



1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-009

April 25, 2022

10 CFR 50.55a(g)(5)(iii)  
10 CFR 50.55a(g)(6)

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

Browns Ferry Nuclear Plant, Units 1, 2, and 3  
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68  
NRC Docket Nos. 50-259, 50-260, and 50-296

Sequoyah Nuclear Plant, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 50-328

Watts Bar Nuclear Plant, Units 1 and 2  
Facility Operating License Nos. NPF-90 and NPF-96  
NRC Docket Nos. 50-390 and 50-391

Subject: **Request for Relief from American Society of Mechanical Engineers Boiler & Pressure Vessel Code, Section XI, In Accordance with 10 CFR 50.55a(g)(5)(iii)**

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards," paragraphs (g)(5)(iii) and (g)(6), Tennessee Valley Authority (TVA) is submitting for Nuclear Regulatory Commission (NRC) approval, requests for relief for the Browns Ferry Nuclear Plant, Units 1, 2, and 3; Sequoyah Nuclear Plant, Units 1 and 2; and Watts Bar Nuclear Plant, Units 1 and 2; from the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC), Section XI, examination requirements for Tables IWB-2500-1, Category B-D, IWC-2500-1, Categories C-A and C-B, and N-716-1, Category R-A, as identified in Enclosures 1, 2, and 3 to this letter.

Specifically, TVA requests relief for the welds listed in these requests from Code requirements of achieving essentially 100 percent examination coverage. ASME BPVC, Section XI, IWA-2200(c) states that when the entire volume or surface area cannot be examined due to interference by another component or part geometry, essentially 100 percent coverage is achieved when the applicable examination coverage is greater than 90 percent. The

component examinations in the scope of these relief requests are those for which greater than 90 percent of the required examination volume or surface area could not be achieved. The enclosures to this letter provide relief requests BFN-0-ISI-31, SQN-19-ISI-1, and WBN-19-ISI-1, which request relief from the requirements of the ASME BPVC, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," ASME Code Classes 1 and 2. The relief requests provide information to support the determination that achieving essentially 100 percent coverage of the listed welds is impractical.

TVA requests approval of this request for relief within one year of the date of this letter.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Stuart L. Rymer, Senior Manager, Fleet Licensing, at [slrymer@tva.gov](mailto:slrymer@tva.gov).

Respectfully,

 Digitally signed by Rymer, Stuart  
for  
Loveridge  
Date: 2022.04.25 15:34:33 -04'00'

James T. Polickoski  
Director, Nuclear Regulatory Affairs

Enclosures:

1. Browns Ferry Nuclear Plant, Units 1, 2, and 3, American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI, Request for Relief Number BFN-0-ISI-31
2. Sequoyah Nuclear Plant, Units 1 and 2, American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI, Request for Relief Number SQN-19-ISI-1
3. Watts Bar Nuclear Plant, Units 1 and 2, American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI, Request for Relief Number WBN-19-ISI-1

cc: (without Enclosures):

NRC Regional Administrator - Region II  
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant  
NRC Senior Resident Inspector - Sequoyah Nuclear Plant  
NRC Senior Resident Inspector - Watts Bar Nuclear Plant  
NRC Project Manager - Browns Ferry Nuclear Plant  
NRC Project Manager - Sequoyah Nuclear Plant  
NRC Project Manager - Watts Bar Nuclear Plant

**Enclosure 1**

**Browns Ferry Nuclear Plant, Units 1, 2, and 3**

**American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI**

**Request for Relief Number BFN-0-ISI-31**

## Browns Ferry Nuclear Plant, Units 1, 2, and 3

### American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI

#### Request for Relief Number BFN-0-ISI-31

#### **Introduction**

This request, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii) and (g)(6), is applicable to examinations performed during the Browns Ferry Nuclear Plant (BFN) Unit 1 first period of the third interval, BFN Unit 2 first period of the fifth interval, and BFN Unit 3 first period of the fourth interval, for which limited examination coverage was obtained. For all three units, the first period ended on January 31, 2019. This enclosure contains the figures and tables that depict the limitations and calculations used to determine obtained-coverage, materials and product forms, ultrasonic examination angles and wave modes used, and the examination results for the welds associated with this request for relief, including any applicable previous examination history used. The following tables (Tables 1, 2, and 3 for BFN Units 1, 2, and 3, respectively) identify the welds within the scope of this request and summarize the extent of examination coverage achieved for each weld.

Frequently, ultrasonic testing (UT) scan numbers were used in the original nondestructive examination (NDE) data sheets to determine and describe the examinations performed and coverage percentages obtained. In the detailed examination data that follows, UT scan number identifiers have been omitted for clarity, and replaced with specific descriptions of weld configurations and scan directions. When referring to NDE datasheets, the scan numbers, if used, have been applied as described in Figure I-1 for Piping and Figure I-2 for Vessels.

#### **I. ASME Code Components Affected**

The BFN Units 1, 2, and 3, Class 1 and 2 welds with limited examinations requiring relief during the first period of the applicable 10-year inservice inspection (ISI) interval are listed in Table 1, Table 2, and Table 3 of this enclosure. The content of this request includes the insights gained from guidance provided in Nuclear Regulatory Commission (NRC) presentation, "Coverage Relief Requests," Reference 1. The following Code Classes, Examination Categories, and Item Numbers apply.

Code Classes:	1 and 2
Examination Categories:	B-D and R-A
Item Numbers:	B3.90, R1.16, and R1.20

#### **II. Applicable Code Edition and Addenda**

During the Unit 1 third 10-year ISI interval, the Unit 2 fifth 10-year ISI interval, and the Unit 3 fourth 10-year ISI interval, the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC) of Record (Code) is ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2007 Edition through 2008 Addenda, as modified by 10 CFR 50.55a, "Codes and Standards." The Appendix VIII requirements and use of the performance demonstration initiative (PDI) requirements at BFN were in accordance



with the 2007 Edition through 2008 Addenda of Section XI, as modified by 10 CFR 50.55a for the limited examinations contained in this request.

For all three units, the first period of the current 10-year ISI interval ended on January 31, 2019. The limited examinations contained in this request are required to be submitted to the NRC within 12 months of the end of the current interval, currently scheduled for January 31, 2026.

### III. Applicable Code Requirements

In accordance with 10 CFR 50.55a(g)(5)(iii) and (g)(6), Tennessee Valley Authority (TVA) is requesting relief from weld examination coverage requirements specified in the ASME BPVC, Section XI for the following examination categories.

Exam Cat.	Item No.	Class 1 Weld Examination Coverage Requirements
B-D	B3.90	100% examination of the reactor vessel nozzle-to vessel welds per Code Case N-613-1 Figure 1.

Exam Cat.	Item No.	Class 1 and Class 2 Piping Welds / Risk-Informed Inservice Inspection Program Coverage Requirements
R-A	R1.16	100% examination per figure IWB-2500-8(c) or IWB-2500-9, -10, -11, as applicable, plus an additional $\frac{1}{2}$ " beyond the base metal thickness transition or counterbore.
	R1.20	100% examination per figure IWB-2500-8(c) or IWB-2500-9, -10, -11, as applicable.

ASME Section XI, IWA-2200(c) states that when performing VT-1 surface, radiographic, or ultrasonic examination on a component with defined surface or volume, essentially 100 percent of the required surface or volume shall be examined. Essentially 100 percent coverage is achieved when the applicable examination coverage is greater than 90 percent. The component examinations in the scope of this relief request are those for which greater than 90 percent of the required examination volume or surface area could not be achieved.

#### Limited Class 1 Nozzle Welds

Examinations performed per Table IWB-2500-1, Examination Category B-D, "Full Penetration Welded Nozzles in Vessels," Item No. B3.90, "Reactor Vessel Nozzle-to-Vessel Welds," encountered limitations on various nozzle to vessel welds on each unit. These welds included Reactor Water Recirculation Outlet (N1), Reactor Water Recirculation Inlet (N2), Steam Outlet (N3), Core Spray (N5), Head Spray (N6), Vent (N7), Jet Pump (N8), Control Rod Drive (N9), and Standby Liquid Control (N10) nozzles. The welds were examined to meet the applicable volumetric requirements depicted in Figure IWB-2500-7. Limited UT examinations have been determined to exist by demonstrated experience as documented below when performing examinations of these nozzle welds.

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

Class 1 piping welds were selected for examination under the BFN Risk-Informed Inservice Inspection (RI-ISI) Program in accordance with ASME Code Case N-716-1 (Reference 2).

During performance of these Category R-A Risk-Informed ISI piping examinations, coverage limitations were encountered on the following two components:

- R-A R1.16, 12-inch Pipe to Valve weld in the Core Spray System on Unit 2
- R-A R1.20, 6-inch Pipe to Valve weld in the Reactor Water Cleanup System on Unit 3

#### **IV. Reason for Request**

Pursuant to 10 CFR 50.55a(g)(5)(iii) and (g)(6), TVA has determined that compliance with the code requirements of achieving essentially 100 percent coverage of the welds listed in this request is impractical. 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. Impracticality of Compliance**

The construction permit applications for BFN Unit 1 and Unit 2 were issued on May 10, 1967. The construction permit application for BFN Unit 3 was issued on July 31, 1968. All three units fall under the provisions of 10 CFR 50.55a(g)(1). Under these provisions, Code Class 1 and 2 components and their supports need not meet the design and access provisions of ASME Section XI.

The design of BFN Units 1, 2, and 3 provide access for examinations to the extent practical. However, component design configurations with conditions resulting in examination limitations (for example, those from support interference, geometric configurations of welds and materials such as fitting 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. Therefore, this relief request addresses those conditions. Details of examination restrictions and reductions in required examination coverage are provided in Table 1, Table 2, and Table 3 of this enclosure.

When examined, the welds listed in this enclosure of this request did not receive the required code volume coverage due to their component design configurations or interference by other items. These conditions resulted in scanning access limitations that prohibited obtaining essentially 100 percent examination coverage (greater than 90 percent) of the required examination volumes. When this situation occurred, 100 percent of the accessible volumes of each weld were covered to the extent practicable.

Every weld was examined as required by applicable procedures and regulations to the extent practicable. In those cases where UT examinations could potentially have interrogated additional area, such as the inside surface of cast stainless valves by looking through a stainless steel weld, these were considered a best effort examination. These are shown on the figures in the attachment to this enclosure by the represented angles. However, no additional coverage is credited.

#### **Burden Caused by Compliance**

For each weld in the scope of this request, it is not possible to obtain UT interrogation of greater than 90 percent of the required code examination volume or surface areas without extensive weld or component design modifications. Examinations have been performed to the maximum

extent possible. Using radiography as an alternative would result in numerous work-related stoppages and increased radiation exposure due to the shutdown and startup of other work in the areas. The water may need to be drained from some 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.

The UT examination techniques used for welds in this request for relief were reviewed to determine if additional coverage could be achieved by improving those techniques. No improvements could be identified, and the examinations have been performed to the maximum extent possible. Therefore, TVA has determined that obtaining essentially 100 percent coverage is not feasible and is impractical without adding additional burden consisting of significant redesign work, increased radiation exposure, and/or potential damage to the plant or the component itself.

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

### Proposed Alternative

- 1) Periodic system pressure tests and VT-2 visual examinations will continue to be performed on Class 1 pressure retaining welds and items during each refueling outage in accordance with Examination Category B-P of Table IWB-2500-1.
- 2) Class 2 pressure retaining welds and items will continue to receive system pressure tests and VT-2 visual examinations during each inspection period in accordance with Examination Category C-H of Table IWC-2500-1.
- 3) UT examinations are conducted to the maximum extent possible using demonstrated techniques as required by ASME Section XI or the RI-ISI Programs.

### Basis for Use

Regulation 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, except design and access provisions and preservice examination requirements, set forth in the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction. This request for relief has been written to address areas where a component is found to have conditions that limit the required examination volume or surface area and, thus, the amount of coverage was reduced below the minimum acceptable. TVA has performed the weld examinations listed in this request to the maximum extent possible for each of the welds identified with limitations in the attachment to this enclosure.

Many of the welds in the scope of this request are located inside the containment. Even though their examination did not meet the essentially 100 percent Code required volume coverage requirement, each of these locations is subject to a system pressure test as described above. In addition, there is continuous monitoring instrumentation in place to assure that early detection of any reactor coolant system (RCS) pressure boundary leakage is identified. This is accomplished by monitoring of the following parameters: (a) pressure and temperature in the primary containment, (b) flow in the equipment drain sump and floor drain sump, (c) cooling

water temperature to and from the drywell coolers, and (d) drywell atmosphere for airborne activity. The unidentified leakage rate limit for BFN is based, with an adequate margin for contingencies, on the crack size large enough to propagate rapidly. The established limit is sufficiently low so that, even if the entire unidentified leakage rate were coming from a single crack in the nuclear system process barrier, corrective action could be taken before the integrity of the barrier is threatened with significant compromise. RCS leakage detection instrumentation is required to be operable by BFN Technical Specification (TS) 3.4.5, "RCS Leakage Detection Instrumentation." BFN TS 3.4.5 requires that the following RCS leakage detection instrumentation shall be operable:

- Drywell floor drain sump monitoring system; and
- One channel of either primary containment atmospheric particulate or atmospheric gaseous monitoring system.

The above instruments are used to quantify any unidentified leakage from the RCS and to meet BFN TS 3.4.4, "RCS Operational Leakage," that states that RCS operational leakage shall be limited to:

- a) No pressure boundary leakage;
- b)  $\leq$  Five gallon per minute (gpm) unidentified leakage;
- c)  $\leq$  30 gpm identified leakage; and
- d)  $\leq$  Two gpm increase in unidentified leakage within the previous 24-hour period in Mode 1.

Based upon the extent of the required UT examination volume achieved for each of the welds within this request for relief and coupled with applicable leakage monitoring and required system pressure tests with VT-2 visual examinations, no further action can be taken by TVA at this time to improve these examinations without applying impractical options. The proposed alternative in this request for relief will provide assurance of an acceptable level of quality and safety by providing reasonable assurance of structural integrity.

## **VII. Duration of Proposed Alternative**

This request for relief is for the limited coverage examinations performed during the first period of the third interval for BFN Unit 1, the first period of the fifth interval for BFN Unit 2, and the first period of the fourth interval for BFN Unit 3. The current 10-year intervals for all three units began on February 1, 2016, and are scheduled to end on January 31, 2026.

## **VIII. Precedents**

Industry requests for relief due to impracticality 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:

- NRC Letter to TVA, “Sequoyah Nuclear Plant, Units 1 and 2 - Relief Request No. 17-ISI-1 Regarding the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (CAC Nos. MF9690 and MF9691; EPID L-2017-LLR-0025),” dated January 26, 2018 (ML18008A068)
- NRC Letter to Virginia Electric & Power Company, “Surry Power Station, Unit No 2 - Requests for Relief LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, and LMT-C04 - For Limited Coverage Examinations Performed in the Fourth 10-Year Inservice Inspection Interval (CAC Nos. MF7718, MF7719, MF7720, MF7721, MF7722, MF7723, MF7724 and MF7725),” dated February 17, 2017 (ML16365A118)
- NRC Letter to Pacific Gas & Electric Company, “Diablo Canyon Power Plant, Unit No. 1 - Relief Request NDE-SIF-U1 to Allow Use of Alternate American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI Examination Requirements for the Third Inservice Inspection Interval (CAC No. MF7552),” dated July 27, 2016 (ML16207A397)
- NRC Letter to Dominion Nuclear Connecticut, Inc. “Millstone Power Station, Unit No. 2 - Relief Requests for Limited Coverage Examinations Performed in the Fourth 10-Year Inservice Inspection Interval (CAC Nos. MF6567, MF6568, and MF6569),” dated July 13, 2016 (ML16172A135)
- NRC Letter to PPL Susquehanna, LLC, “Susquehanna Steam Electric Station, Units 1 and 2 - Relief Requests for the Third 10-Year Inservice Inspection Interval (CAC NOS. MF6302, MF6303, MF6304, MF6305, MF6306, and MF6307),” dated May 10, 2016 (ML16069A199)

## **IX. References**

1. NRC presentation, “Coverage Relief Requests,” Industry and NRC NDE Technical Information Exchange Public Meeting, January 13-15, 2015 (ML15013A266).
2. ASME Code Case N-716-1, “Alternative Classification and Examination Requirements,” January 27, 2013.

FIGURE I-1 – SCANNING NOMENCLATURE IDENTIFICATION FOR PIPING

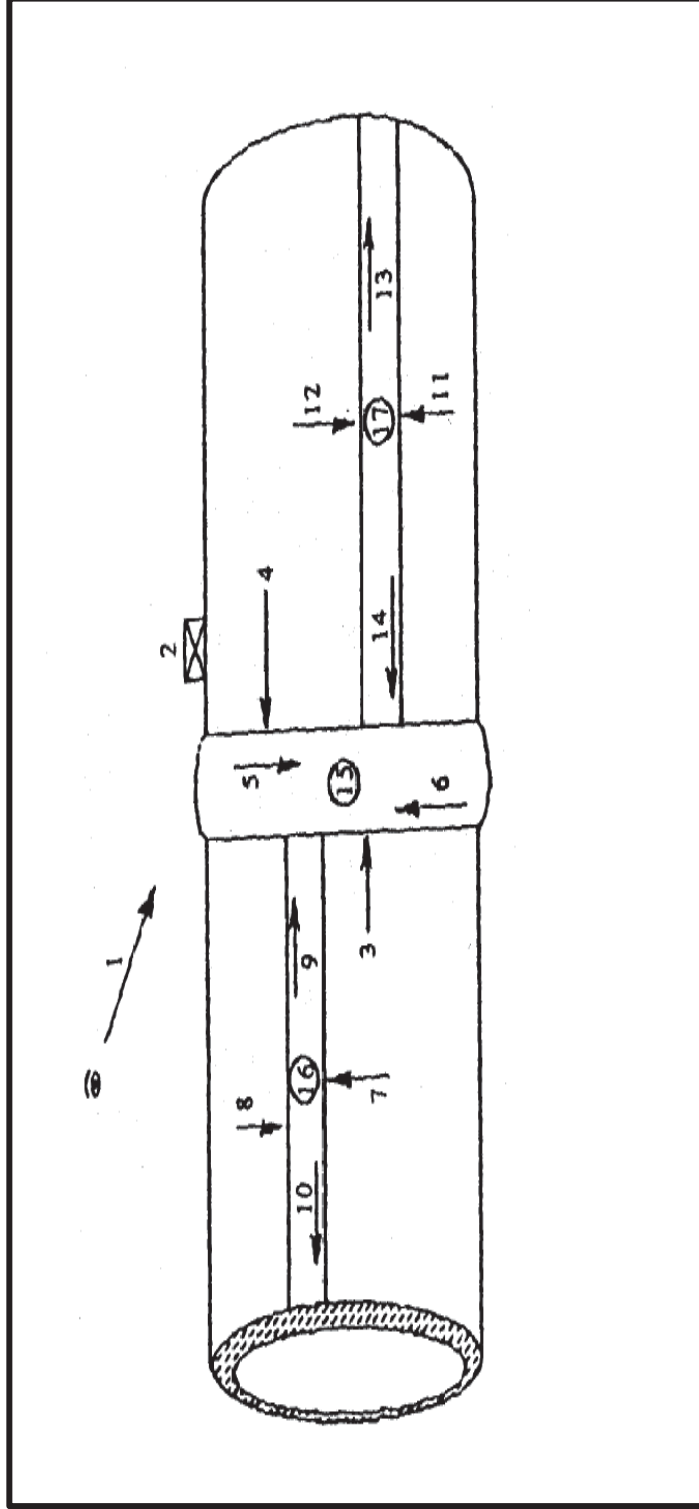


FIGURE I-2 – SCANNING NOMENCLATURE IDENTIFICATION FOR VESSELS

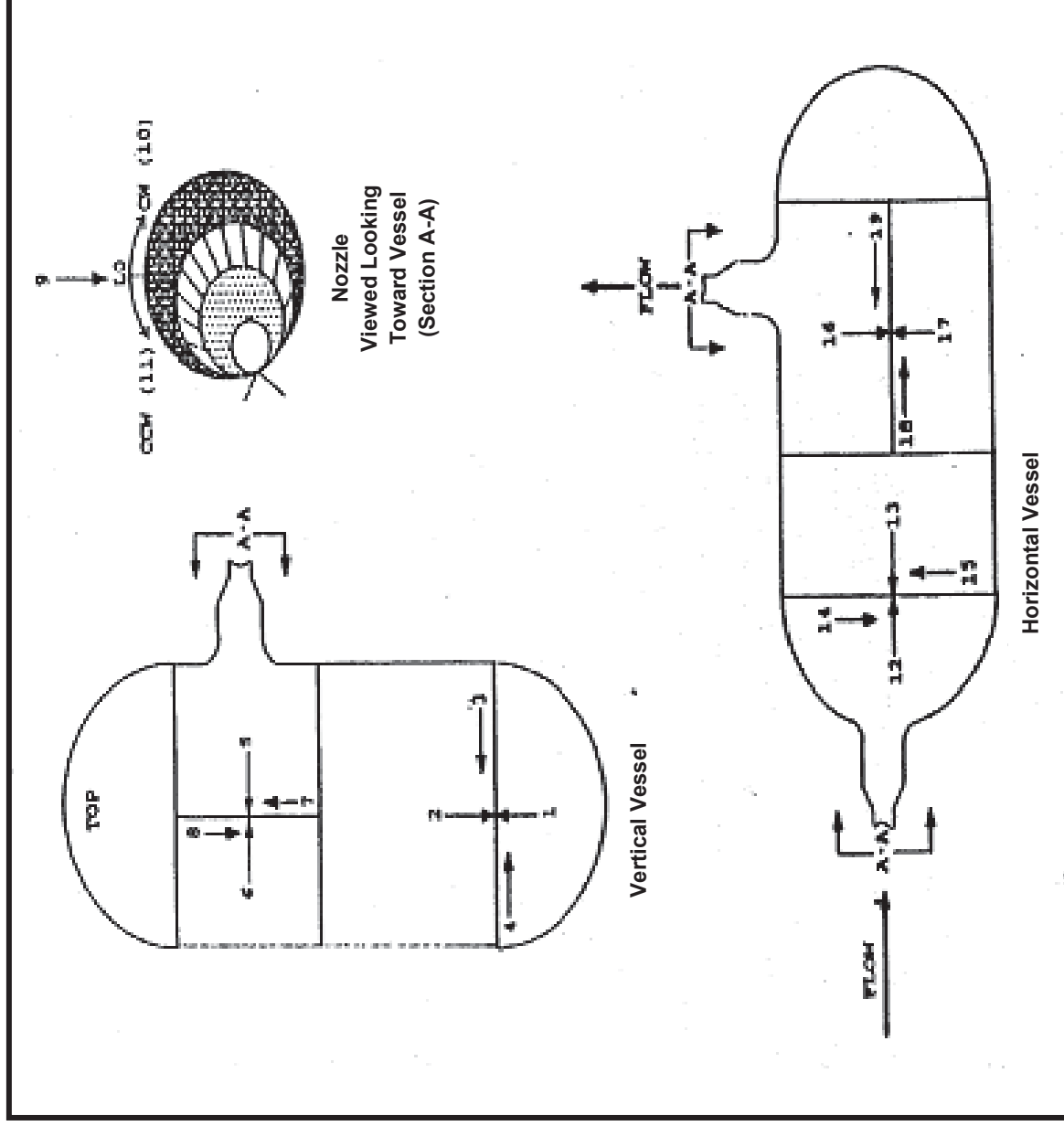


TABLE 1 – BFN UNIT 1 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained	Examination Limitations and Results	Applicable Tables and Figures
1.1 N1A-NV U1R12	1 B-D B3.90	28" Reactor Water Recirculation Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	35.6%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.1-1  Figures 1.1-1 through 1.1-5
1.2 N2D-NV U1R12	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	38.5%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.2-1  Figures 1.2-1 through 1.2-5
1.3 N2E-NV U1R12	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	38.5%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.3-1  Figures 1.3-1 through 1.3-5



TABLE 1 – BFN UNIT 1 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained	Examination Limitations and Results	Applicable Tables and Figures
1.4 N2G-NV U1R12	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	38.5%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.4-1  Figures 1.4-1 through 1.4-5
1.5 N3D-NV U1R12	1 B-D B3.90	26" Steam Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding to approx. 2'-3/4" of ext. end	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	39.9%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.5-1  Figures 1.5-1 through 1.5-5

TABLE 1 – BFN UNIT 1 WELDS WITH LIMITED EXAMINATIONS

Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained	Examination Limitations and Results	Applicable Tables and Figures
1.6 N5A-NV U1R12	1 B-D B3.90	10" Core Spray Nozzle to Shell Weld  Shell $T^{NOM} = 6.125"$ Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	26.8%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.6-1  Figures 1.6-1 through 1.6-6
1.7 N6A-NV U1R12	1 B-D B3.90	6" Head Spray Nozzle to Shell Weld  Head $T^{NOM} = 4.0"$	Nozzle: A-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: MN-MO Steel Plate	54.1%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.7-1  Figures 1.7-1 through 1.7-5
1.8 N7-NV U1R12	1 B-D B3.90	4" Vent Nozzle to Shell Weld  Head $T^{NOM} = 4.0"$	Nozzle: A-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: MN-MO Steel Plate	73.6%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.8-1  Figures 1.8-1 through 1.8-5

## Enclosure 1

### 1.1 Weld **N1A-NV** – 28" Reactor Water Recirculation Outlet Nozzle to Shell Weld

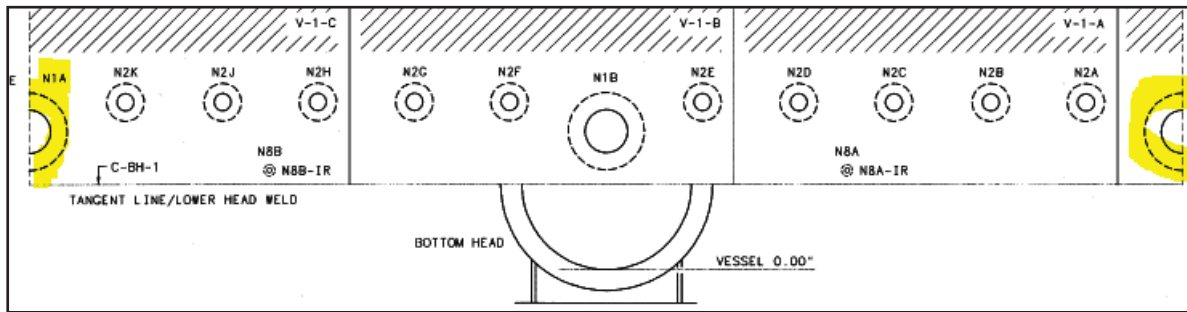


Figure 1.1-1 Weld **N1A-NV** (Extracted from Reference Drawing 1-CHM-0992-C-01)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-094. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 35.6 percent as described in Table 1.1-1 and combined with Figures 1.1-2 through 1.1-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-037 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

