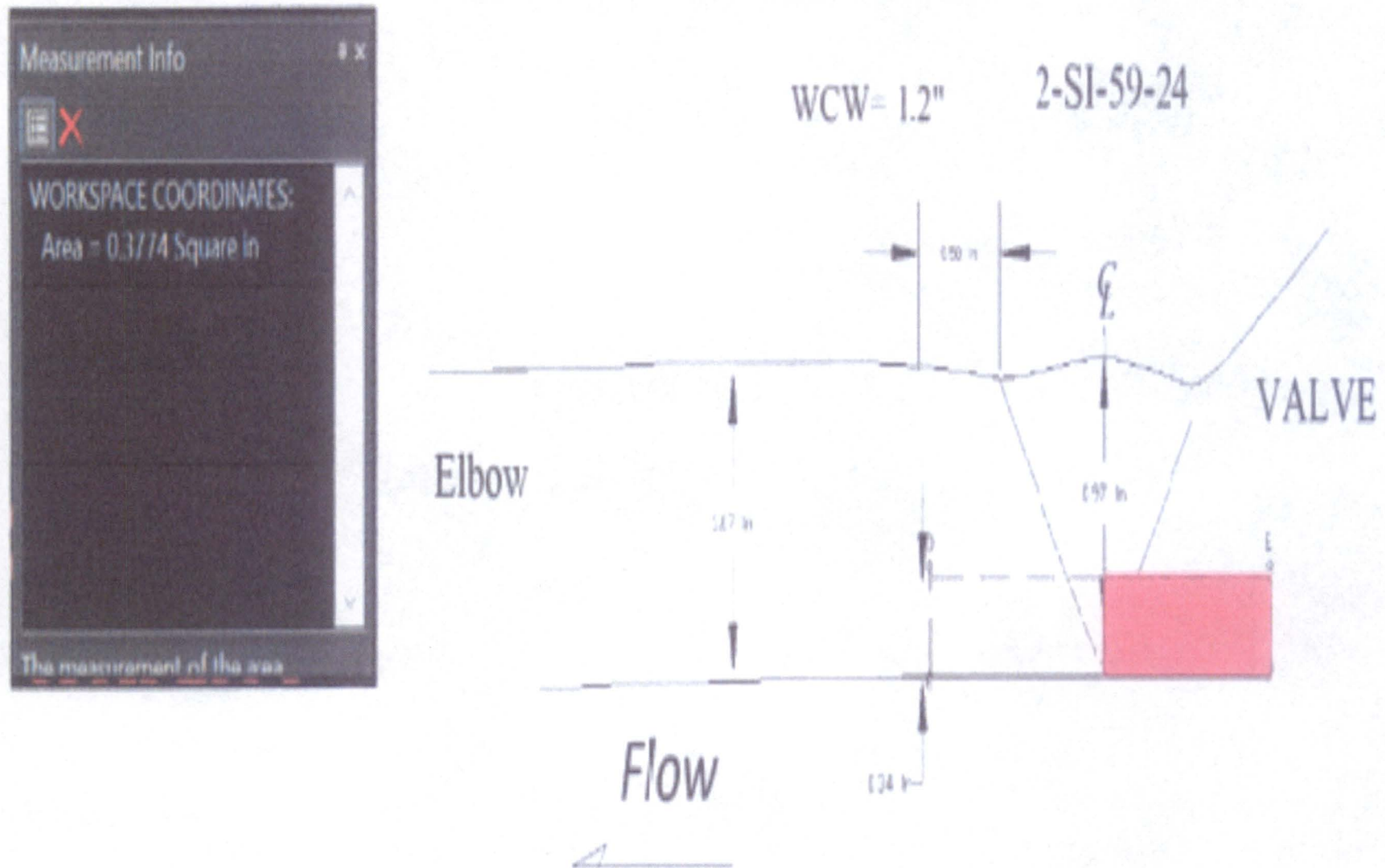
**Figure 1.36-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required**

**1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**



**Figure 1.36-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**

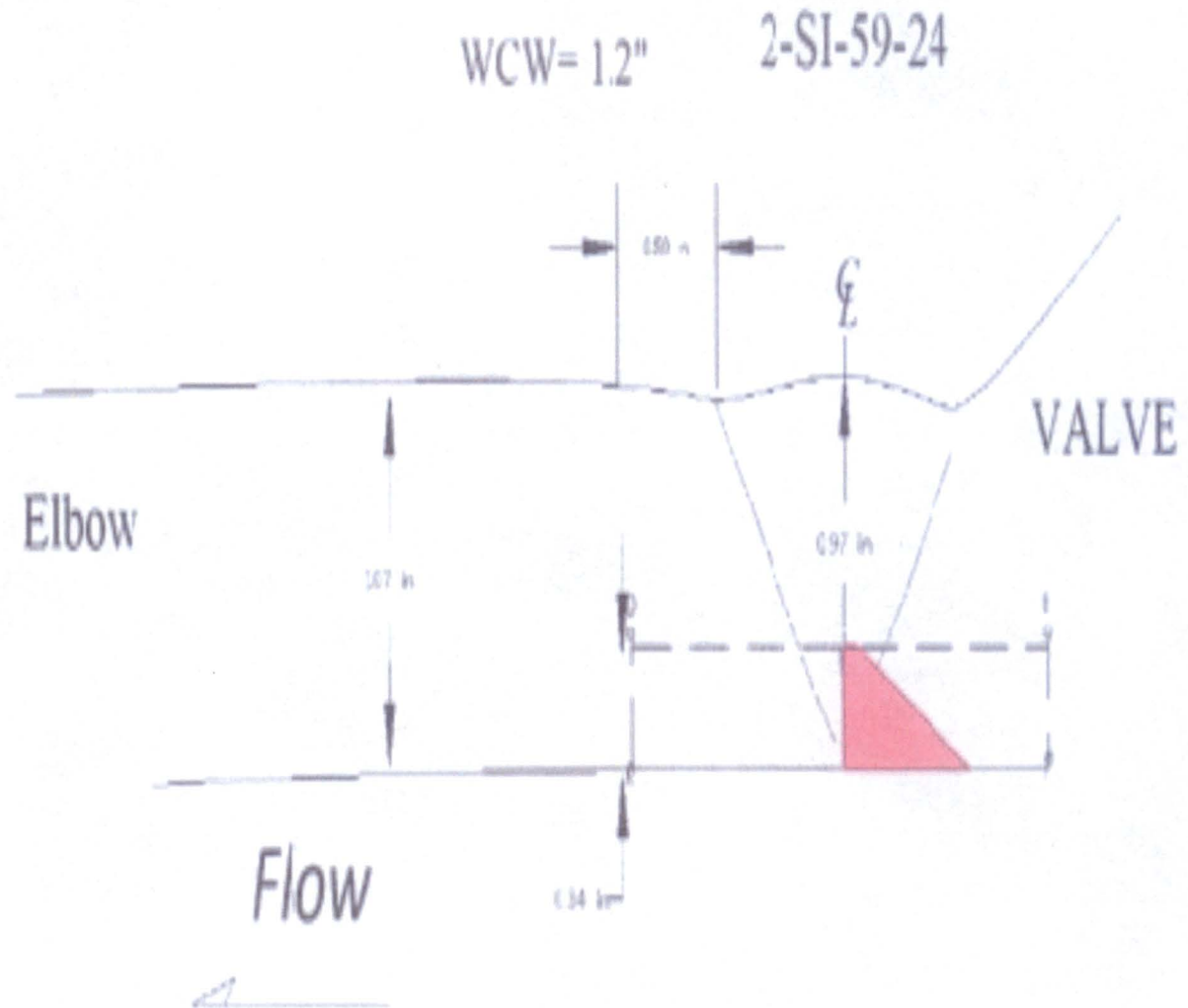
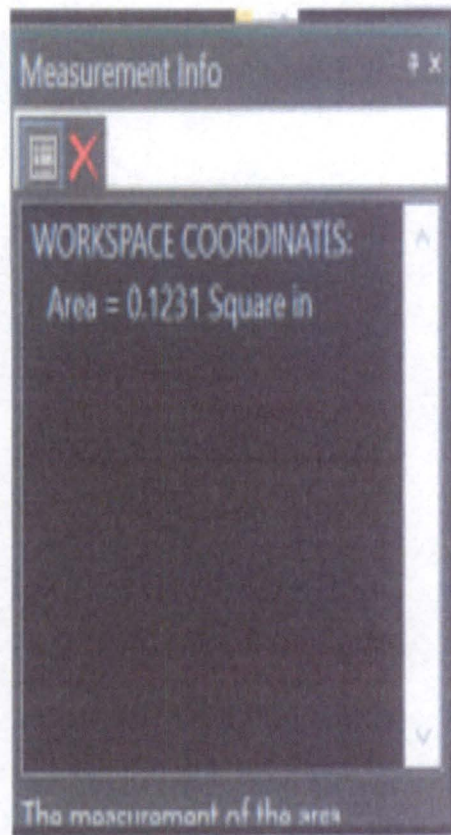
**1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**



**Figure 1.36-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required**



**1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**



**Figure 1.36-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**

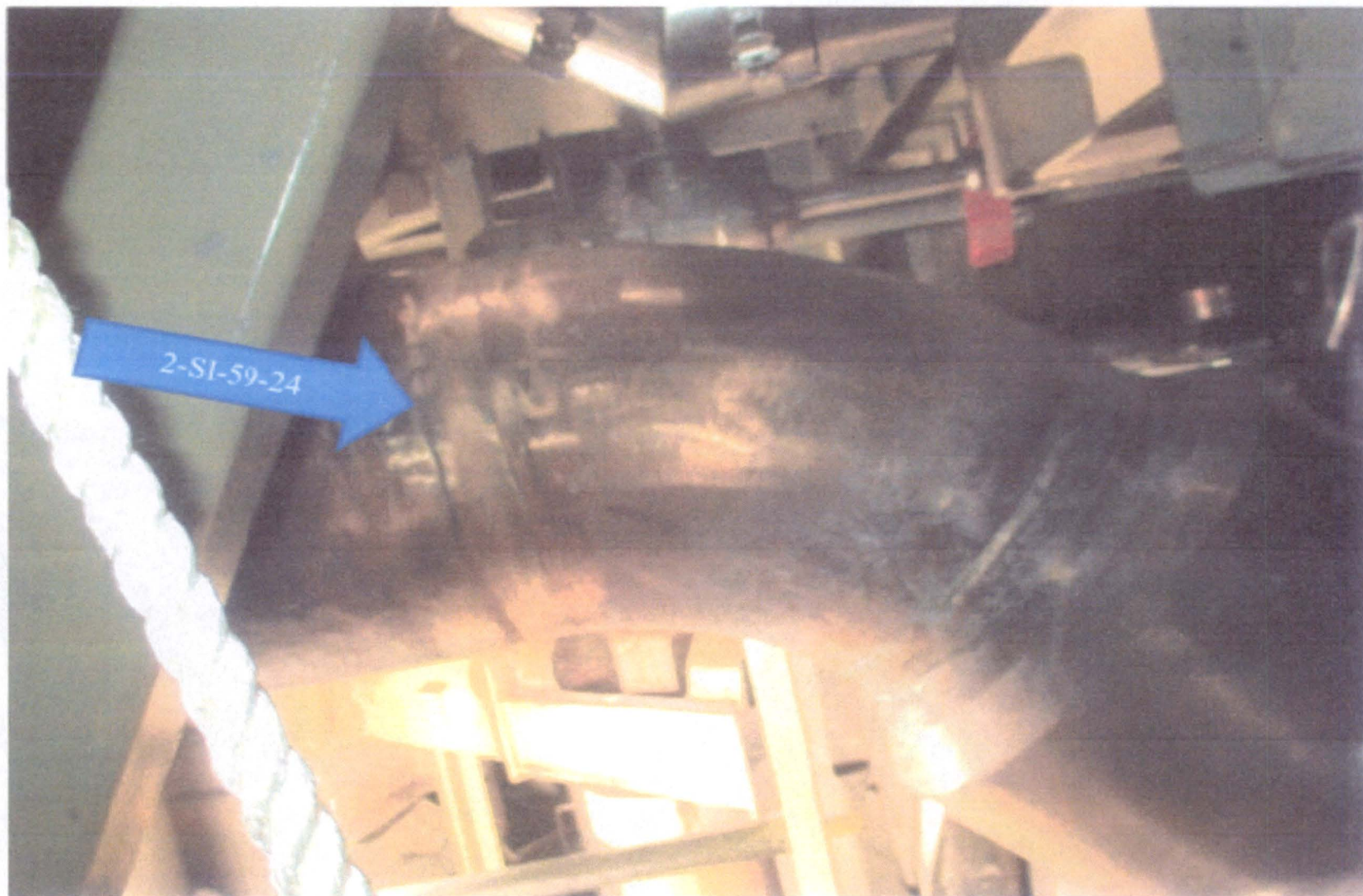
**1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	34.25"	0.3774 in <sup>2</sup>	0.3774 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	34.25"	0.3774 in <sup>2</sup>	0.1231 in <sup>2</sup>	32.6% (Note 1)
Clockwise	34.25"	0.7548 in <sup>2</sup>	0.3774 in <sup>2</sup>	50%
Counterclockwise	34.25"	0.7548 in <sup>2</sup>	0.3774 in <sup>2</sup>	50%
Code Required Coverage Achieved				50%
Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume				

**Table 1.36-1 Weld 2-SI-59-24 Coverage Calculation Results**



**1.36 Weld 2-SI-59-24 Safety Injection Valve to Elbow**



**Figure 1.36-6 Weld 2-SI-59-24 Component Photograph**



### **1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection**

Weld 2-SI-59-25 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-016. Previous ISI UT data was not documented as reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50%** as described in Figures 1.37-2, 1.37-3, 1.37-4, 1.37-5, and Table 1.37-1. A photograph of weld 2-SI-59-25 is provided in Figure 1.37-6.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

### 1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection

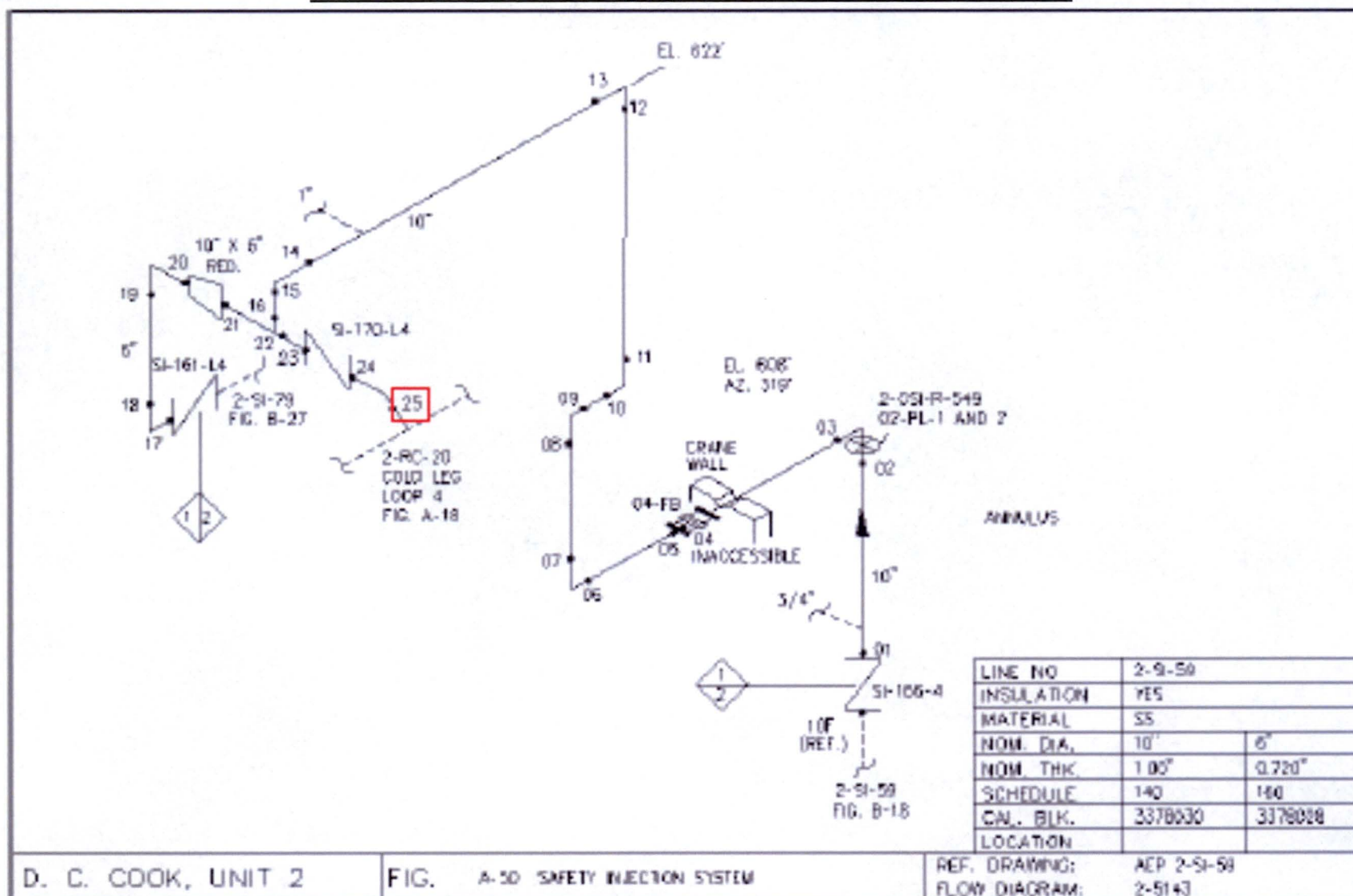
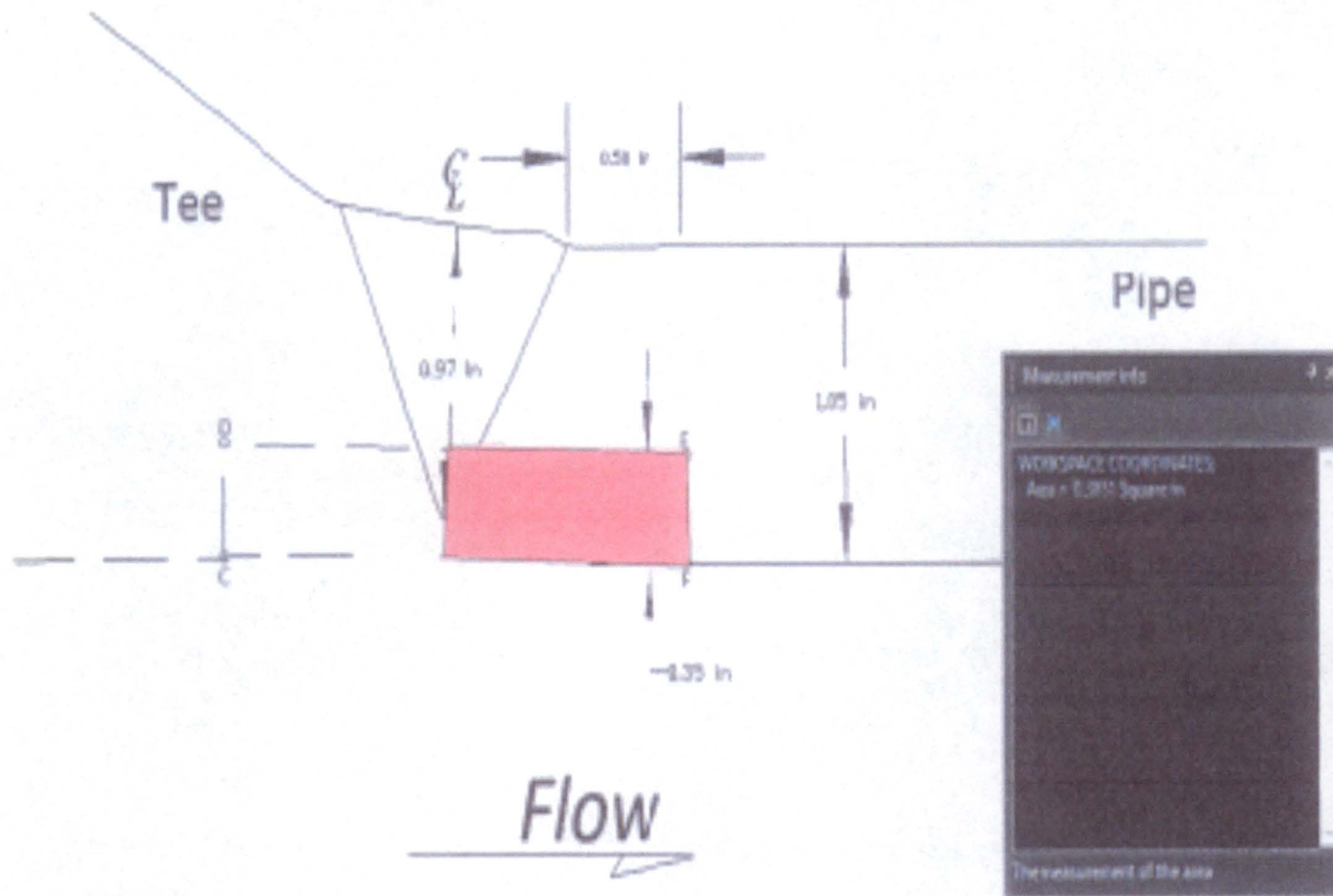


Figure 1.37-1 Weld 2-SI-59-25 (Extracted from Reference DRAWING 2A-50)