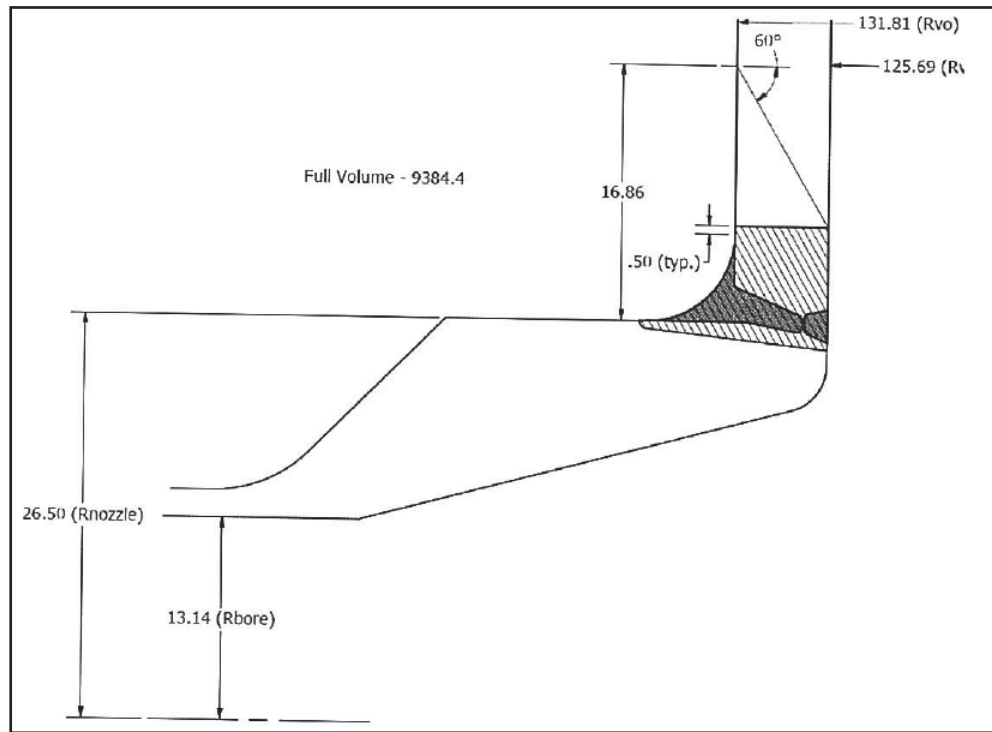


Figure 1.1-2 Weld **N1A-NV**, Full Volume Required Coverage

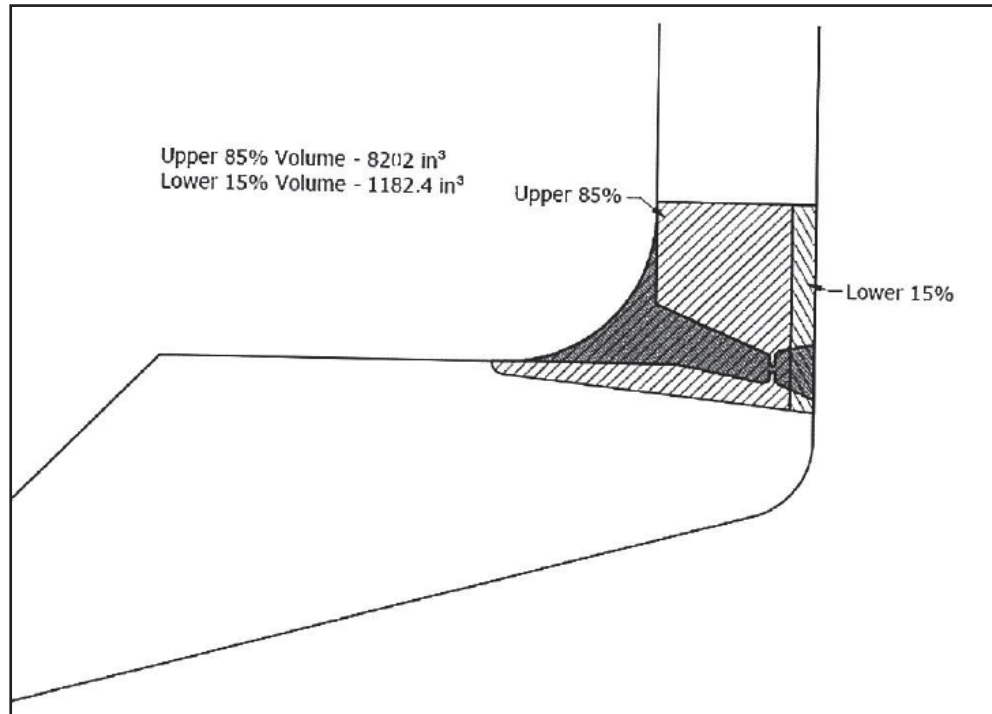


Figure 1.1-3 Weld **N1A-NV**, Upper 85% & Lower 15% Required Coverage

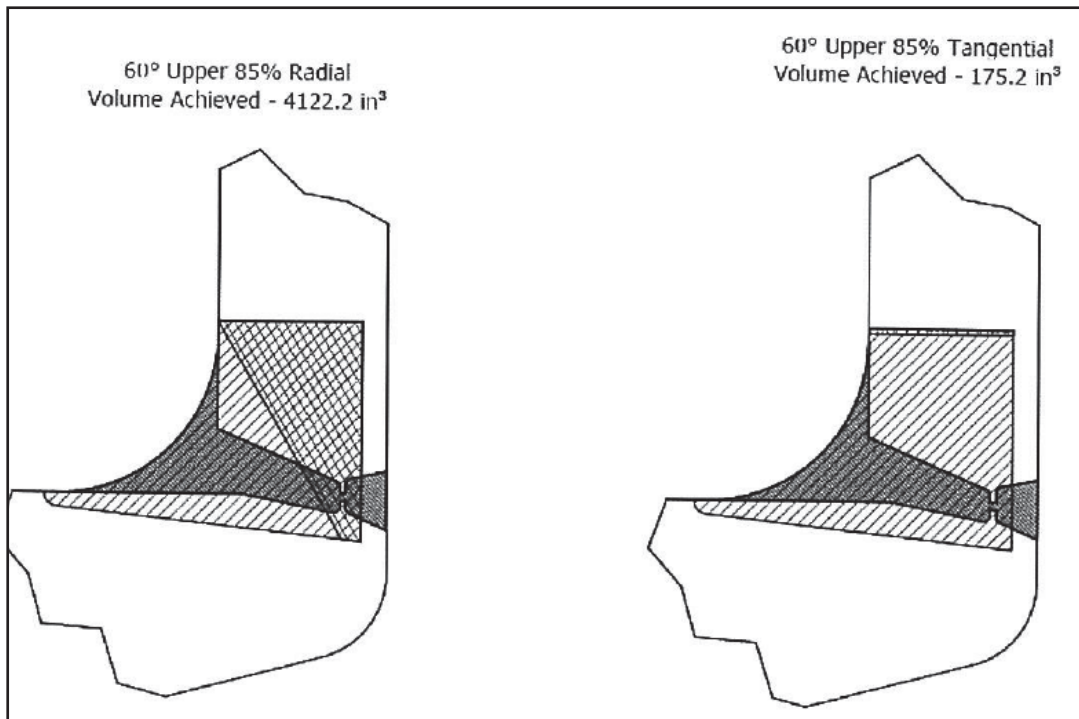


Figure 1.1-4 Weld **N1A-NV**, Upper 85% Coverage Limitation

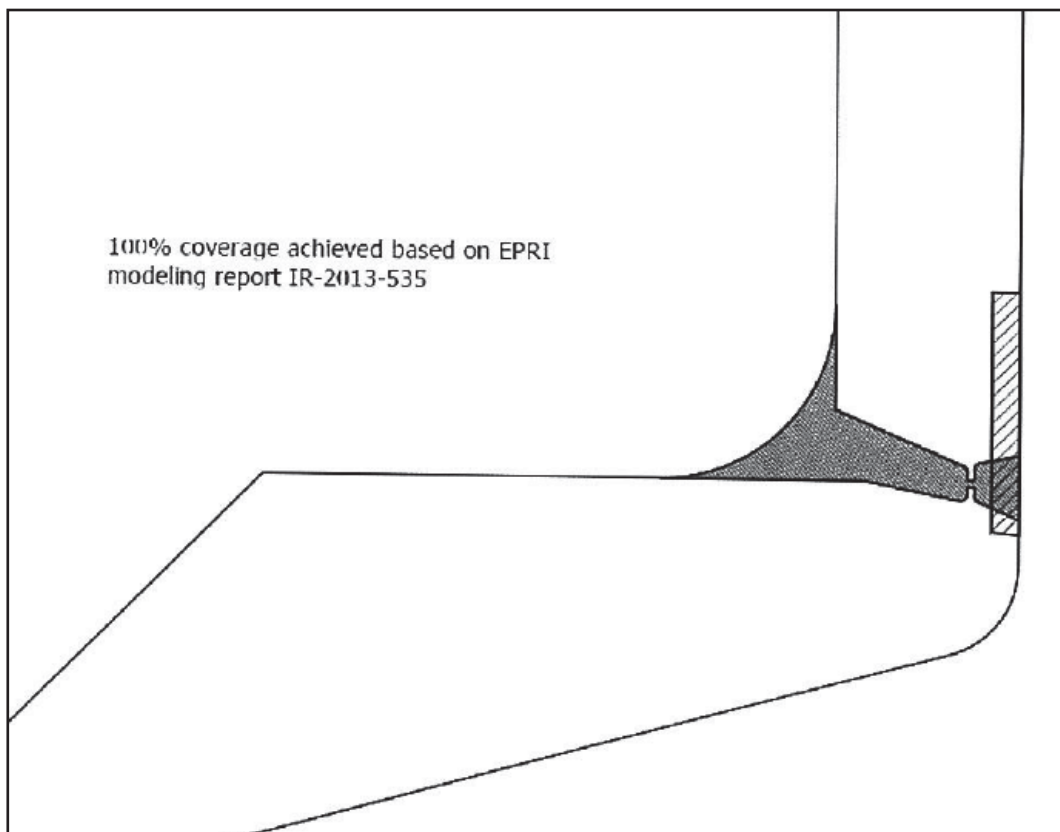


Figure 1.1-5 Weld **N1A-NV**, Lower 15% Coverage

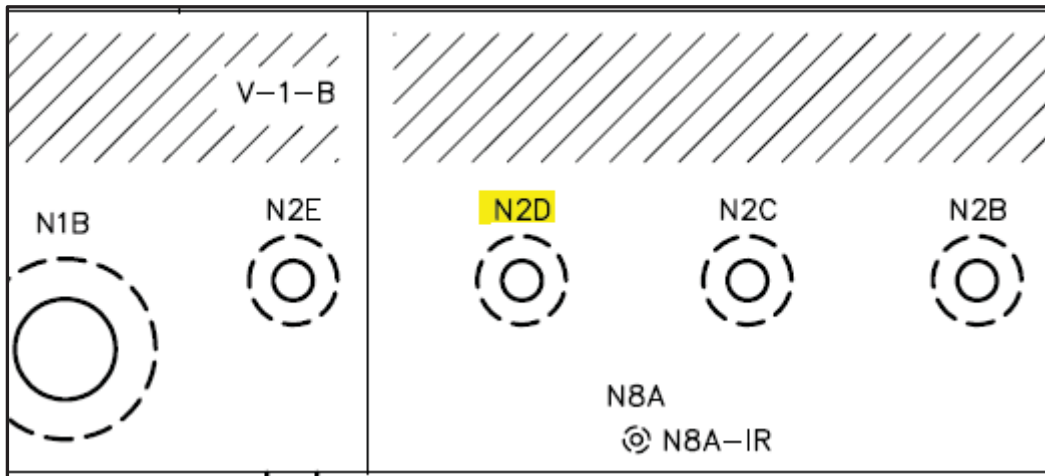
Enclosure 1

Table 1.1-1 Weld **N1A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	9384.4	1182.4	8202	9384.4
Exam Volume Achieved (in <sup>3</sup> )	5304.6	1182.4	175.2	1357.6
% Coverage Achieved	<b>(A) 56.5</b>	100	2.14	<b>(B) 14.5</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 35.5%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 43°, 50°, 55° Shear and 60° Refracted Longitudinal.

1.2 Weld **N2D-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 1.2-1 Weld **N2D-NV** (Extracted from Reference Drawing 1-CHM-0992-C-01)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-062A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 38.5 percent as described in Table 1.2-1 and combined with Figures 1.2-2 through 1.2-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-038 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

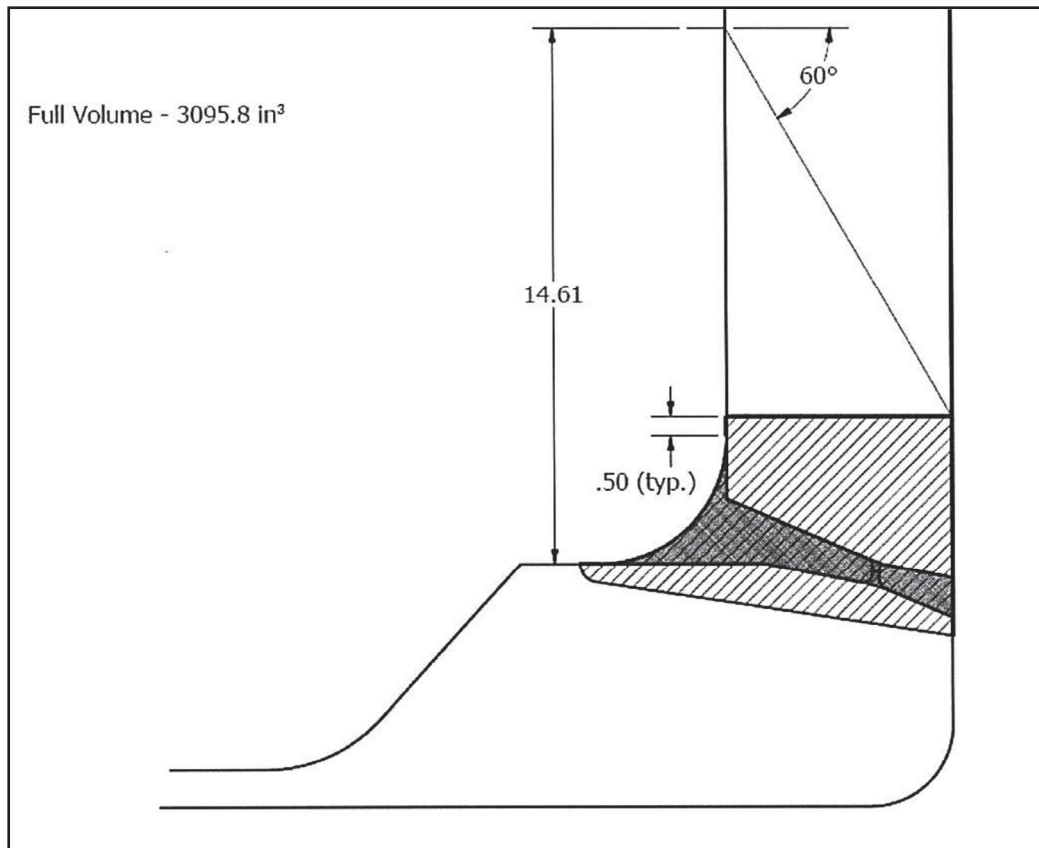


Figure 1.2-2 Weld **N2D-NV**, Full Volume Required Coverage

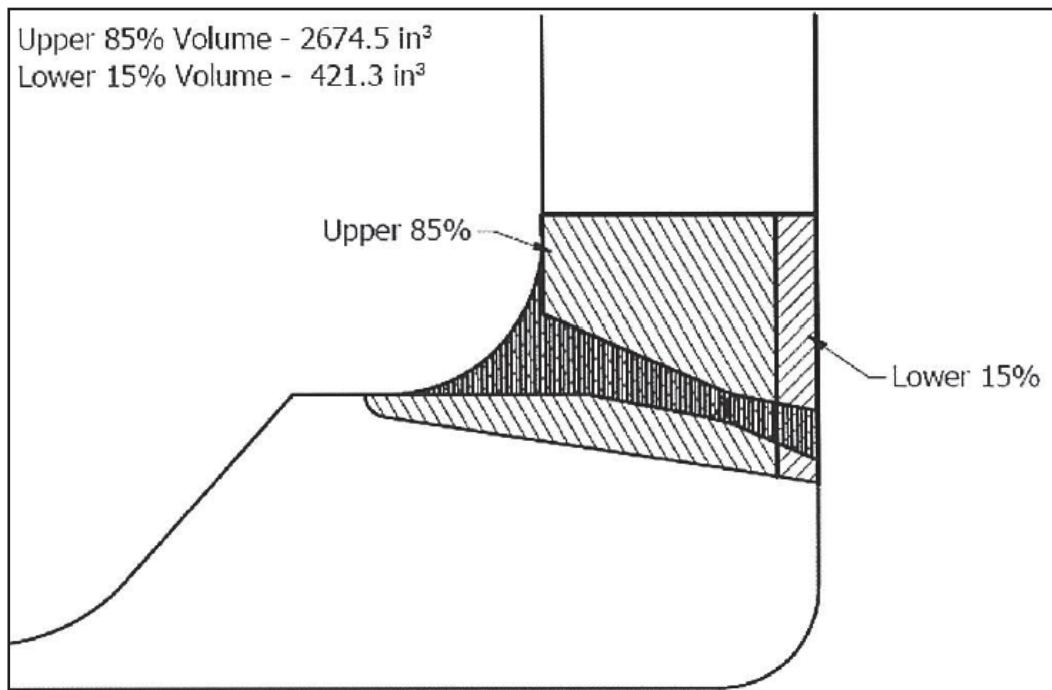


Figure 1.2-3 Weld **N2D-NV**, Upper 85% & Lower 15% Required Coverage



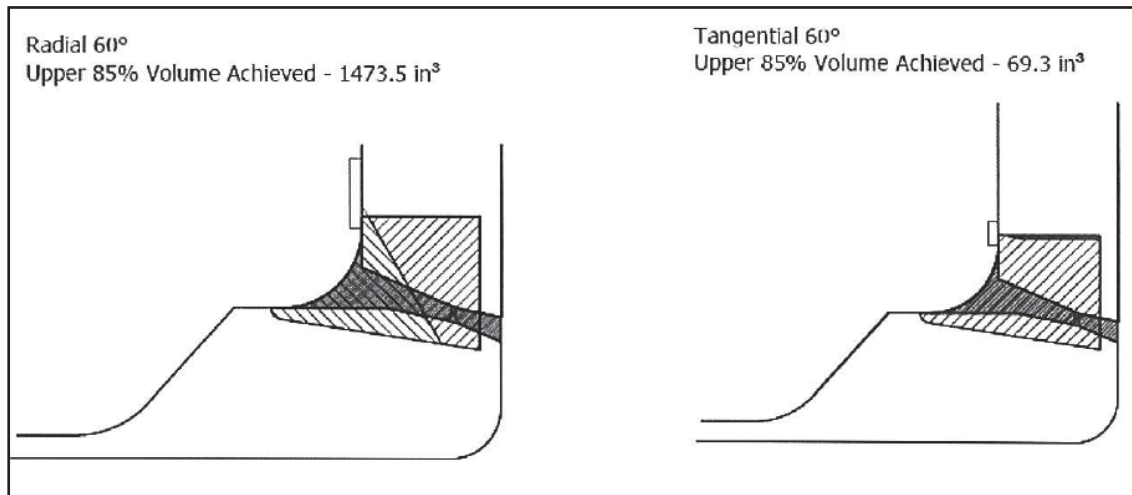


Figure 1.2-4 Weld **N2D-NV**, Upper 85% Coverage Limitation

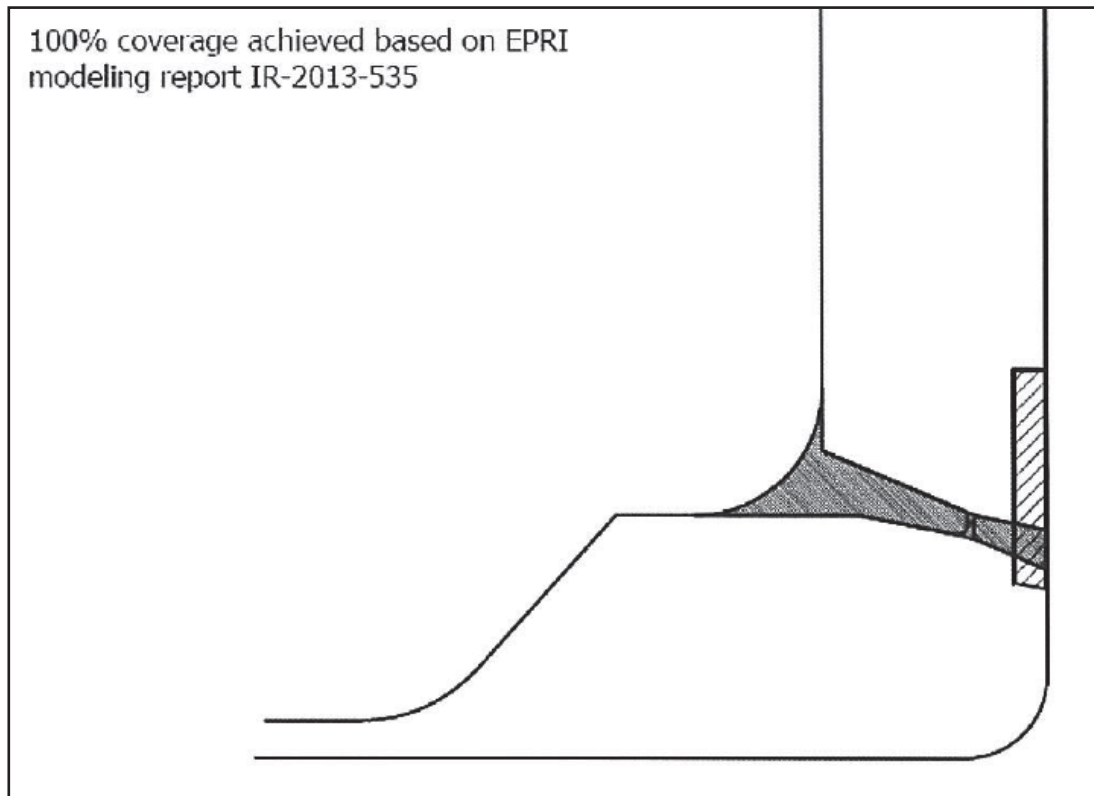


Figure 1.2-5 Weld **N2D-NV**, Lower 15% Coverage

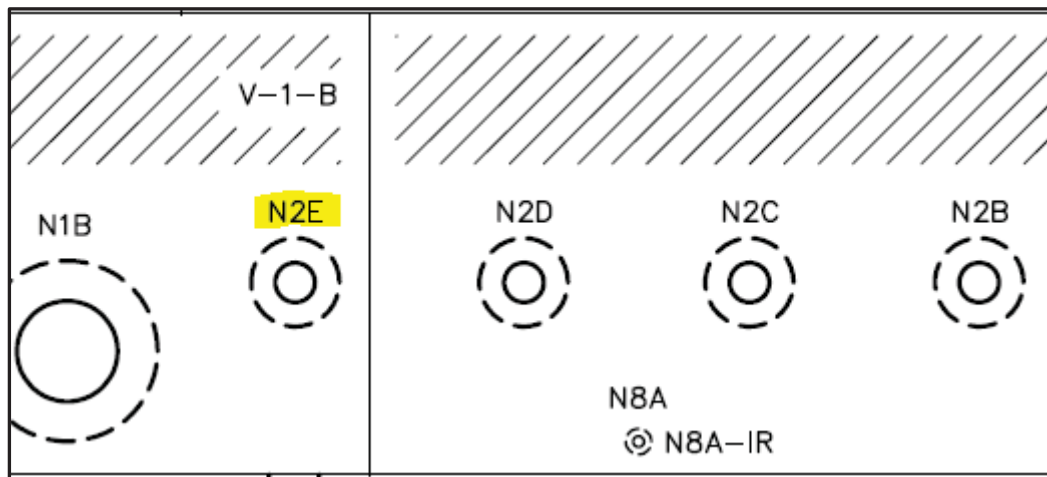
Enclosure 1

Table 1.2-1 Weld **N2D-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3095.8	421.3	2674.5	3095.8
Exam Volume Achieved (in <sup>3</sup> )	1894.8	421.3	69.3	490.6
% Coverage Achieved	<b>(A) 61.21</b>	100	2.59	<b>(B) 15.85</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 38.5%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR-2013-535.  
Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

1.3 Weld **N2E-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 1.3-1 Weld **N2E-NV** (Extracted from Reference Drawing 1-CHM-0992-C-01)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-063A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 38.5 percent as described in Table 1.3-1 and combined with Figures 1.3-2 through 1.3-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-039 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

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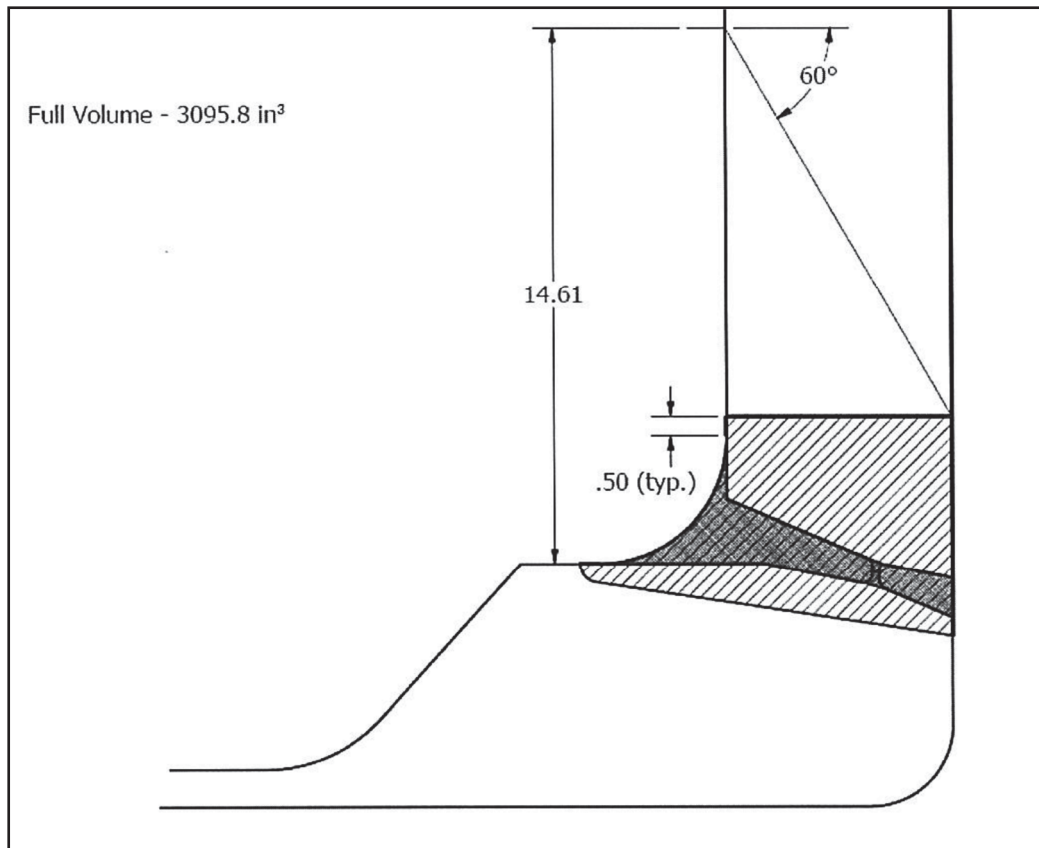


Figure 1.3-2 Weld **N2E-NV**, Full Volume Required Coverage

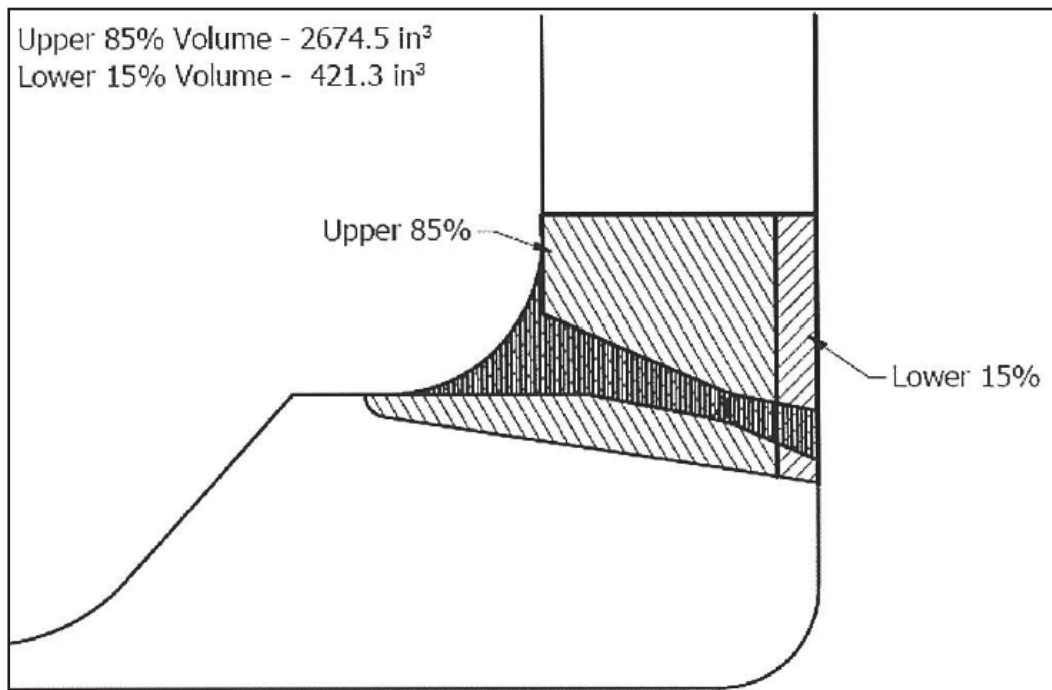


Figure 1.3-3 Weld **N2E-NV**, Upper 85% & Lower 15% Required Coverage

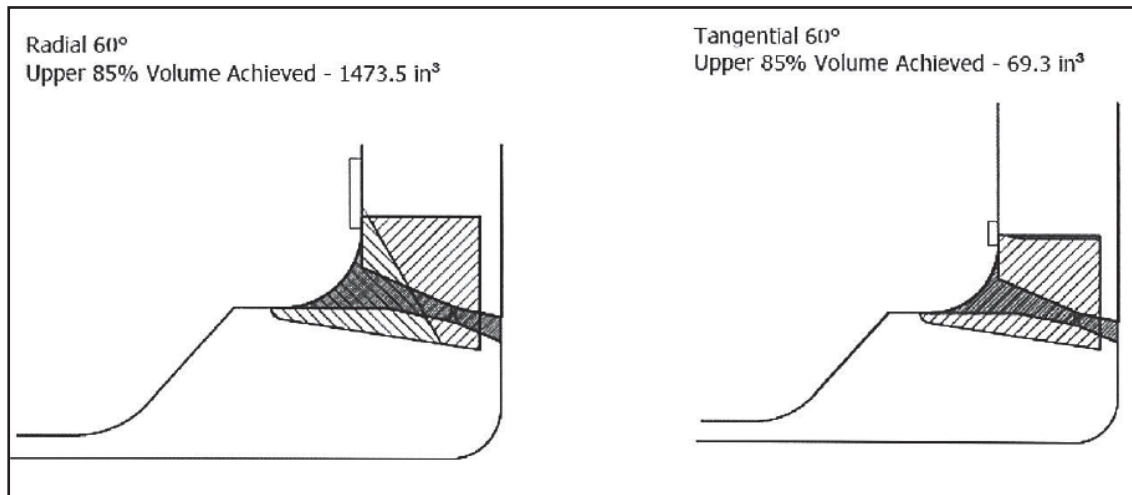


Figure 1.3-4 Weld **N2E-NV**, Upper 85% Coverage Limitation

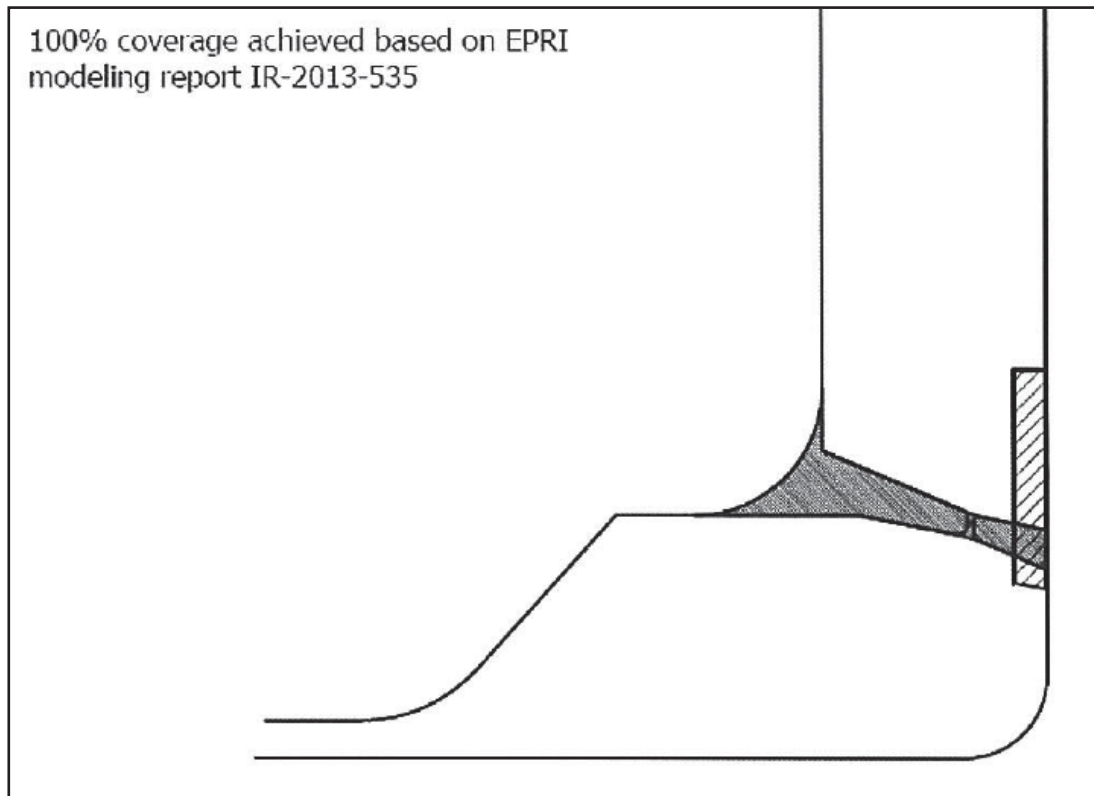


Figure 1.3-5 Weld **N2E-NV**, Lower 15% Coverage

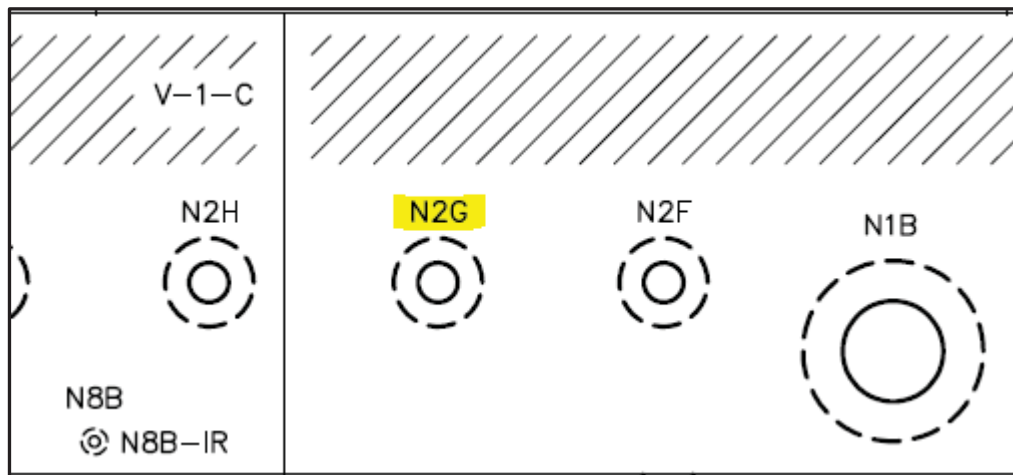
Enclosure 1

Table 1.3-1 Weld **N2E-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3095.8	421.3	2674.5	3095.8
Exam Volume Achieved (in <sup>3</sup> )	1894.8	421.3	69.3	490.6
% Coverage Achieved	<b>(A) 61.21</b>	100	2.59	<b>(B) 15.85</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 38.5%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

1.4 Weld **N2G-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 1.4-1 Weld **N2G-NV** (Extracted from Reference Drawing 1-CHM-0992-C-01)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-068A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 38.5 percent as described in Table 1.4-1 and combined with Figures 1.4-2 through 1.4-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-040 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

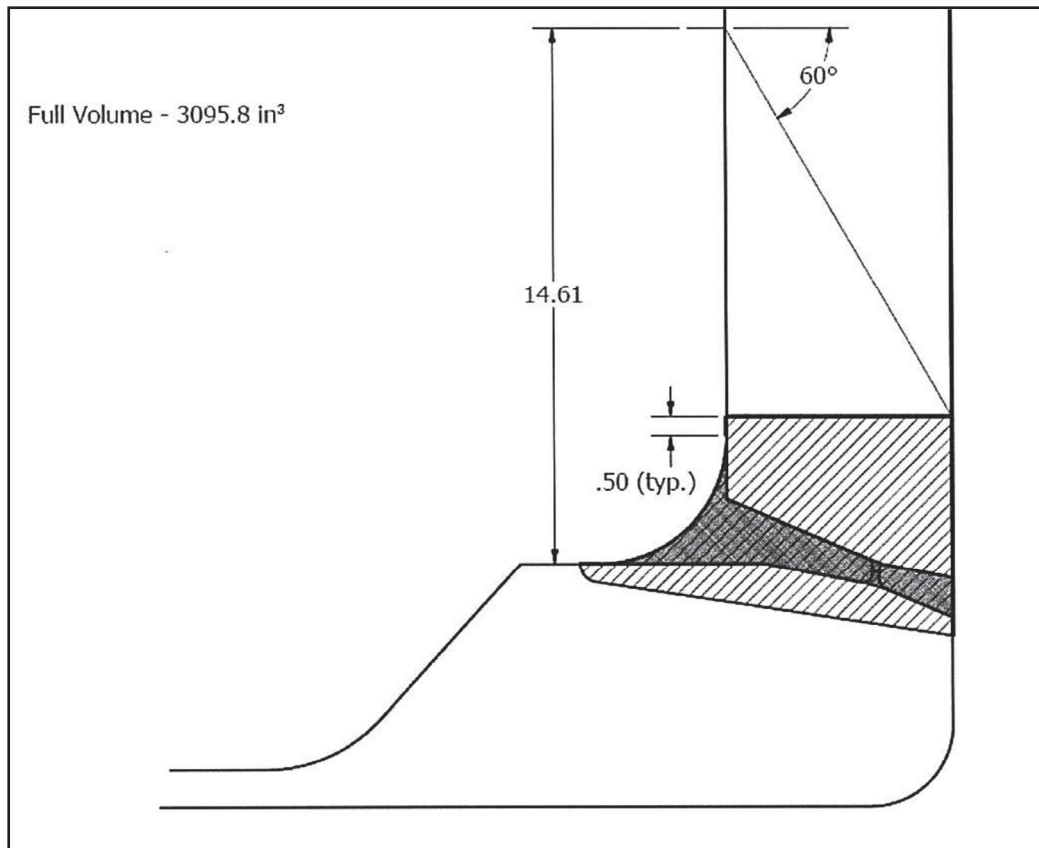


Figure 1.4-2 Weld **N2G-NV**, Full Volume Required Coverage

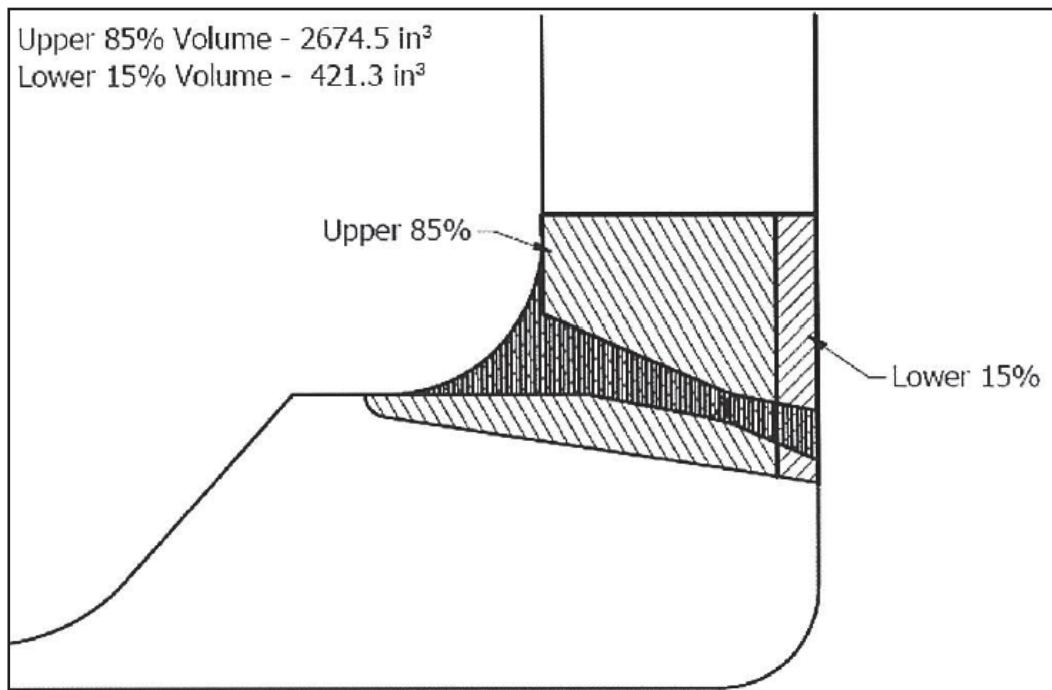


Figure 1.4-3 Weld **N2G-NV**, Upper 85% & Lower 15% Required Coverage



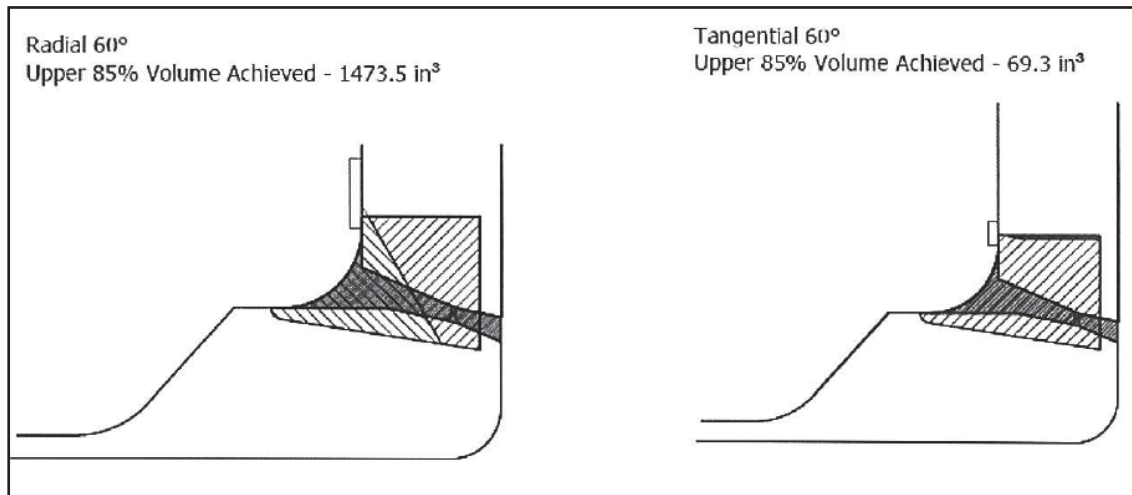


Figure 1.4-4 Weld **N2G-NV**, Upper 85% Coverage Limitation

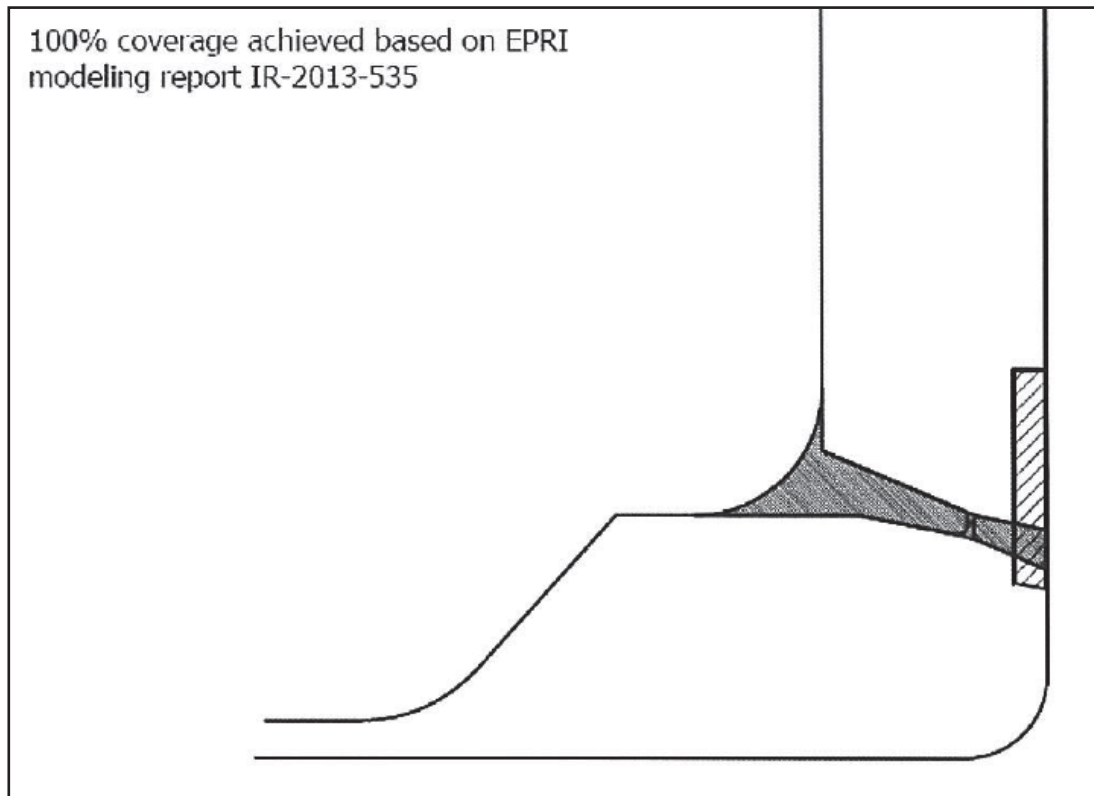


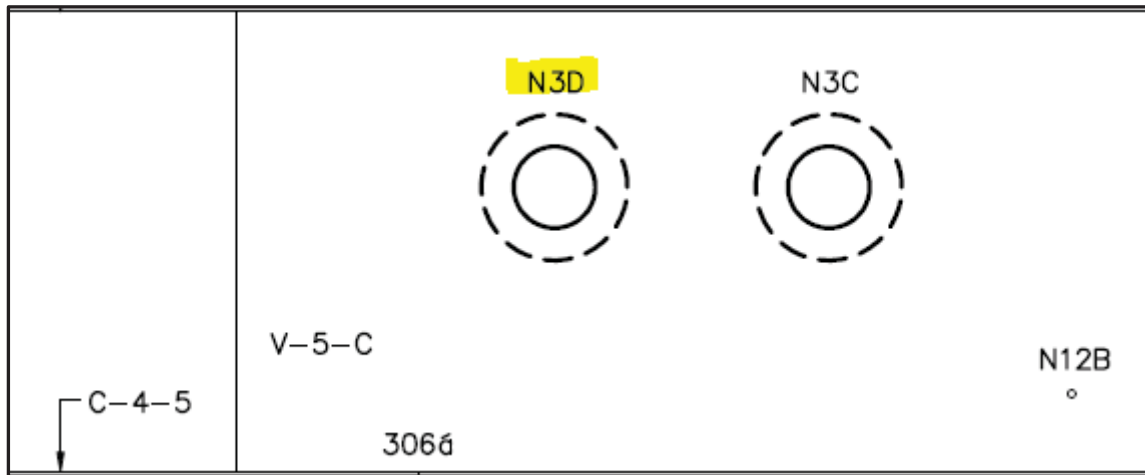
Figure 1.4-5 Weld **N2G-NV**, Lower 15% Coverage

Table 1.4-1 Weld **N2G-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3095.8	421.3	2674.5	3095.8
Exam Volume Achieved (in <sup>3</sup> )	1894.8	421.3	69.3	490.6
% Coverage Achieved	<b>(A) 61.21</b>	100	2.59	<b>(B) 15.85</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 38.5%</b>			

Note:

1) Examination angles and coverage areas based on Electric Power Research Institute (EPRI) Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

1.5 Weld **N3D-NV** – 26" Steam Outlet Nozzle to Shell WeldFigure 1.5-1 Weld **N3D-NV** (Extracted from Reference Drawing 1-CHM-0992-C-01)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-102A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 39.9 percent as described in Table 1.5-1 and combined with Figure 1.5-2 through 1.5-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-041 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

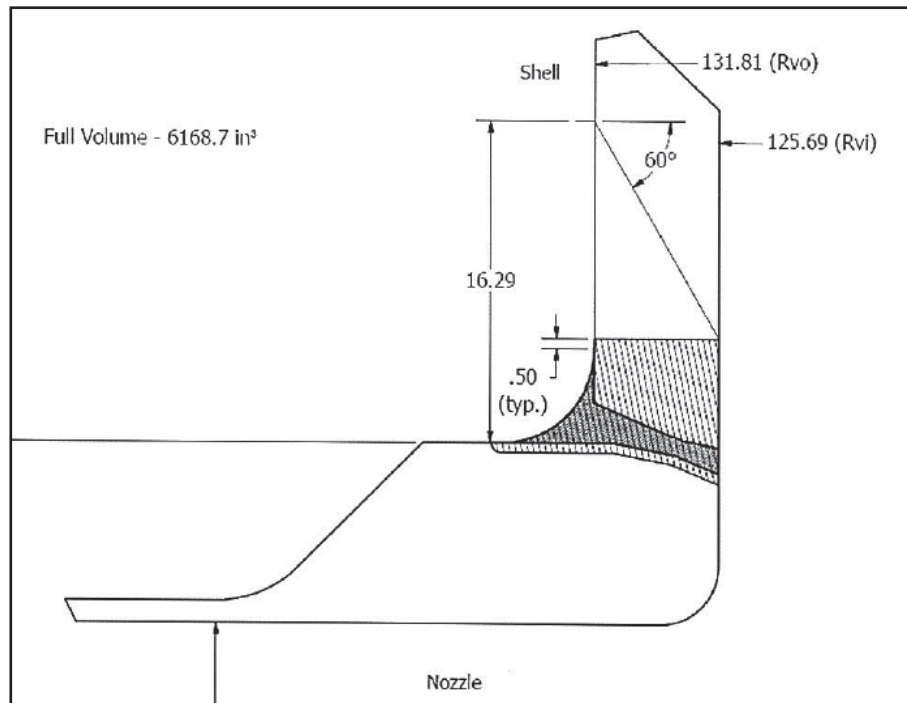


Figure 1.5-2 Weld **N3D-NV**, Full Volume Required Coverage

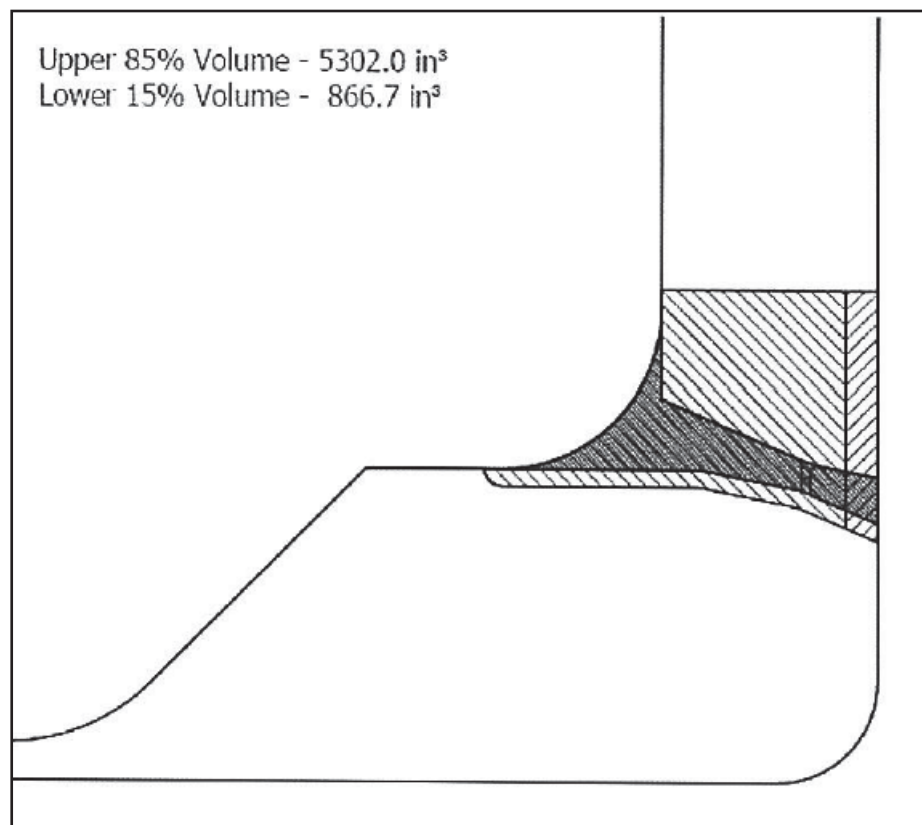


Figure 1.5-3 Weld **N3D-NV**, Upper 85% & Lower 15% Required Coverage

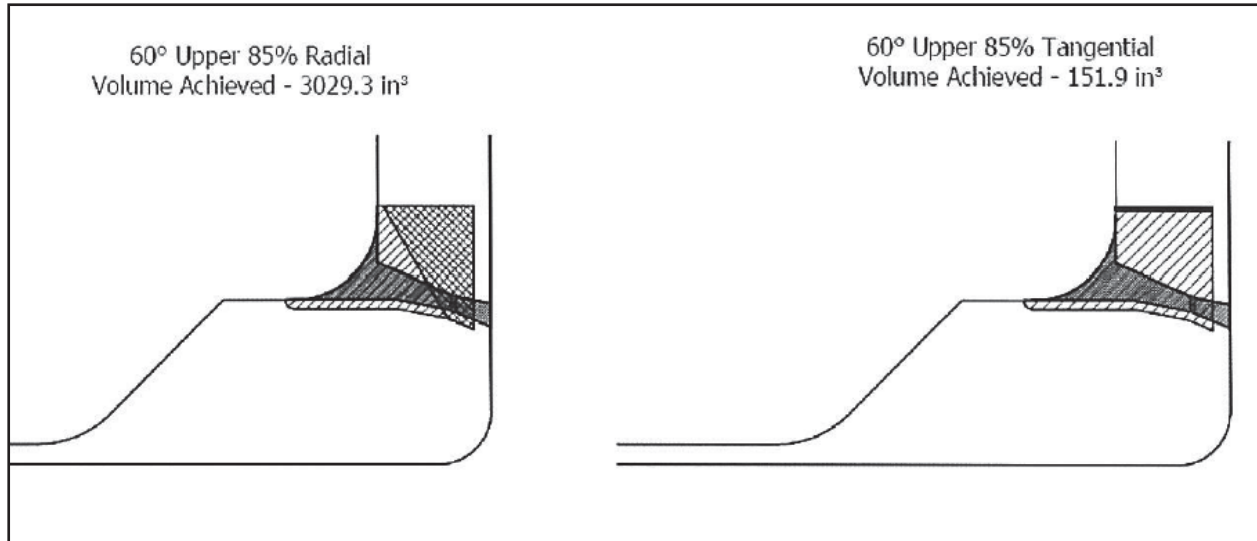


Figure 1.5-4 Weld **N3D-NV**, Upper 85% Coverage Limitation

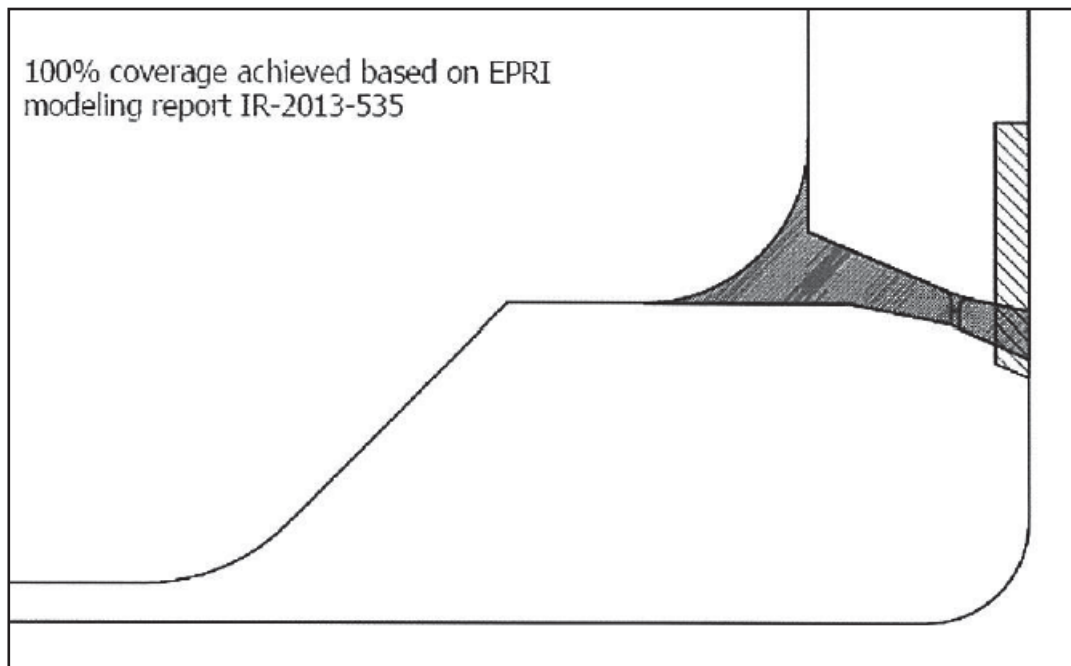


Figure 1.5-5 Weld **N3D-NV**, Lower 15% Coverage

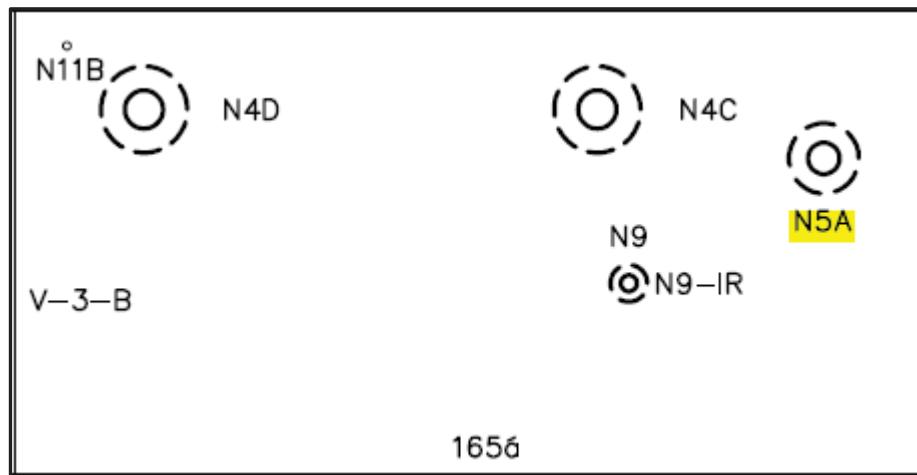
Enclosure 1

Table 1.5-1 Weld **N3D-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	6168.7	866.7	5302	6168.7
Exam Volume Achieved (in <sup>3</sup> )	3896	866.7	151.9	1018.6
% Coverage Achieved	<b>(A) 63.2</b>	100	2.86	<b>(B) 16.5</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 39.9%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 40°, 50°, 70°, Shear and 60° Refracted Longitudinal.

1.6 Weld **N5A-NV** – 10" Core Spray Nozzle to Shell WeldFigure 1.6-1 Weld **N5A-NV** (Extracted from Reference Drawing 1-CHM-0992-C-01)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-090. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration and permanent insulation support ring resulting in total UT coverage of 26.8 percent as described in Table 1.6-1 and combined with Figure 1.6-2 through 1.6-6.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-042 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

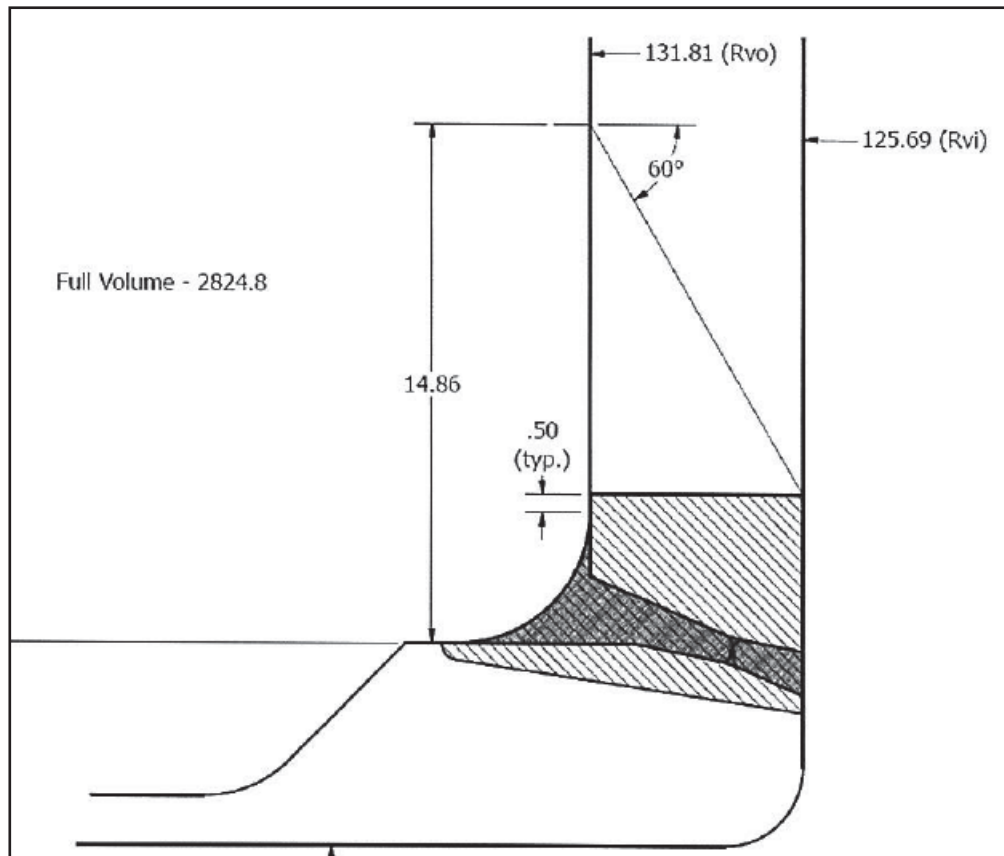


Figure 1.6-2 Weld **N5A-NV**, Full Volume Required Coverage

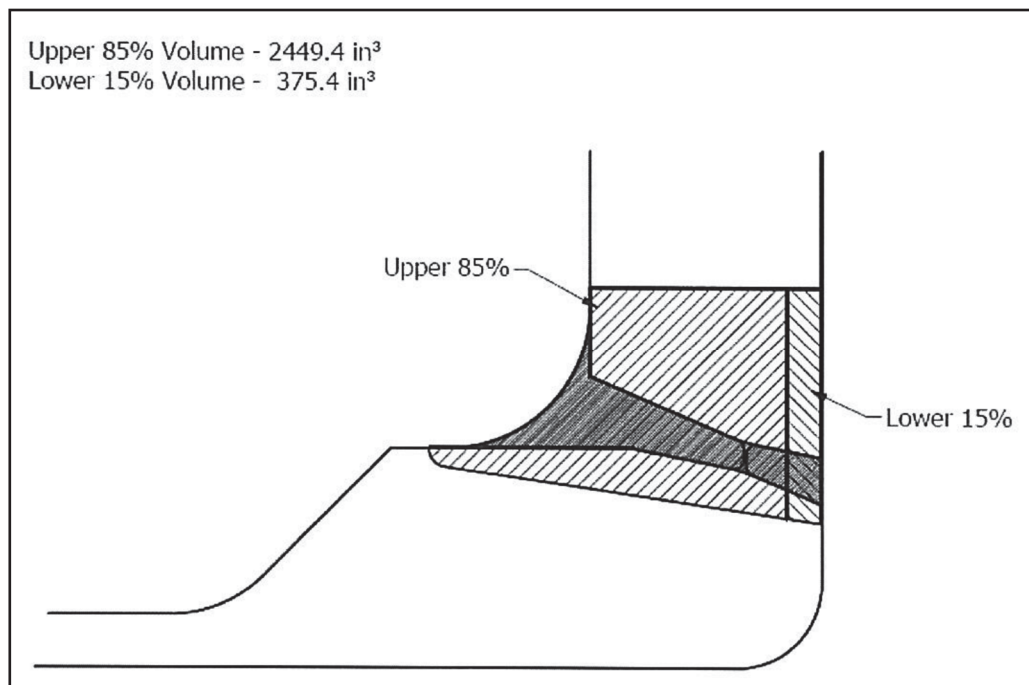


Figure 1.6-3 Weld **N5A-NV**, Upper 85% & Lower 15% Required Coverage



Enclosure 1

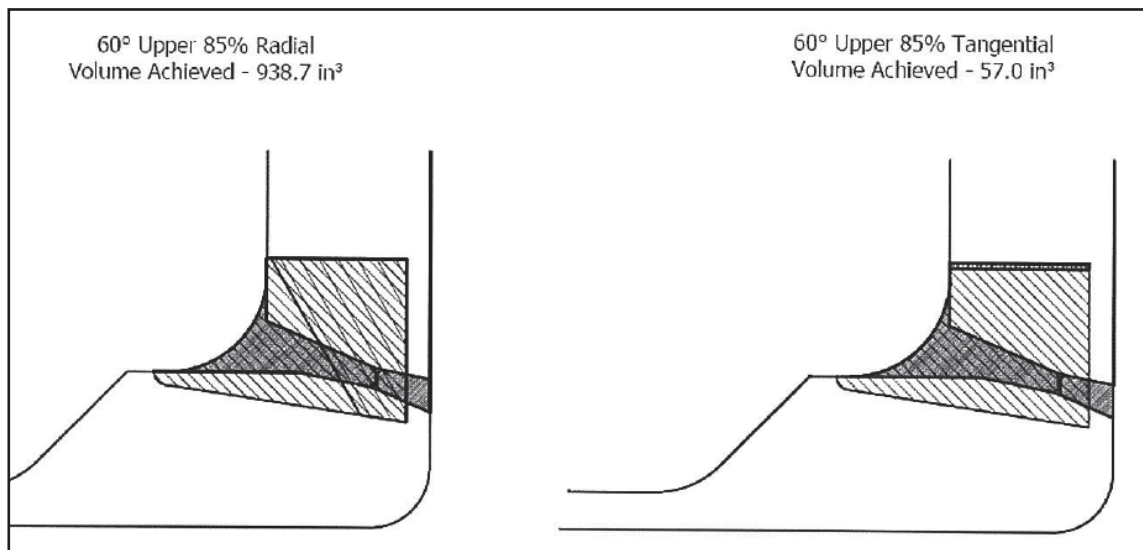


Figure 1.6-4 Weld **N5A-NV**, Upper 85% Coverage Limitation

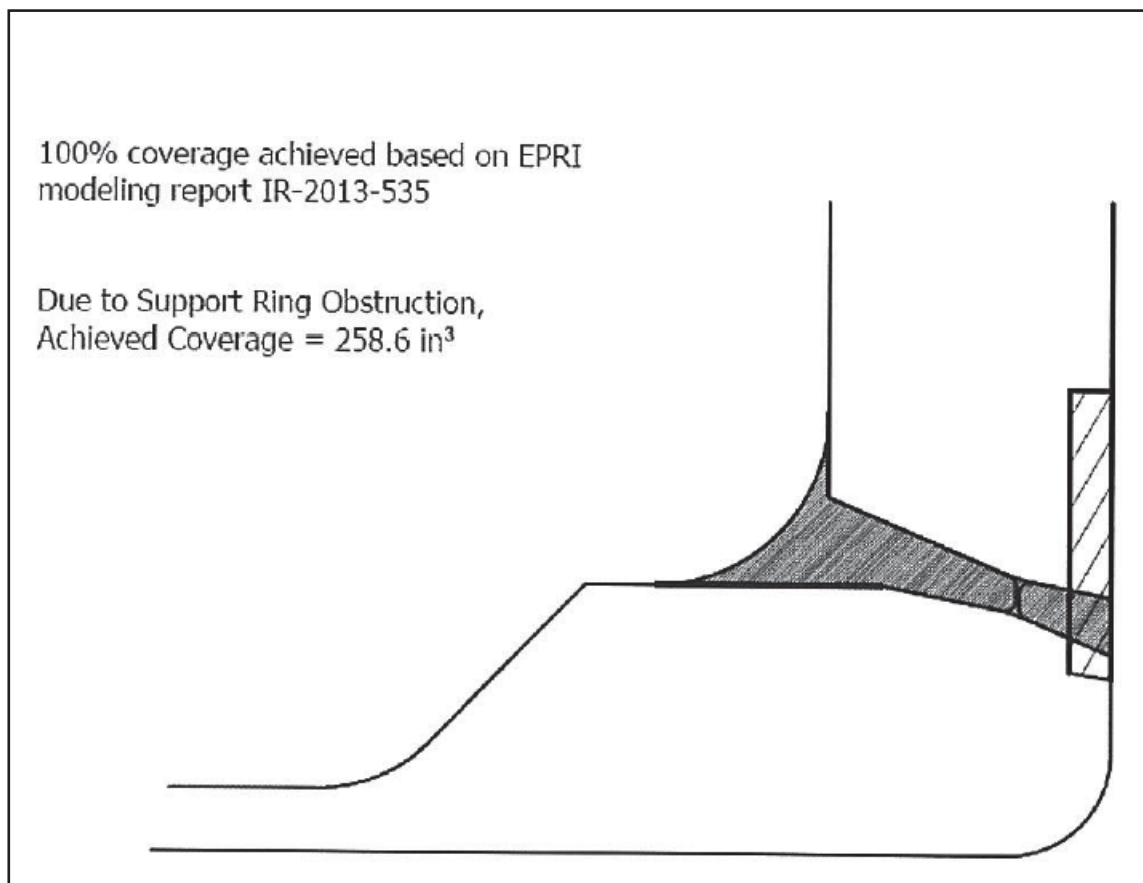
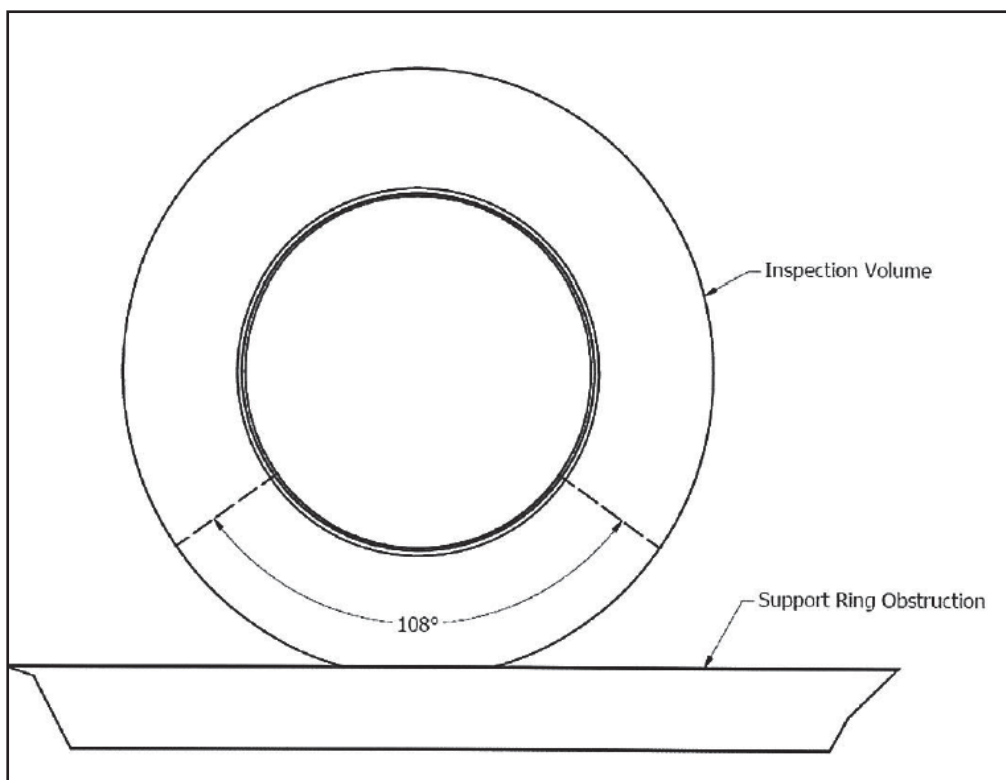