**1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection**



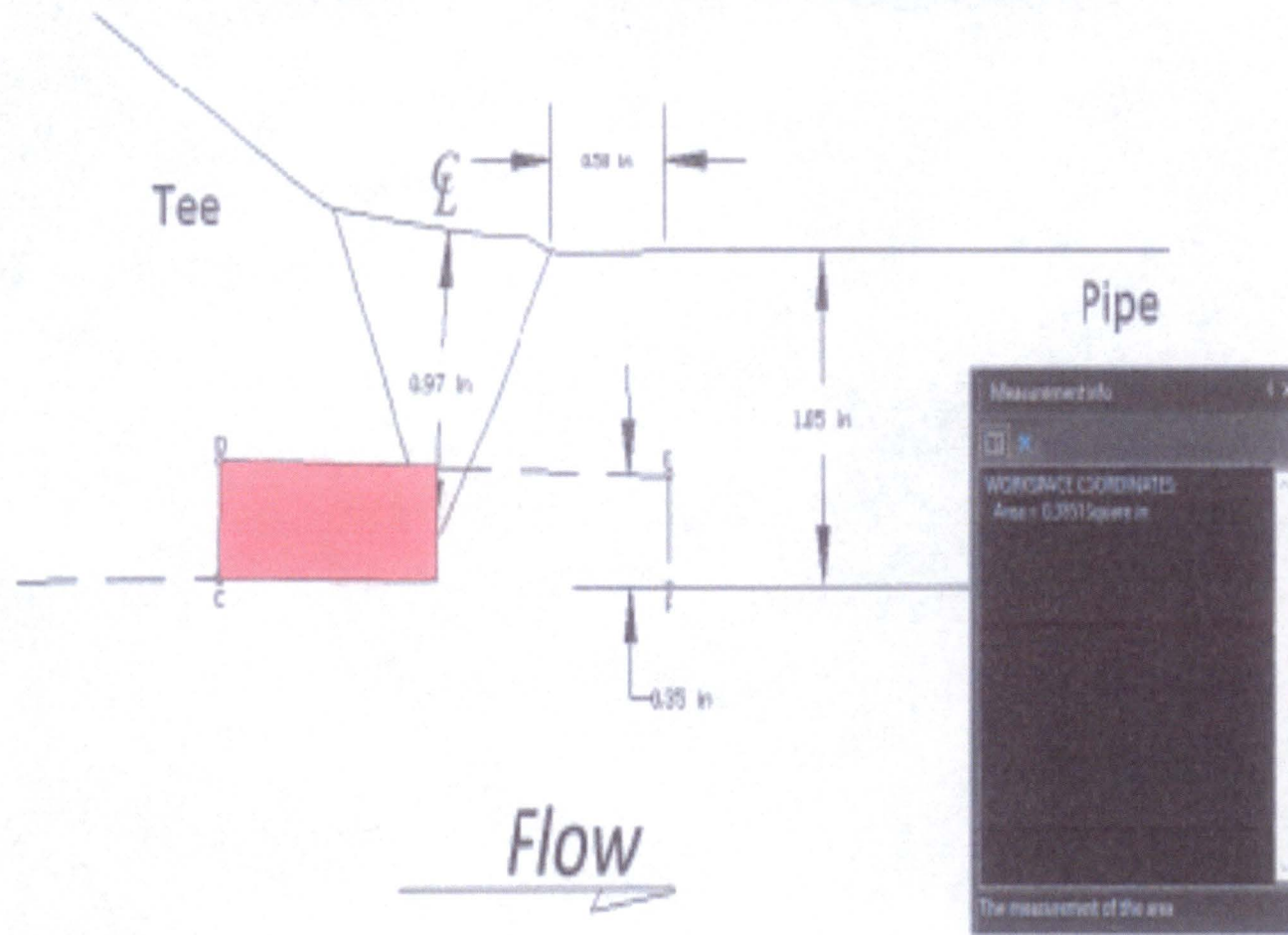
**Figure 1.37-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required**



The diagram shows a nozzle on the left and a pipe on the right. The nozzle has a vertical centerline with points B and C. A horizontal dashed line extends from point B to point E. The pipe has a horizontal centerline with points F and G. The distance between the horizontal centerlines of the nozzle and pipe is 1.05 in. The distance between the vertical centerlines of the nozzle and pipe is 0.56 in. The distance from the vertical centerline of the nozzle to the vertical centerline of the pipe is 0.97 in. The distance from the vertical centerline of the pipe to the vertical centerline of the nozzle is 0.35 in. The flow direction is indicated by an arrow labeled "Flow" pointing to the right.

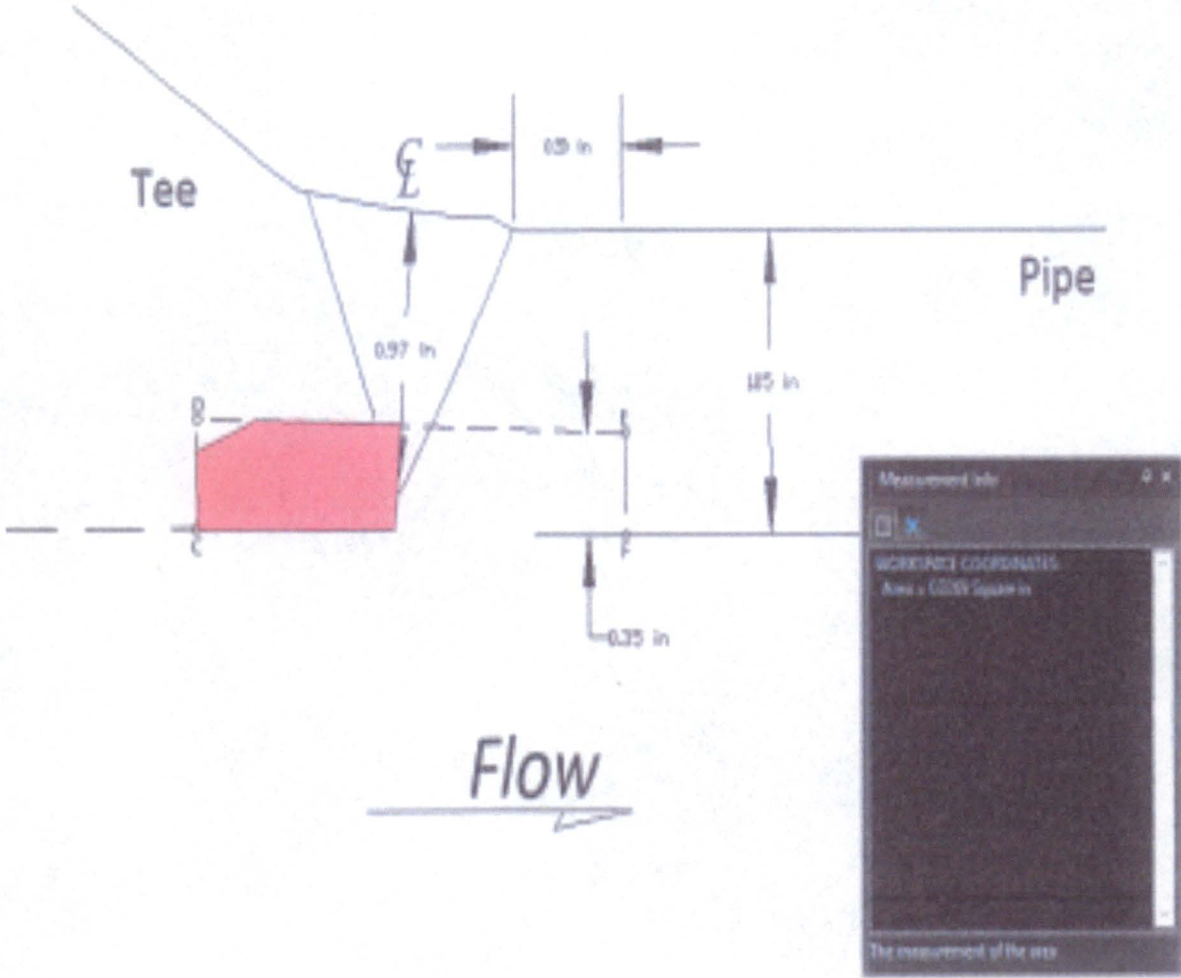
**Figure 1.37-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**

**1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection**



**Figure 1.37-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required**

### **1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection**



**Figure 1.37-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**

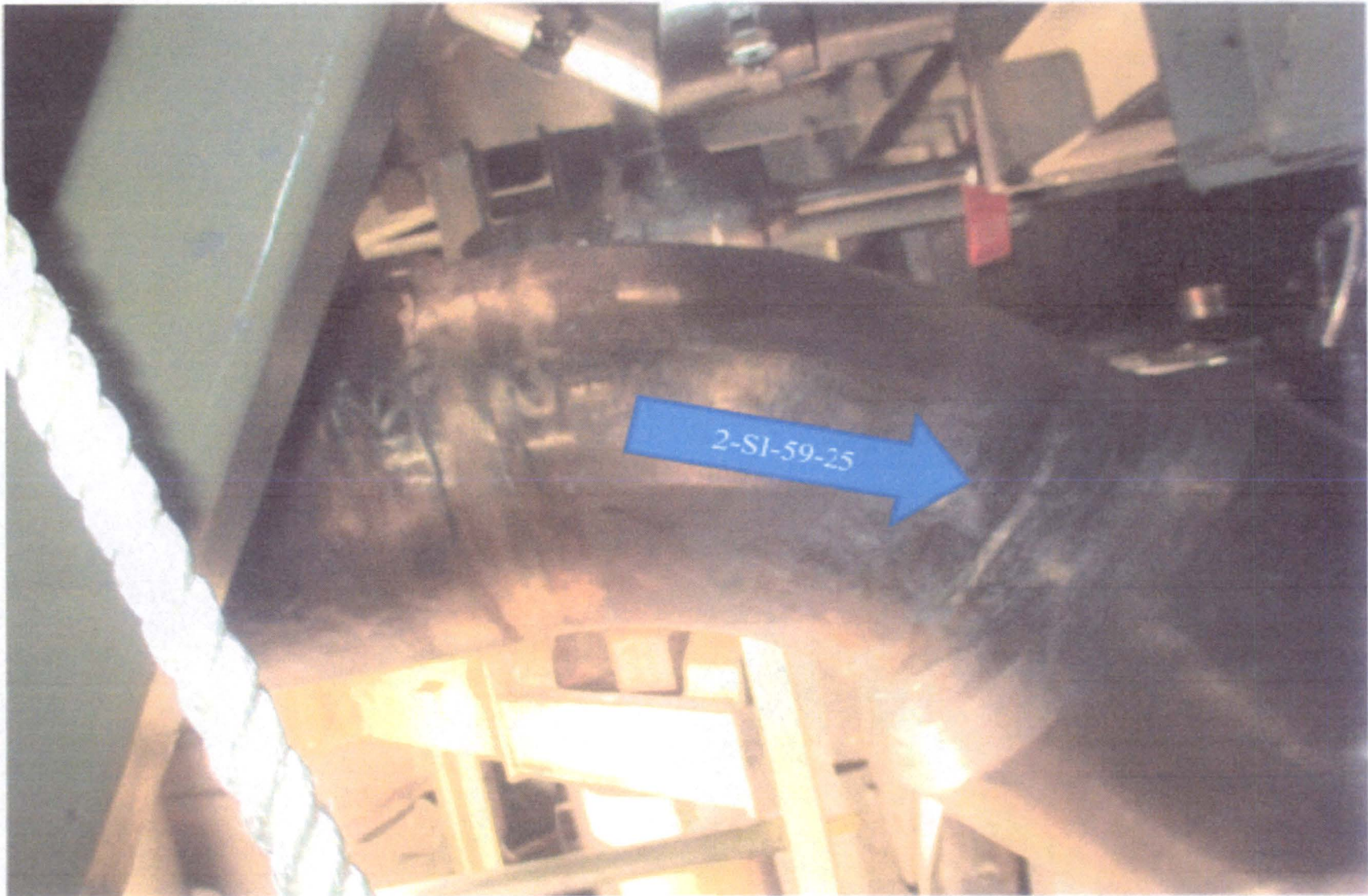


**1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	34.25"	0.3577 in <sup>2</sup>	0.3577 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	34.25"	0.3577 in <sup>2</sup>	0.1213 in <sup>2</sup>	33.9% (Note 1)
Clockwise	34.25"	0.7154 in <sup>2</sup>	0.3577 in <sup>2</sup>	50%
Counterclockwise	34.25"	0.7154 in <sup>2</sup>	0.3577 in <sup>2</sup>	50%
Code Required Coverage Achieved				50%
Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume				

**Table 1.37-1 Weld 2-SI-59-25 Coverage Calculation Results**

**1.37 Weld 2-SI-59-25 Safety Injection Elbow to Branch Connection**



**Figure 1.37-6 Weld 2-SI-59-25 Component Photograph**



### **1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**

Weld 2-SI-60-31 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-017. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the valve. The examination resulted in total UT coverage of **50%** as described in Figures 1.38-2, 1.38-3, 1.38-4, 1.38-5 and Table 1.38-1. A photograph of weld 2-SI-60-31 is provided in Figure 1.38-6.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



### 1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow

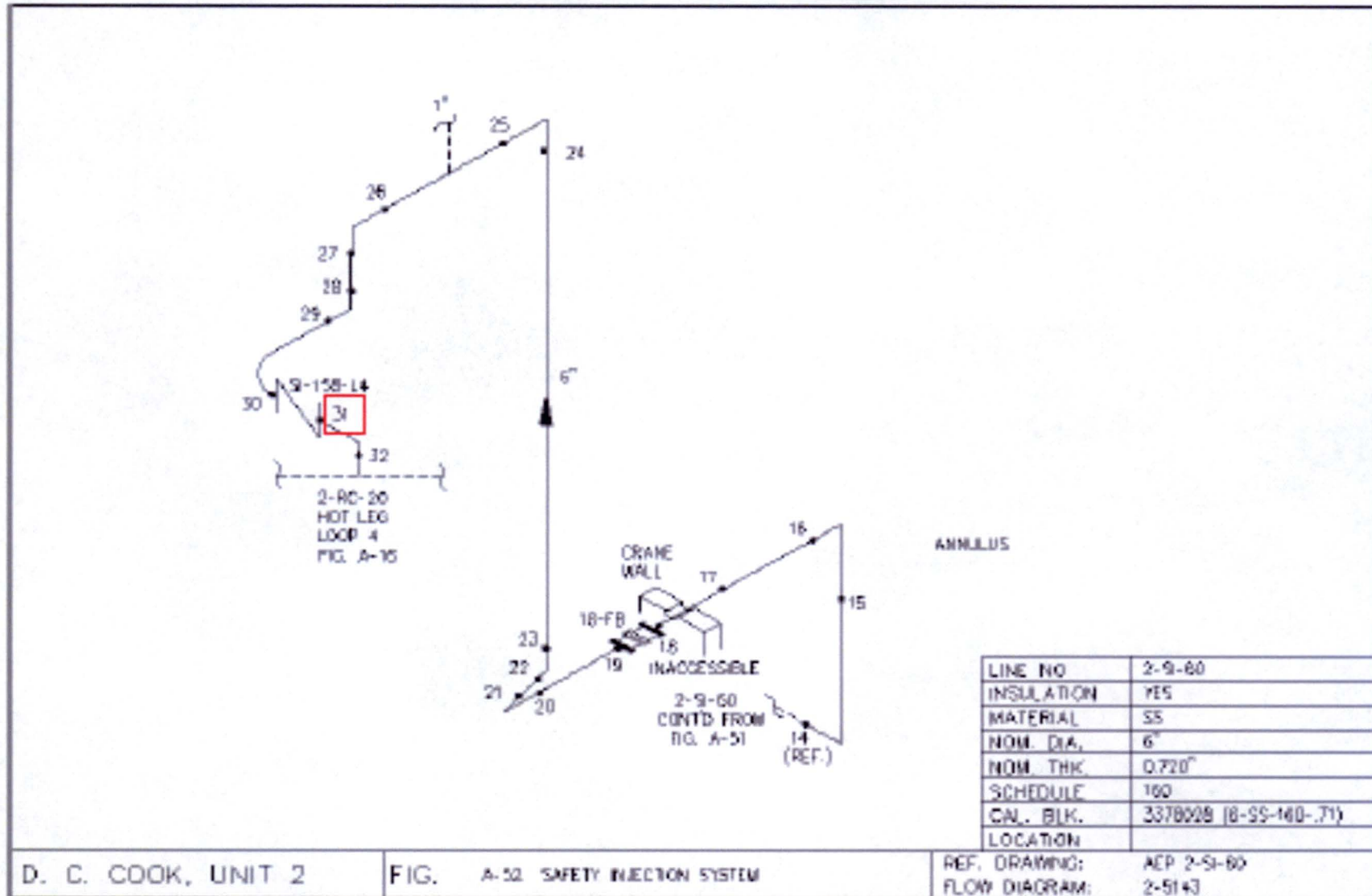
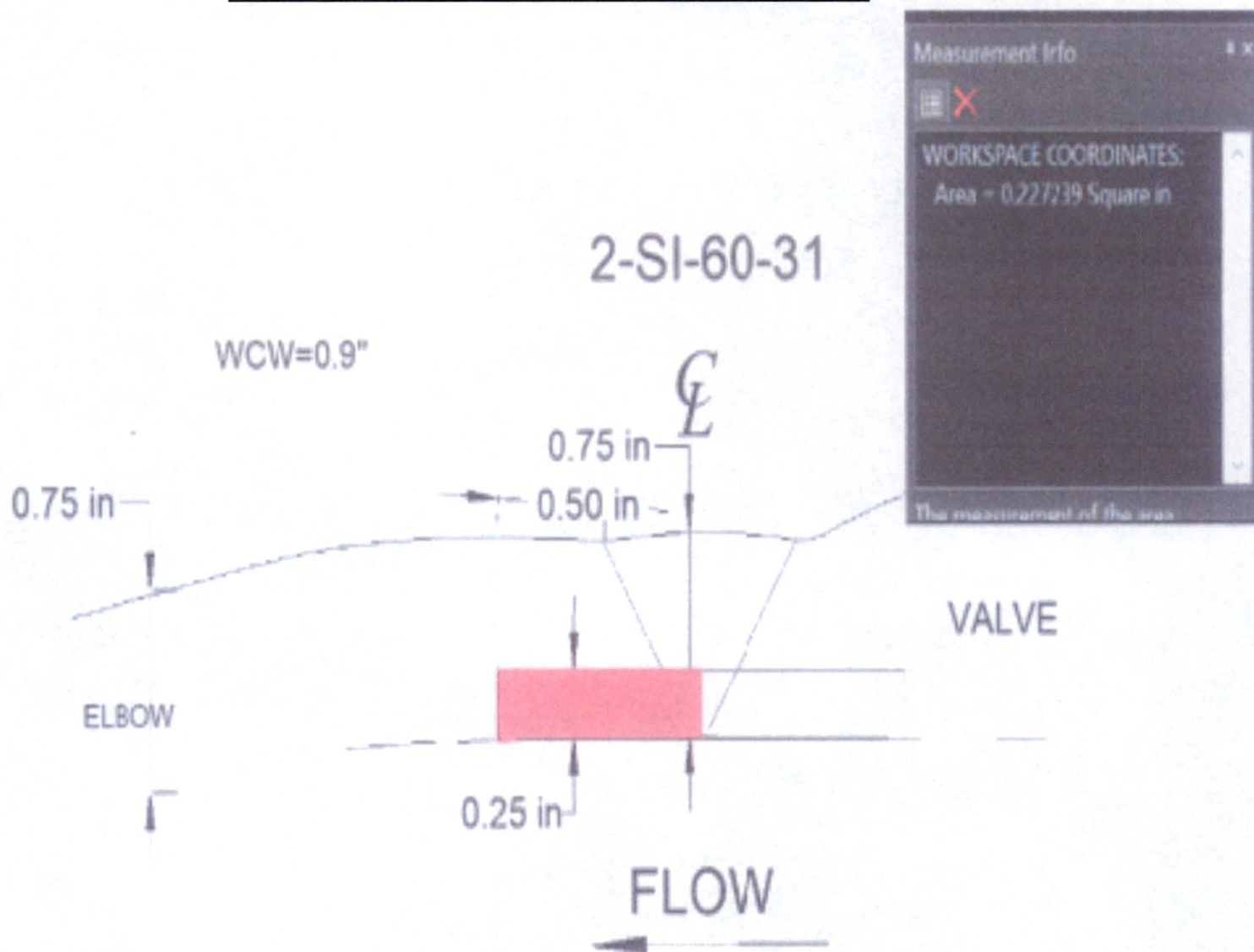