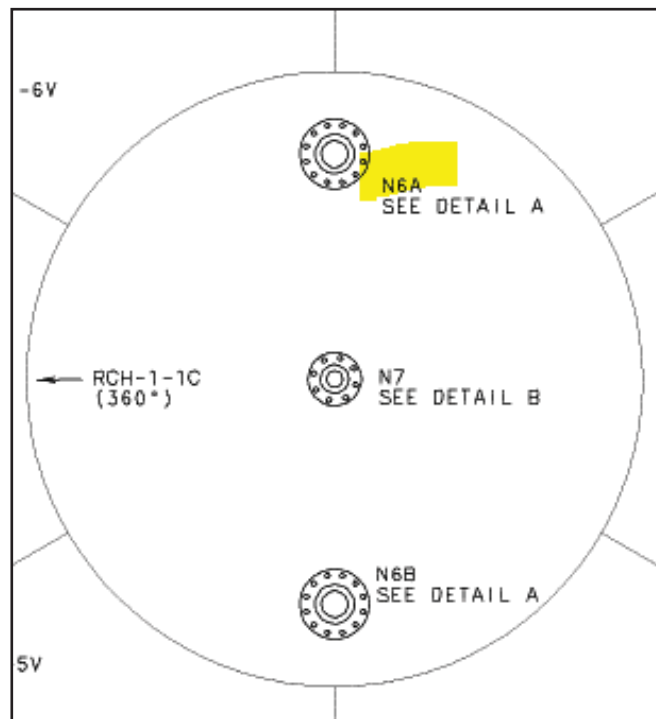
Figure 1.6-5 Weld **N5A-NV**, Lower 15% Coverage

Figure 1.6-6 Weld **N5A-NV**, Support Ring ObstructionTable 1.6-1 Weld **N5A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	2824.8	375.4	2449.4	2824.8
Exam Volume Achieved (in <sup>3</sup> )	1197.3	258.6	57.0	315.6
% Coverage Achieved	(A) 42.4	68.9	2.33	(B) 11.2
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 26.8%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

1.7 Weld **N6A-NV** – 6" Head Spray Nozzle to Shell Weld (RPV Head)Figure 1.7-1 Weld **N6A-NV** (Extracted from Reference Drawing 1-CHM-2102-A-1)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-088A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 54.1 percent as described in Table 1.7-1 and combined with Figure 1.7-2 through 1.7-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R08, UT-10-044 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

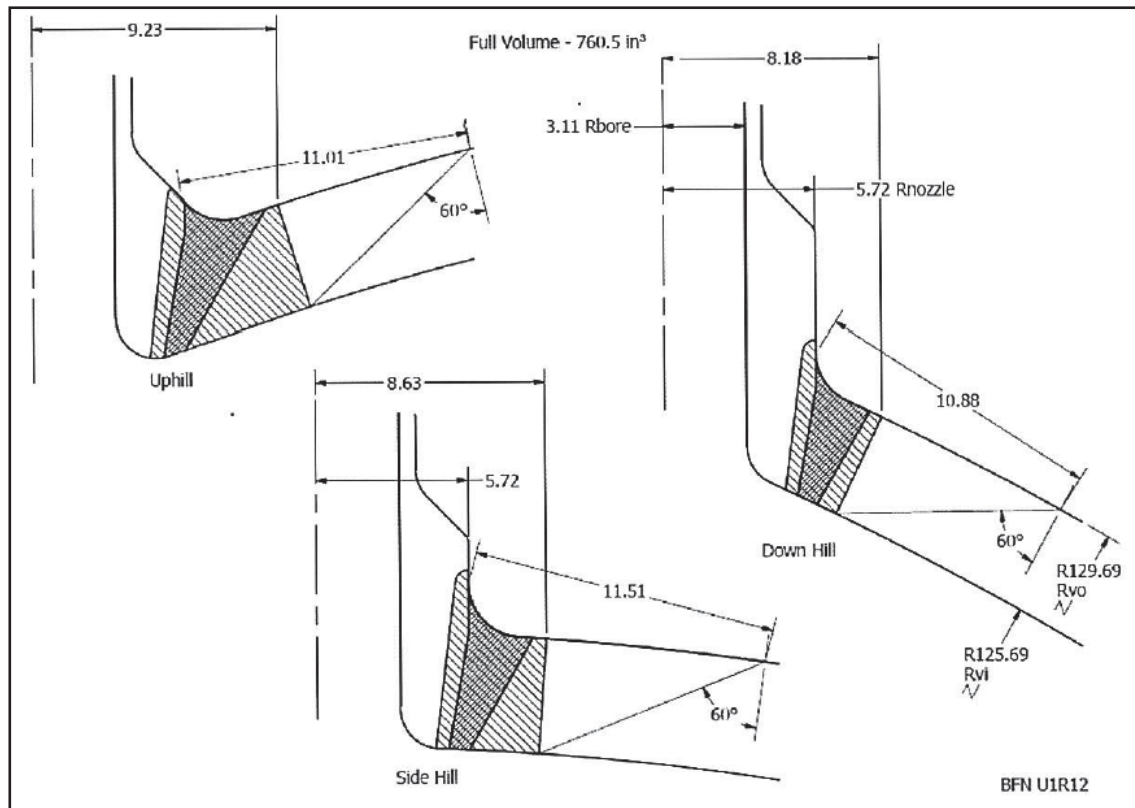


Figure 1.7-2 Weld **N6A-NV**, Full Volume Required Coverage

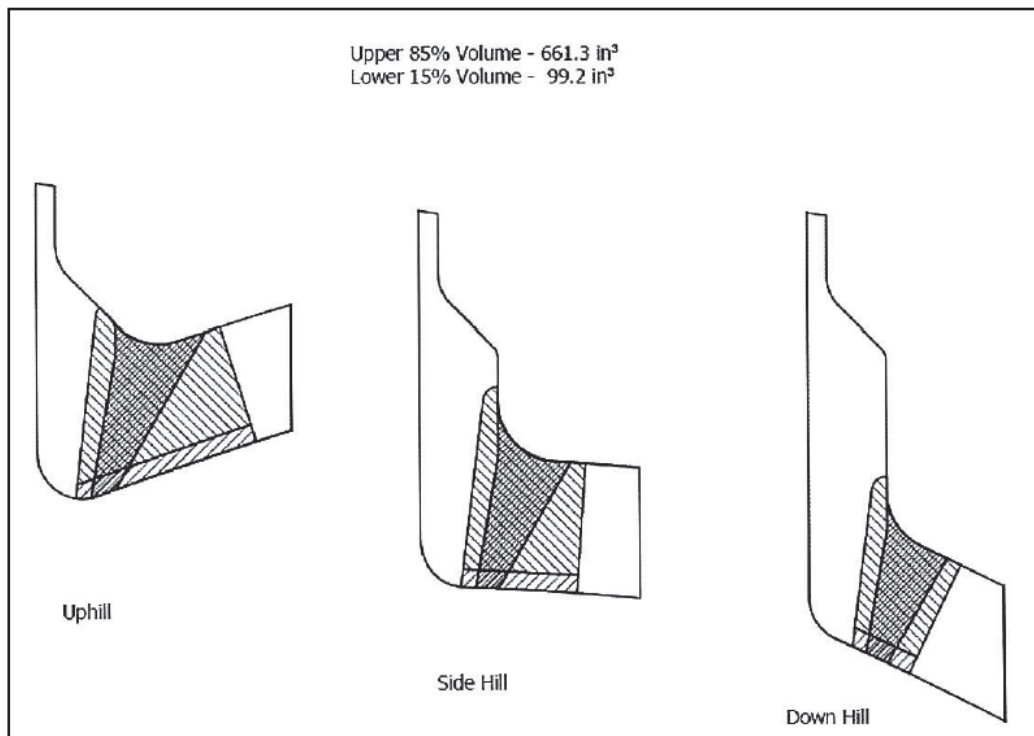


Figure 1.7-3 Weld **N6A-NV**, Upper 85% & Lower 15% Required Coverage

# Enclosure 1

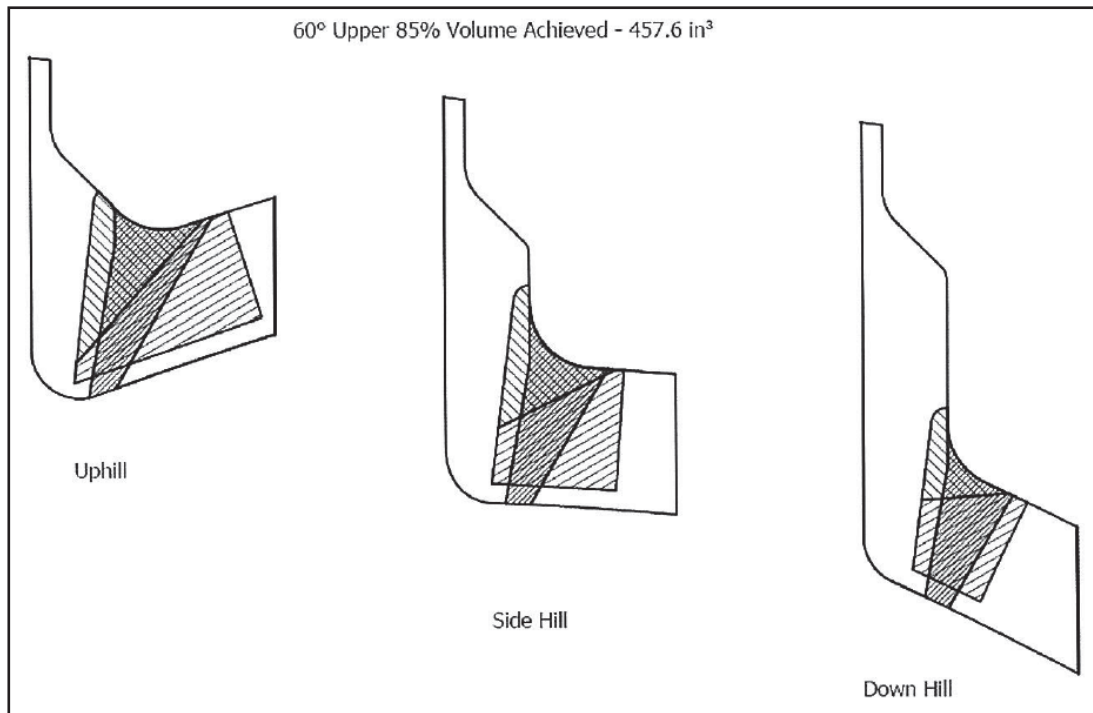


Figure 1.7-4 Weld **N6A-NV**, Upper 85% Radial Coverage Achieved

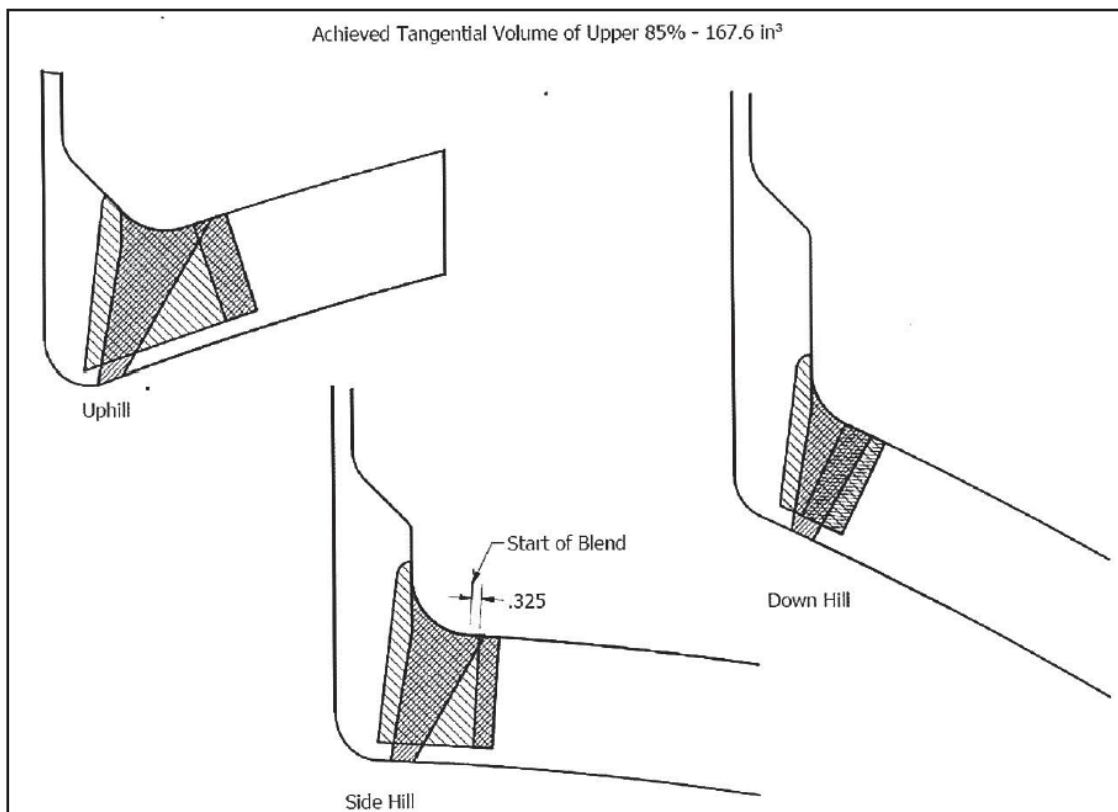


Figure 1.7-5 Weld **N6A-NV**, Tangential Volume of Upper 85% Achieved

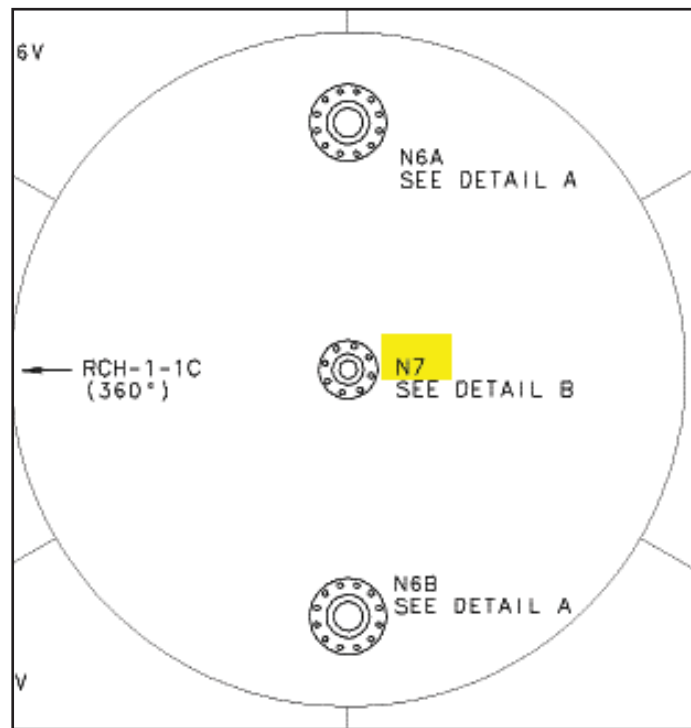
Enclosure 1

Table 1.7-1 Weld **N6A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	760.5	99.2	661.3	760.5
Exam Volume Achieved (in <sup>3</sup> )	556.8	99.2	167.6	266.8
% Coverage Achieved	<b>(A) 73.21</b>	100.0	25.34	<b>(B) 35.08</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 54.1%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 22°, 26°, 35°, 40°, 50°, Shear and 60° Refracted Longitudinal.

1.8 Weld **N7-NV** – 4" Vent Nozzle to Shell Weld (RPV Head)Figure 1.8-1 Weld **N7-NV** (Extracted from Reference Drawing 1-CHM-2102-A-1)

This weld was UT examined in the third 10-Year ISI Interval, first period, during the U1R12 refueling outage in 2018. The NDE data can be found on UT Report No. R-096A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 73.6 percent as described in Table 1.8-1 and combined with Figure 1.8-2 through 1.8-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R06, Report Nos: R0278 and R0285 were reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

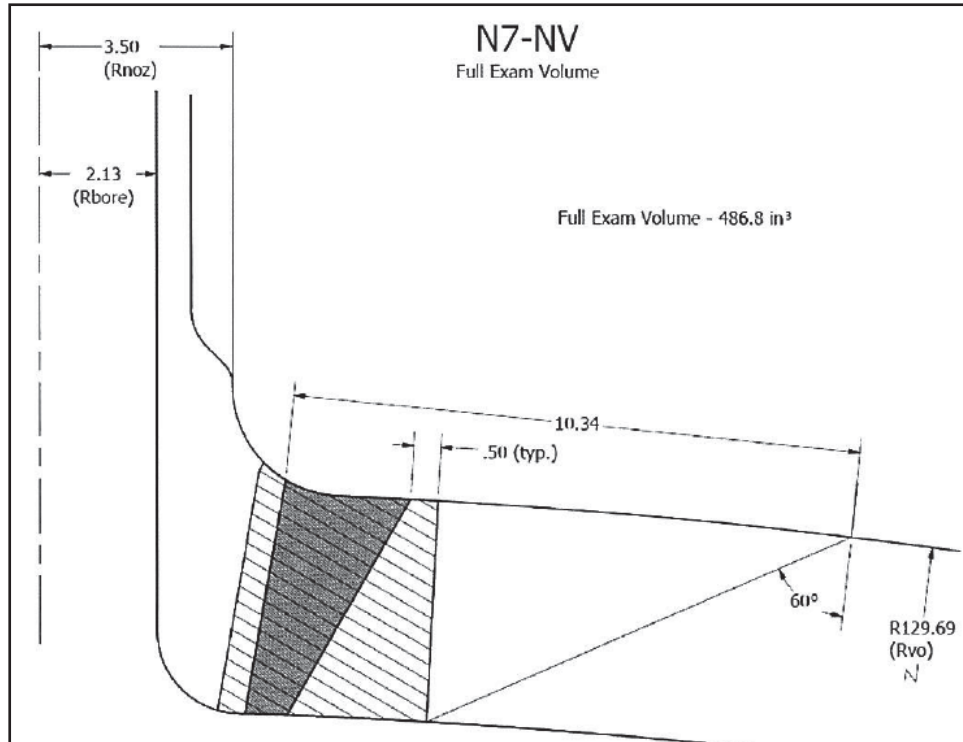


Figure 1.8-2 Weld **N7-NV**, Full Volume Required Coverage

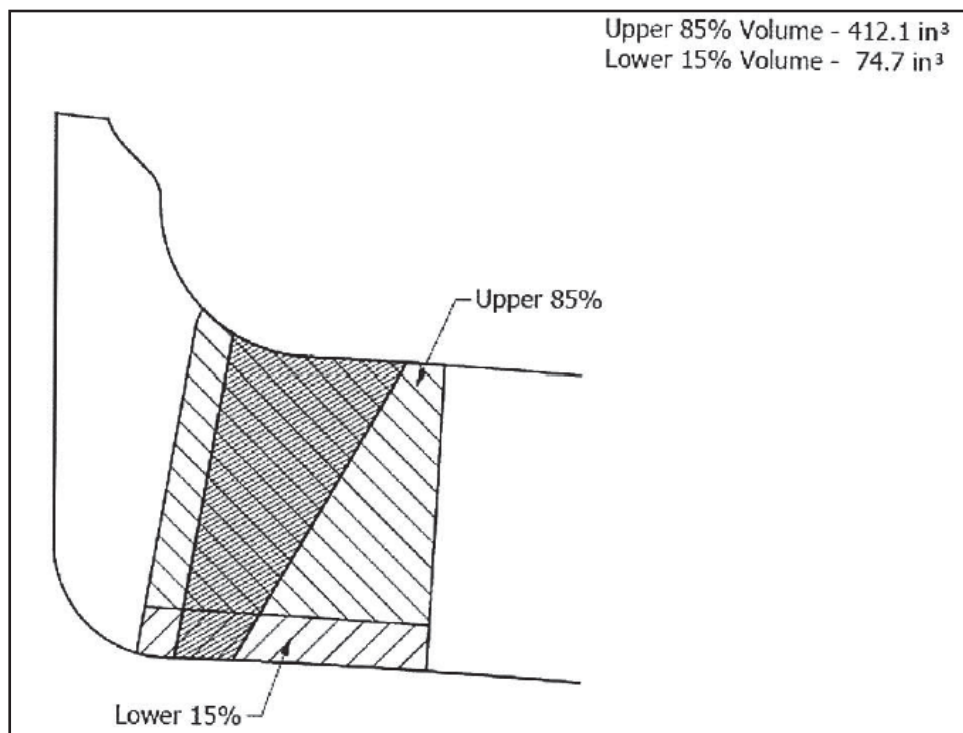


Figure 1.8-3 Weld **N7-NV**, Upper 85% & Lower 15% Required Coverage



## Enclosure 1

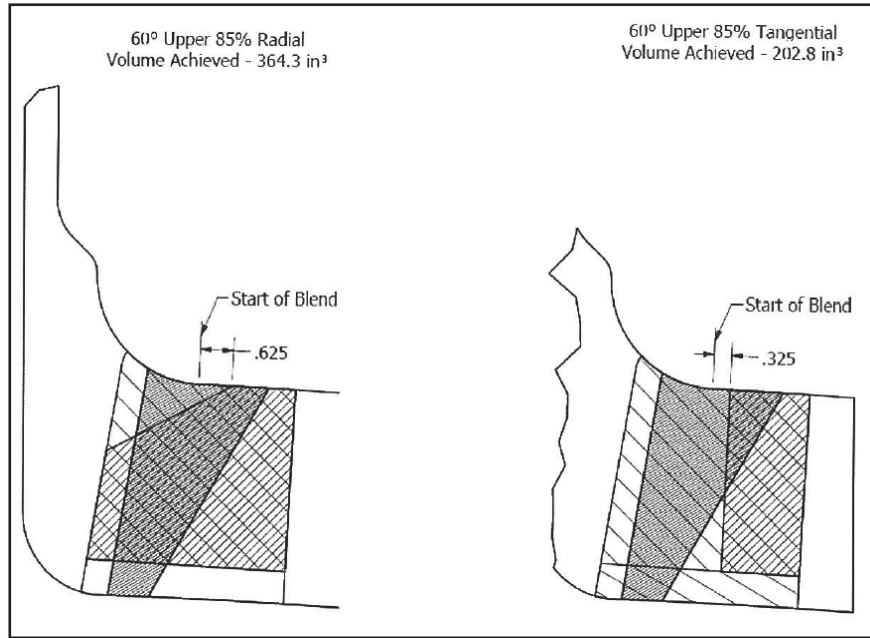


Figure 1.8-4 Weld **N7-NV**, Upper 85% Coverage Achieved

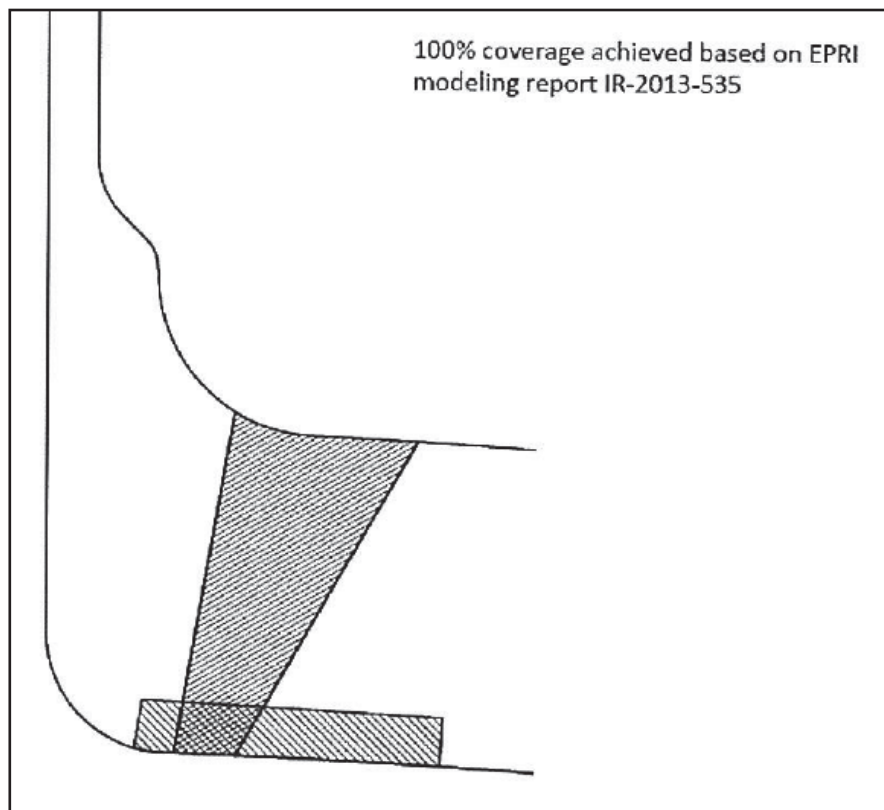


Figure 1.8-5 Weld **N7-NV**, Lower 15% Coverage

Enclosure 1

Table 1.8-1 Weld **N7-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	486.8	74.7	412.1	486.8
Exam Volume Achieved (in <sup>3</sup> )	439.0	74.7	202.8	277.5
% Coverage Achieved	<b>(A) 90.2</b>	100.0	49.2	<b>(B) 57.0</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 73.6%</b>			

Note:

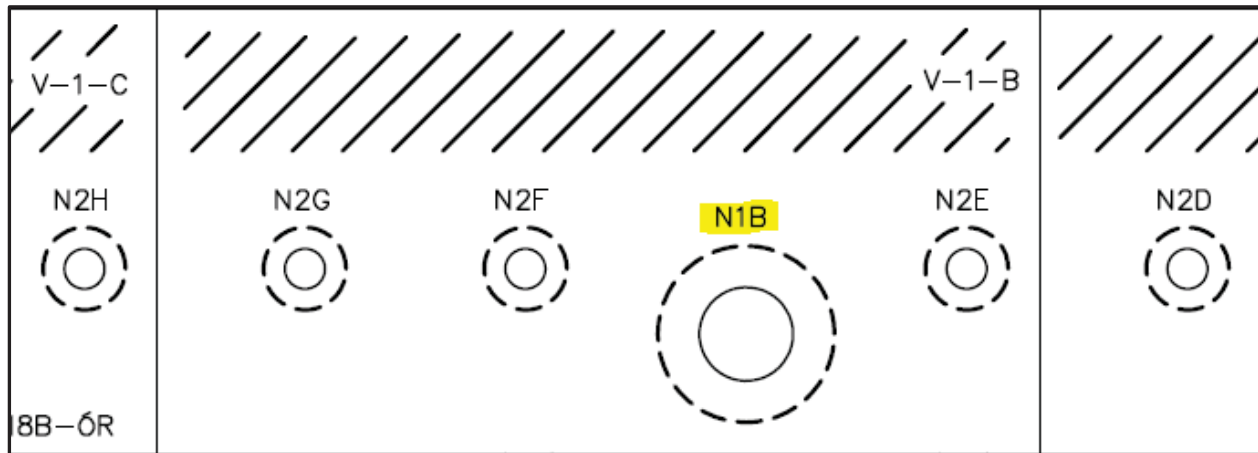
1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 35°, 45°, Shear and 60° Refracted Longitudinal.