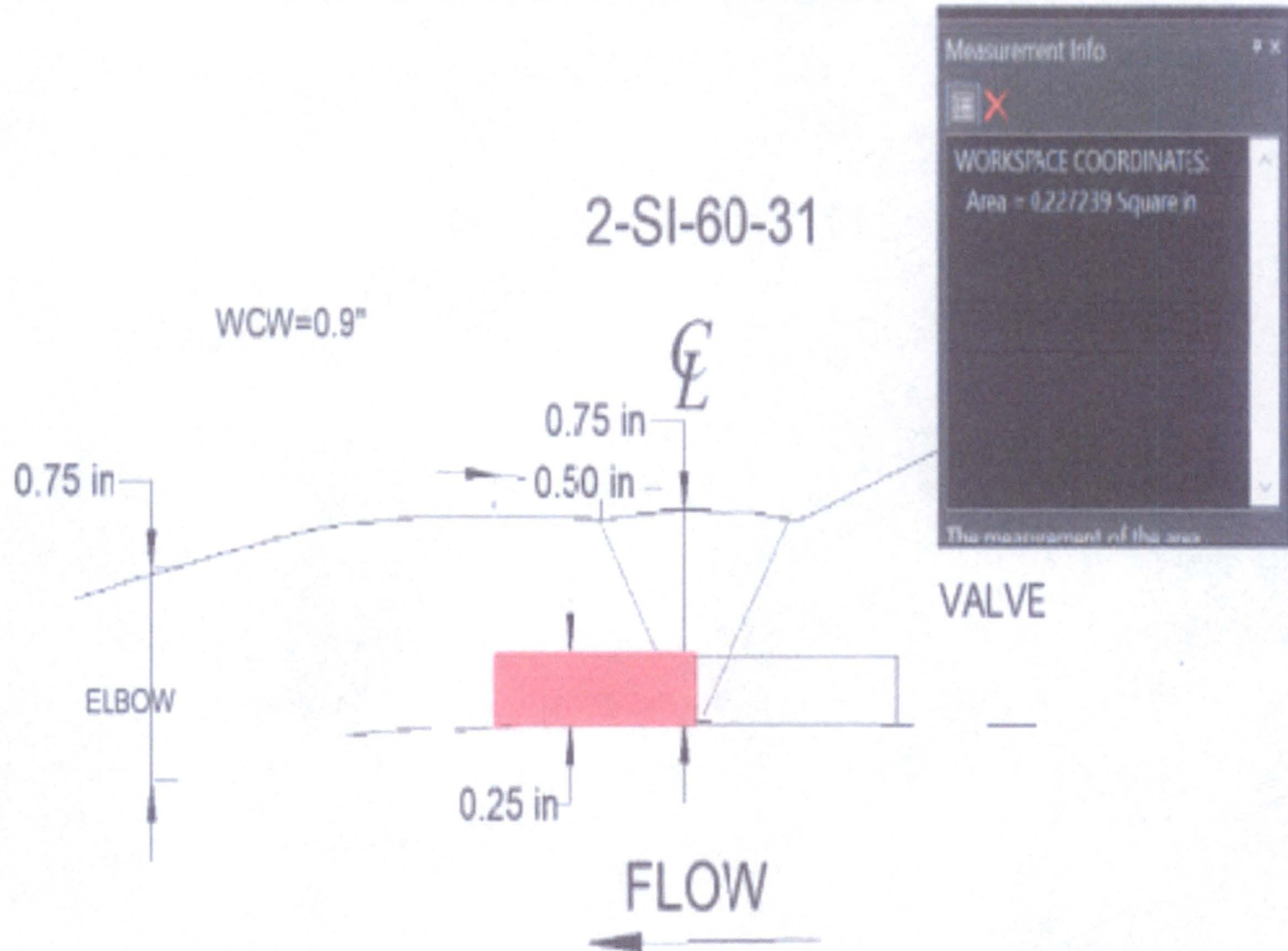
Figure 1.38-1 Weld 2-SI-60-31 (Extracted from Reference DRAWING 2A-52)

**1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**



**Figure 1.38-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required**

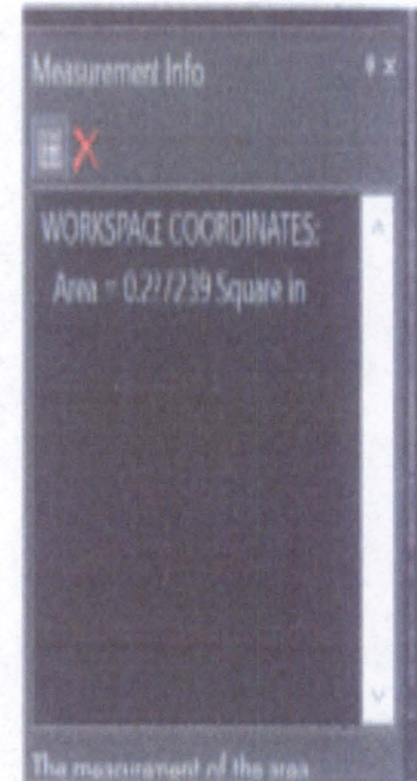
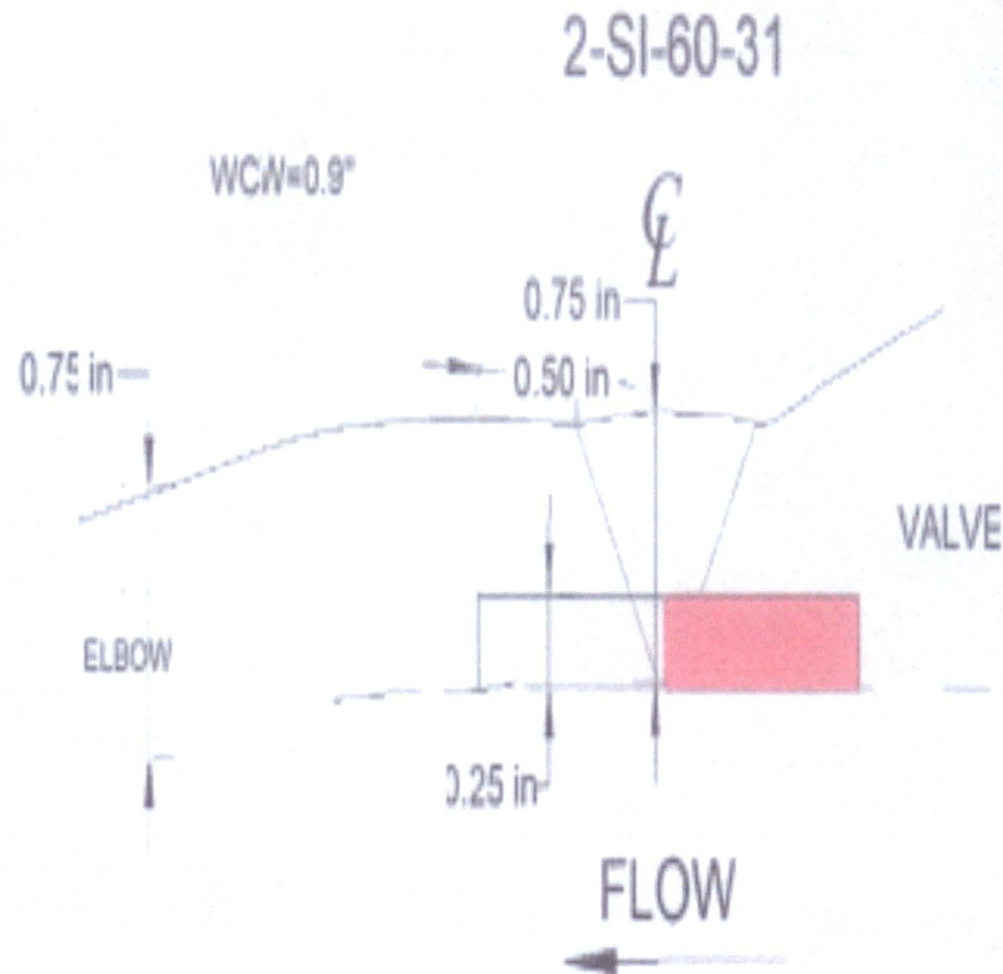
**1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**



**Figure 1.38-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**

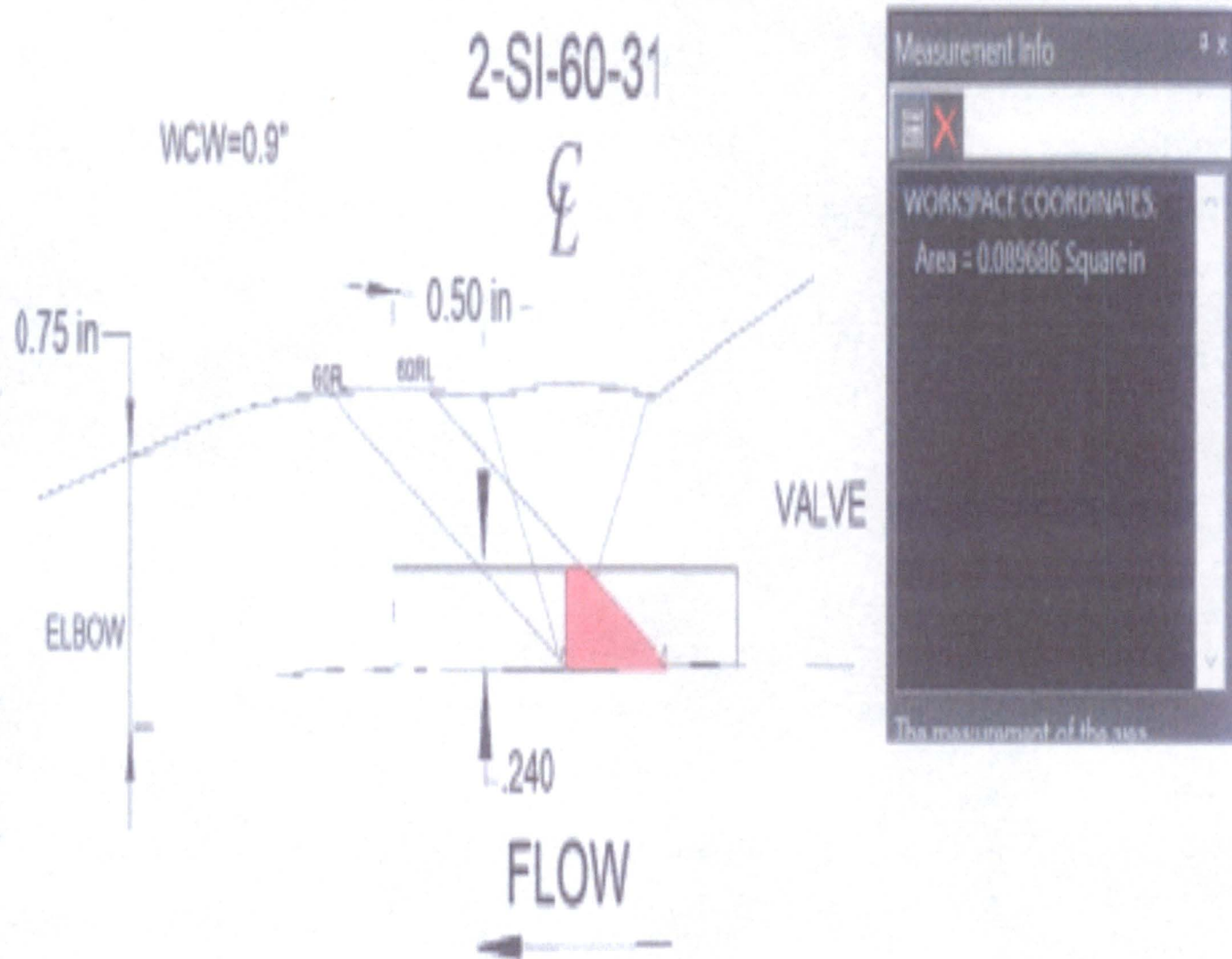


**1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**



**Figure 1.38-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required**

**1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**



**Figure 1.38-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**

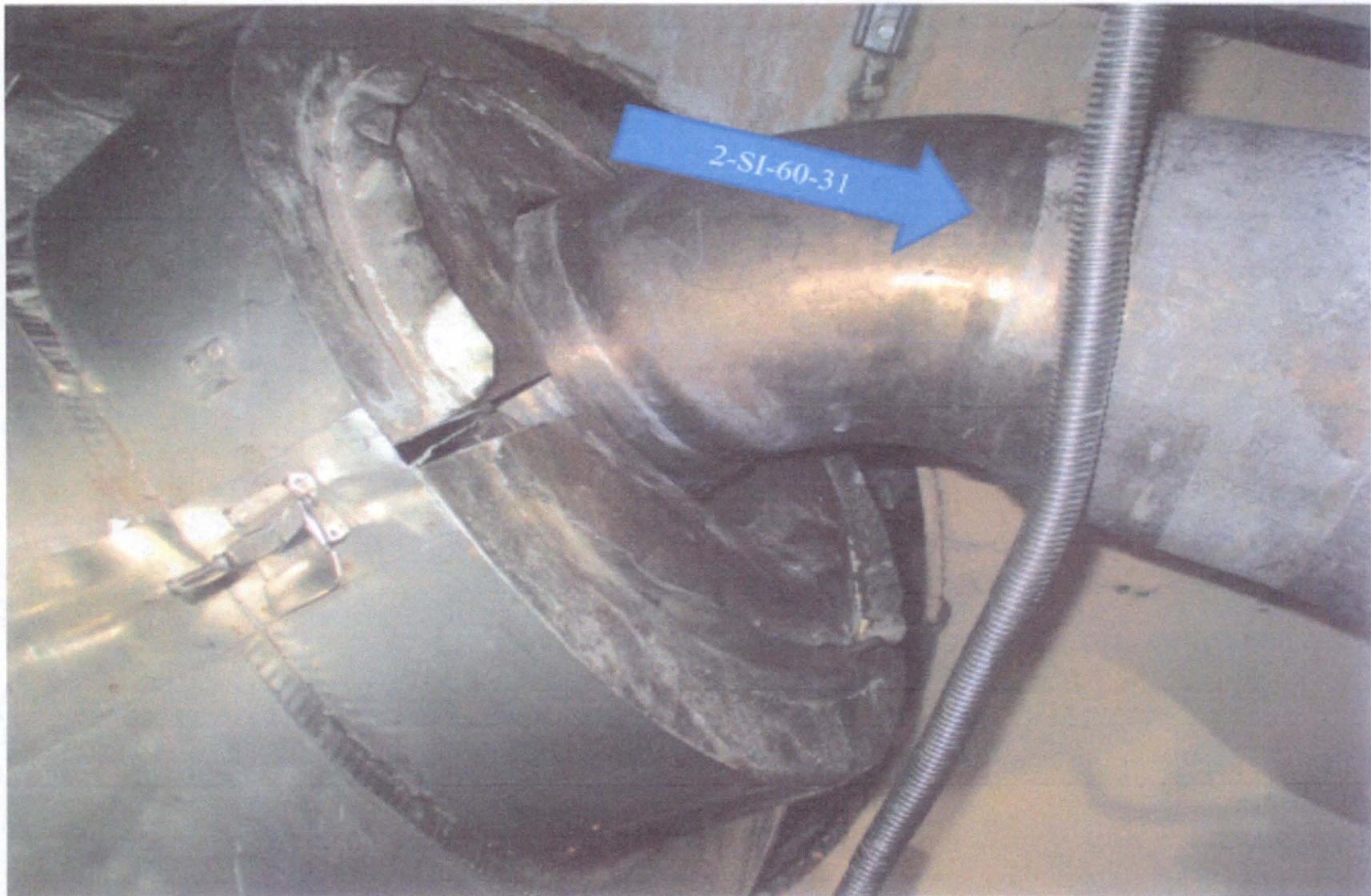
**1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	21.25"	0.2272 in <sup>2</sup>	0.2272 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	21.25"	0.2272 in <sup>2</sup>	0.0896 in <sup>2</sup>	39.4% (Note 1)
Clockwise	21.25"	0.4544 in <sup>2</sup>	0.2272 in <sup>2</sup>	50%
Counterclockwise	21.25"	0.4544 in <sup>2</sup>	0.2272 in <sup>2</sup>	50%
Code Required Coverage Achieved				50%
Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume				

**Table 1.38-1 Weld 2-SI-60-31 Coverage Calculation Results**



**1.38 Weld 2-SI-60-31 Safety Injection Valve to Elbow**



**Figure 1.38-6 Weld 2-SI-60-31 Component Photograph**

### **1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**

Weld 2-SI-60-32 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-018. Previous ISI UT data was not documented as reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50%** as described in Figures 1.39-2, 1.39-3, 1.39-4, 1.39-5, and Table 1.39-1. A photograph of weld 2-SI-60-32 is provided in Figure 1.39-6.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



### 1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection

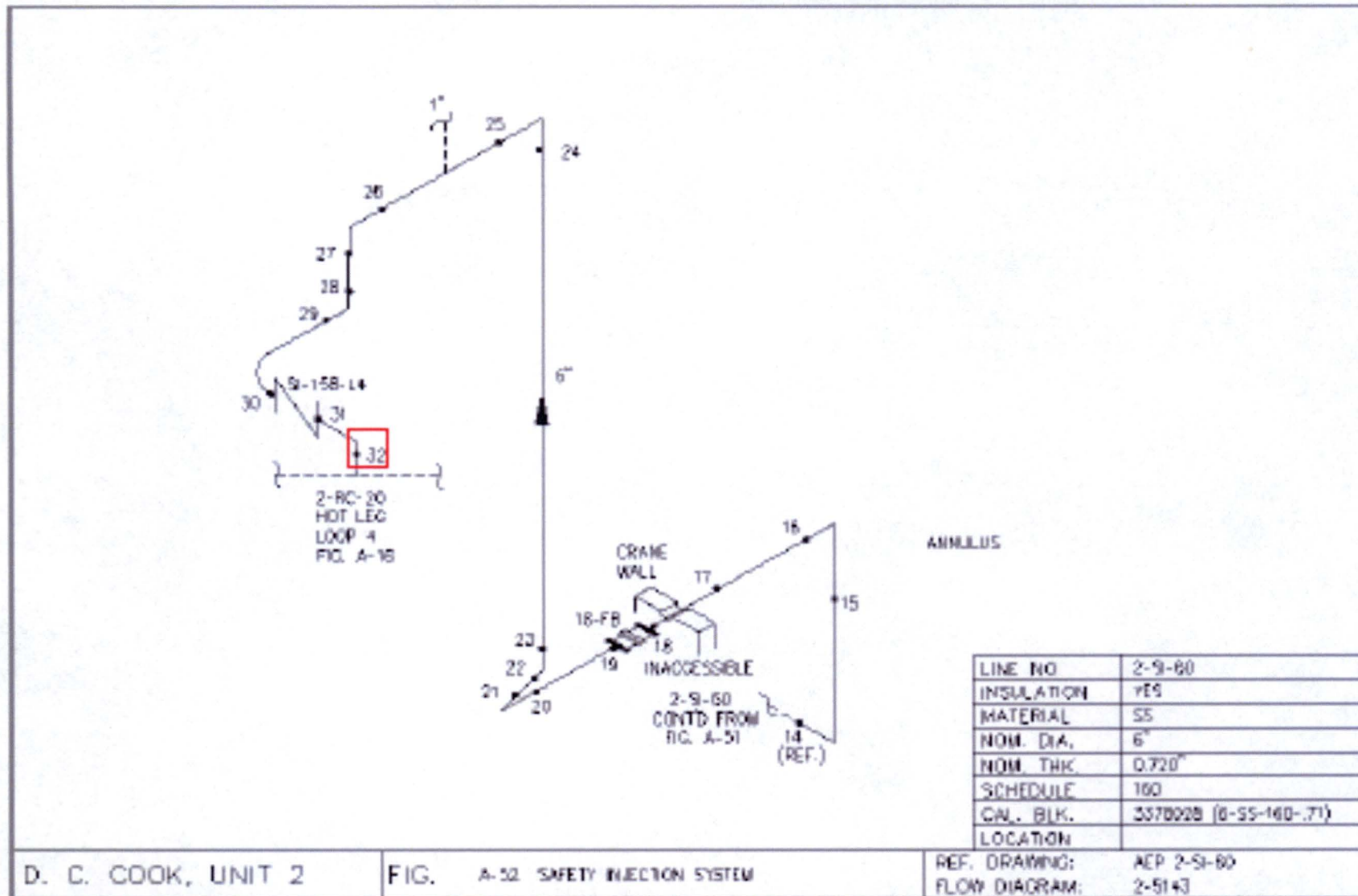
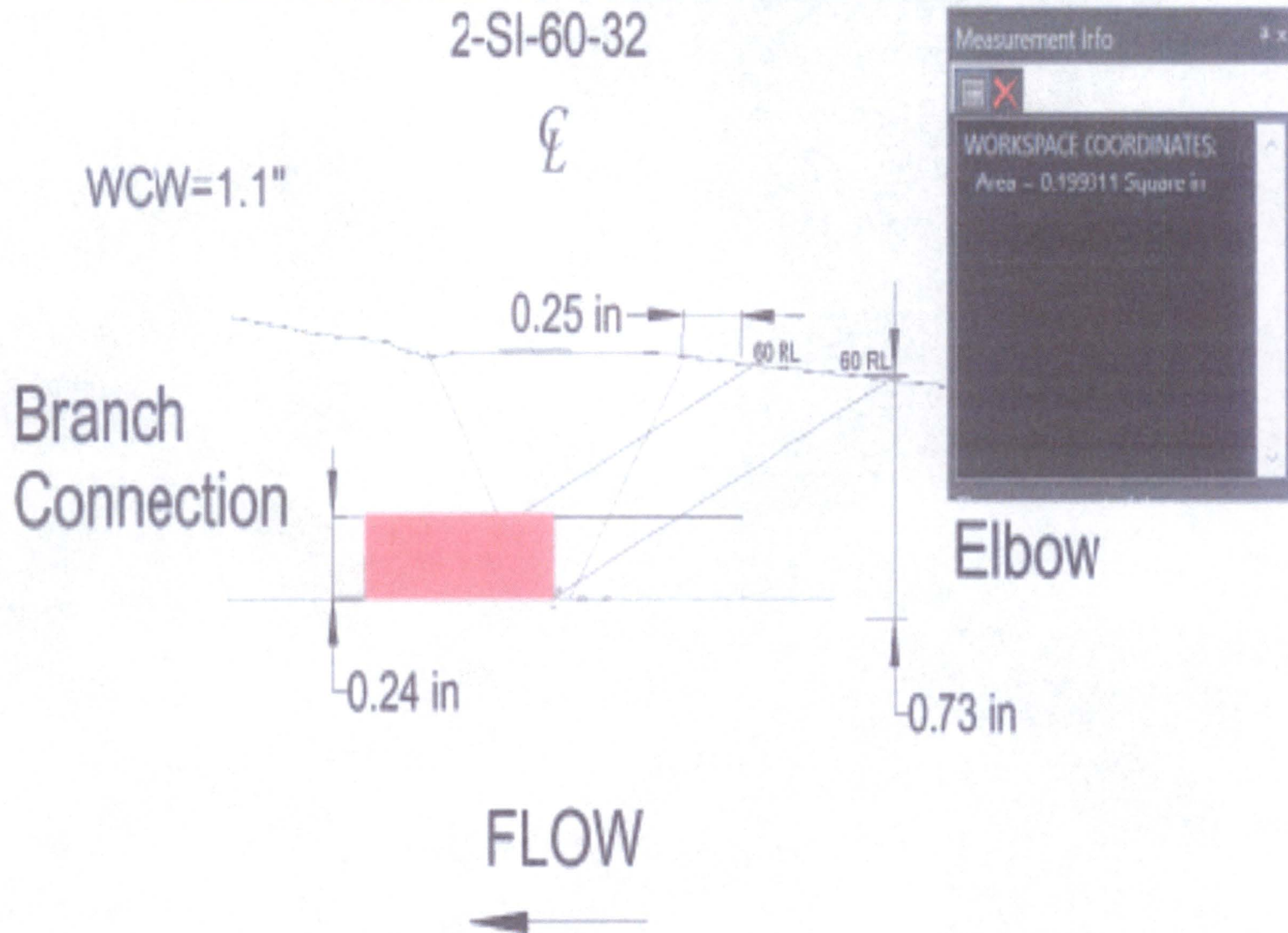


Figure 1.39-1 Weld 2-SI-60-32 (Extracted from Reference DRAWING 2A-52)

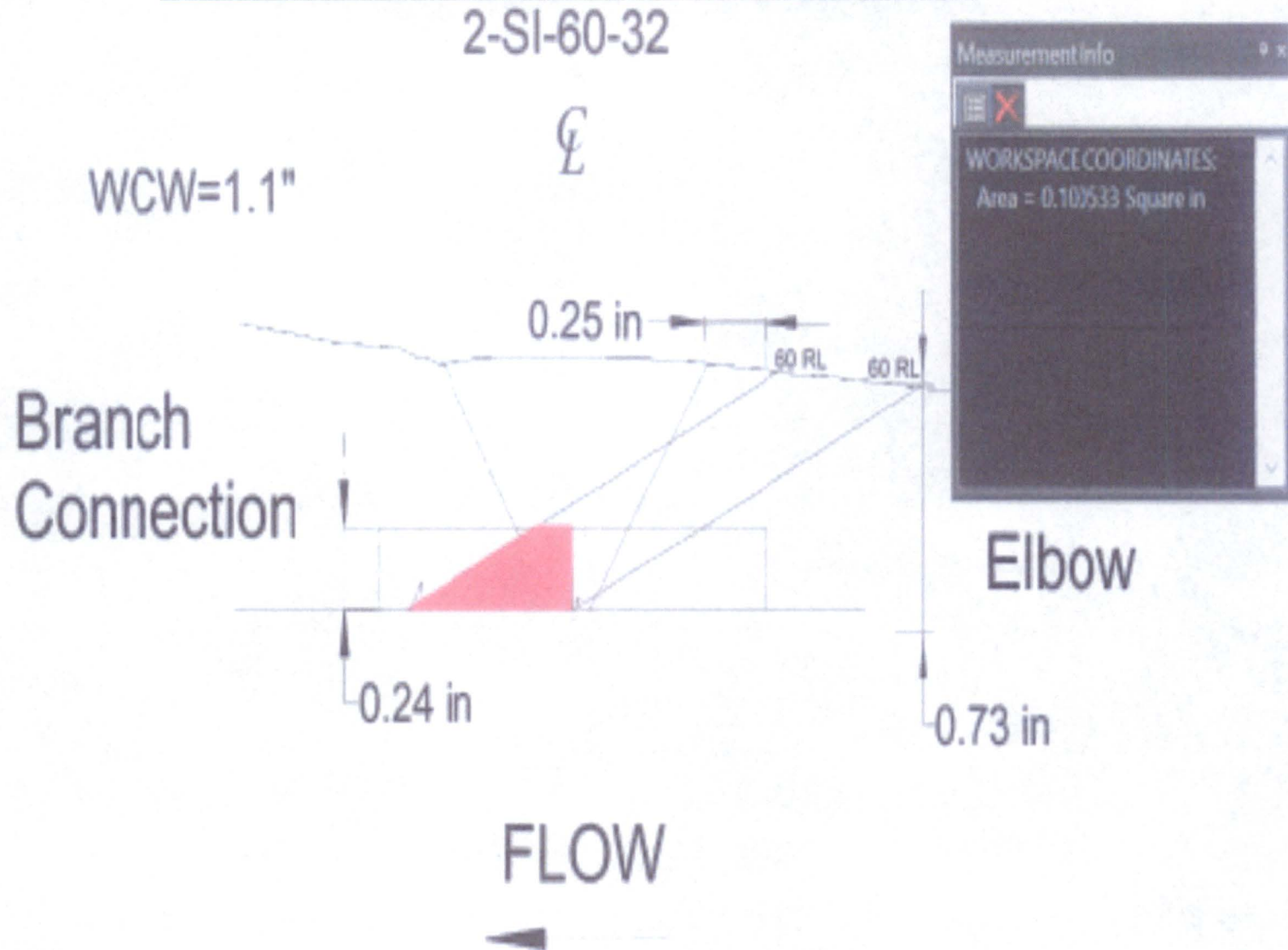


**1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**



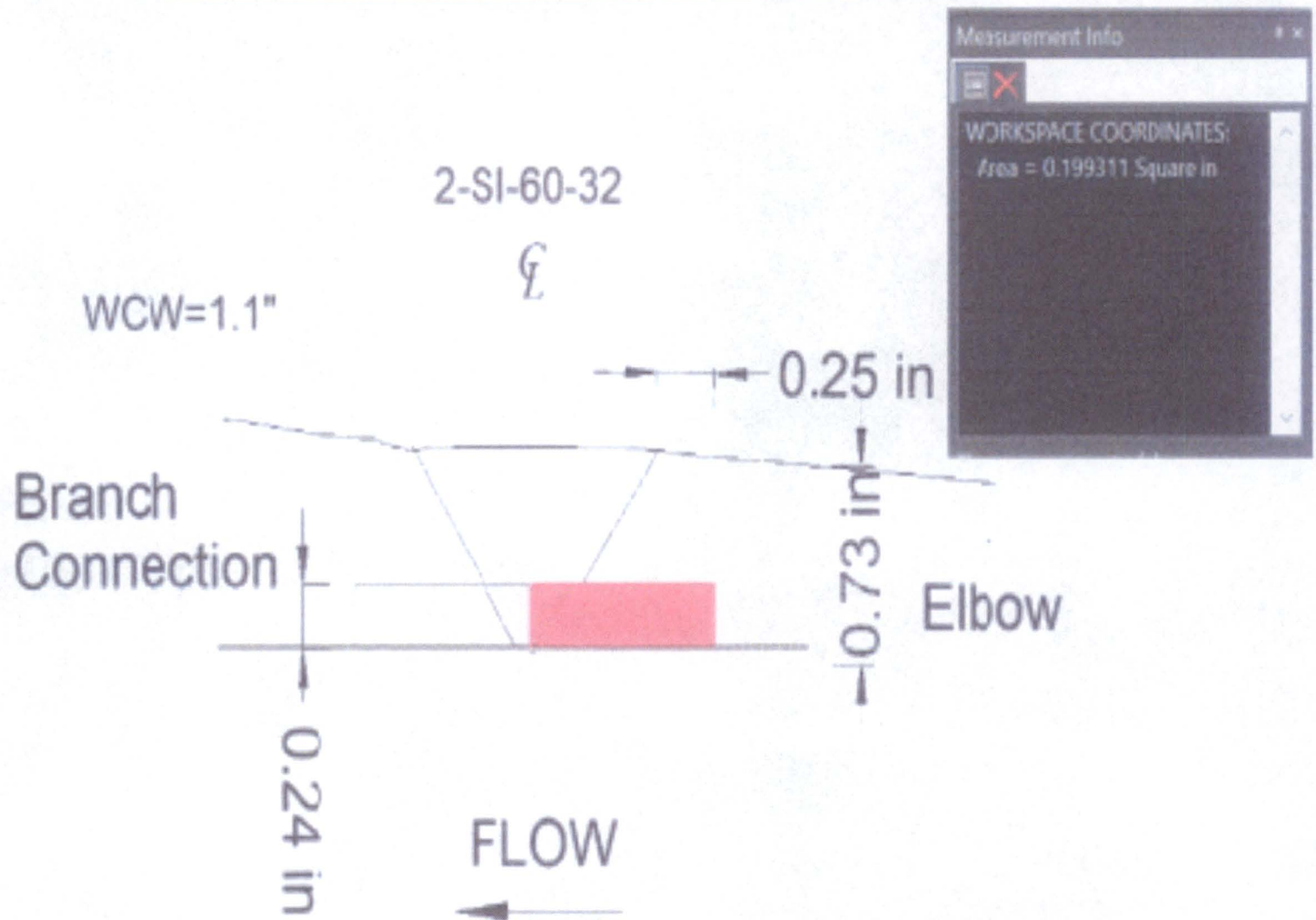
**Figure 1.39-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required**

**1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**



**Figure 1.39-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**

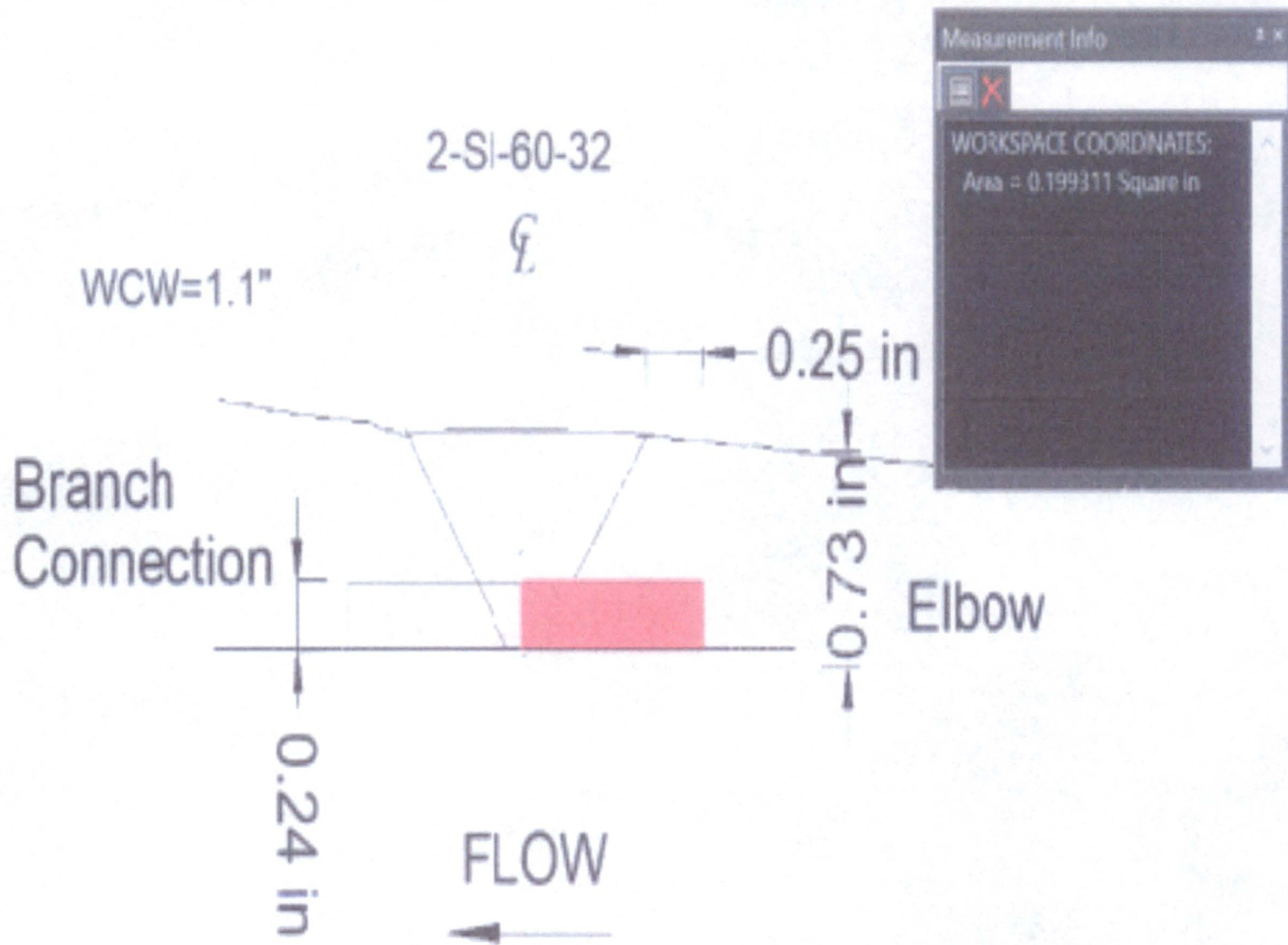
**1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**



**Figure 1.39-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required**



**1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**



**Figure 1.39-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**

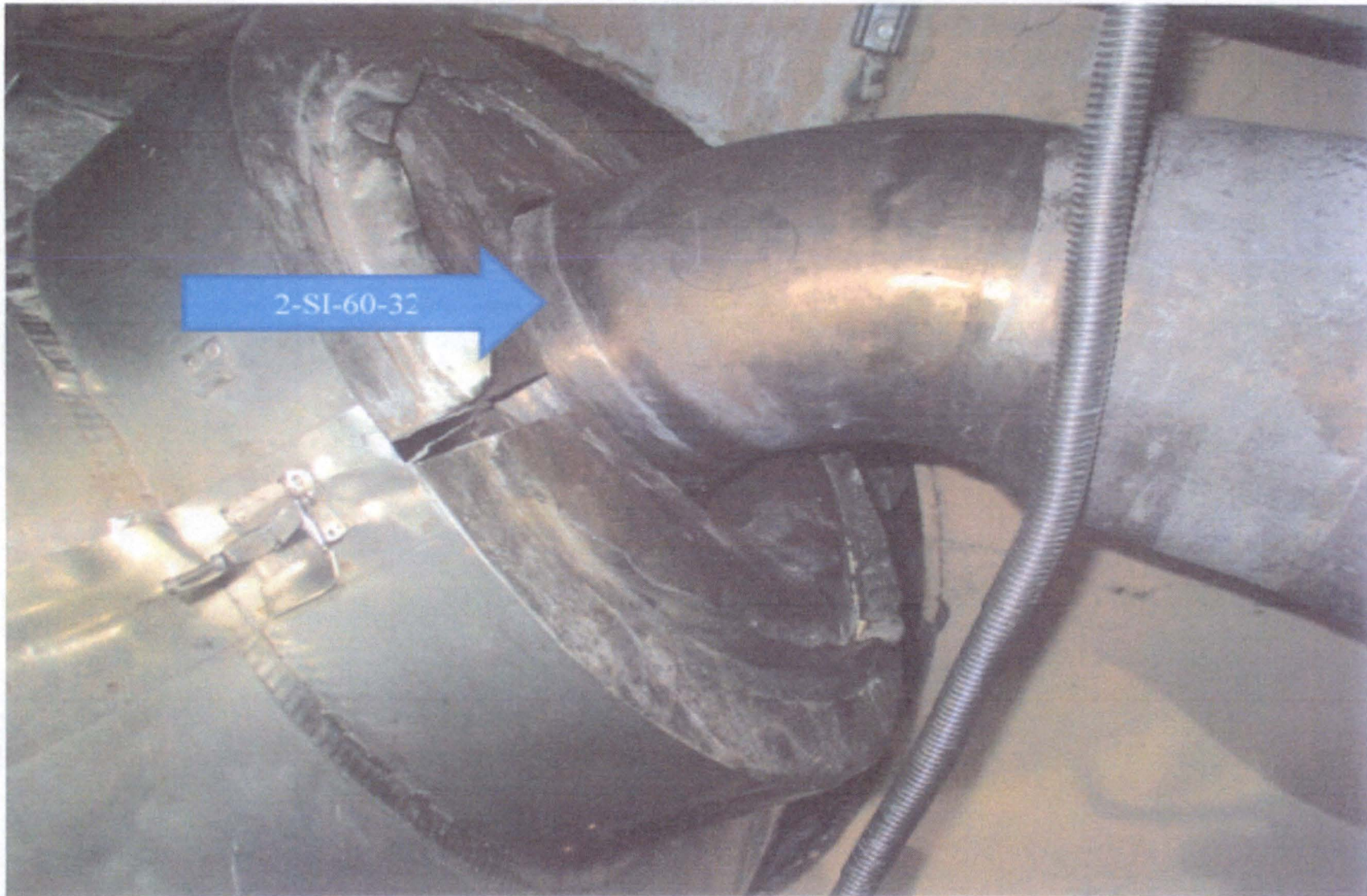
**1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	21.25"	0.1993 in <sup>2</sup>	0.1993 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	21.25"	0.1993 in <sup>2</sup>	0.1005 in <sup>2</sup>	50.4% (Note 1)
Clockwise	21.25"	0.1993 in <sup>2</sup>	0.1993 in <sup>2</sup>	50%
Counterclockwise	21.25"	0.1993 in <sup>2</sup>	0.1993 in <sup>2</sup>	50%
Code Required Coverage Achieved				50%
Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume				

**Table 1.39-1 Weld 2-SI-60-32 Coverage Calculation Results**



**1.39 Weld 2-SI-60-32 Safety Injection Elbow to Branch Connection**



**Figure 1.39-6 Weld 2-SI-60-32 Component Photograph**



#### **1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection**

Weld 2-SI-61-15 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-019. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50%** as described in Figures 1.40-2, 1.40-3, 1.40-4, 1.40-5, and Table 1.40-1. A photograph of weld 2-SI-61-15 is provided in Figure 1.40-6.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).

# 1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection

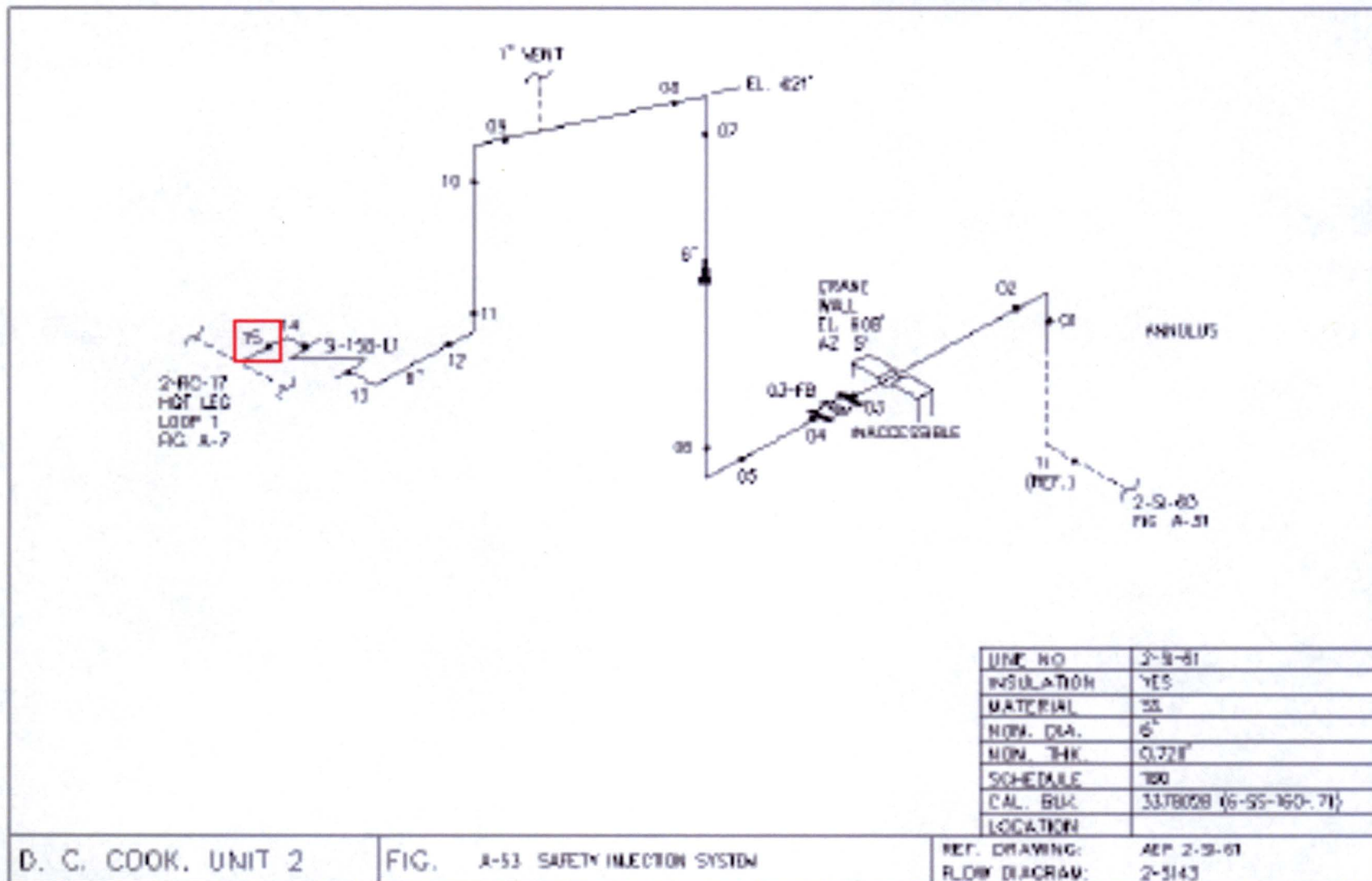
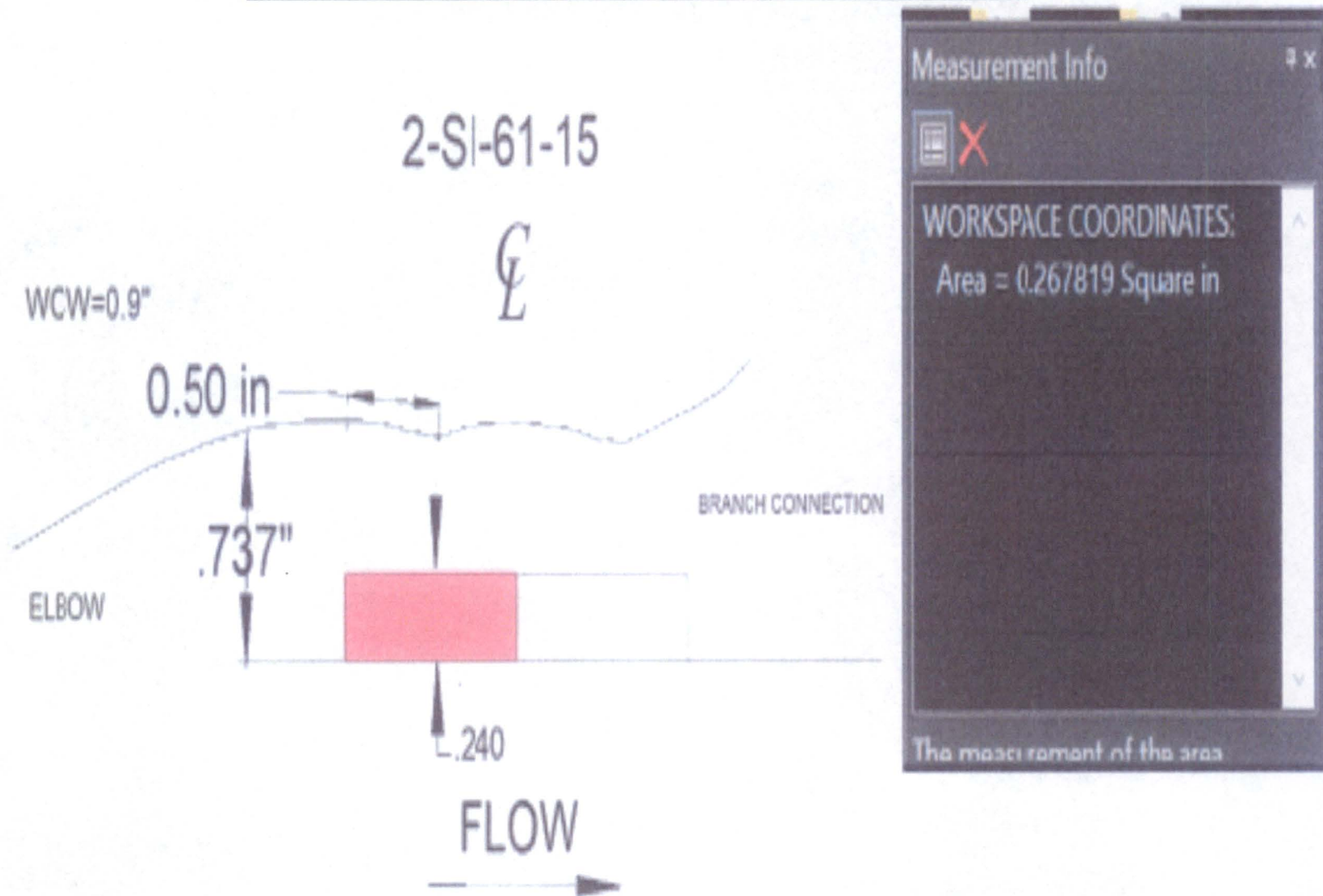