TABLE 2 – BFN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
2.1 N1B-NV U2R19	1 B-D B3.90	28" Reactor Water Recirculation Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	42.2%	Geometric Nozzle Design Configuration No Recordable Indications	Table 2.1-1  Figures 2.1-1 through 2.1-4
2.2 N2A-NV U2R19	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.0%	Geometric Nozzle Design Configuration Limitation. No Recordable Indications	Table 2.2-1  Figures 2.2-1 through 2.2-4
2.3 N2C-NV U2R19	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.0%	Geometric Nozzle Design Configuration Limitation No Recordable Indications	Table 2.3-1  Figures 2.3-1 through 2.3-4

TABLE 2 – BFN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
2.4 N2H-NV U2R19	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.0%	Geometric Nozzle Design Configuration Limitation No Recordable Indications	Table 2.4-1  Figures 2.4-1 through 2.4-4
2.5 N3B-NV U2R19	1 B-D B3.90	26" Steam Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding to approx. 2'-3/4" of ext. end	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	42.3%	Geometric Nozzle Design Configuration Limitation No Recordable Indications	Table 2.5-1  Figures 2.5-1 through 2.5-4

TABLE 2 – BFN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
2.6 N5B-NV U2R19	1 B-D B3.90	10" Core Spray Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	36.0%	Geometric Nozzle Design Configuration and Insulation Support Ring Limitation No Recordable Indications	Table 2.6-1  Figures 2.6-1 through 2.6-4
2.7 N7-NV U2R19	1 B-D B3.90	4" Vent Nozzle to Head Weld  Closure Head T <sup>NOM</sup> = 4.0"	Nozzle: A-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: MN-MO Steel Plate	50.9%	Geometric Nozzle Design Configuration Limitation No Recordable Indications	Table 2.7-1  Figures 2.7-1 through 2.7-4
2.8 N9-NV U2R19	1 B-D B3.90	4" Control Rod Drive Hydraulic System Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	54.2%	Geometric Nozzle Design Configuration Limitation Previously Recorded Indication Observed With No Changes	Table 2.8-1  Figures 2.8-1 through 2.8-4

TABLE 2 – BFN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
2.9 N10-NV U2R19	1 B-D B3.90	1.5" Standby Liquid Control System Nozzle to Head Weld  Bottom Head T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A 508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Head: MN-MO Steel Plate with Inconel Cladding	89.9%	Geometric Nozzle Design Configuration Limitation No Recordable Indications	Table 2.9-1  Figures 2.9-1 through 2.9-4
2.10 TCS-2-406 U2R19	1 R-A R1.16	12" Core Spray System Pipe to Valve Weld  Pipe T <sup>NOM</sup> = .687"	Pipe: Carbon Steel SA 333 Gr. 6	Weld: Stainless Steel	Valve: Stainless Steel A351 Gr. CF8M	48.5%	Valve Side Configuration Limitation No Recordable Indications	Table 2.10-1  Figures 2.10-1 through 2.10-3

2.1 Weld **N1B-NV** – 28” Reactor Water Recirculation Outlet Nozzle to Shell WeldFigure 2.1-1 Weld **N1B-NV** (Extracted from Reference Drawing 2-CHM-2046-C-01)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-067. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 42.2 percent as described in Table 2.1-1 and combined with Figure 2.1-2 through 2.1-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-137 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

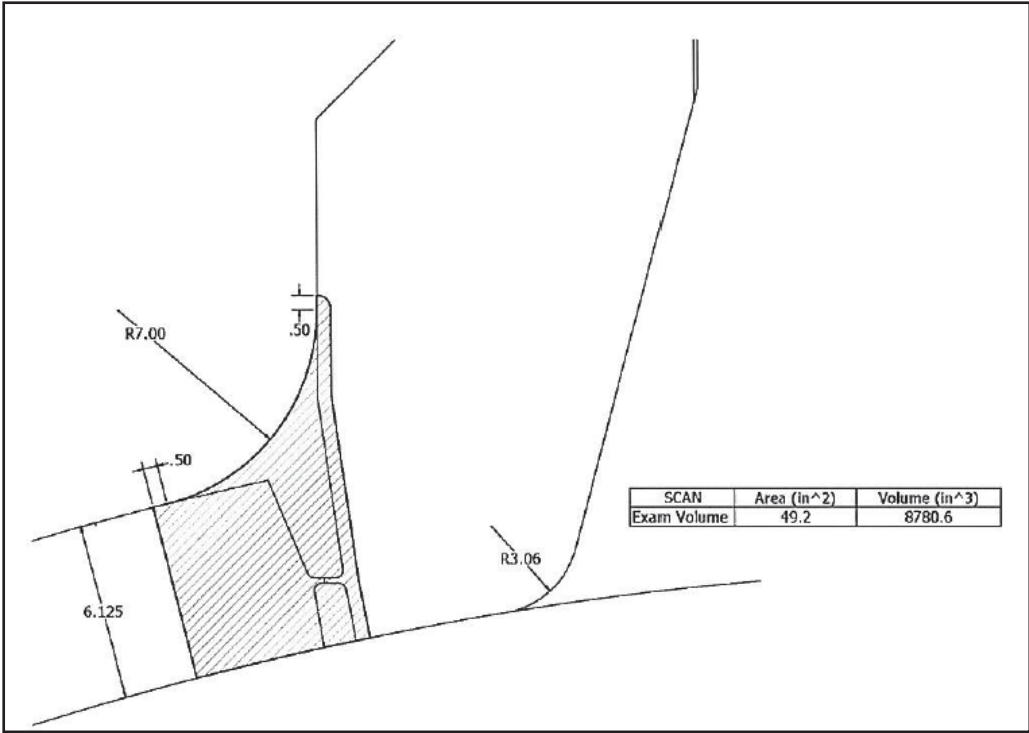


Figure 2.1-2 Weld **N1B-NV**, Full Volume Required Coverage

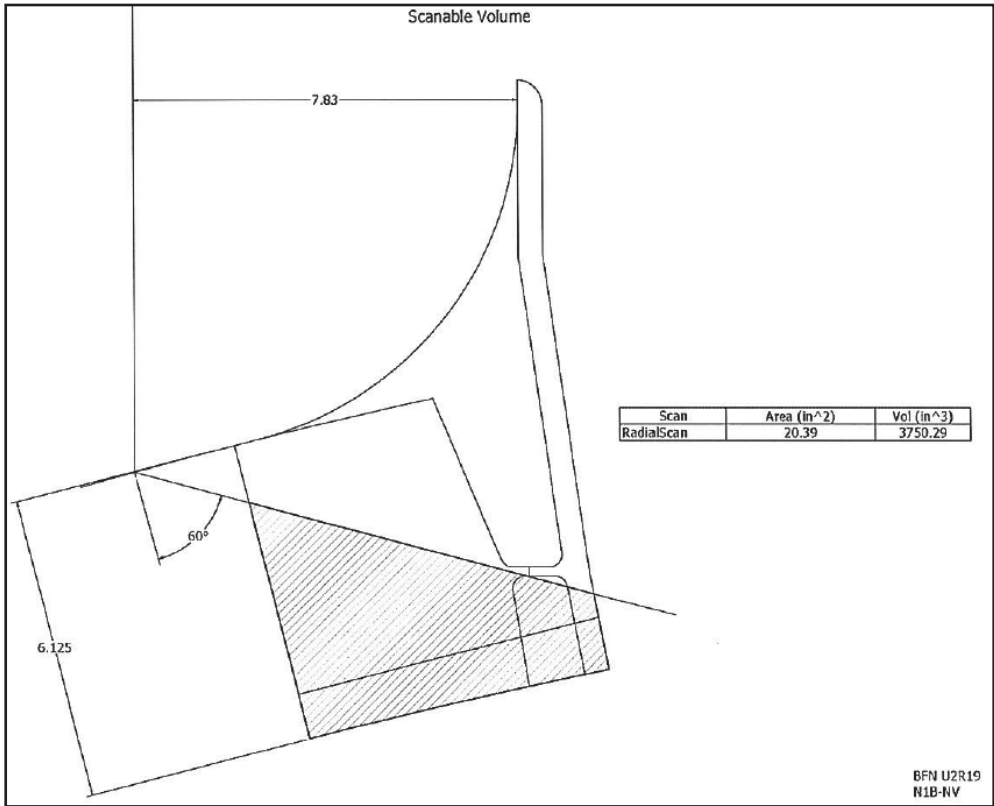


Figure 2.1-3 Weld **N1B-NV**, Achievable Radial Coverage



# Enclosure 1

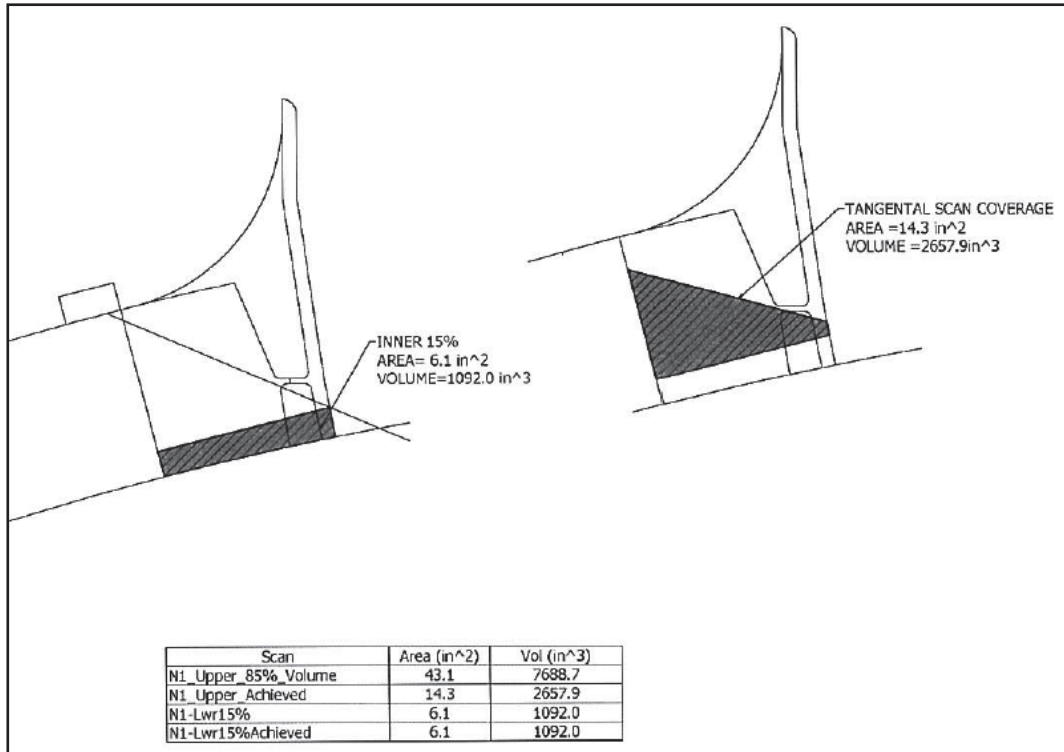


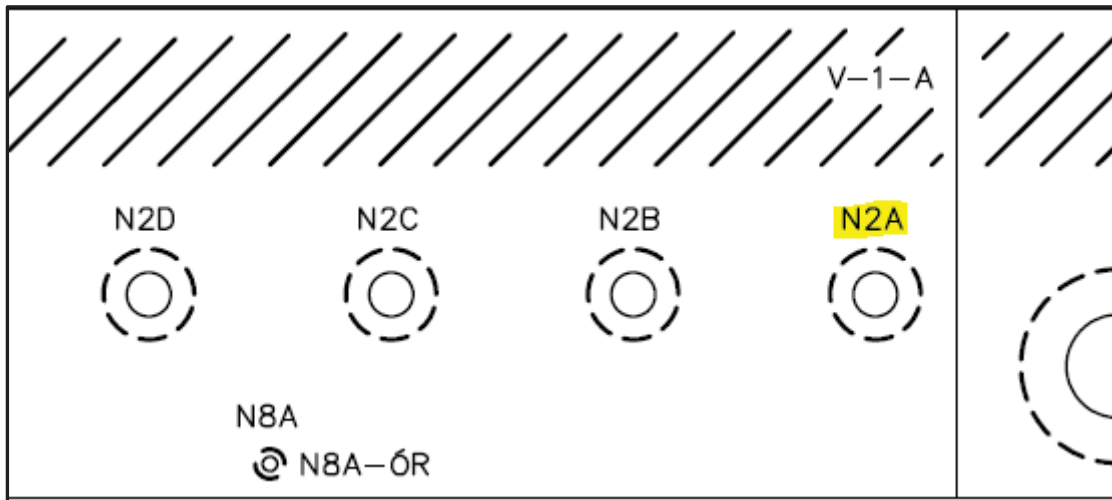
Figure 2.1-4 Weld **N1B-NV**, Upper 85% & Lower 15% Achieved Tangential Coverage

Table 2.1-1 Weld **N1B-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	8780.6	1092	7688.7	8780.7
Exam Volume Achieved (in <sup>3</sup> )	3750.29	1092	2657.9	3749.9
% Coverage Achieved	(A) 42.7	100	34.6	(B) 42.7
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 42.7%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 43°, 50°, 55° Shear and 60° Refracted Longitudinal.

2.2 Weld **N2A-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 2.2-1 Weld **N2A-NV** (Extracted from Reference Drawing 2-CHM-2046-C-01)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-058A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.0 percent as described in Table 2.2-1 and combined with Figure 2.2-2 through 2.2-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-138 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

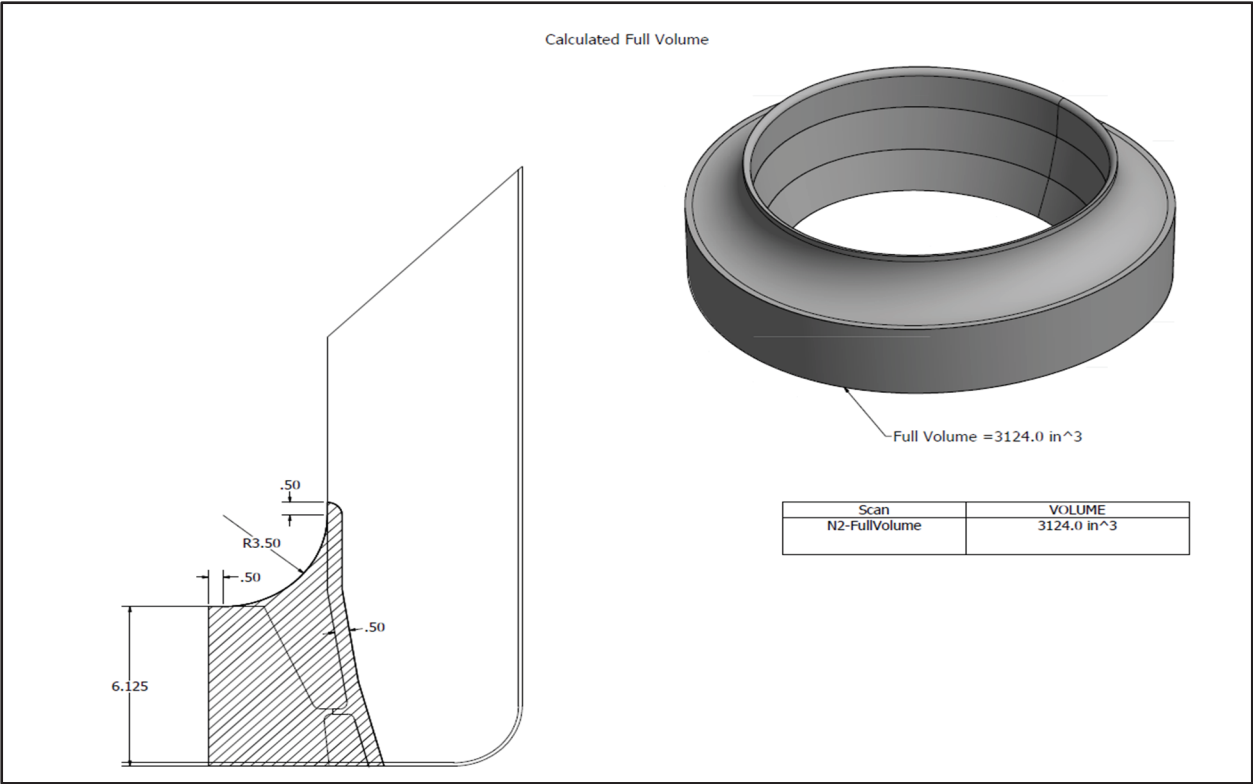


Figure 2.2-2 Weld **N2A-NV**, Full Volume Required Coverage

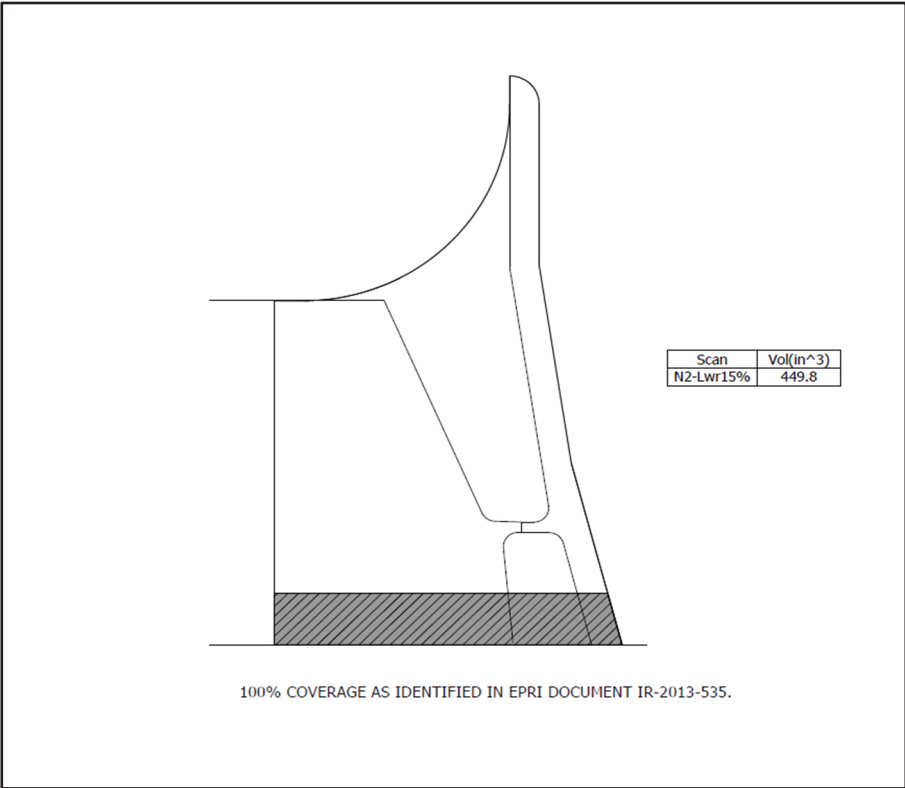


Figure 2.2-3 Weld **N2A-NV**, Inner 15% Radial Coverage Achieved

# Enclosure 1

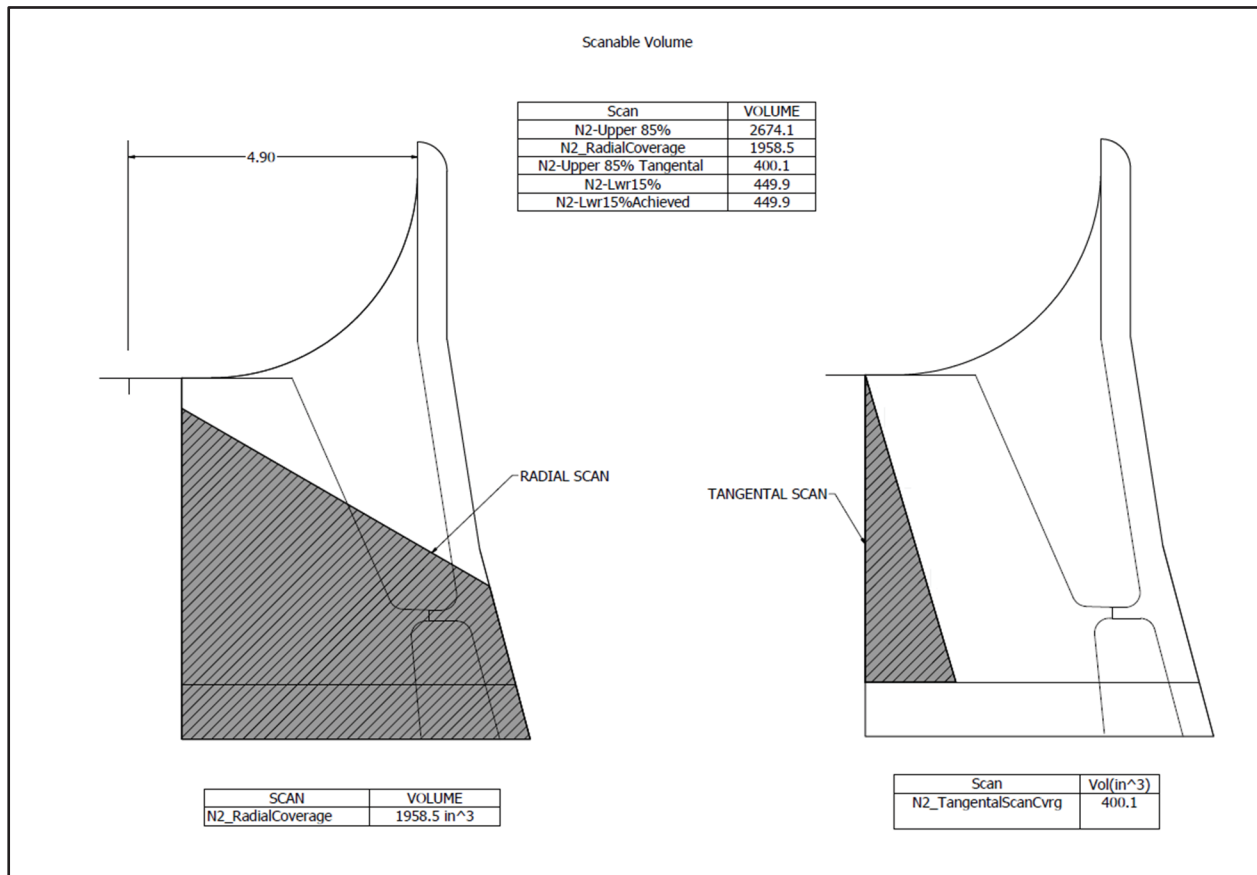


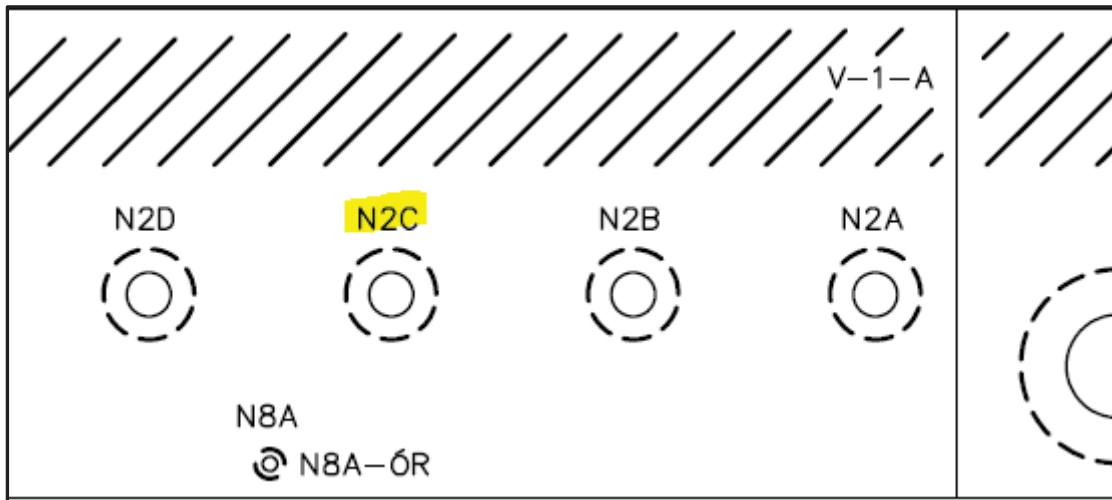
Figure 2.2-4 Weld **N2A-NV**, Upper 85% Tangential and Radial Coverage Achieved

Table 2.2-1 Weld **N2A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3124.0	449.8	2674.1	3124.0
Exam Volume Achieved (in <sup>3</sup> )	1958.5	449.9	400.1	850.0
% Coverage Achieved	<b>(A) 62.7%</b>	100%	15.0%	<b>(B) 27.2%</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.0</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

2.3 Weld **N2C-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 2.3-1 Weld **N2C-NV** (Extracted from Reference Drawing 2-CHM-2046-C-01)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-059A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.0 percent as described in Table 2.3-1 and combined with Figure 2.3-2 through 2.3-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-139 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

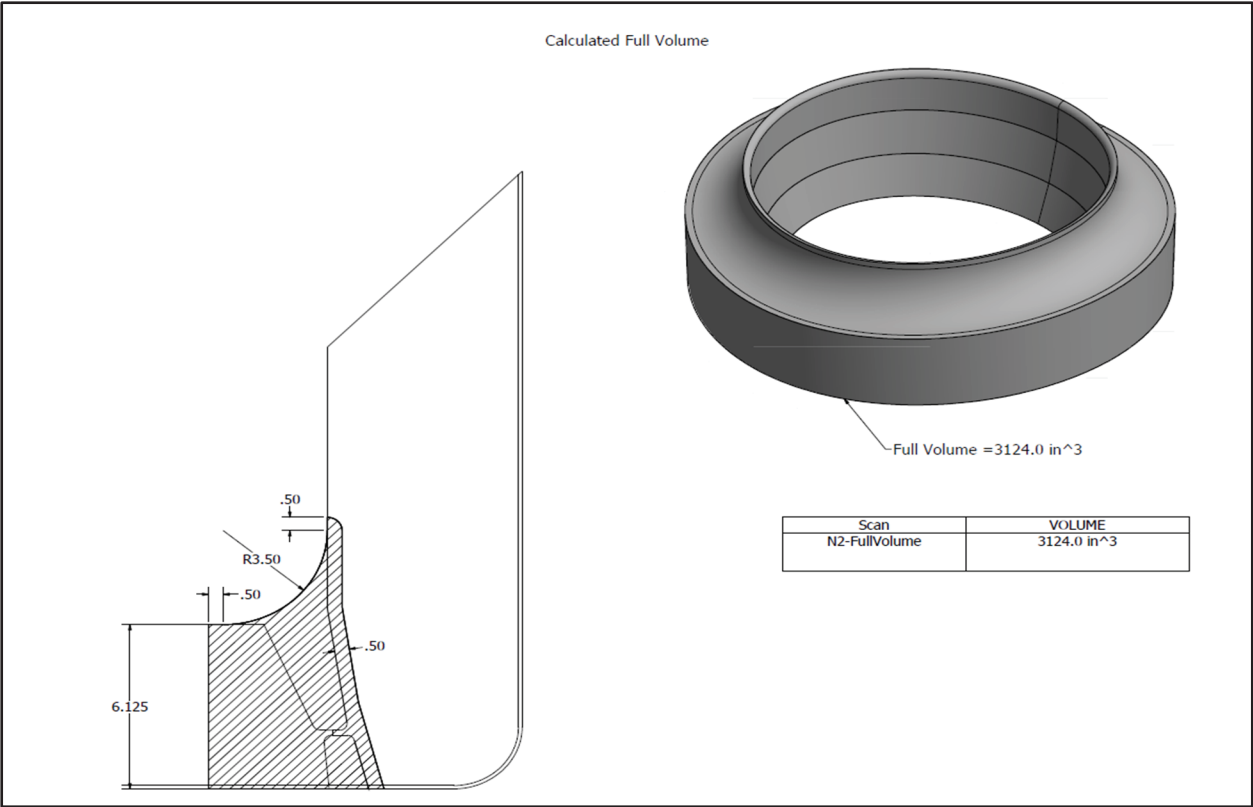


Figure 2.3-2 Weld **N2C-NV**, Full Volume Required Coverage

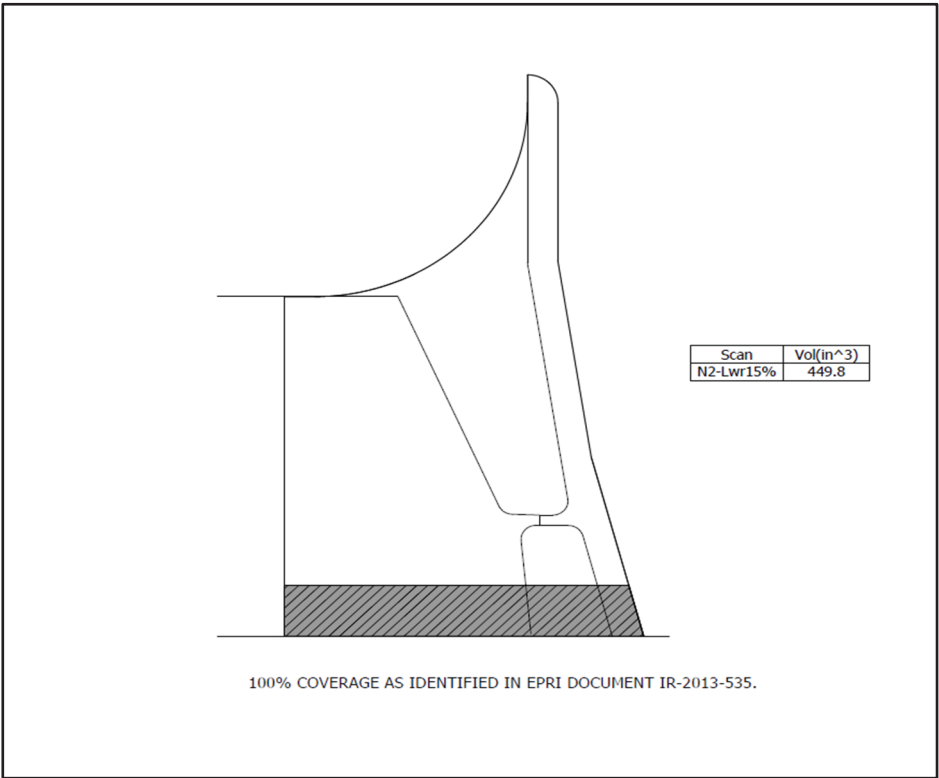


Figure 2.3-3 Weld **N2C-NV**, Inner 15% Radial Coverage Achieved

# Enclosure 1

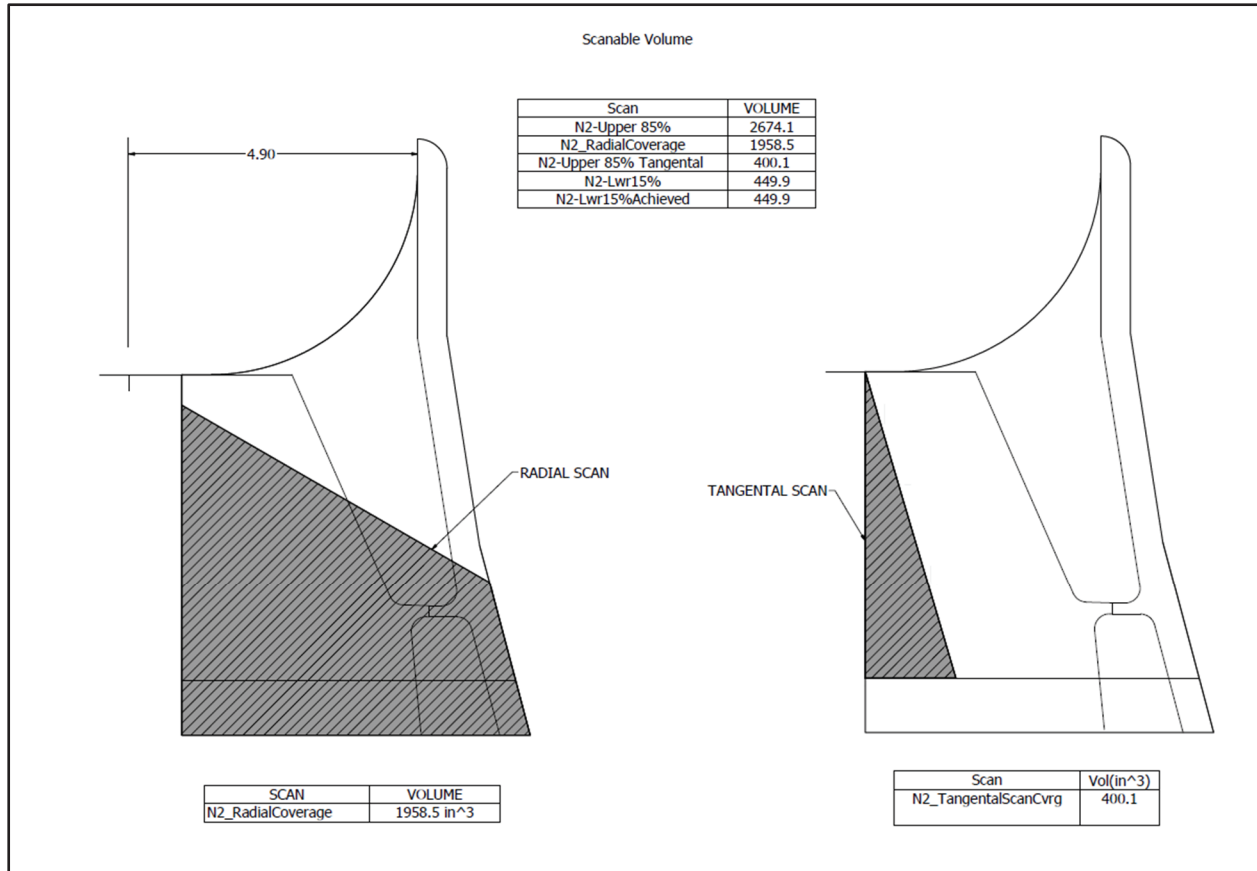


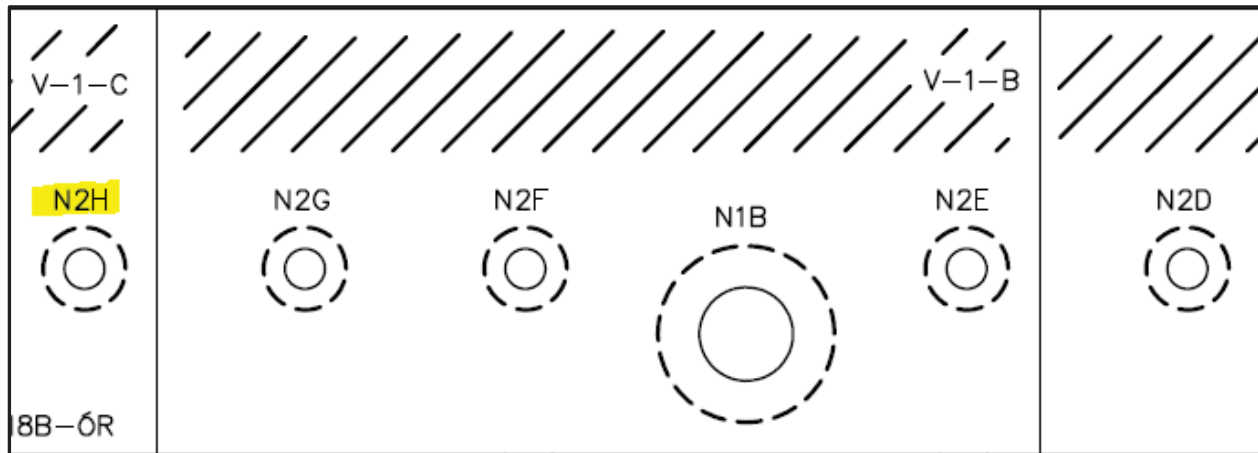
Figure 2.3-4 Weld **N2C-NV**, Upper 85% Tangential and Radial Coverage Achieved

Table 2.3-1 Weld **N2C-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3124.0	449.8	2674.1	3124.0
Exam Volume Achieved (in <sup>3</sup> )	1958.5	449.8	400.1	850.0
% Coverage Achieved	<b>(A) 62.7%</b>	100%	15.0%	<b>(B) 27.2%</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.0</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

2.4 Weld **N2H-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 2.4-1 Weld **N2H-NV** (Extracted from Reference Drawing 2-CHM-2046-C-01)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-091A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.0 percent as described in Table 2.4-1 and combined with Figure 2.4-2 through 2.4-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-143 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.