Figure 1.40-1 Weld 2-SI-61-15 (Extracted from Reference DRAWING 2A-53)

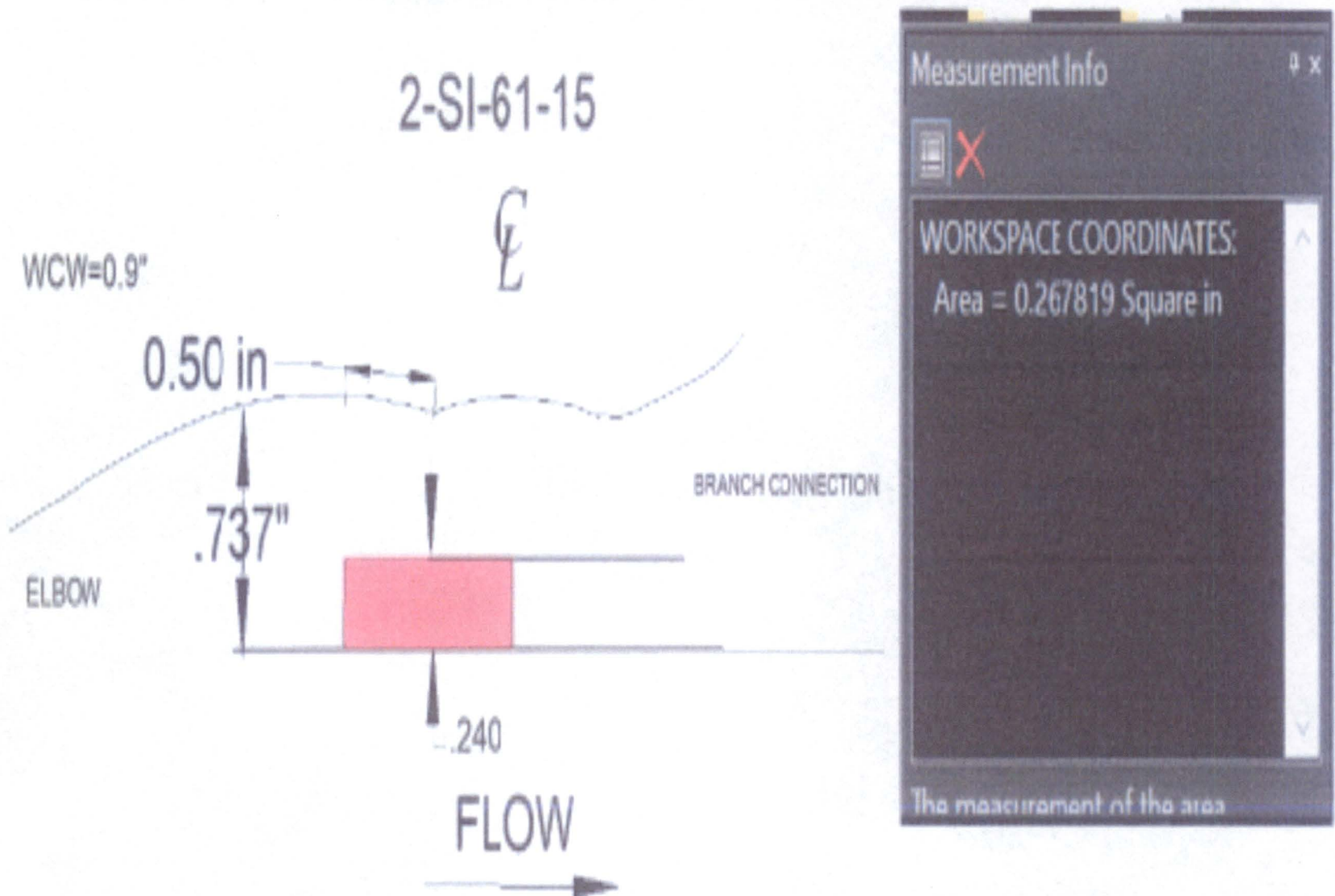
**1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection**



**Figure 1.40-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required**



**1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection**



**Figure 1.40-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**

1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection

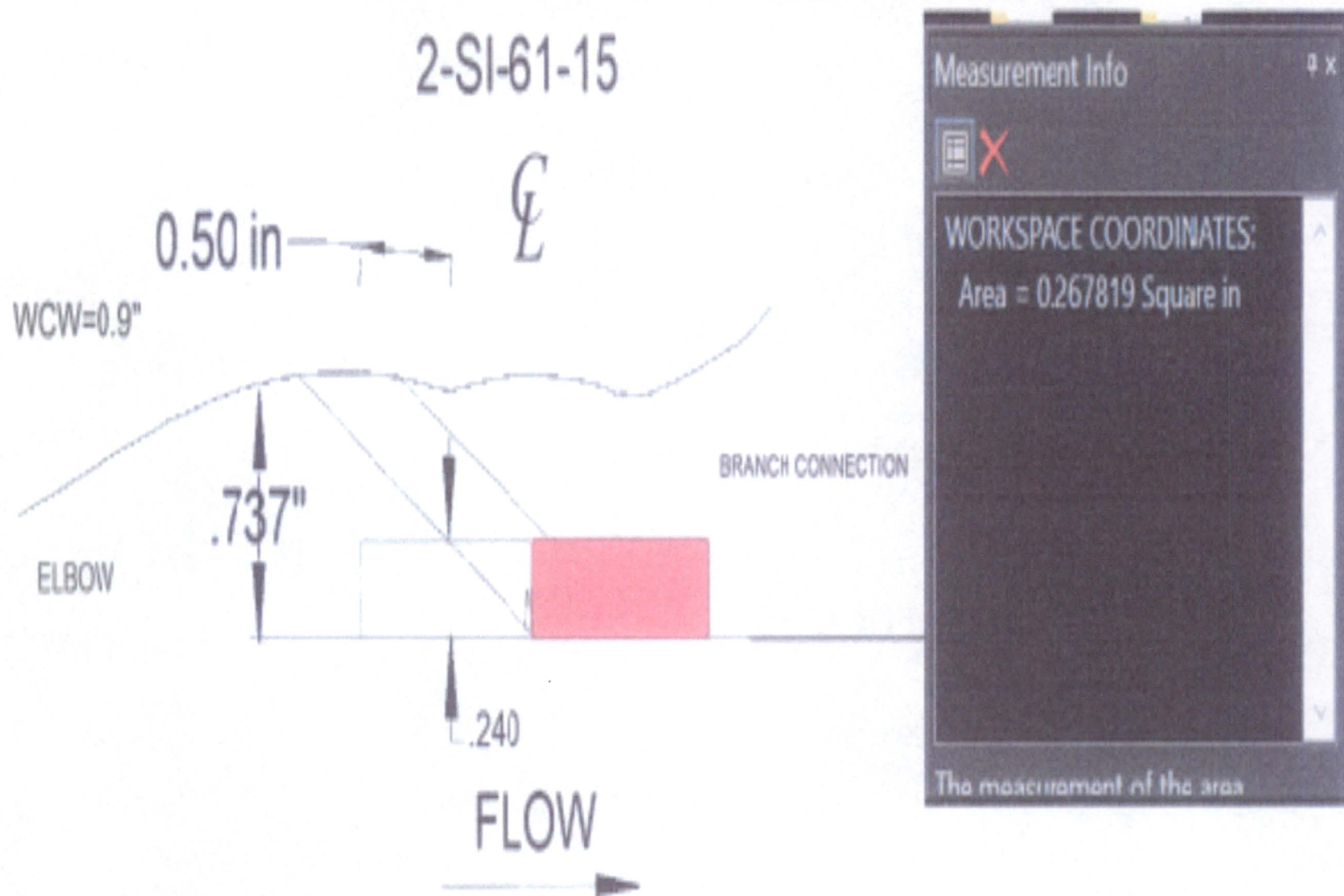
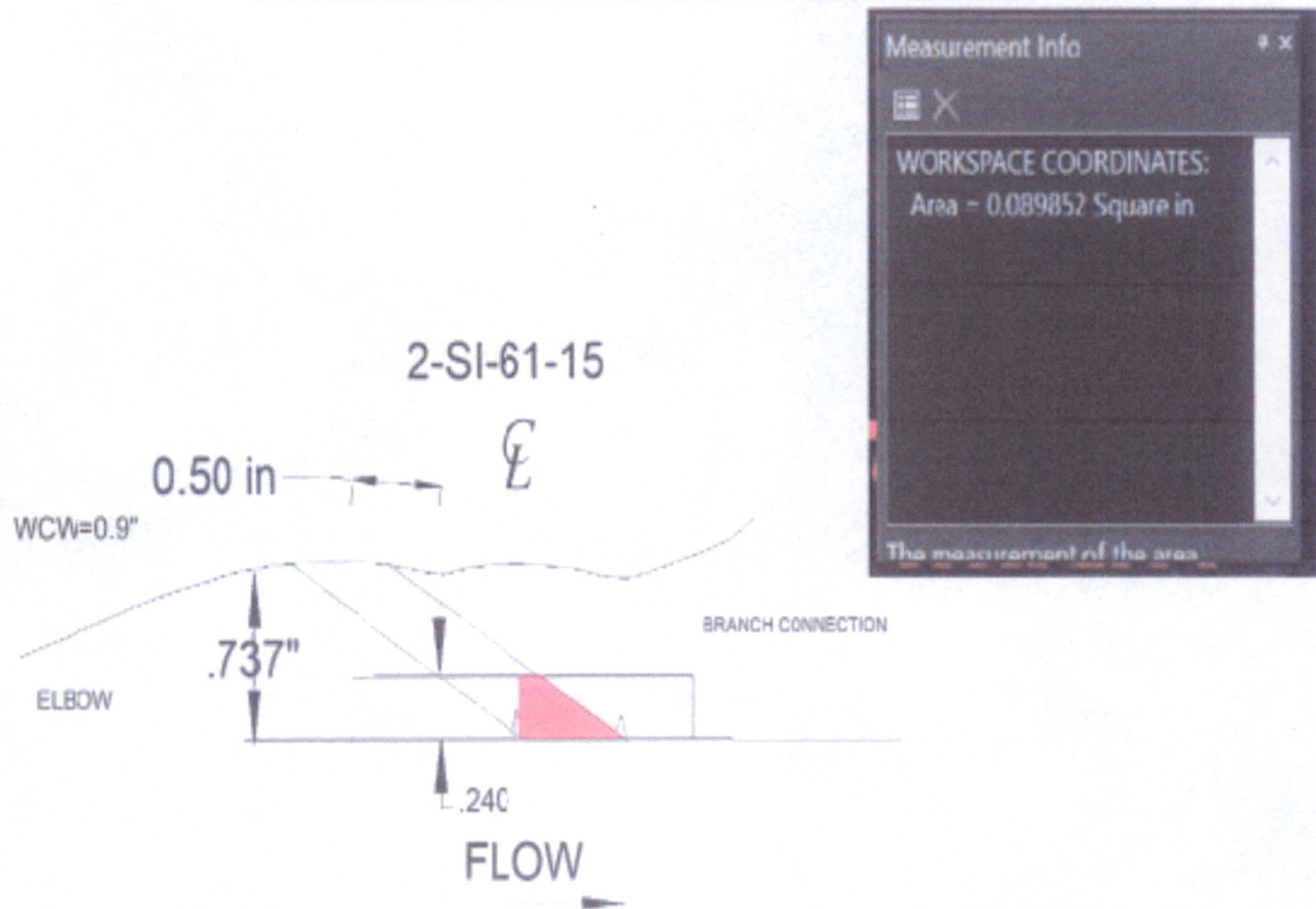


Figure 1.40-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required

**1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection**



**Figure 1.40-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**



**1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection**

<b>Examination Performed</b>	<b>Length of Exam</b>	<b>Required Exam Area</b>	<b>Achieved Exam Area</b>	<b>Coverage Achieved</b>
<b>Upstream Axial</b>	<b>21.25"</b>	<b>0.2678 in<sup>2</sup></b>	<b>0.2678 in<sup>2</sup></b>	<b>100%</b>
<b>Upstream Axial for Downstream Volume</b>	<b>21.25"</b>	<b>0.2678 in<sup>2</sup></b>	<b>0.0898 in<sup>2</sup></b>	<b>33.5% (Note 1)</b>
<b>Clockwise</b>	<b>21.25"</b>	<b>0.5356 in<sup>2</sup></b>	<b>0.2678 in<sup>2</sup></b>	<b>50%</b>
<b>Counterclockwise</b>	<b>21.25"</b>	<b>0.5356 in<sup>2</sup></b>	<b>0.2678 in<sup>2</sup></b>	<b>50%</b>
<b>Code Required Coverage Achieved</b>				<b>50%</b>
<b>Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume</b>				

**Table 1.40-1 Weld 2-SI-61-15 Coverage Calculation Results**

**1.40 Weld 2-SI-61-15 Safety Injection Elbow to Branch Connection**



**Figure 1.40-6 Weld 2-SI-61-15 Component Photograph**



#### **1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection**

Weld 2-SI-62-32 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-020. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50%** as described in Figures 1.41-2, 1.41-3, 1.41-4, 1.41-5, and Table 1.41-1. A photograph of weld 2-SI-62-32 is provided in Figure 1.41-6.

No recordable indications were detected during this examination.

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



# 1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection

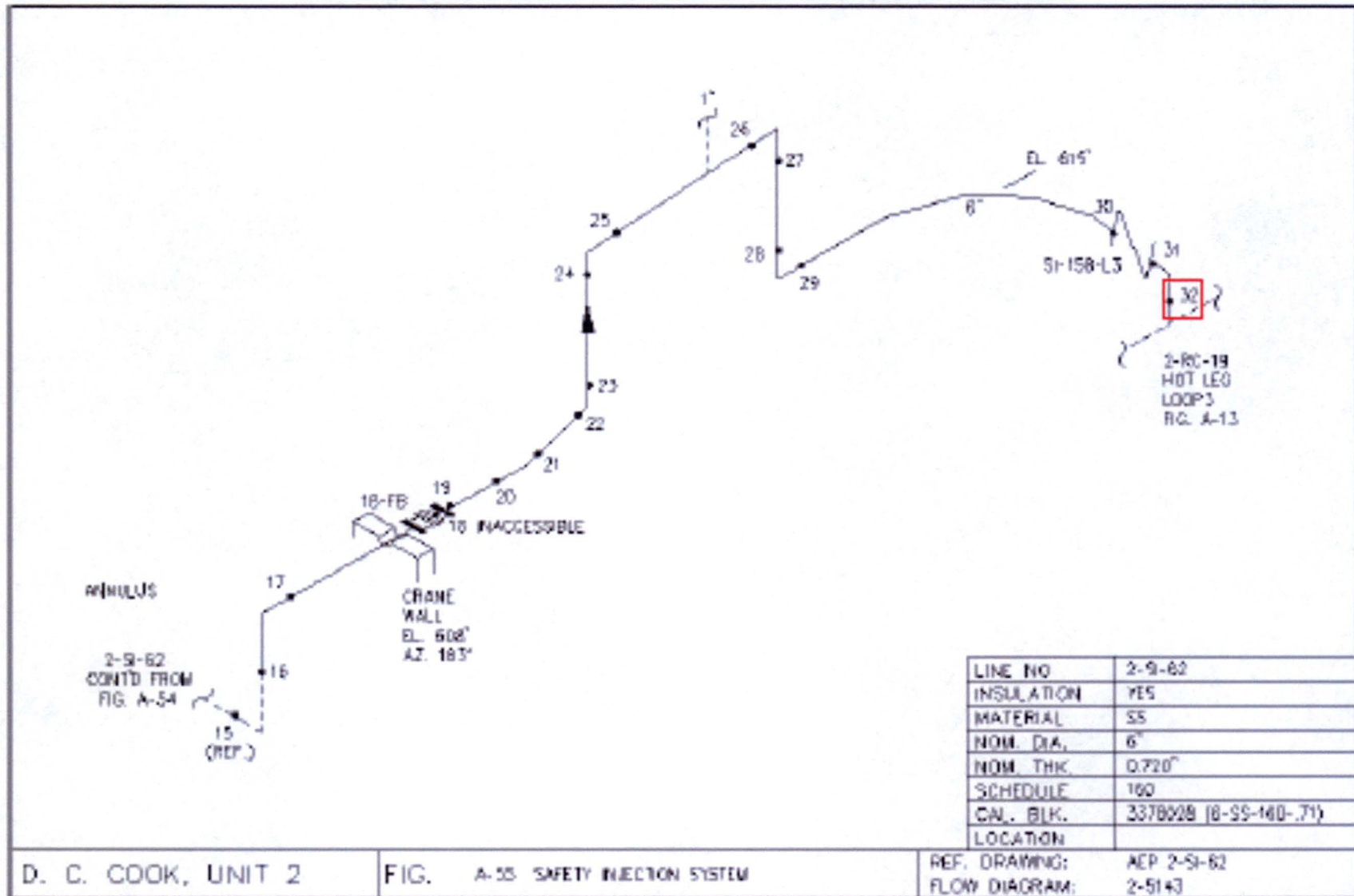


Figure 1.41-1 Weld 2-SI-62-32 (Extracted from Reference DRAWING 2A-55)

1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection

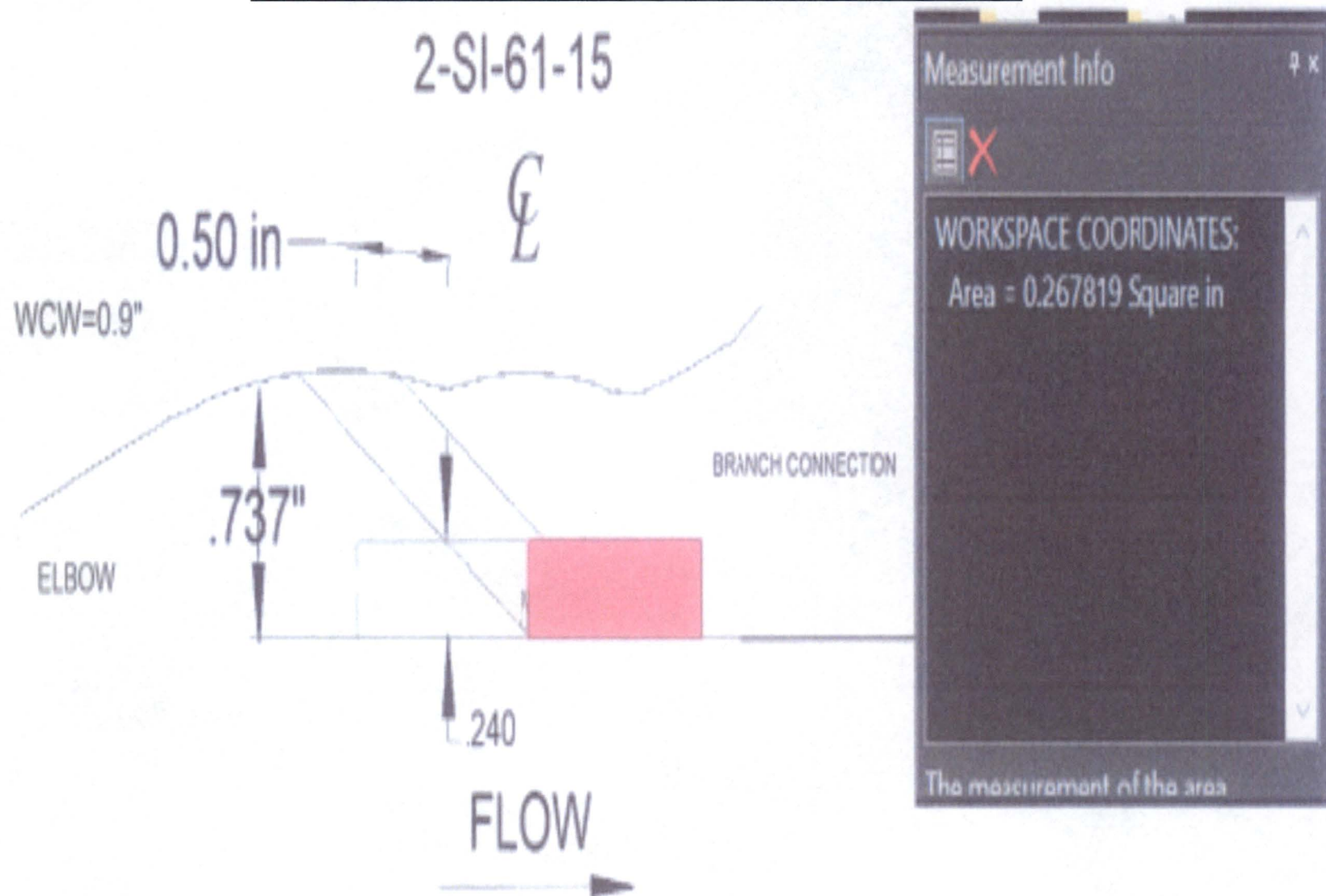
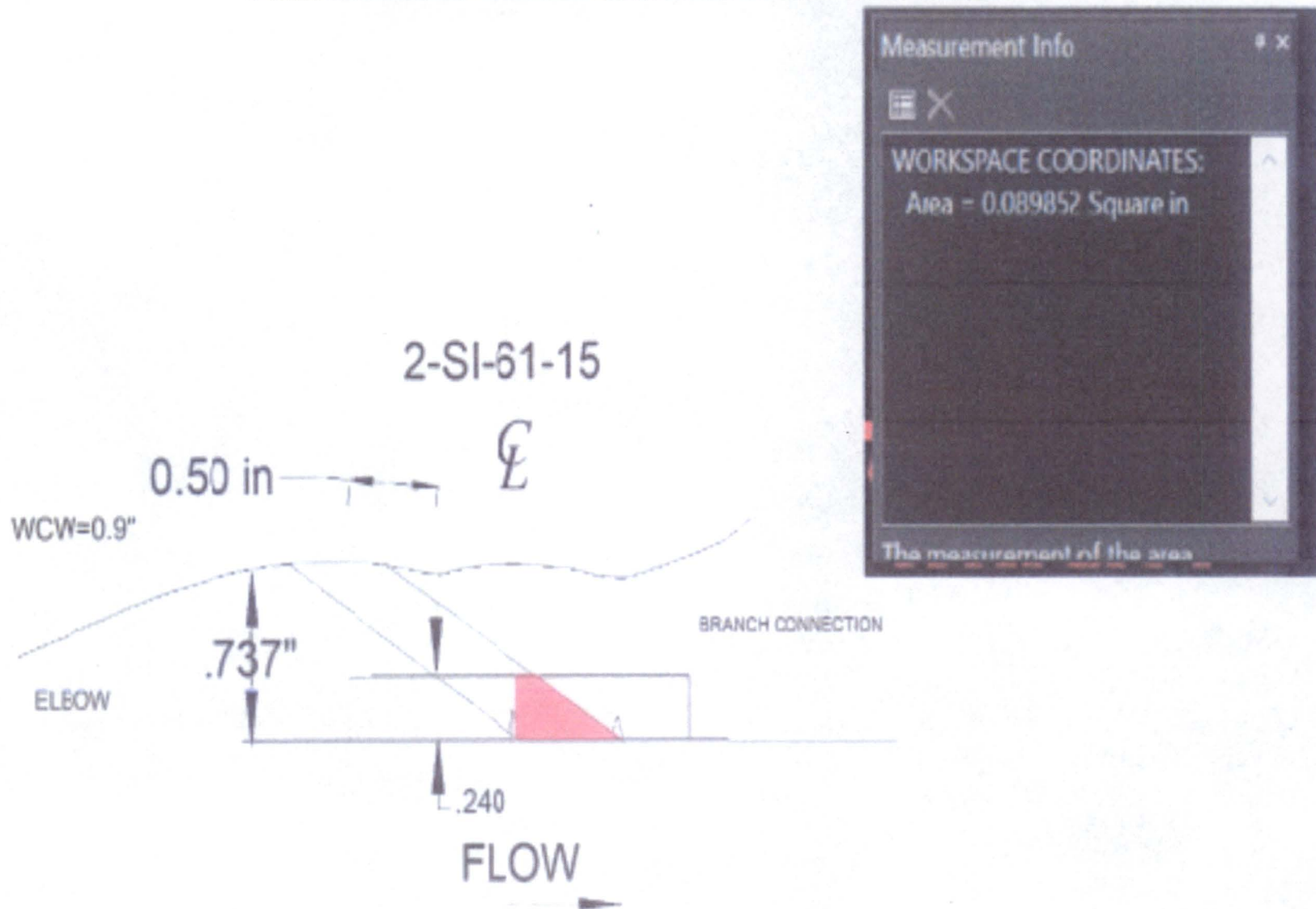


Figure 1.41-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required

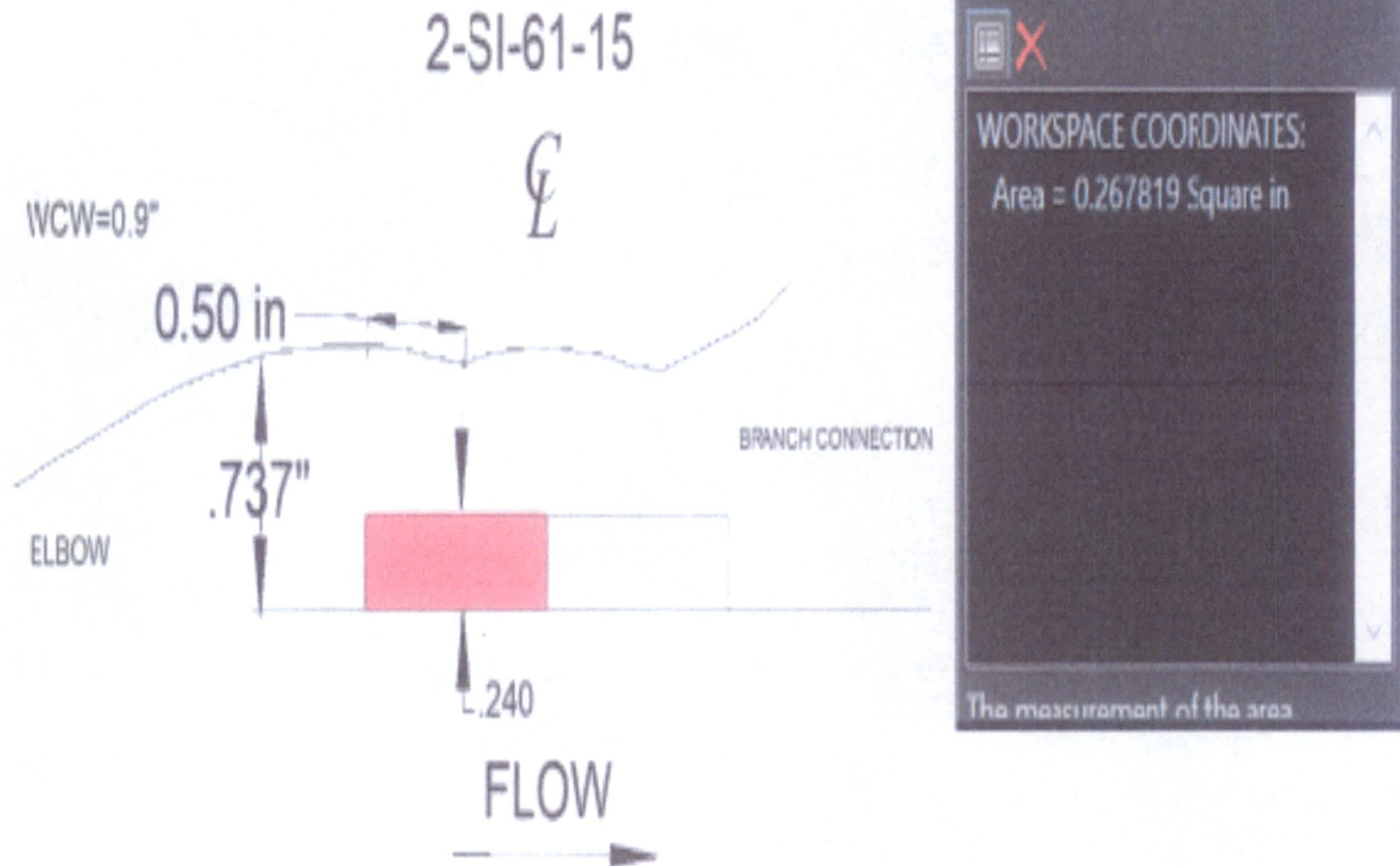
**1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection**



**Figure 1.41-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved**

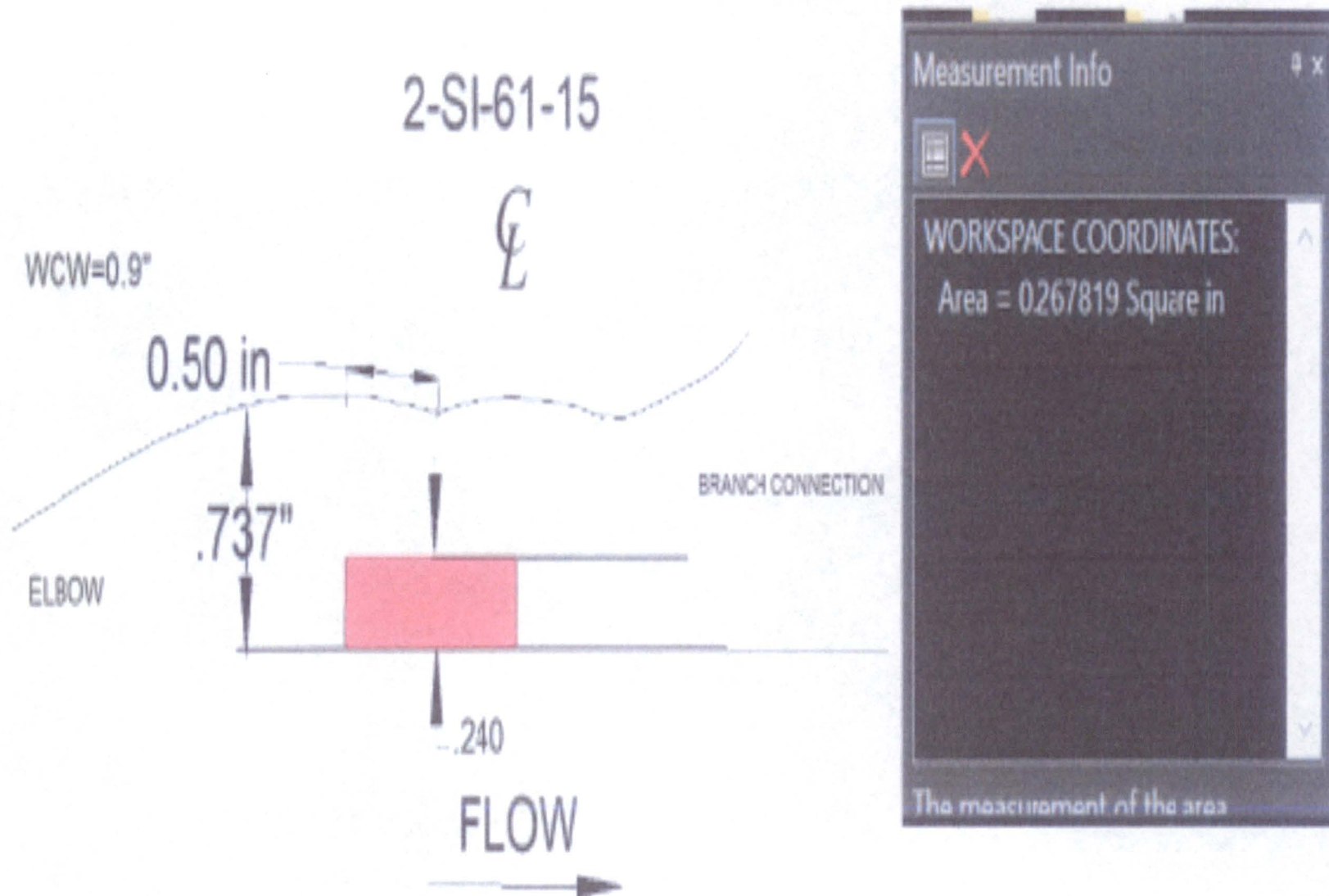


**1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection**



**Figure 1.41-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required**

**1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection**



**Figure 1.41-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**

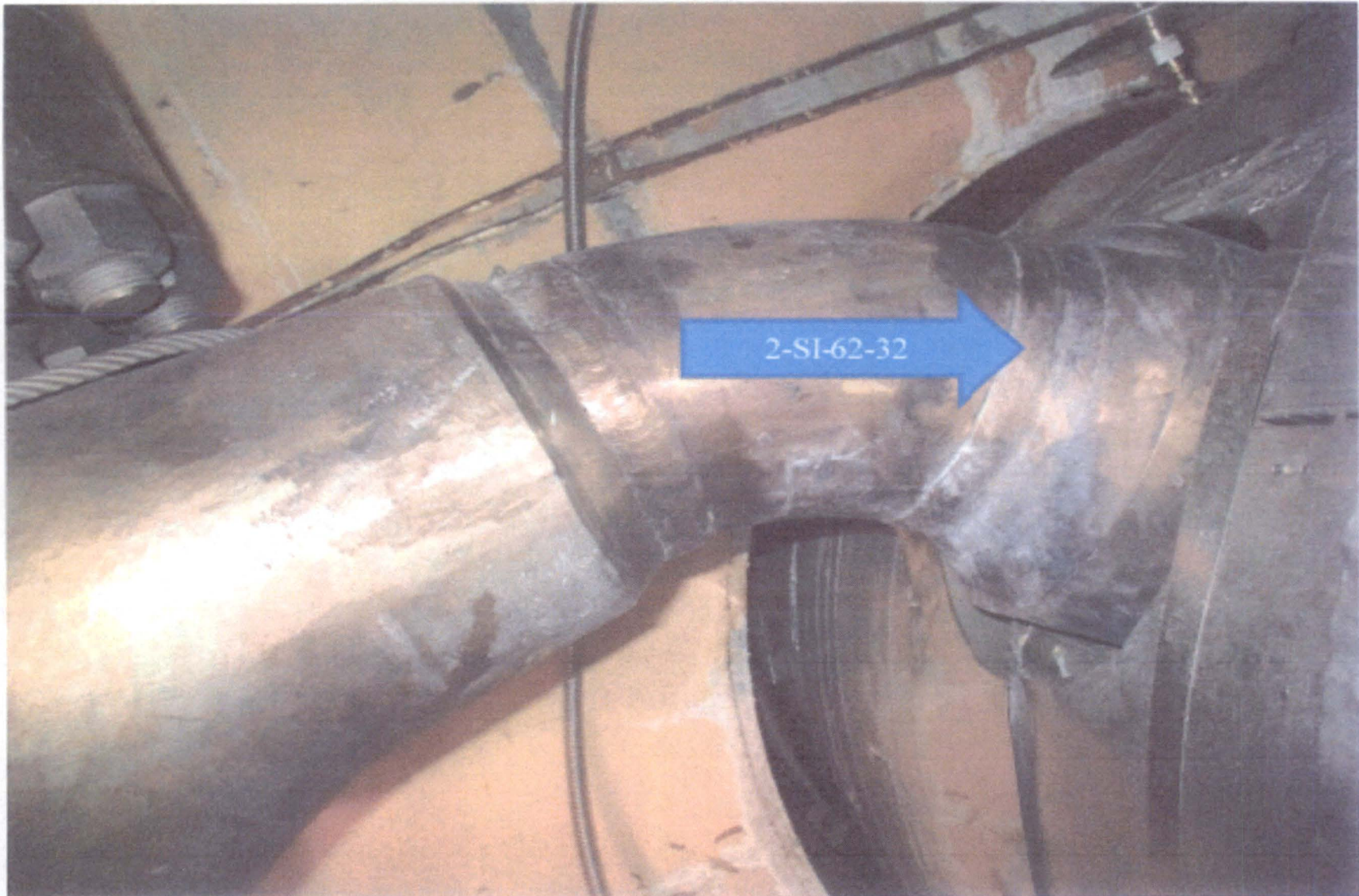
**1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection**

<b>Examination Performed</b>	<b>Length of Exam</b>	<b>Required Exam Area</b>	<b>Achieved Exam Area</b>	<b>Coverage Achieved</b>
<b>Upstream Axial</b>	<b>21.25"</b>	<b>0.2678 in<sup>2</sup></b>	<b>0.2678 in<sup>2</sup></b>	<b>100%</b>
<b>Upstream Axial for Downstream Volume</b>	<b>21.25"</b>	<b>0.2678 in<sup>2</sup></b>	<b>0.0898 in<sup>2</sup></b>	<b>33.5% (Note 1)</b>
<b>Clockwise</b>	<b>21.25"</b>	<b>0.5356 in<sup>2</sup></b>	<b>0.2678 in<sup>2</sup></b>	<b>50%</b>
<b>Counterclockwise</b>	<b>21.25"</b>	<b>0.5356 in<sup>2</sup></b>	<b>0.2678 in<sup>2</sup></b>	<b>50%</b>
<b>Code Required Coverage Achieved</b>				<b>50%</b>
<b>Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume</b>				

**Table 1.41-1 Weld 2-SI-62-32 Coverage Calculation Results**



**1.41 Weld 2-SI-62-32 Safety Injection Elbow to Branch Connection**



**Figure 1.41-6 Weld 2-SI-62-32 Component Photograph**

#### **1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection**

Weld 2-CS-120-13 was UT examined in Inspection Period 3, during the U2C25 refueling outage in 2019. The NDE data came from UT Report No. U2-VE-19-004. No previous ISI UT data was identified for review.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-8(c). The corresponding CRV as shown on that Figure is C-D-E-F. The UT examination was limited due to the configuration of the branch connection. The examination resulted in total UT coverage of **50%** as described in Figures 1.42-2, 1.42-3, 1.42-4, 1.42-5, and Table 1.42-1. A photograph of weld 2-CS-120-13 is provided in Figure 1.42-7.

One recordable indication was detected during this examination. The indication was determined to be metallurgical indication beam "re-direct" and found to be acceptable (see Figure 1.42-6).

The ultrasonic examination was performed in accordance with Code Case N-716-1 as approved by the Nuclear Regulatory Commission (NRC) under the Regulatory Guide 1.147 Rev. 18.

The examination satisfied the requirements of Appendix VIII and Supplement 2 with qualified personnel, procedures and equipment to the 2001 Edition of Appendix VIII as conditioned by 10 CFR 50.55a(b)(2)(xv).