Enclosure 1

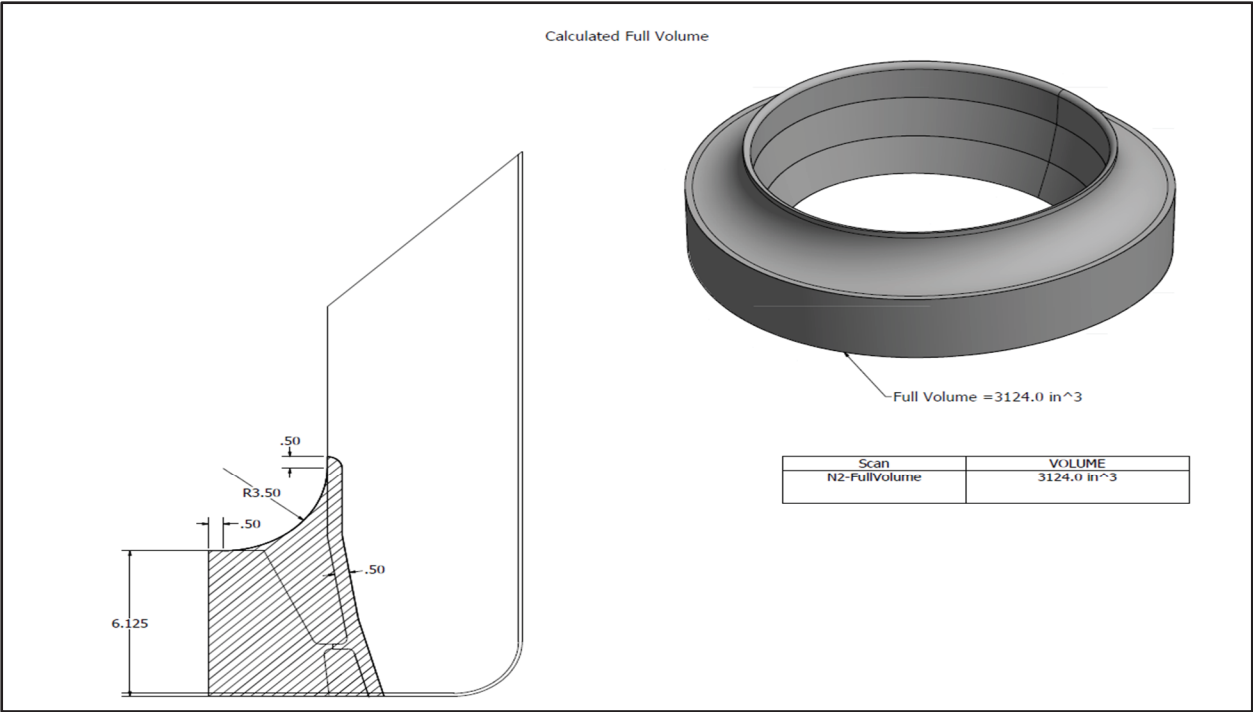


Figure 2.4-2 Weld **N2H-NV**, Full Volume Required Coverage

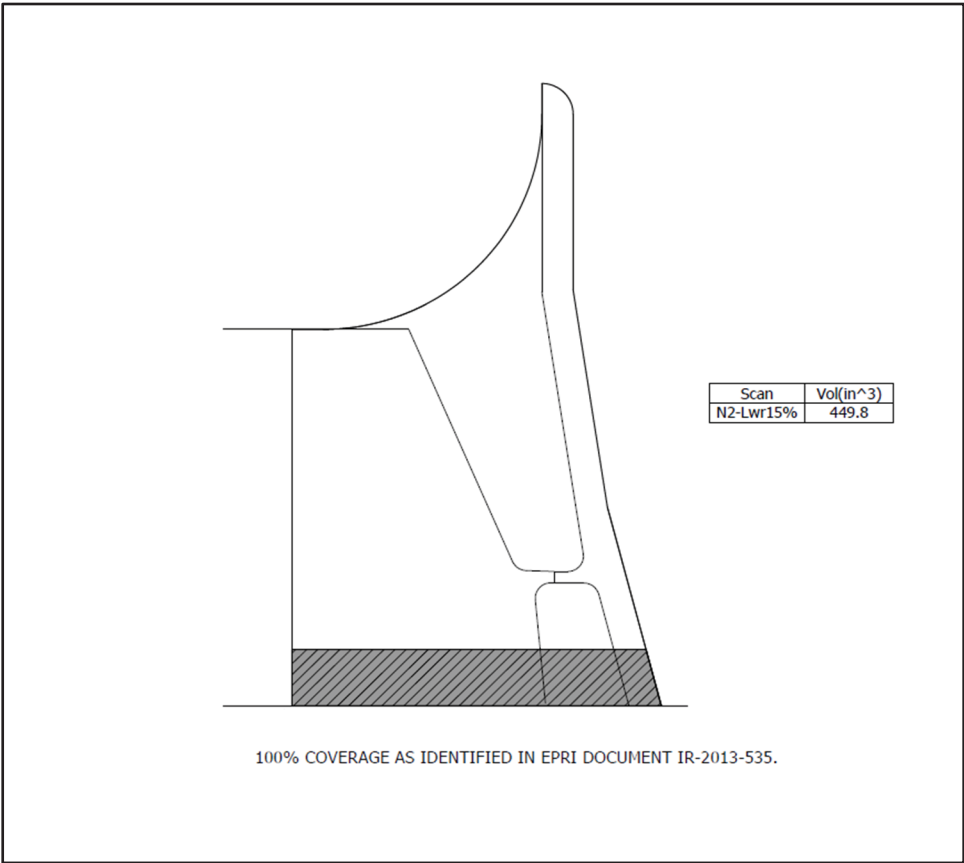


Figure 2.4-3 Weld **N2H-NV**, Inner 15% Radial Coverage Achieved

# Enclosure 1

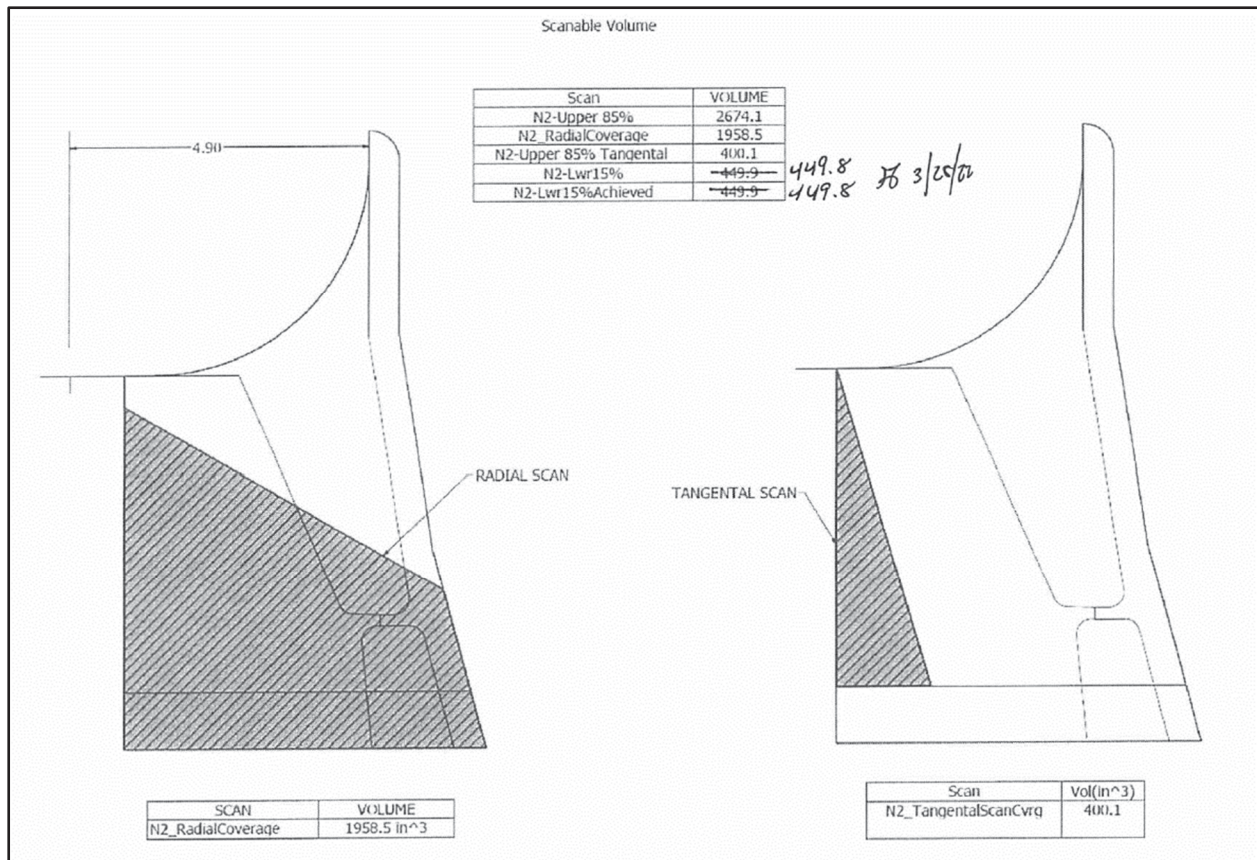


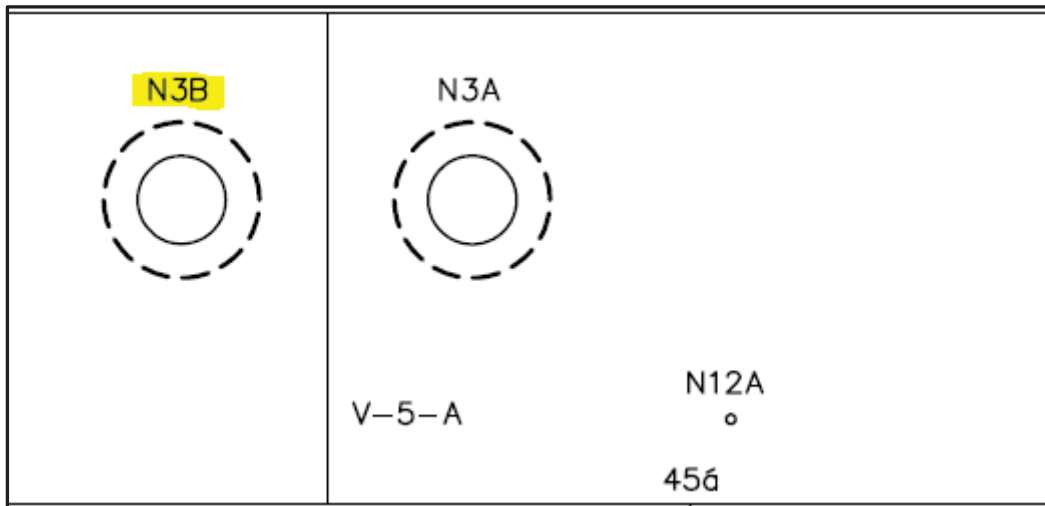
Figure 2.4-4 Weld **N2H-NV**, Upper 85% Tangential and Radial Coverage Achieved

Table 2.4-1 Weld **N2H-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3124.0	449.8	2674.1	3124.0
Exam Volume Achieved (in <sup>3</sup> )	1958.5	449.8	400.1	850.0
% Coverage Achieved	(A) 62.7%	100%	15.0%	(B) 27.2%
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.0</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

2.5 Weld **N3B-NV** – 26" Steam Outlet Nozzle to Shell WeldFigure 2.5-1 Weld **N3B-NV** (Extracted from Reference Drawing 2-CHM-2046-C-01)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-125A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 42.3 percent as described in Table 2.5-1 and combined with Figure 2.5-2 through 2.5-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-175 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

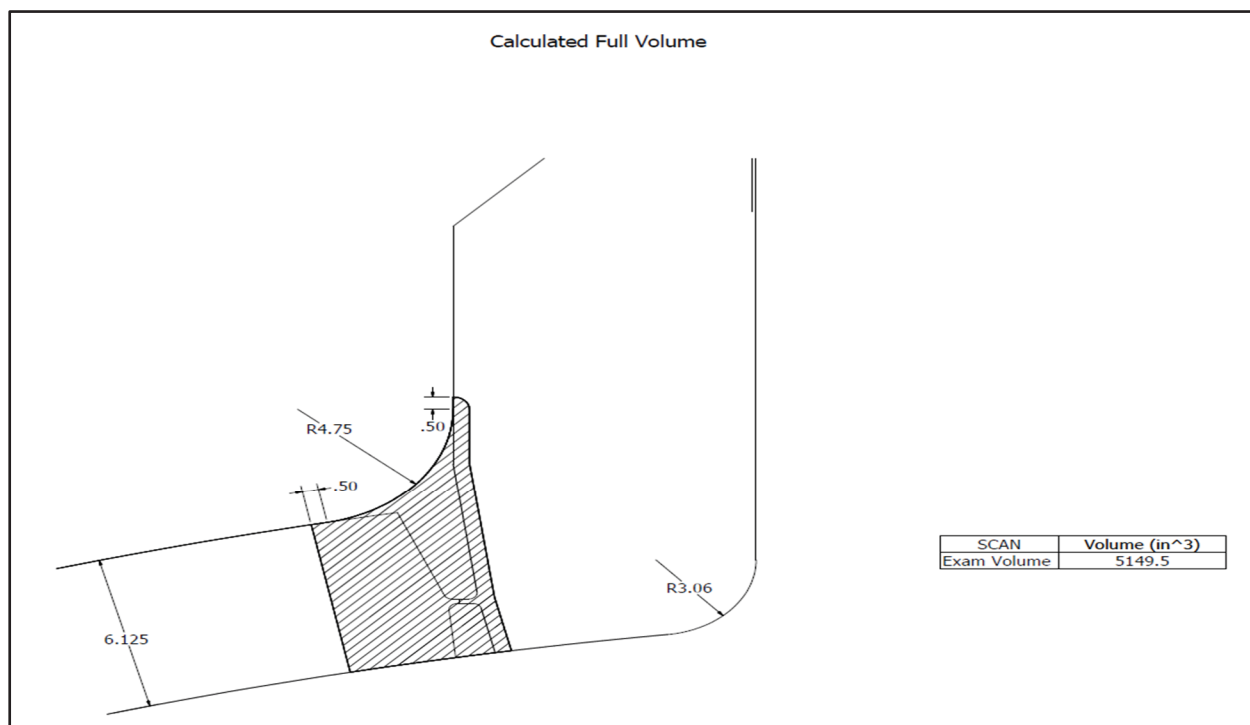


Figure 2.5-2 Weld **N3B-NV**, Full Volume Required Coverage

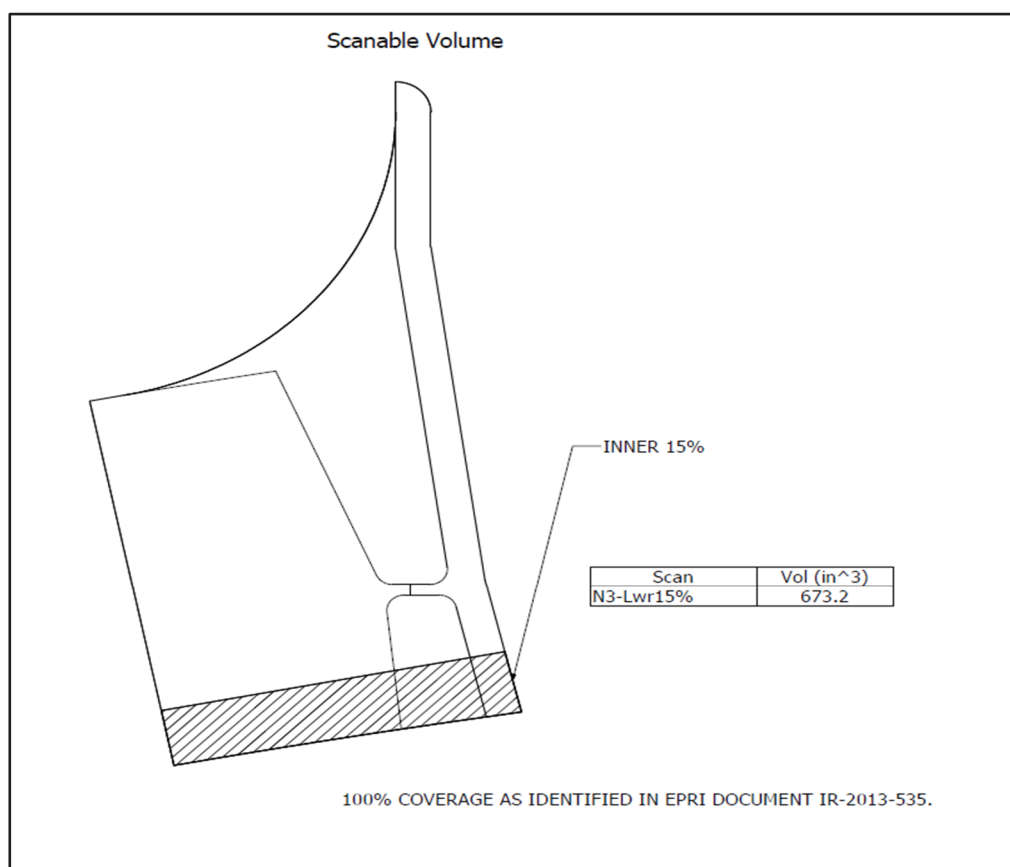


Figure 2.5-3 Weld **N3B-NV**, Inner 15% Coverage Achieved

# Enclosure 1

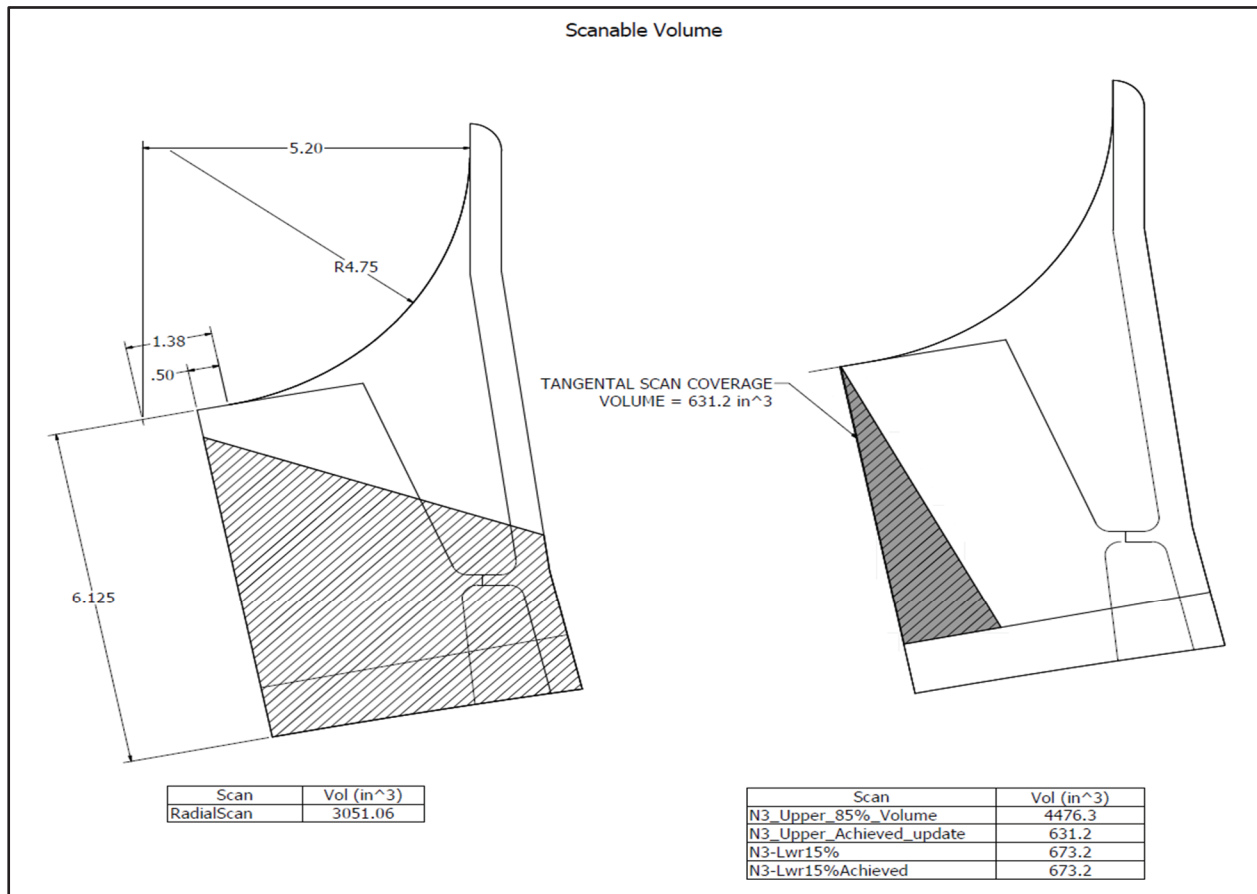


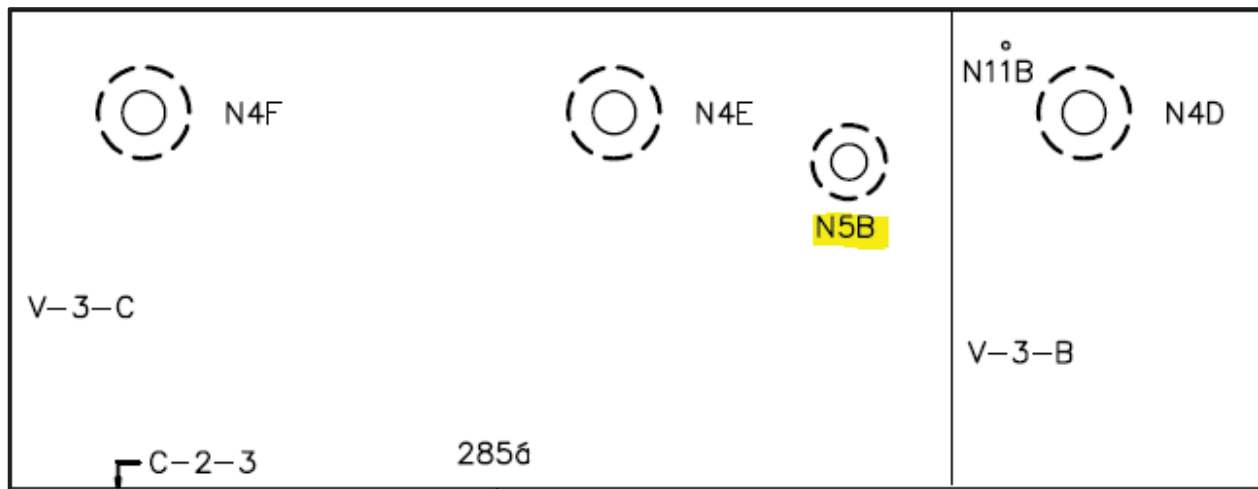
Figure 2.5-4 Weld **N3B-NV**, Upper 85% Tangential and Radial Coverage Achieved

Table 2.5-1 Weld **N3B-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	5149.5	673.2	4476.3	5149.5
Exam Volume Achieved (in <sup>3</sup> )	3051.1	673.2	631.2	1304.4
% Coverage Achieved	(A) 59.3	100	14.1	(B) 25.3
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 42.3%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 50°, 70°, Shear and 60° Refracted Longitudinal.

2.6 Weld **N5B-NV** – 10" Core Spray Nozzle to Shell WeldFigure 2.6-1 Weld **N5B-NV** (Extracted from Reference Drawing 2-CHM-2046-C-01)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-141A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration and insulation support ring resulting in total UT coverage 36.0 percent as described in Table 2.6-1 and combined with Figure 2.6-2 through 2.6-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-157 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

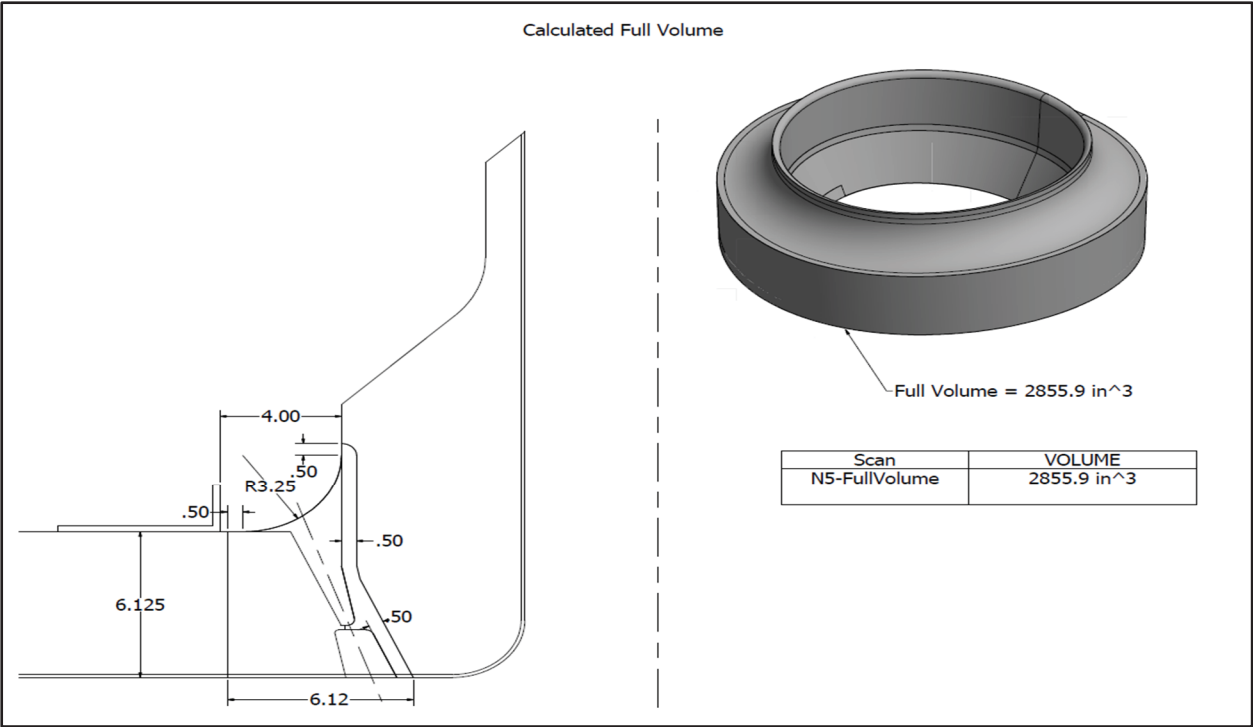


Figure 2.6-2 Weld **N5B-NV**, Full Volume Required Coverage

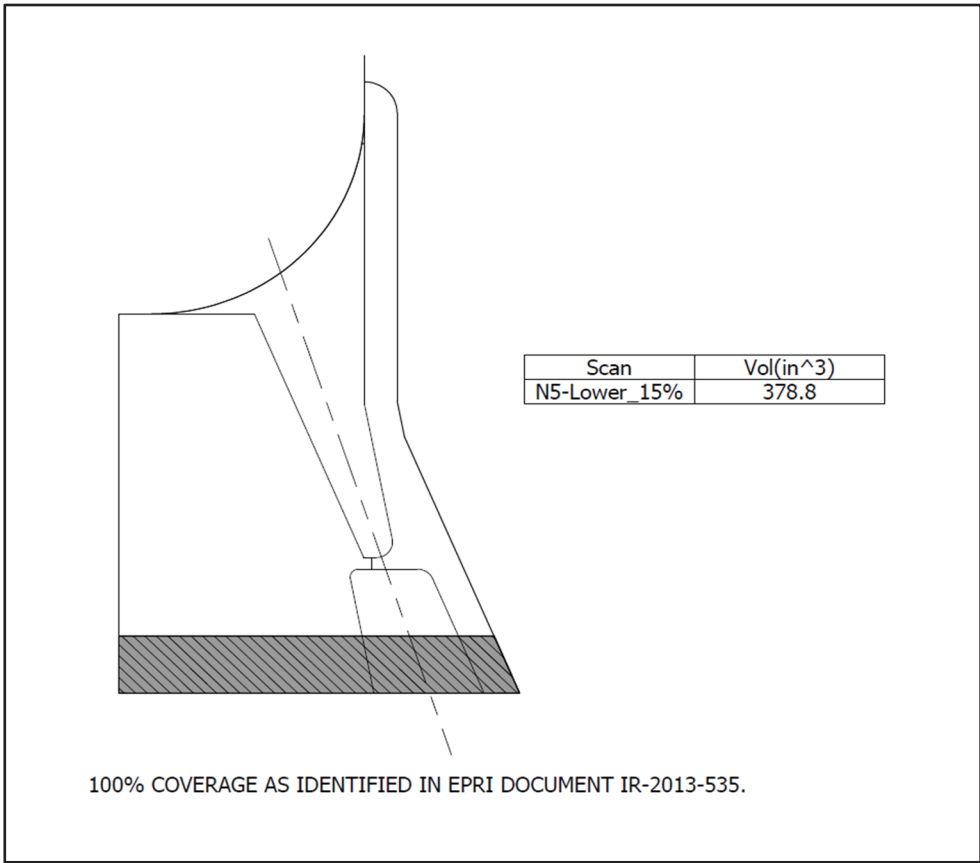


Figure 2.6-3 Weld **N5B-NV**, Inner 15% Coverage Achieved

# Enclosure 1

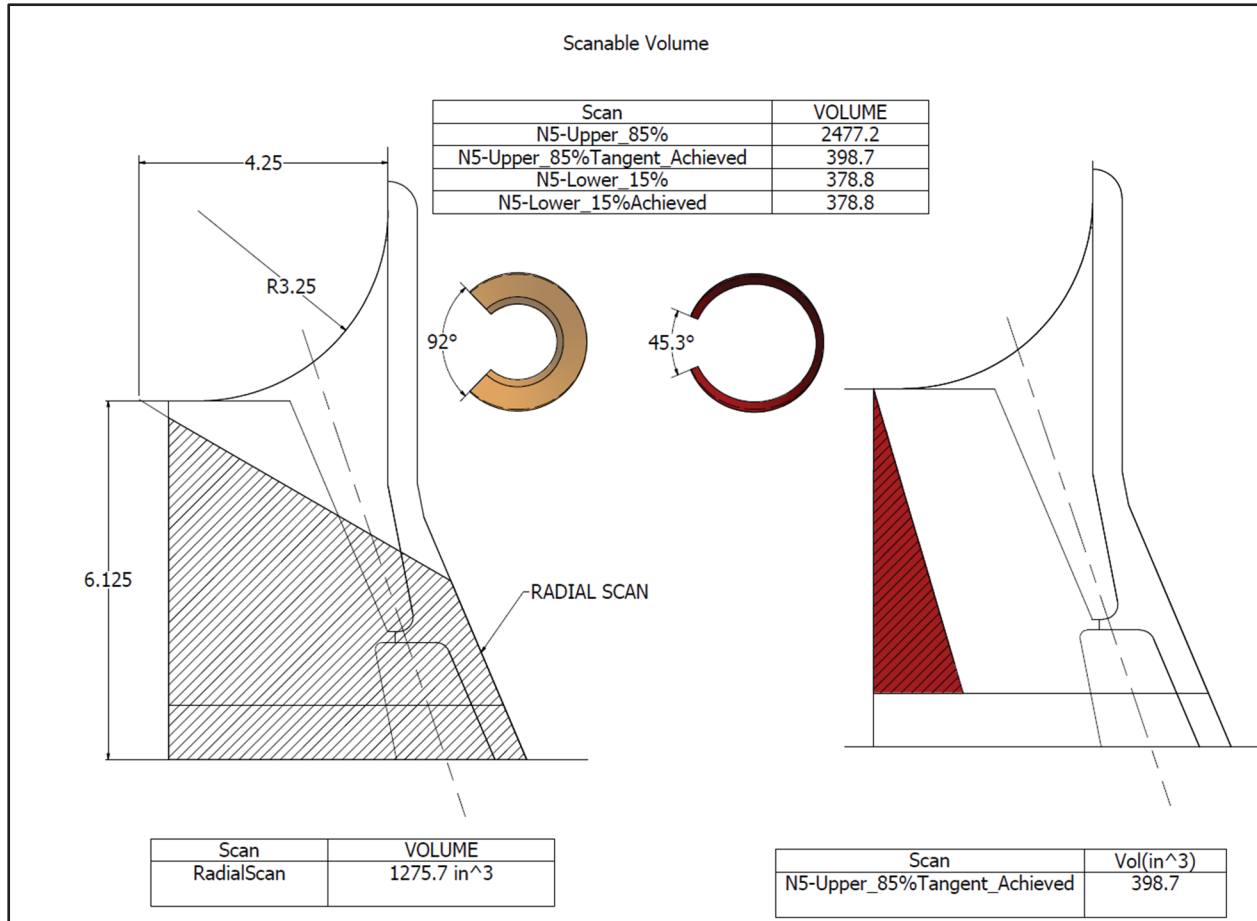


Figure 2.6-4 Weld **N5B-NV**, Upper 85% Tangential and Radial Coverage Achieved

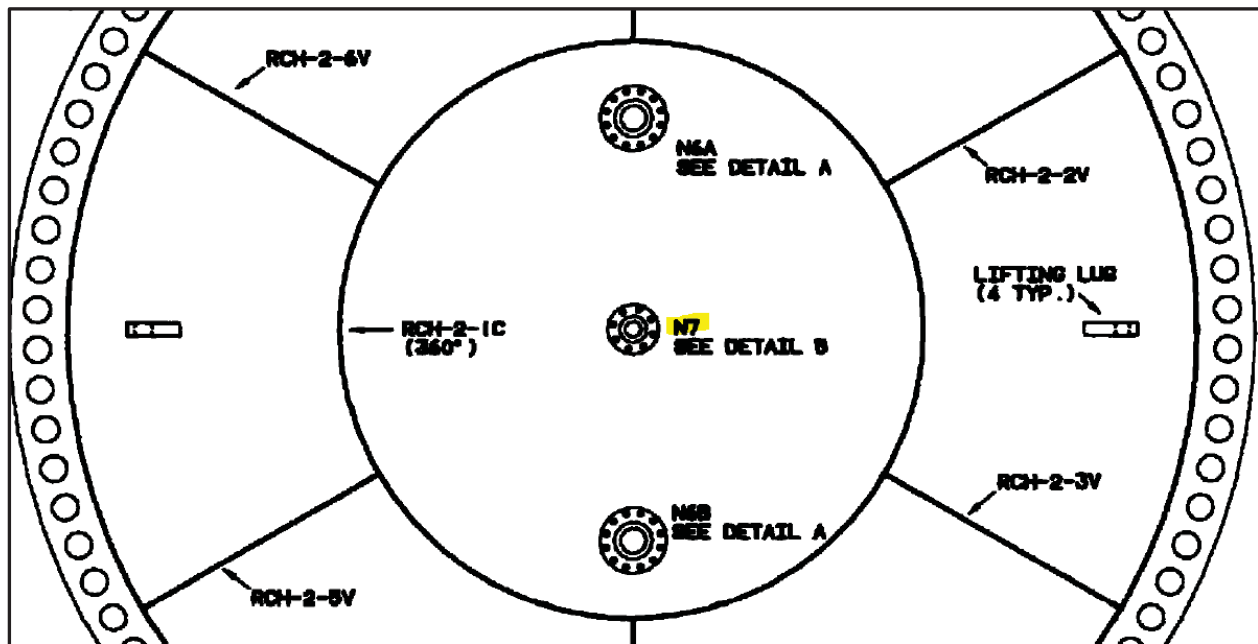
Table 2.6-1 Weld **N5B-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	2855.9	378.8	2477.2	2855.9
Exam Volume Achieved (in <sup>3</sup> )	1275.7	378.8	398.7	777.5
% Coverage Achieved	(A) 44.7%	100.0%	16.1%	(B) 27.2%
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 36.0%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.



2.7 Weld **N7-NV** – 4" Vent Nozzle to Head WeldFigure 2.7-1 Weld **N7-NV** (Extracted from Reference Drawing 2-ISI-0408-C-1)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-071A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 50.9 percent as described in Table 2.7-1 and combined with Figure 2.7-2 through 2.7-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-080 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

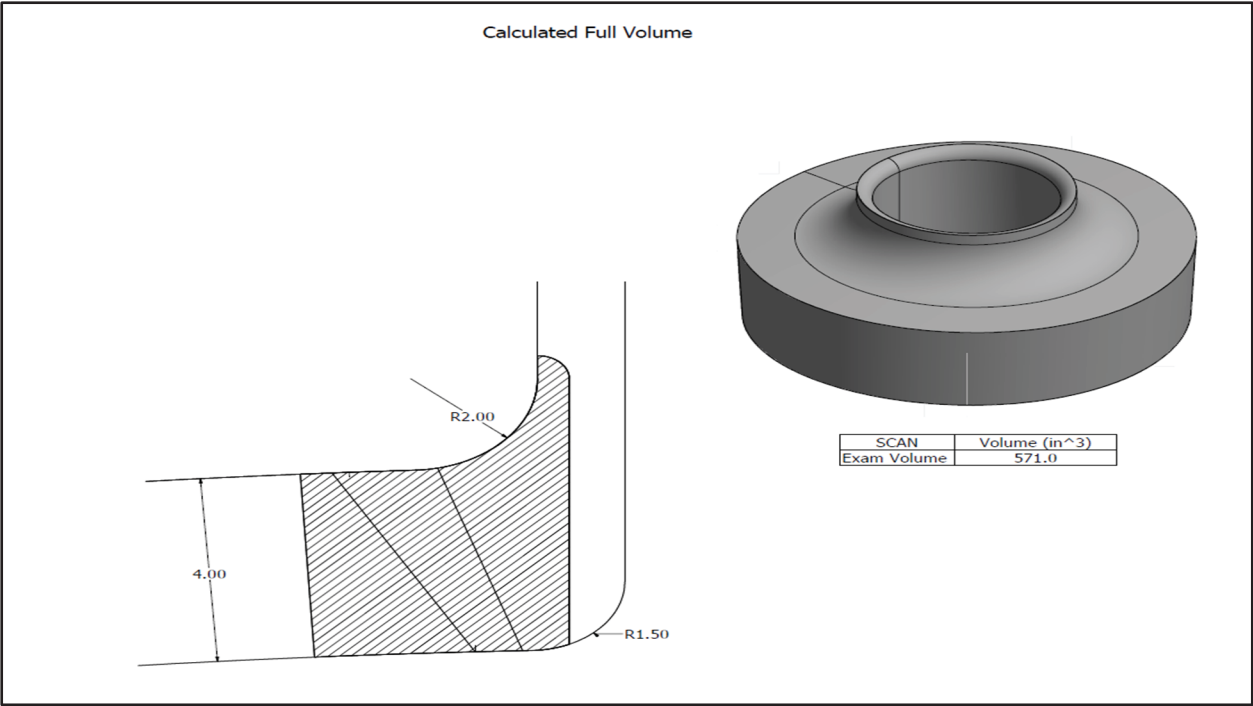


Figure 2.7-2 Weld **N7-NV**, Full Volume Required Coverage

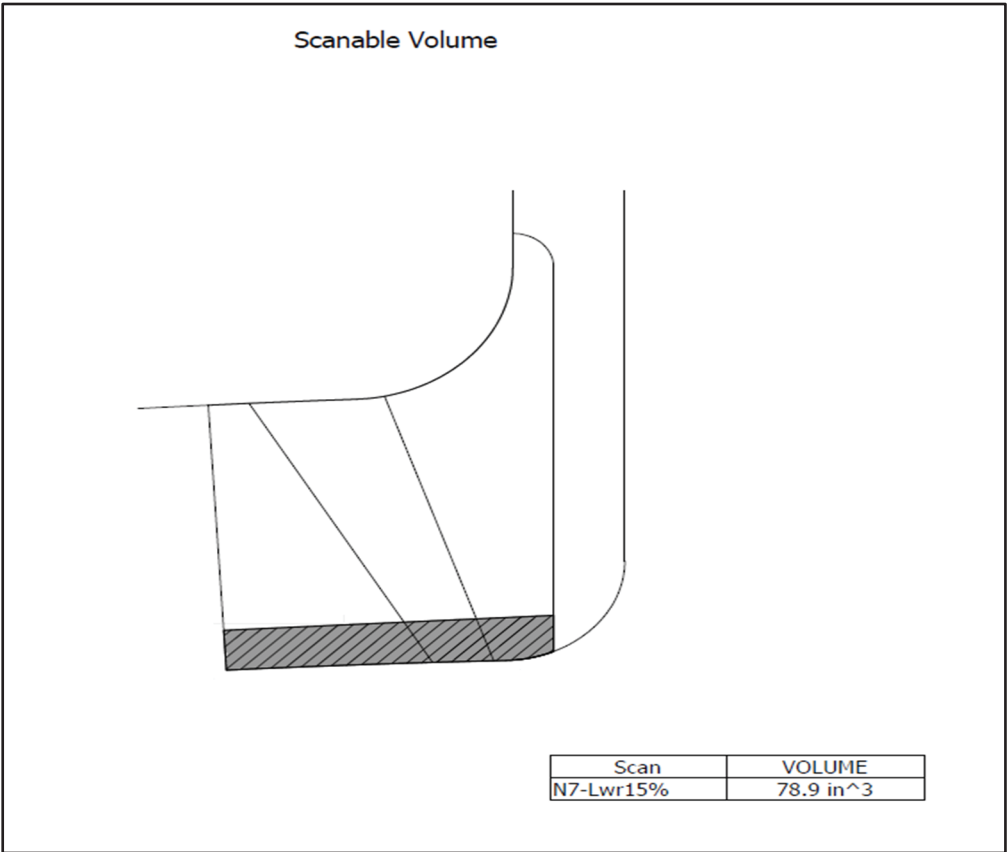


Figure 2.7-3 Weld **N7-NV**, Inner 15% Coverage Achieved

# Enclosure 1

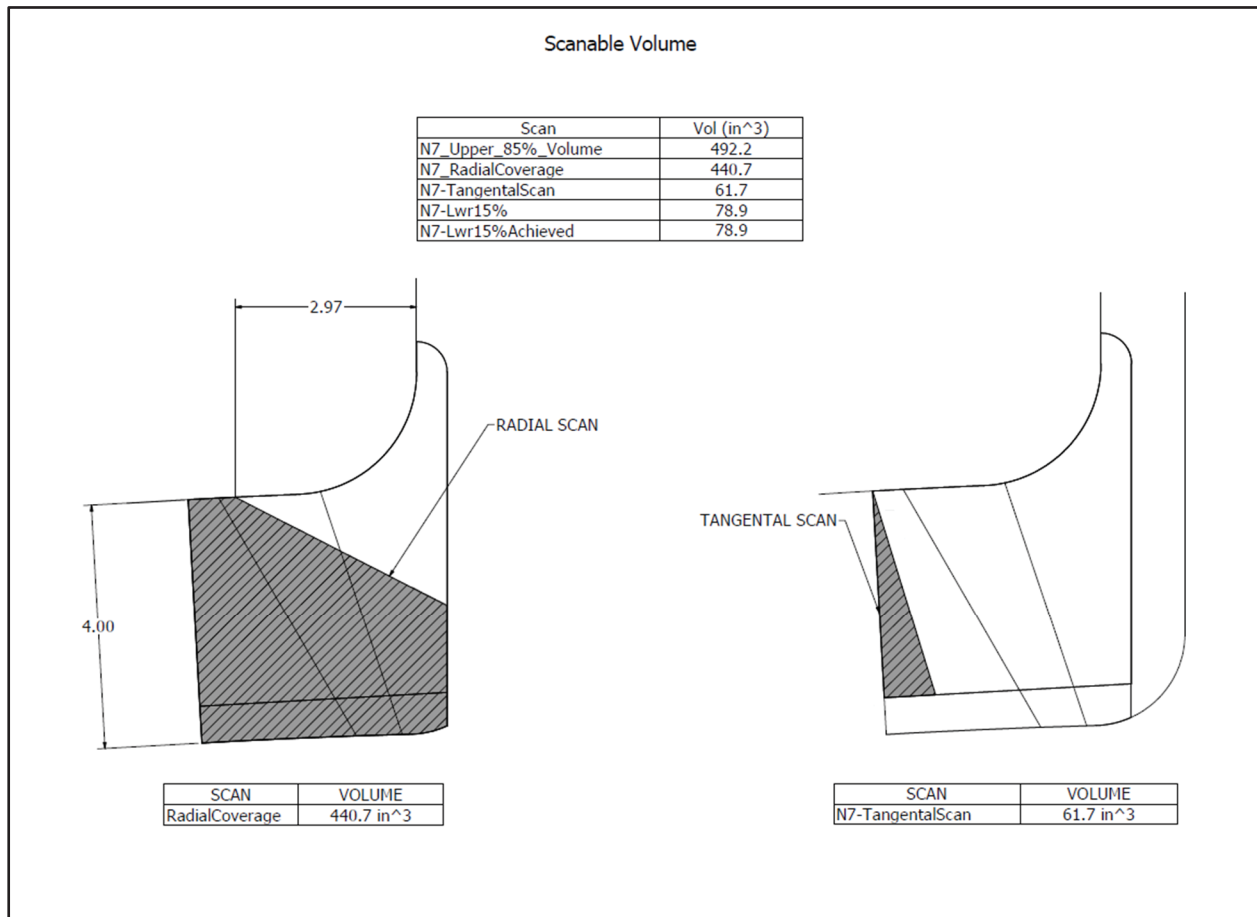


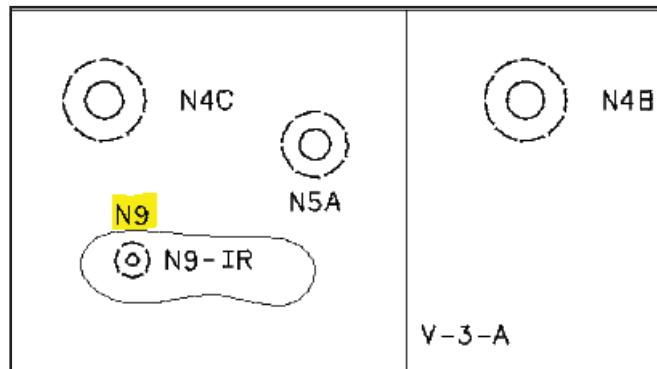
Figure 2.7-4 Weld **N7-NV**, Upper 85% Tangential and Radial Coverage Achieved

Table 2.7-1 Weld **N7-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	571.0	78.9	492.2	571.0
Exam Volume Achieved (in <sup>3</sup> )	440.7	78.9	61.7	140.6
% Coverage Achieved	<b>(A) 77.2%</b>	100.0%	12.5%	<b>(B) 24.6%</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 50.9%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 35°, 45°, Shear and 60° Refracted Longitudinal.

2.8 Weld **N9-NV** – 4” Control Rod Drive Hydraulic System Nozzle to Shell WeldFigure 2.8-1 Weld **N9-NV** (Extracted from Reference Drawing 2-CHM-2046-C-1)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-122A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 54.2 percent as described in Table 2.8-1 and combined with Figure 2.8-2 through 2.8-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R14, UT R-117 report was reviewed for the UT examination per TVA procedures. One reportable flaw indication that exceeded the acceptance criteria of IWB-3500 was evaluated per IWB-3610 and was determined to be acceptable. The same acceptable flaw was detected during the U2R19 outage with no observable change.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

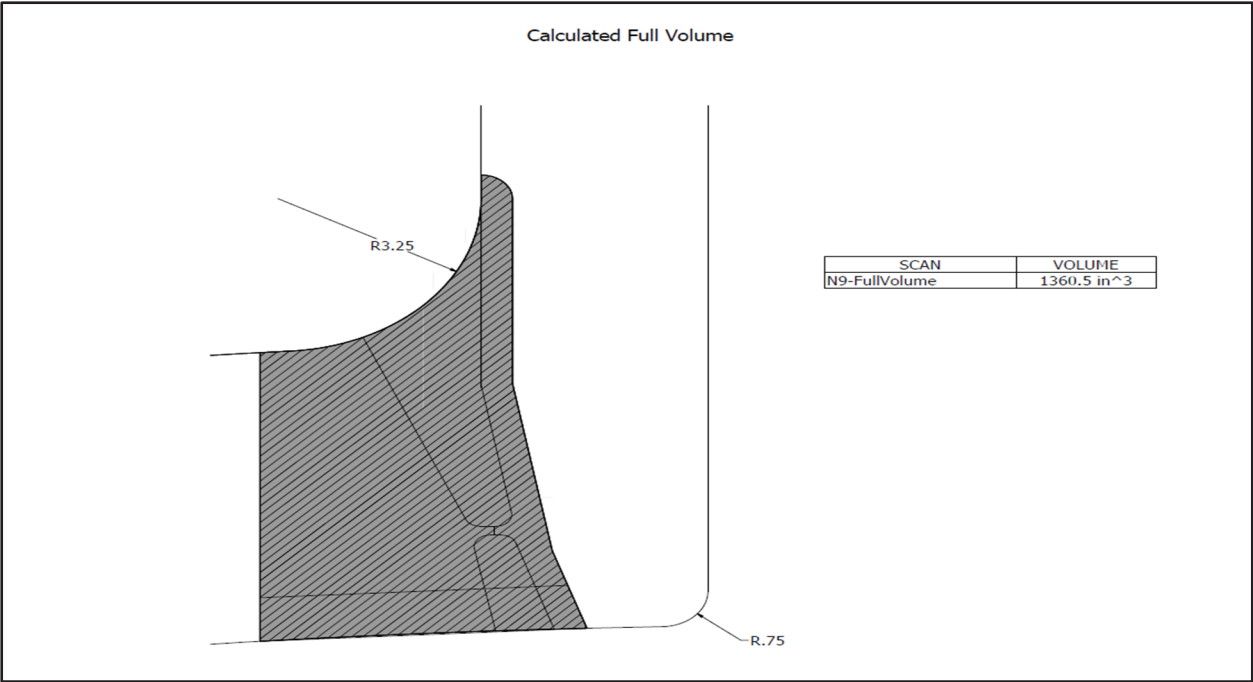


Figure 2.8-2 Weld **N9-NV**, Full Volume Required Coverage

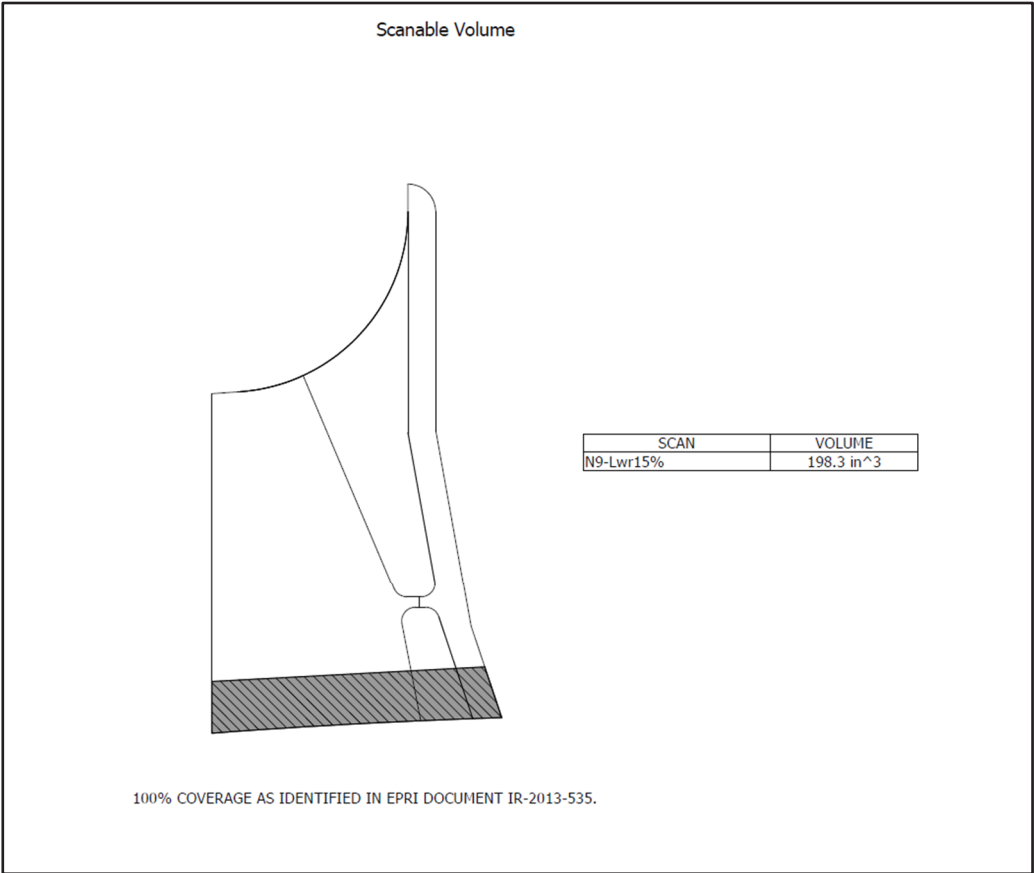


Figure 2.8-3 Weld **N9-NV**, Inner 15% Coverage Achieved

# Enclosure 1

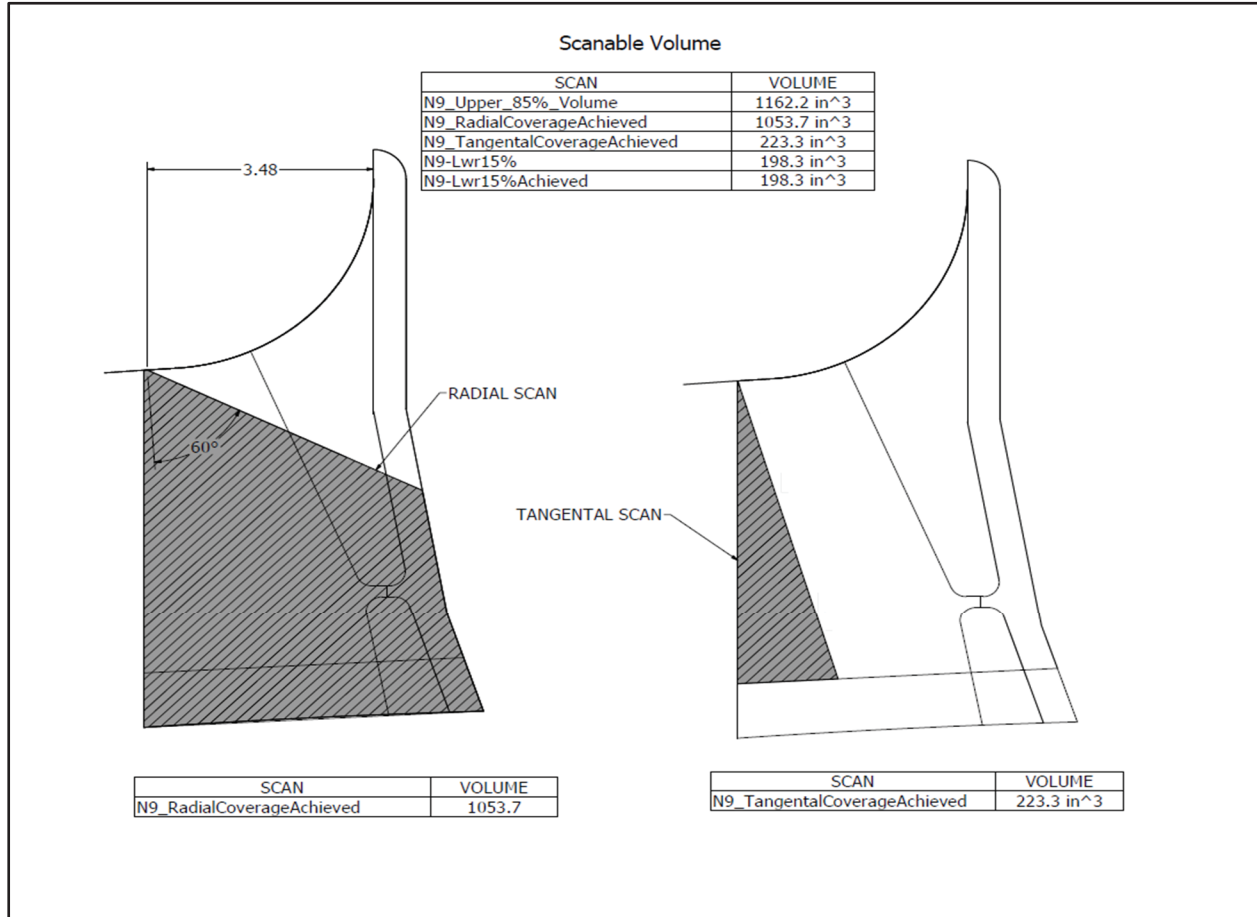


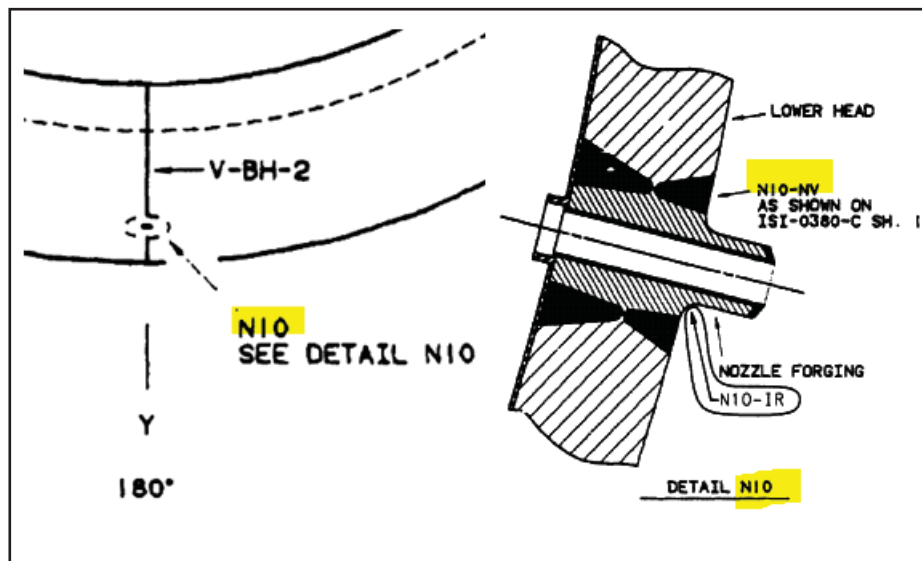
Figure 2.8-4 Weld **N9-NV**, Upper 85% Tangential and Radial Coverage Achieved

Table 2.8-1 Weld **N9-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	1360.5	198.3	1162.2	1360.5
Exam Volume Achieved (in <sup>3</sup> )	1053.7	198.3	223.3	421.6
% Coverage Achieved	(A) 77.4%	100.0%	19.2%	(B) 31.0%
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 54.2%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 20°, 35°, and 45° Shear and 60° Refracted Longitudinal.

2.9 Weld **N10-NV** – 1.5" Standby Liquid Control System Nozzle to Head WeldFigure 2.9-1 Weld **N10-NV** (Extracted from Reference Drawing 2-ISI-0444-C-1)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017. The NDE data can be found on UT Report No. R-121. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 89.9 percent as described in Table 2.9-1 and combined with Figure 2.9-2 through 2.9-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R16, UT VE-11-019 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

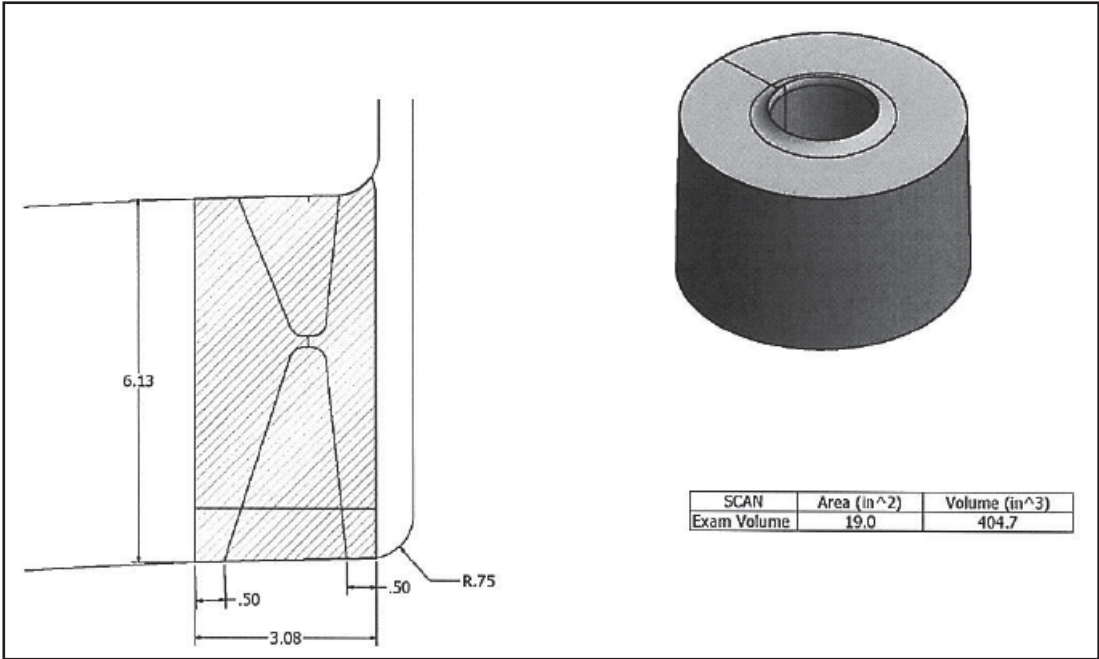


Figure 2.9-2 Weld **N10-NV**, Full Volume Required Coverage

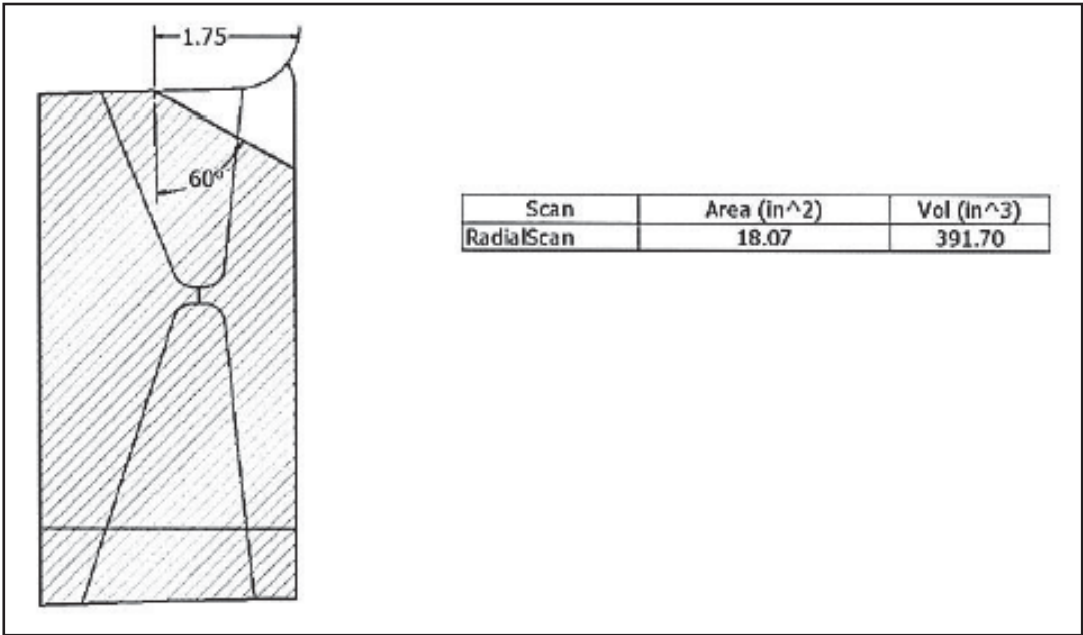


Figure 2.9-3 Weld **N10-NV**, Achievable Radial Coverage



# Enclosure 1

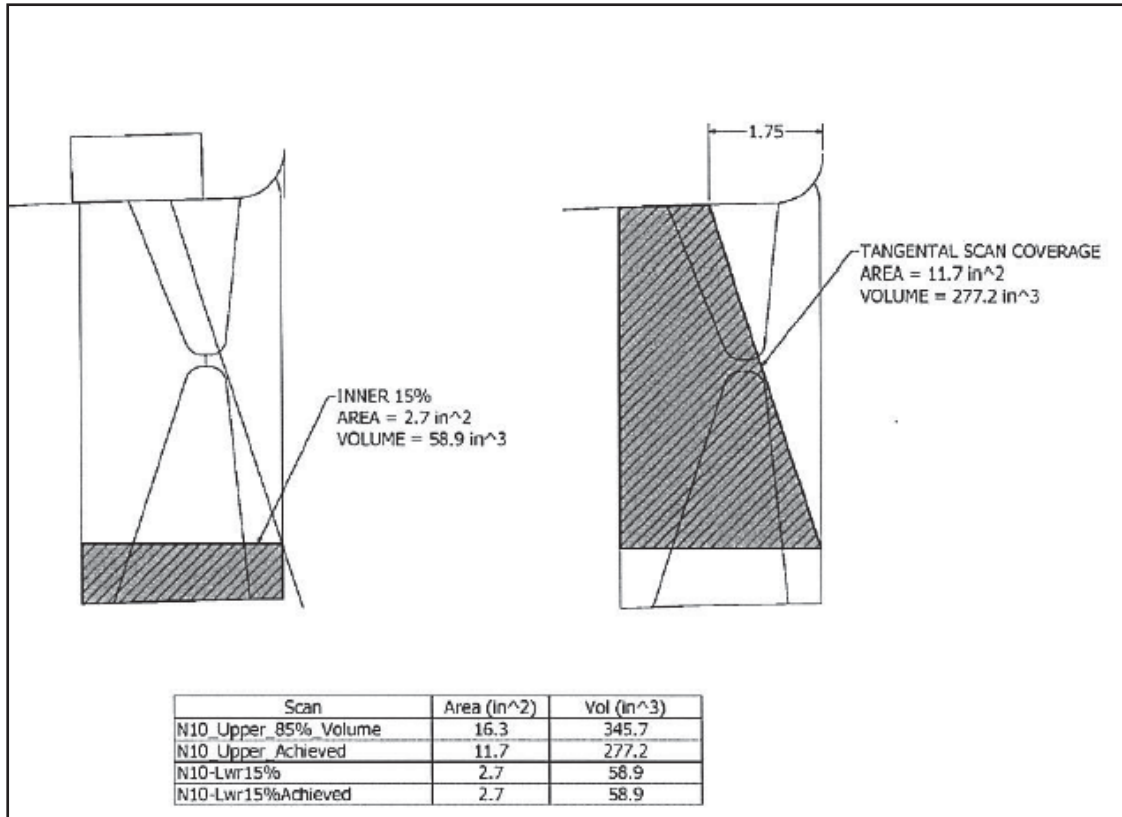


Figure 2.9-4 Weld **N10-NV**, Upper 85% & Lower 15% Achieved Tangential Coverage

Table 2.9-1 Weld **N10-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	404.7	58.9	345.7	404.6
Exam Volume Achieved (in <sup>3</sup> )	391.7	58.9	277.2	336.1
% Coverage Achieved	<b>(A) 96.8</b>	100	80.2	<b>(B) 83.0</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 89.9%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 45° Shear and 60° Refracted Longitudinal.