# 1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection

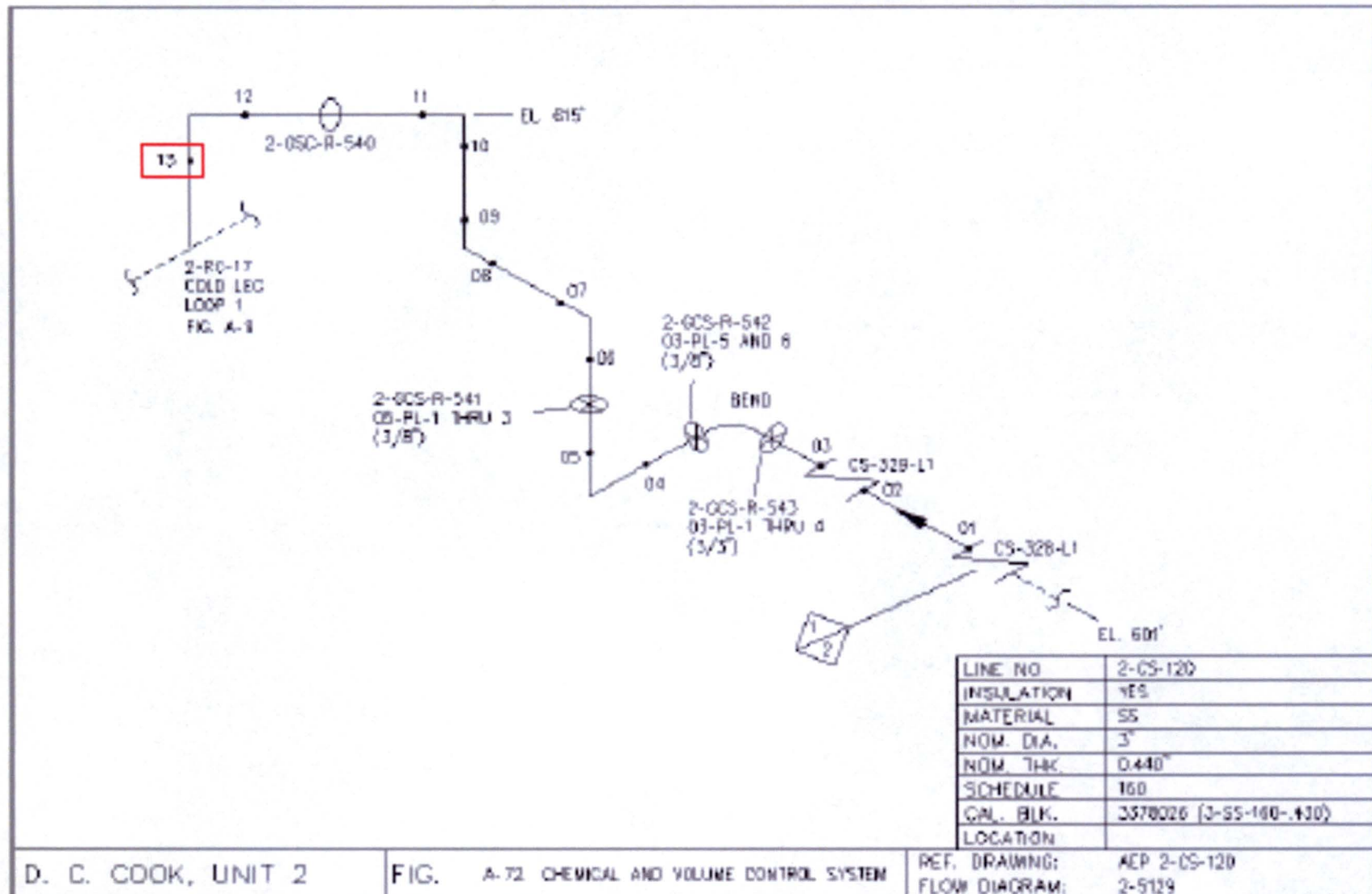
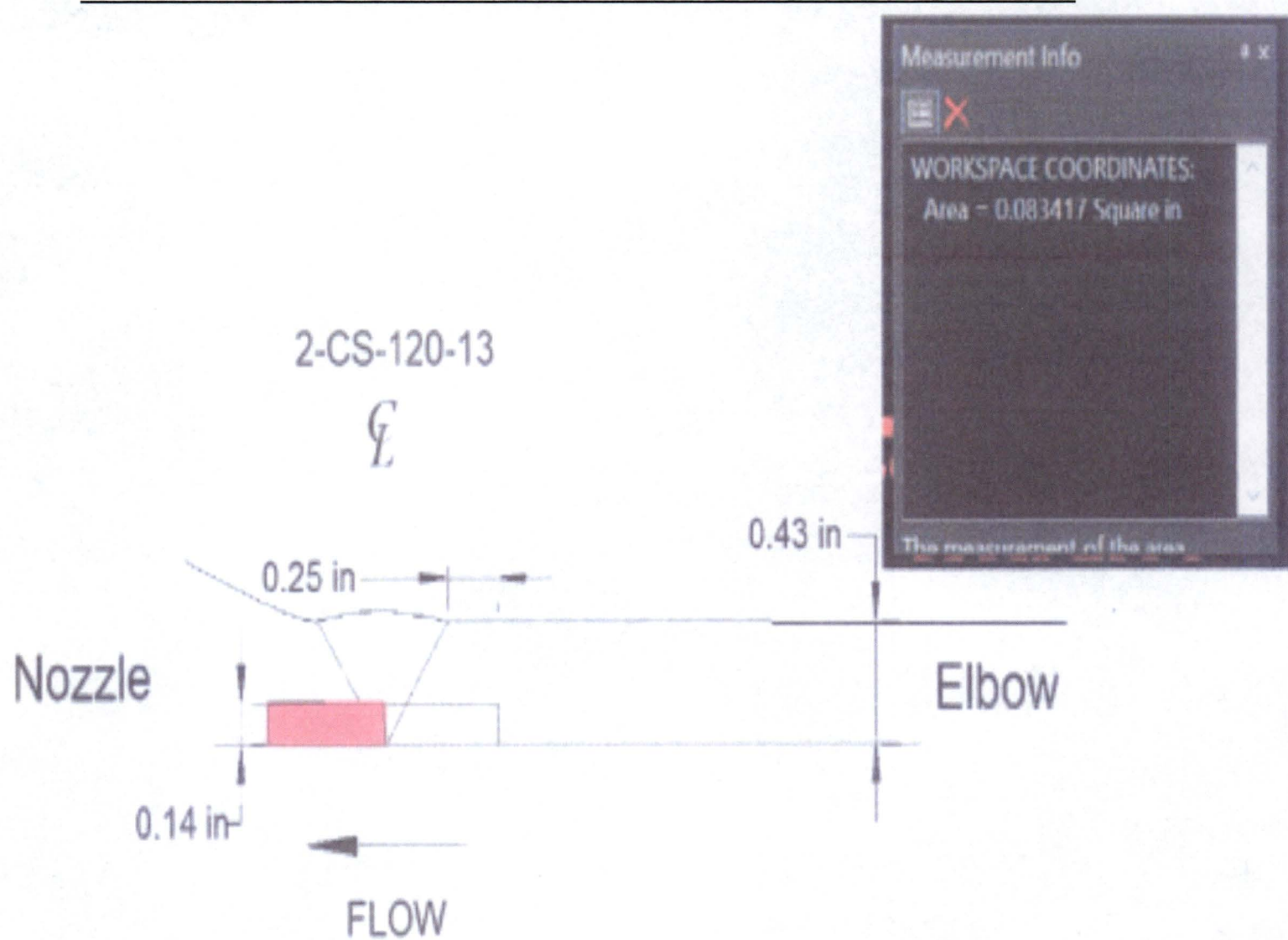


Figure 1.42-1 Weld 2-CS-120-13 (Extracted from Reference DRAWING 2A-72)



**1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection**



**Figure 1.42-2 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Required**

1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection

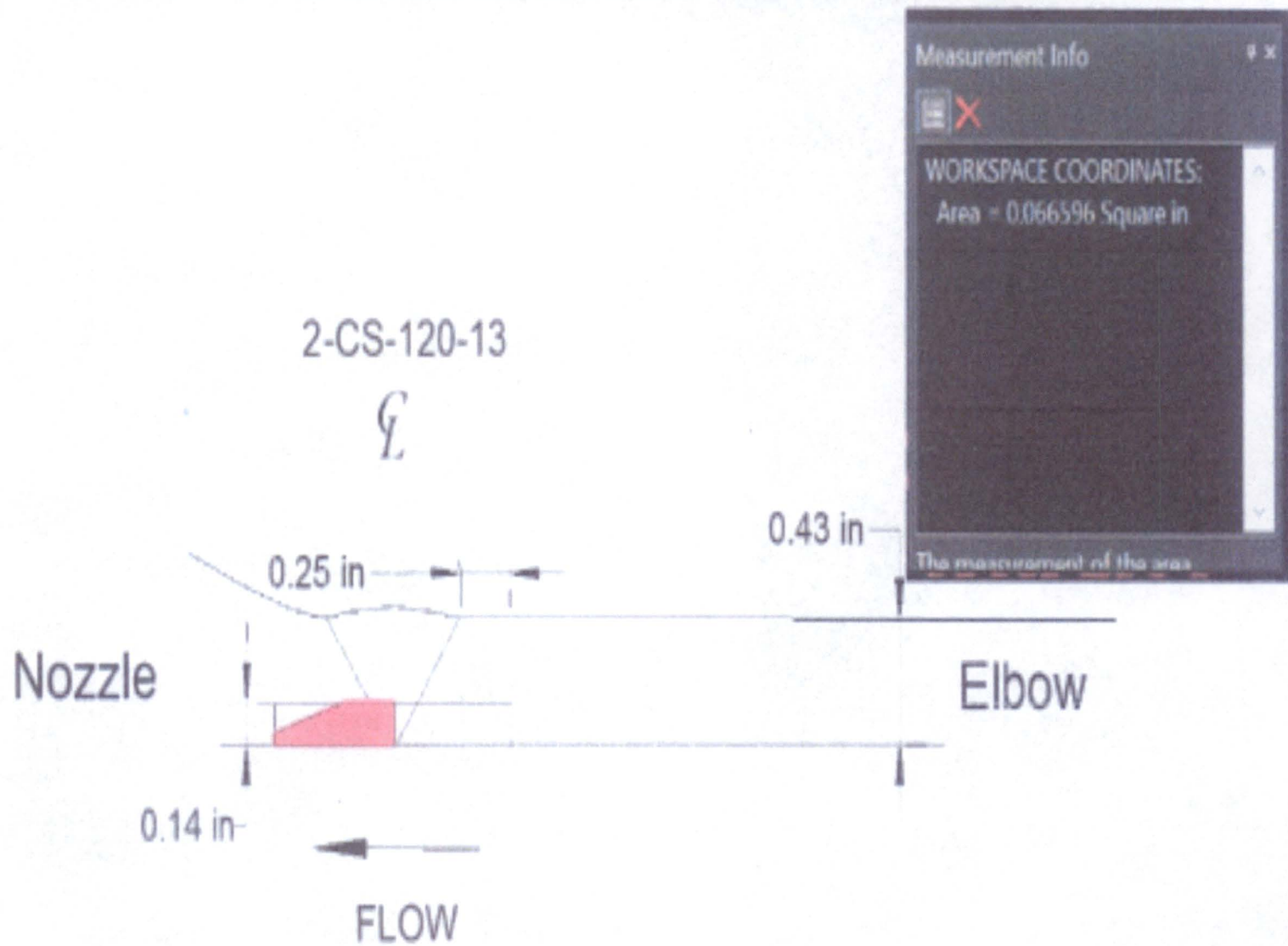


Figure 1.42-3 Phased Array Ultrasonic Examination Coverage Assessment Downstream Coverage Achieved

1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection

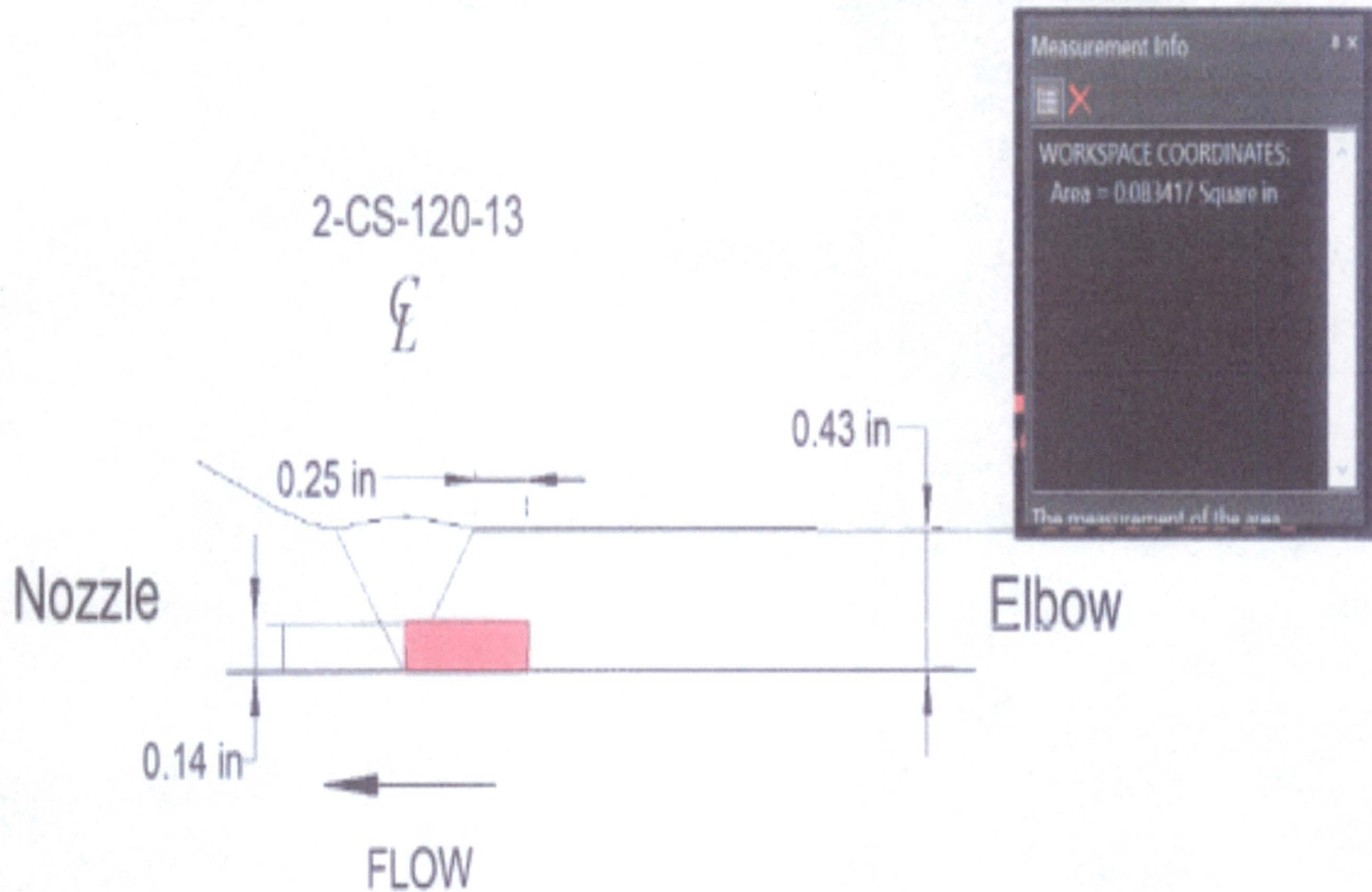
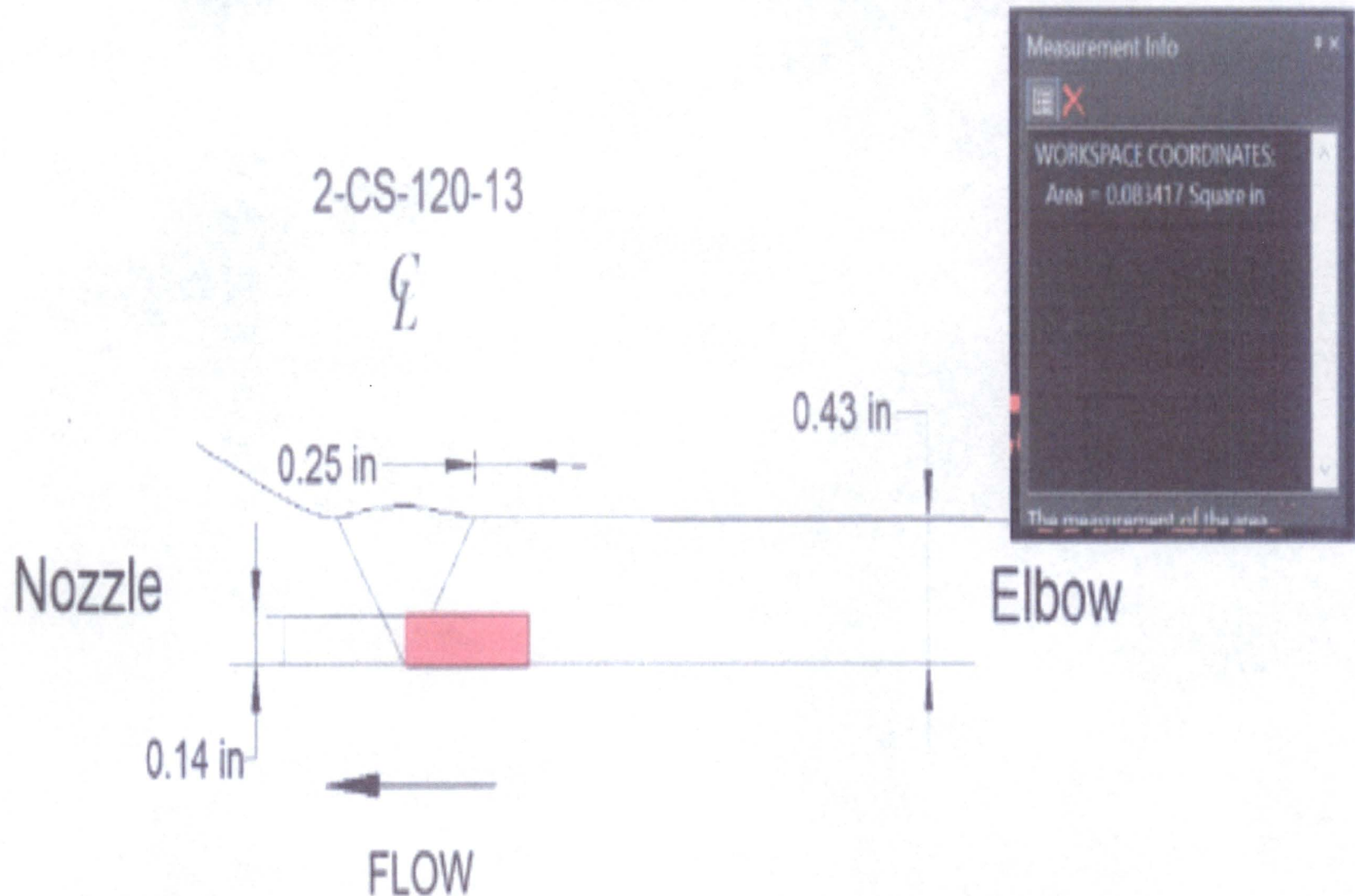


Figure 1.42-4 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Required



**1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection**



**Figure 1.42-5 Phased Array Ultrasonic Examination Coverage Assessment Upstream Coverage Achieved**

**1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection**

Examination Performed	Length of Exam	Required Exam Area	Achieved Exam Area	Coverage Achieved
Upstream Axial	11.0"	0.1194 in <sup>2</sup>	0.1194 in <sup>2</sup>	100%
Upstream Axial for Downstream Volume	11.0"	0.1194 in <sup>2</sup>	0.0661 in <sup>2</sup>	55.3% (Note 1)
Clockwise	11.0"	0.2388 in <sup>2</sup>	0.1194 in <sup>2</sup>	50%
Counterclockwise	11.0"	0.2388 in <sup>2</sup>	0.1194 in <sup>2</sup>	50%
Code Required Coverage Achieved				50%
Note 1: Far side volume coverage is considered "Best Effort" and is not included in coverage calculation of Code required volume				

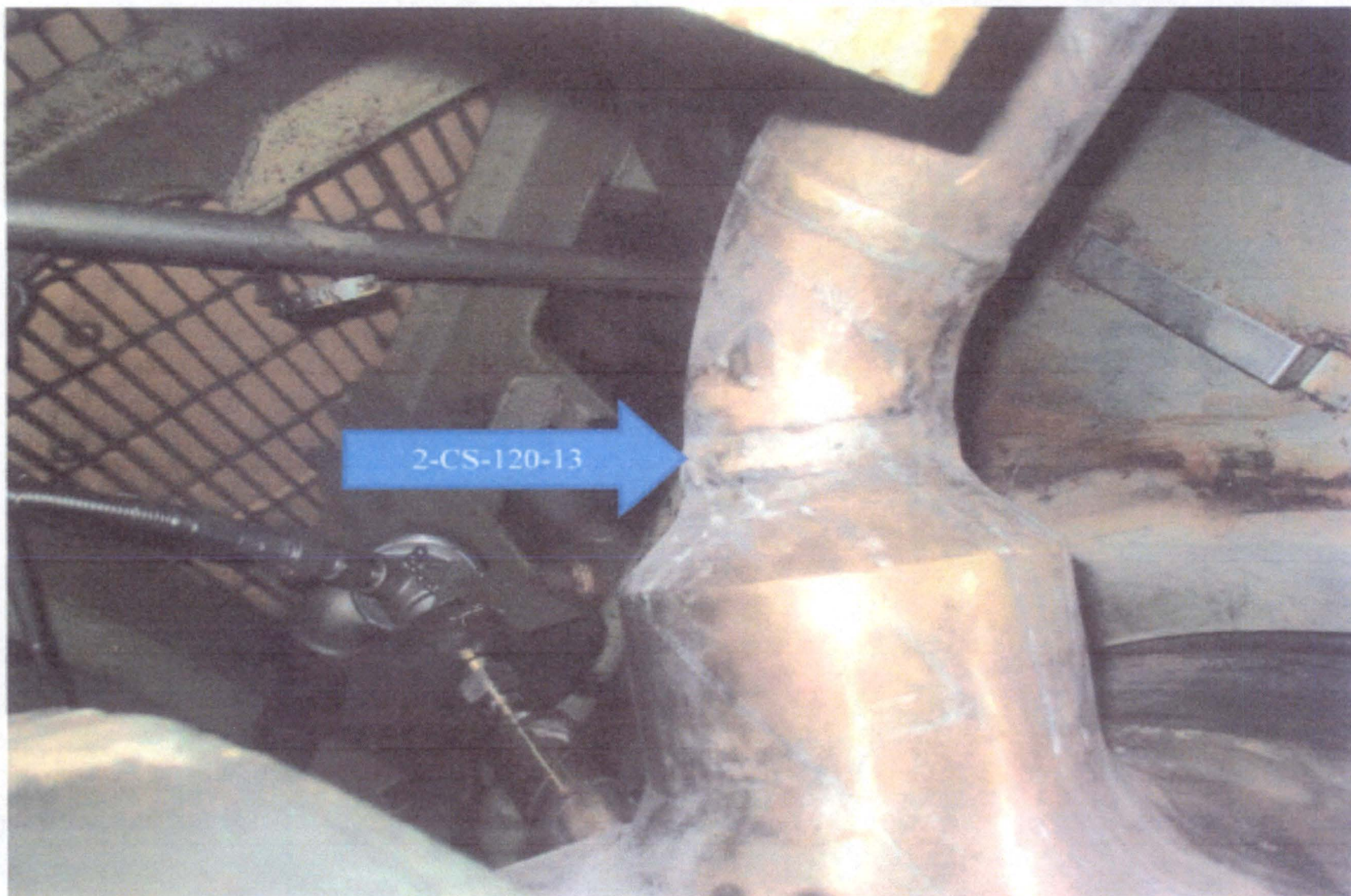
**Table 1.42-1 Weld 2-CS-120-13 Coverage Calculation Results**

$\mathcal{L}$ 

**Figure 1.42-6 Weld 2-CS-120-13 Indication Plot**



**1.42 Weld 2-CS-120-13 Chemical and Volume Control Elbow to Branch Connection**



**Figure 1.42-7 Weld 2-CS-120-13 Component Photograph**

#### **1.43 Weld 14"-2-RC-21 Pressurizer Lower Head Surge Nozzle-to-Vessel Weld**

Weld 14"-2-RC-21 was UT examined in Inspection Period 2 during the U2C21 refueling outage in 2013. The NDE data came from UT Report No. U2-VE-13-020. Previous ISI UT data was not documented as reviewed.

The UT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-7(b). The corresponding CRV as shown on that Figure is A-B-C-D-E-F-G-H. The UT examination was limited by the configuration of the Nozzle-to-Shell and adjacent heater sleeves resulting in total UT coverage of **65.2%** as described in Figure 1.43-2, Figure 1.43-3 and Table 1.43-1. A photograph of weld 14"-2-RC-21 is provided in Figure 1.43-4.

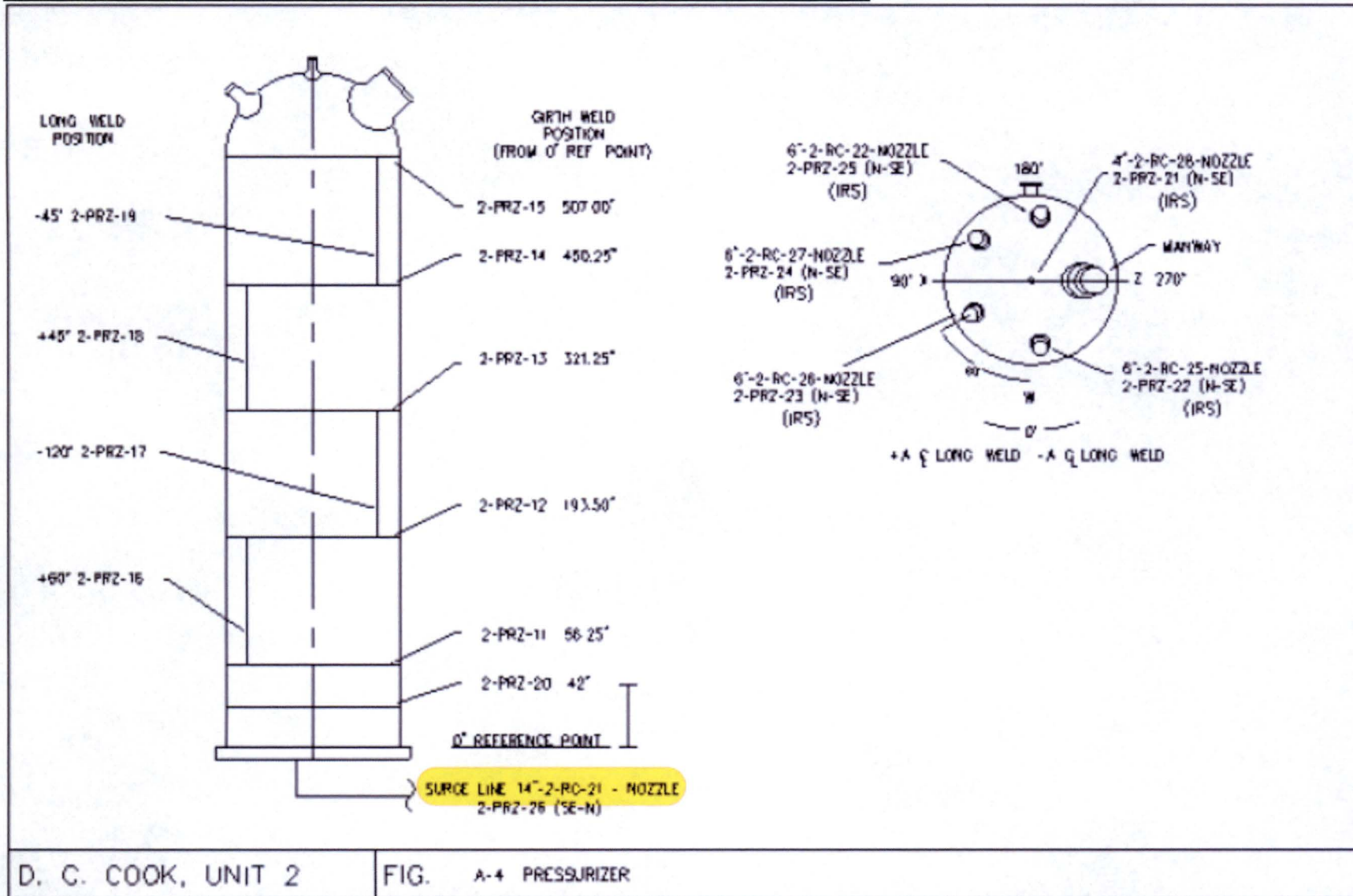
No recordable indications were detected during this scan.

Section XI Appendices and Supplements used for this UT examination were Appendix I and Article 4 of ASME Section V.

**Note:** No laminations were reported on the Pressurizer Lower Head that could interfere with the angle beam examinations performed on Weld 14"-2-RC-21.



### 1.43 Weld 14"-2-RC-21 Pressurizer Lower Head Surge Nozzle-to-Vessel Weld



D. C. COOK, UNIT 2

FIG. A-4 PRESSURIZER

Figure 1.43-1 Weld 14"-2-RC-21 (Extracted from Reference DRAWING 2A-4)



# 1.43 Weld 14"-2-RC-21 Pressurizer Lower Head Surge Nozzle-to-Vessel Weld

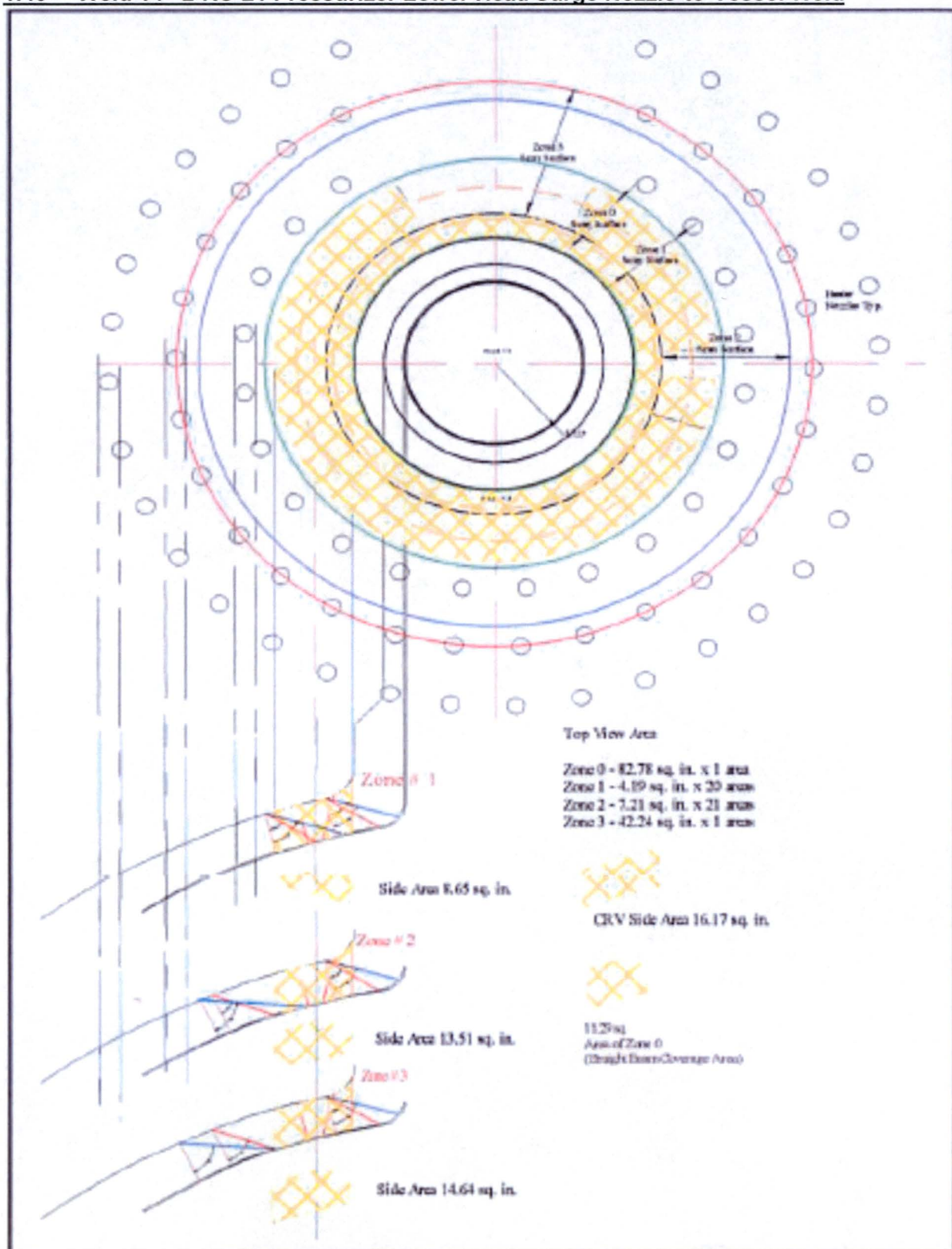


Figure 1.43-2 Weld 14"-2-RC-21 Coverage Plot

1.43 Weld 14"-2-RC-21 Pressurizer Lower Head Surge Nozzle-to-Vessel Weld

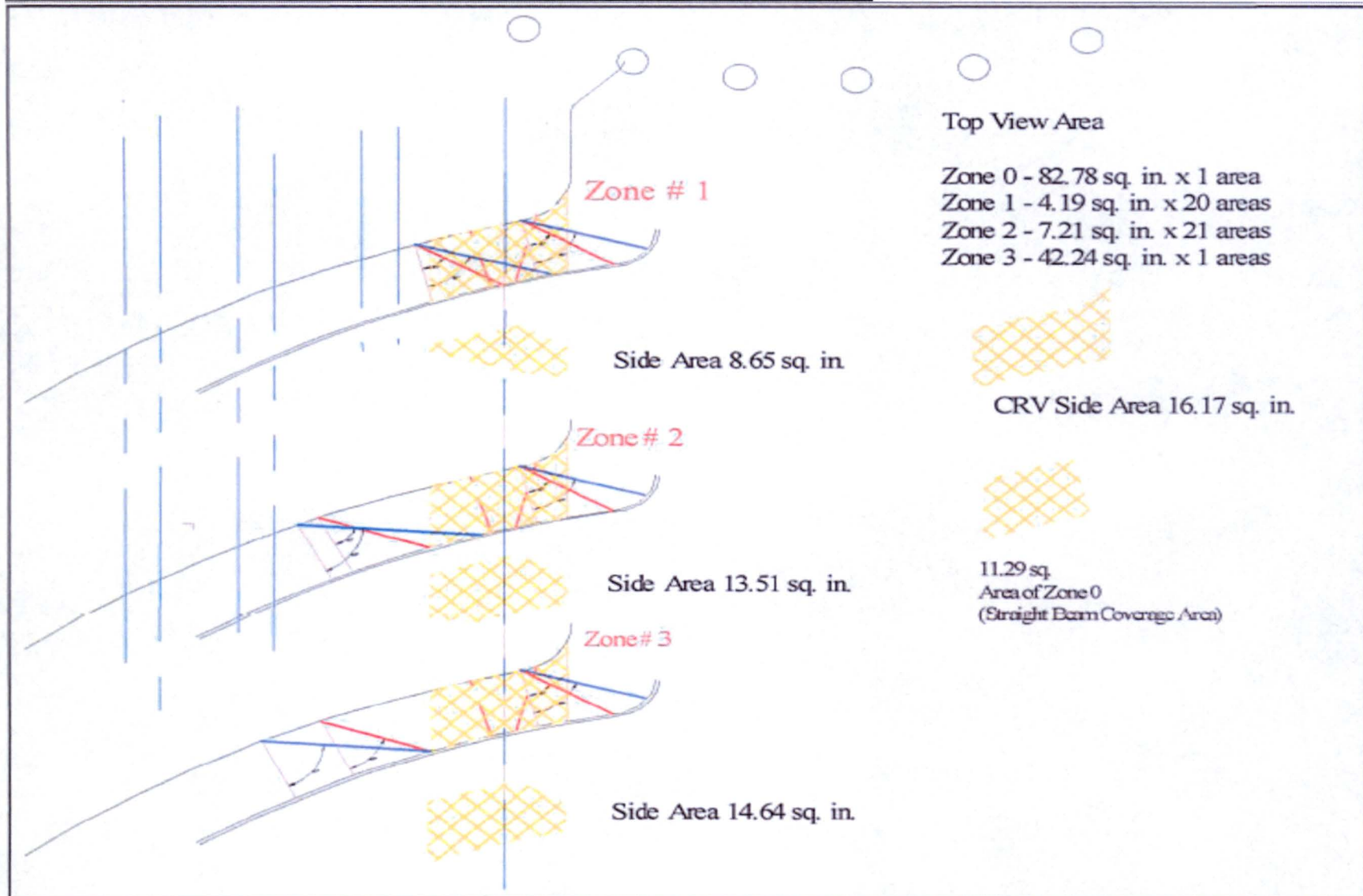


Figure 1.43-3 Weld 14"-2-RC-21 Coverage Plot



**1.43 Weld 14"-2-RC-21 Pressurizer Lower Head Surge Nozzle-to-Vessel Weld**

Side View Area = 16.17 sq. in. x Top View Area = 76.0" sq. in.

$$(16.17 \times 76)$$

**Total Volume = 1228.92 cu. in.**

		Side View Areas Area			Top View Areas					
Zones		Exam Area Achieved/Total Area = Exam % Achieved			Area x Tk x # Areas = Exam Area Achieved					Zone Area Achieved cu. in.
		Exam Areas Achieved	Side View Area		Areas in Sq. In.	Tk	# Areas			
Zone 0		11.29	16.17		82.78	3"	1			
		Exam % Achieved		69.8%	x	Exam Area Achieved		248.34	=	173.34
Zone 1		8.65	16.17		4.19	3"	20			
		Exam % Achieved		53.4%	x	Exam Area Achieved		251.40	=	134.24
Zone 2		13.51	16.17		7.21	3"	21			
		Exam % Achieved		83.5%	x	Exam Area Achieved		454.23	=	379.28
Zone 3		14.64	16.17		42.24	3"	1			
		Exam % Achieved		90.5%	x	Exam Area Achieved		126.72	=	114.68
										801.54

$$801.54/1228.92 = 65.2\% \text{ of CRV}$$

**Table 1.43-1 Weld 14"-2-RC-21 Coverage Calculation Results**



**1.43 Weld 14"-2-RC-21 Pressurizer Lower Head Surge Nozzle-to-Vessel Weld**



**Figure 1.43-4 Weld 14"-2-RC-21 Component Photograph**

#### **1.44 Weld 1-PRZ-26 Pressurizer Lower Head to Support Skirt Weld**

Weld 1-PRZ-26 was MT examined in Inspection Period 2 during the U1C26 refueling outage in 2014. The NDE data came from MT Report No. U1-MT-14-001. Previous ISI MT data was reviewed.

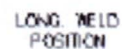
The MT Code Required Volume (CRV) was determined based on Section XI, Figure IWB-2500-14. The corresponding CRV as shown on that Figure is A-B or C-D. The surface area examined was A-B (outside diameter of weld). The MT examination was limited by an adjacent air duct resulting in total MT coverage of **88.2%** as described in Figure 1.44-2. A photograph of weld 1-PRZ-26 is provided in Figure 1.44-3.

No recordable indications were detected during this examination.

The MT examination met Section XI Paragraph IWA-2221.



#### **1.44 Weld 1-PRZ-26 Pressurizer Lower Head to Support Skirt Weld**



-44- 1-PRZ-19

+48' 1-PP2-18

-25\* 1-PRQ-17

+23' 1-PRZ-16

CIRCUIT WELD  
POSITION  
(FROM OF REF. POINT)

1-PRZ-15 570.00°

1-FRZ-14 450.38"

1-FR2-13 321.75°

1-FRZ-12 193.38

1-PRZ-11 64 38'

1-PR2-28 31.12°

0' REFERENCE POINT

SOURCE LINE (14<sup>v</sup>-1-RC-5, 1-PR2-25)]

6-1-RC-6-NOZZLE  
1-FPT-20 (N-SE)

8-1-RC-7-NOZZLE  
1-PRZ-21 (N-SE)

6-1-RC-8-NOZZLE  
1-PRZ-22 (N-SE)

4'-1-RC-10-MOZZLE  
1-PRZ-24 (N-SE)

— HANNAH

270

6'-1-RC-9-NOZZLE  
1-FRZ-23 (N-SE)

+A 5 LONG, WELD -A 6 LONG, WELD

FIG. A-4 PRESSURIZER

**Figure 1.44-1 Weld 1-PRZ-26 (Extracted from Reference DRAWING 1A-4)**



**1.44 Weld 1-PRZ-26 Pressurizer Lower Head to Support Skirt Weld**

**Pressurizer O.D. is 305.5"**

**36" of 1-PRZ-26 inaccessible due to ducting from 180 Deg to 270 Deg. MT Yoke would not fit between Duct and Pressurizer.**

$$305.5'' - 36'' = 269.5''$$

$$269.5/305.5=.8821$$

**88.2% Coverage Obtained**

**Figure 1.44-2 Weld 1-PRZ-26 Coverage Calculation**

1.44 Weld 1-PRZ-26 Pressurizer Lower Head to Support Skirt Weld

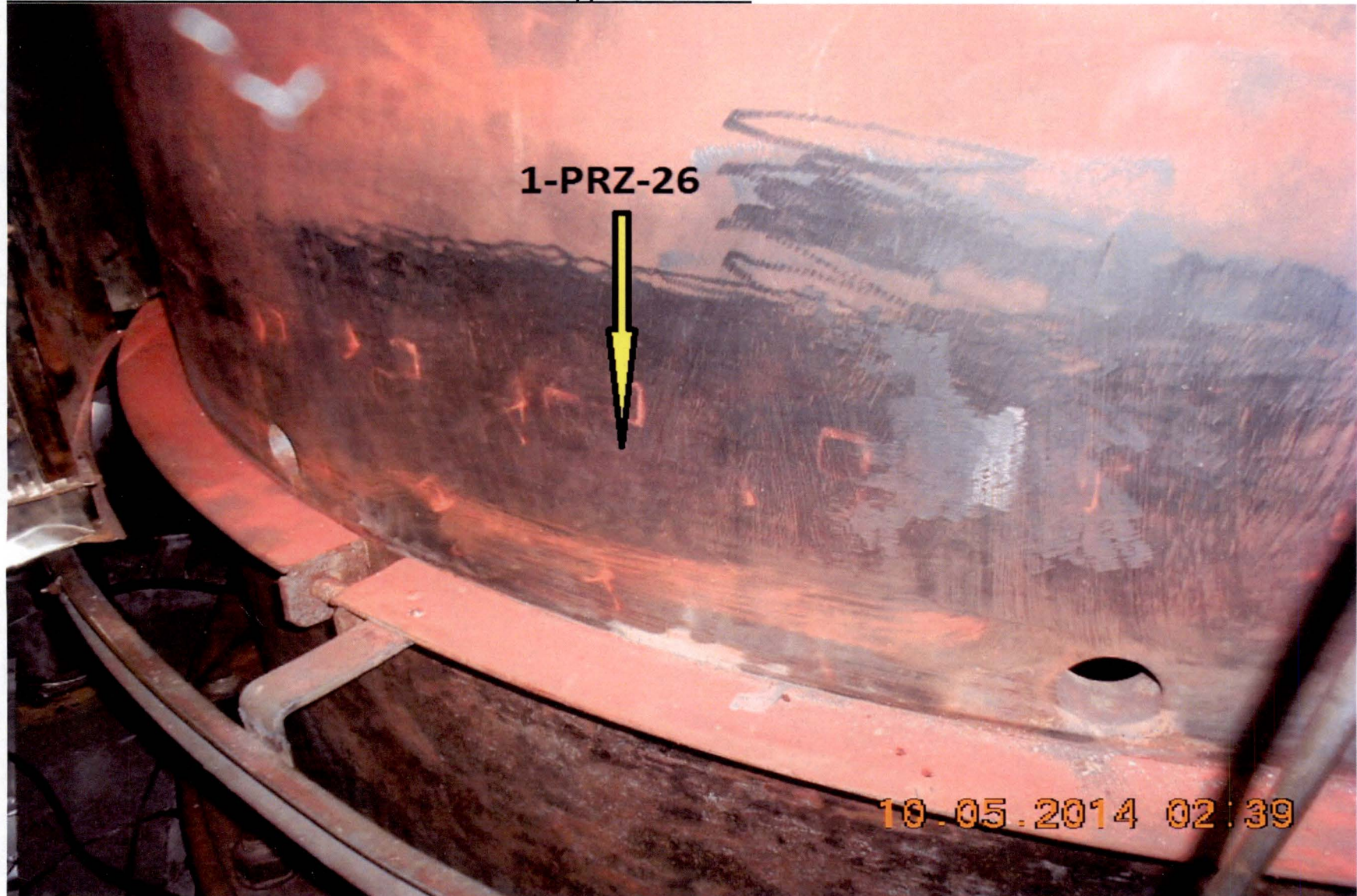


Figure 1.44-3 Weld 1-PRZ-26 Component Photograph