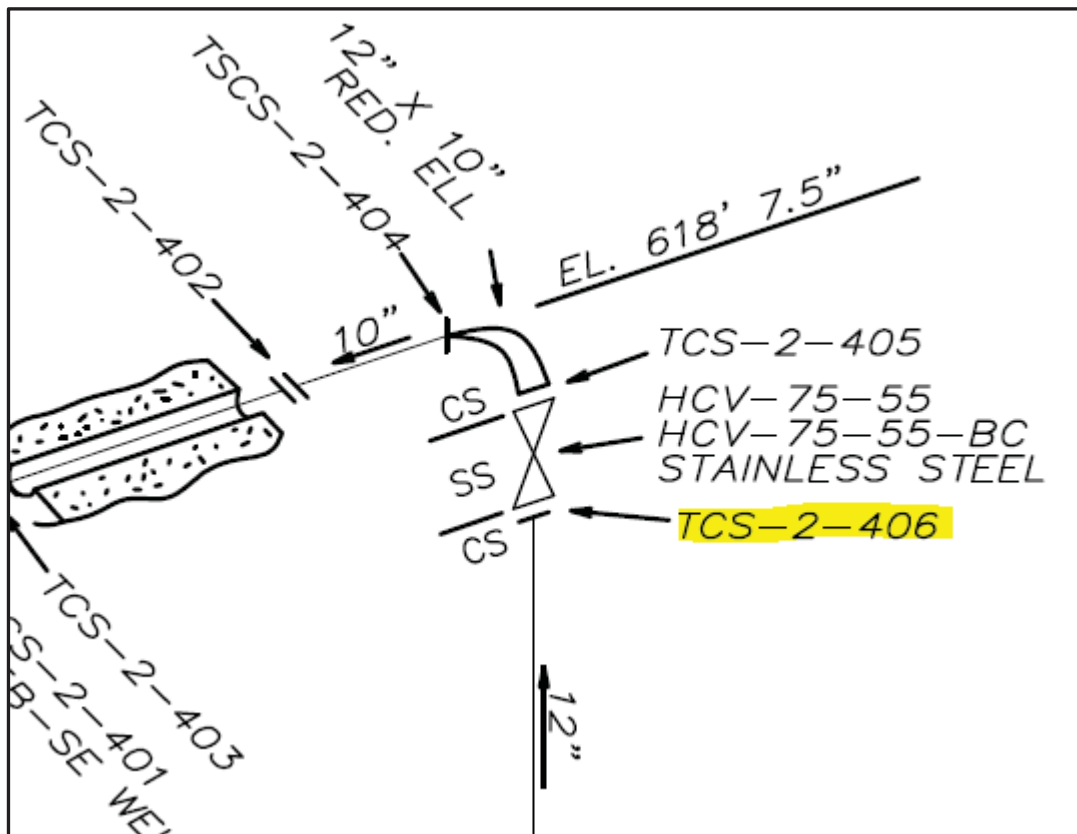
2.10 Weld **TCS-2-406** – 12" Core Spray System Pipe to Valve Weld

Figure 2.10-1 Weld TCS-2-406 (Extracted from Reference Drawing 2-ISI-0271-C-1)

This weld was UT examined in the fifth 10-Year ISI Interval, first period, during the U2R19 refueling outage in 2017 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No: R1.16, "Welds Subject to Intergranular or Transgranular Stress Corrosion Cracking (IGSCC or TGSCC)," degradation mechanisms. The NDE data can be found on UT Report No. R-079. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam volume C-D-E-F with an additional RI-ISI requirement to increase the volume to include 0.5 inch beyond the base metal thickness transition or counterbore. The UT examination was limited from the valve side of the weld due to the geometric configuration resulting in total UT coverage of 48.5 percent as described in Table 2.10-1 and combined with Figure 2.10-2 through 2.10-3.

Examination of an alternate risk informed selection was not practical. Each of the possible alternative welds are similar in design and materials (carbon steel piping to stainless steel valve) such that similar coverage limitations are expected. Instead, three additional examinations were performed on similar components subject to the same degradation mechanism in the Residual Heat Removal and Reactor Water Recirculation systems. Although not examined for Code Case N-716-1 credit, these representative examinations provide additional assurance that IGSCC is not occurring in a similar operating environment. For each of the three additional exams, essentially 100 percent coverage was obtained, and no indications were recorded.

## Enclosure 1

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U2R10, UT R-136 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

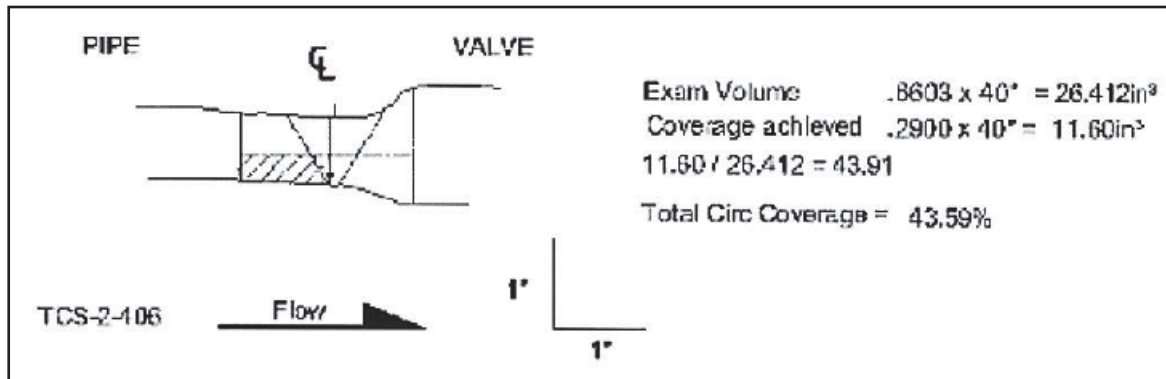
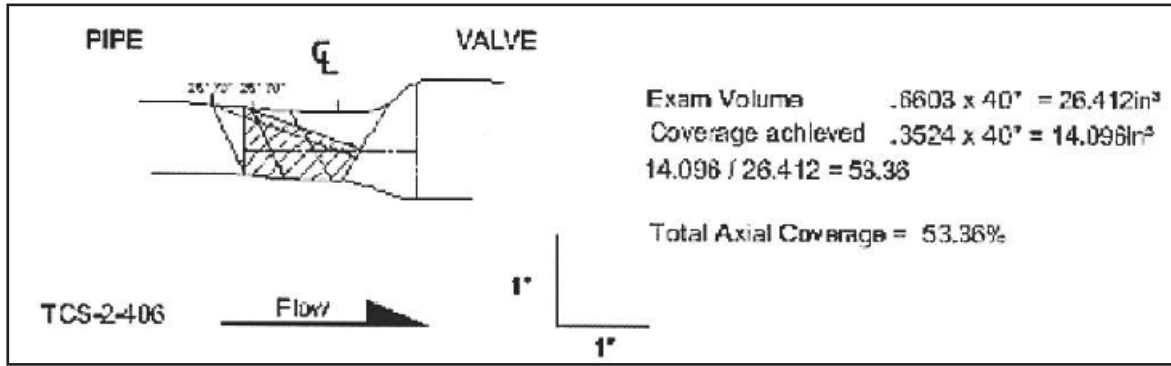


Table 2.10-1 Weld TCS-2-406 Scan Coverage and Scan Summary

SCANS	% COVERAGE
Axial Coverage	53.36%
Circ CCW	43.59%

CUMULATIVE % COVERAGE =  
 $96.95\% \div 2 \text{ SCANS} = 48.48\%$  or  
 TOTAL COVERAGE % = 48.5%

Notes: Wave Modes Used = 35° to 65° Shear and 25° to 70° Refracted Longitudinal.

TABLE 3 – BFN UNIT 3 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
3.1 N1A-NV U3R17	1 B-D B3.90	28" Reactor Water Recirculation Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	44.9%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.1-1  Figures 3.1-1 through 3.1-4
3.2 N2B-NV U3R17	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.0%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.2-1  Figures 3.2-1 through 3.2-4
3.3 N2D-NV U3R17	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.0%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.3-1  Figures 3.3-1 through 3.3-4

TABLE 3 – BFN UNIT 3 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
3.4 N2F-NV U3R17	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.0%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.4-1  Figures 3.4-1 through 3.4-4
3.5 N3B-NV U3R17	1 B-D B3.90	26" Steam Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding to 2'-3/4" of ext. end	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	42.3%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.5-1  Figures 3.5-1 through 3.5-4

TABLE 3 – BFN UNIT 3 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
3.6 N5A-NV U3R17	1 B-D B3.90	10" Core Spray Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	33.7%	Geometric Nozzle Design Configuration and Insulation Support Ring No Recordable Indications	Table 3.6-1  Figures 3.6-1 through 3.6-4
3.7 N8A-NV U3R17	1 B-D B3.90	4" Jet Pump Instrumentation Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125 (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	81.0%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.7-1  Figures 3.7-1 through 3.7-5
3.8 N2G-NV U3R18	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.8%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.8-1  Figures 3.8-1 through 3.8-4

TABLE 3 – BFN UNIT 3 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
3.9 N2H-NV U3R18	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.8%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.9-1  Figures 3.9-1 through 3.9-4
3.10 N2J-NV U3R18	1 B-D B3.90	12" Reactor Water Recirculation Inlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Alloy Steel Forging with Austenitic Stainless Steel Cladding	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	45.8%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.10-1  Figures 3.10-1 through 3.10-4

TABLE 3 – BFN UNIT 3 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
3.11 N3C-NV U3R18	1 B-D B3.90	26" Steam Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding to 2'-3/4" of ext. end	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	42.3%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.11-1  Figures 3.11-1 through 3.11-4
3.12 N3D-NV U3R18	1 B-D B3.90	26" Steam Outlet Nozzle to Shell Weld  Shell T <sup>NOM</sup> = 6.125" Cladding = 0.125" (min)	Nozzle: A-508 Class 2 Alloy Steel Forging with Austenitic Stainless Steel Cladding to 2'-3/4" of ext. end	Weld: Carbon Steel	Shell: MN-MO Steel Plate with Austenitic Stainless Steel Cladding	42.3 %	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.12-1  Figures 3.12-1 through 3.12-4



TABLE 3 – BFN UNIT 3 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
3.13 N6A-NV U3R18	1 B-D B3.90	6" Head Spray Nozzle to Shell Weld  Shell $T^{NOM} = 4"$	Nozzle: A-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: MN-MO Steel Plate	44.9%	Geometric Nozzle Design Configuration No Recordable Indications	Table 3.13-1 Figures 3.13-1 through 3.13-4
3.14 RWCU-3-001- 042 U3R18	1 R-A R1.20	6" Reactor Water Cleanup Pipe to Valve Weld  Sch. 80 Pipe $T^{NOM} = 0.432"$	Pipe: SA-376 316NG	Weld: Stainless Steel	Valve: SA-351 Gr. CF8M	37.6%	Geometric Valve Configuration No Recordable Indications	Table 3.14-1 Figures 3.14-1 through 3.14-2

### 3.1 Weld **N1A-NV** – 28" Reactor Water Recirculation Outlet Nozzle to Shell Weld

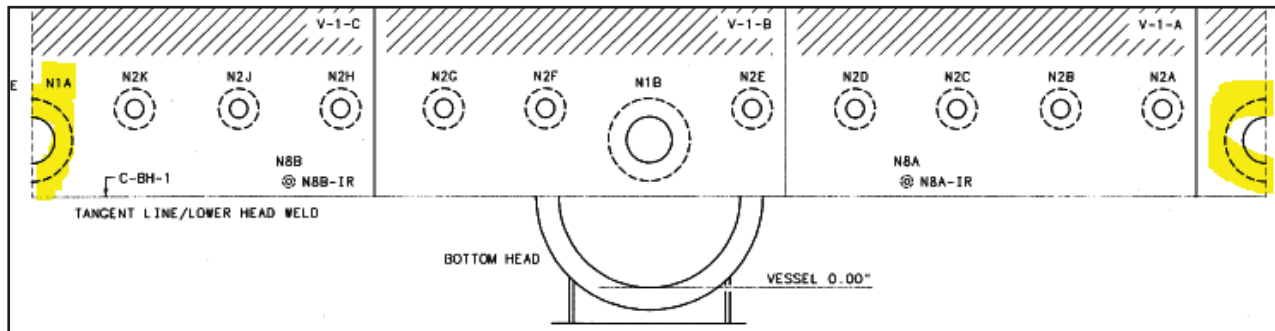


Figure 3.1-1 Weld **N1A-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-071A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage of 44.9 percent as described in Table 3.1-1 and combined with Figure 3.1-2 through 3.1-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-079 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

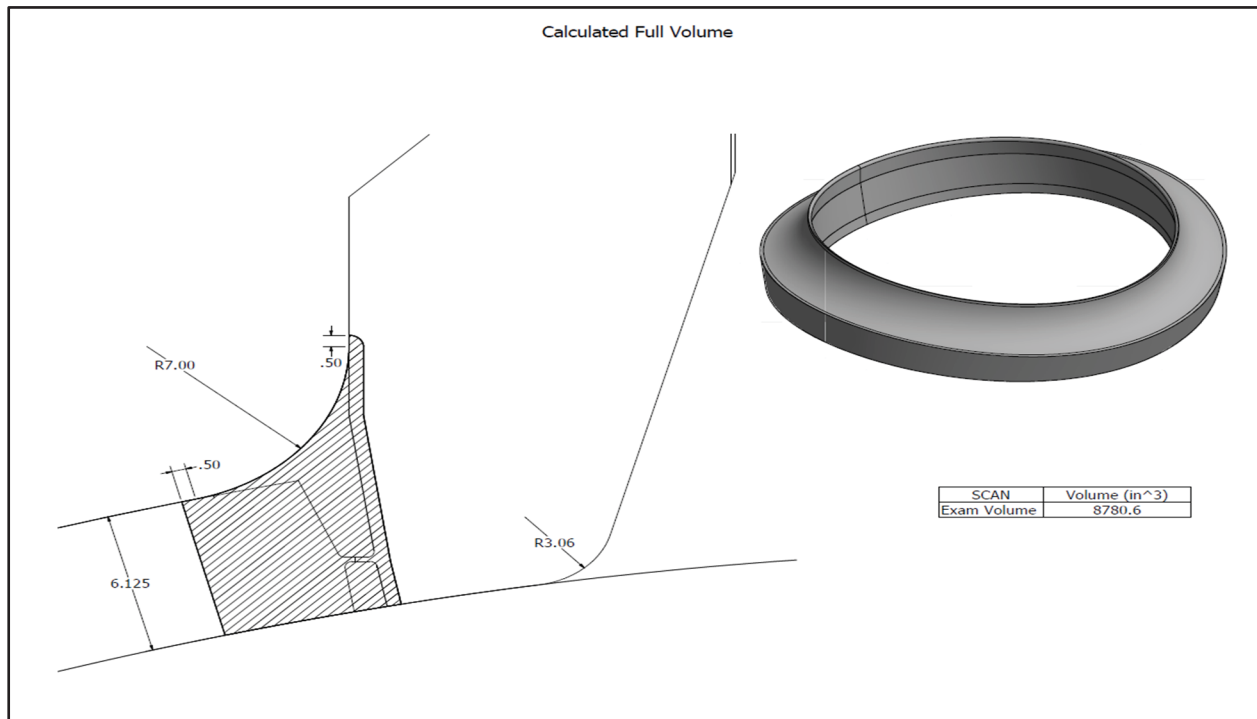


Figure 3.1-2 Weld **N1A-NV**, Required Exam Full Volume Coverage

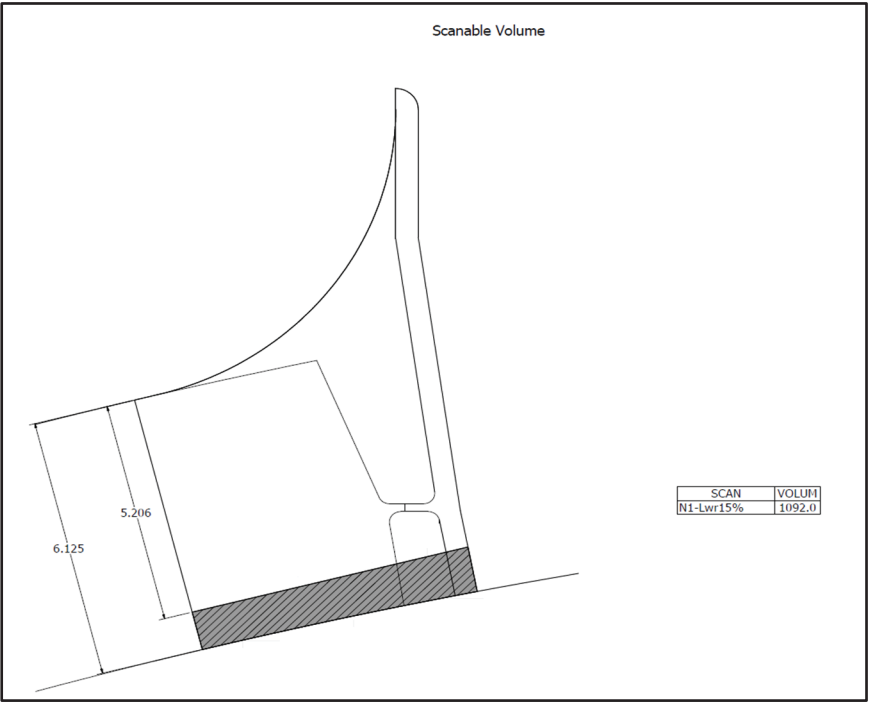


Figure 3.1-3 Weld **N1A-NV**, Inner 15%  
Achieved Coverage

## Enclosure 1

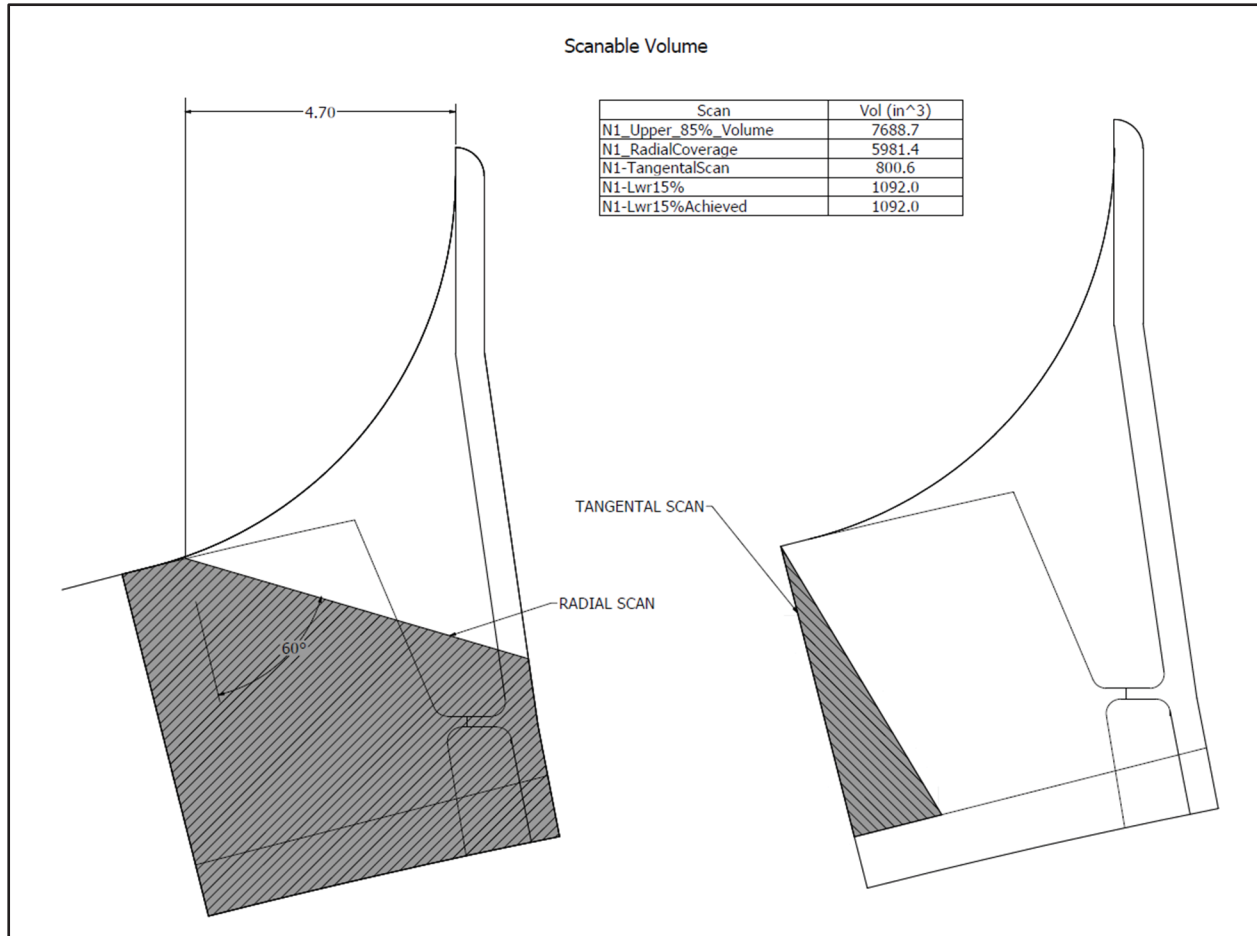


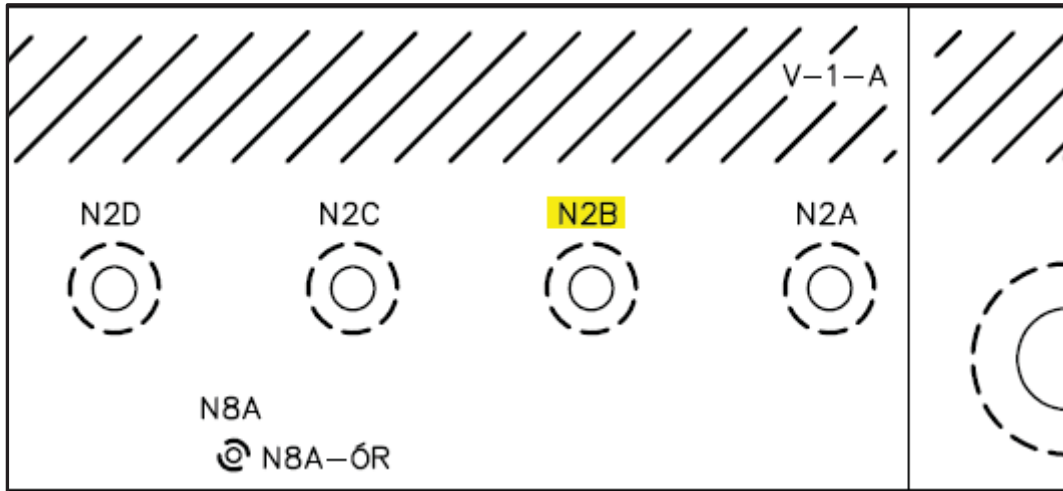
Figure 3.1-4 Weld **N1A-NV**, Outer 85%  
Tangential (Transverse) and Radial Coverage Achieved

Table 3.1-1 Weld **N1A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	8780.6	1092.0	7688.7	8780.7
Exam Volume Achieved (in <sup>3</sup> )	5981.4	1092.0	800.6	1892.6
% Coverage Achieved	<b>(A) 68.1%</b>	100.0%	10.4%	<b>(B) 21.6%</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 44.9%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 43°, 50°, 55° Shear and 60° Refracted Longitudinal.

3.2 Weld **N2B-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 3.2-1 Weld **N2B-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-072A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.0 percent as described in Table 3.2-1 and combined with Figure 3.2-2 through 3.2-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R14, UT R-080 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

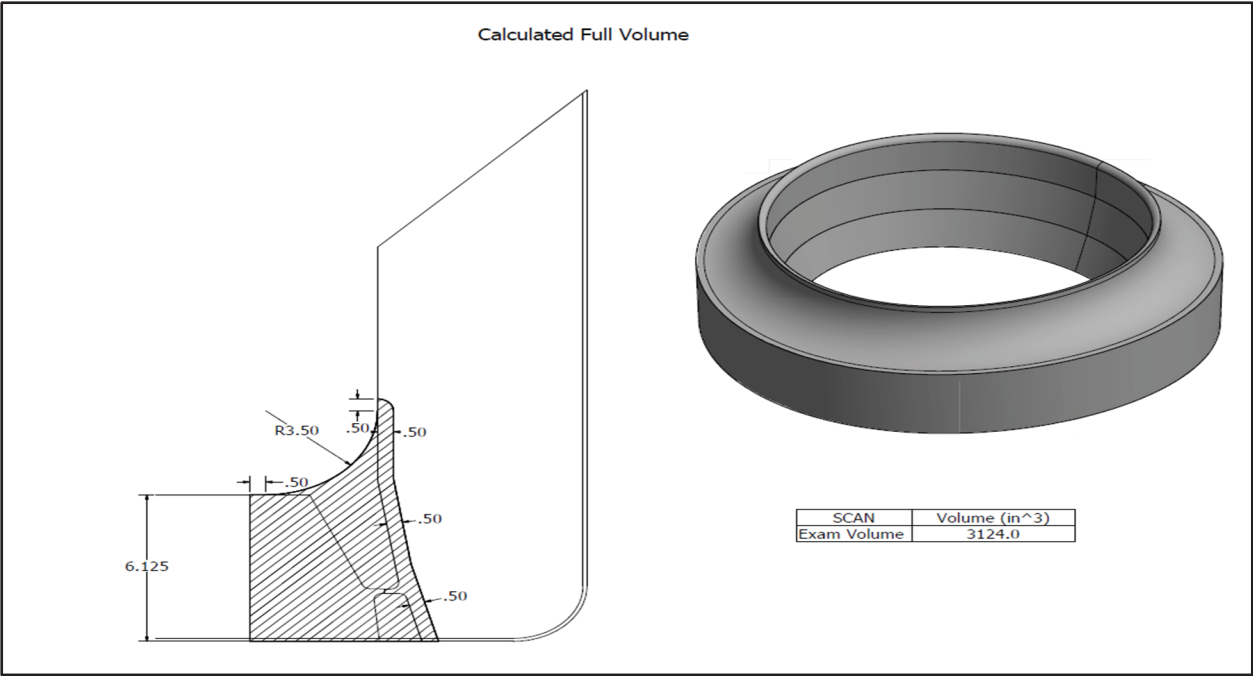


Figure 3.2-2 Weld **N2B-NV**, Required Exam Full Volume Coverage

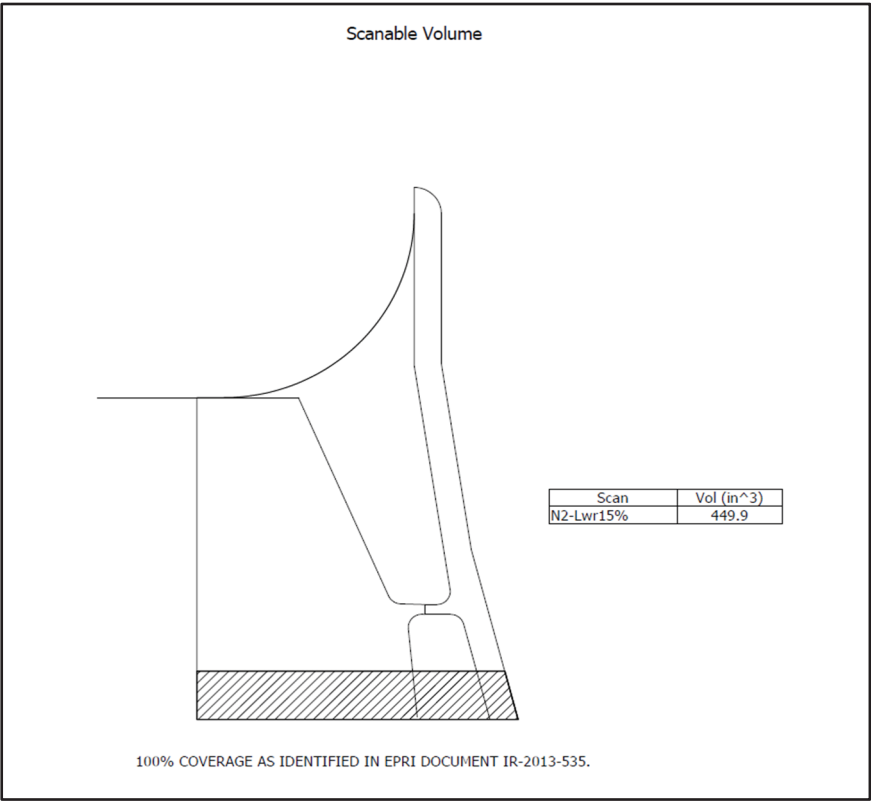


Figure 3.2-3 Weld **N2B-NV**, Inner 15%  
Achieved Coverage

# Enclosure 1

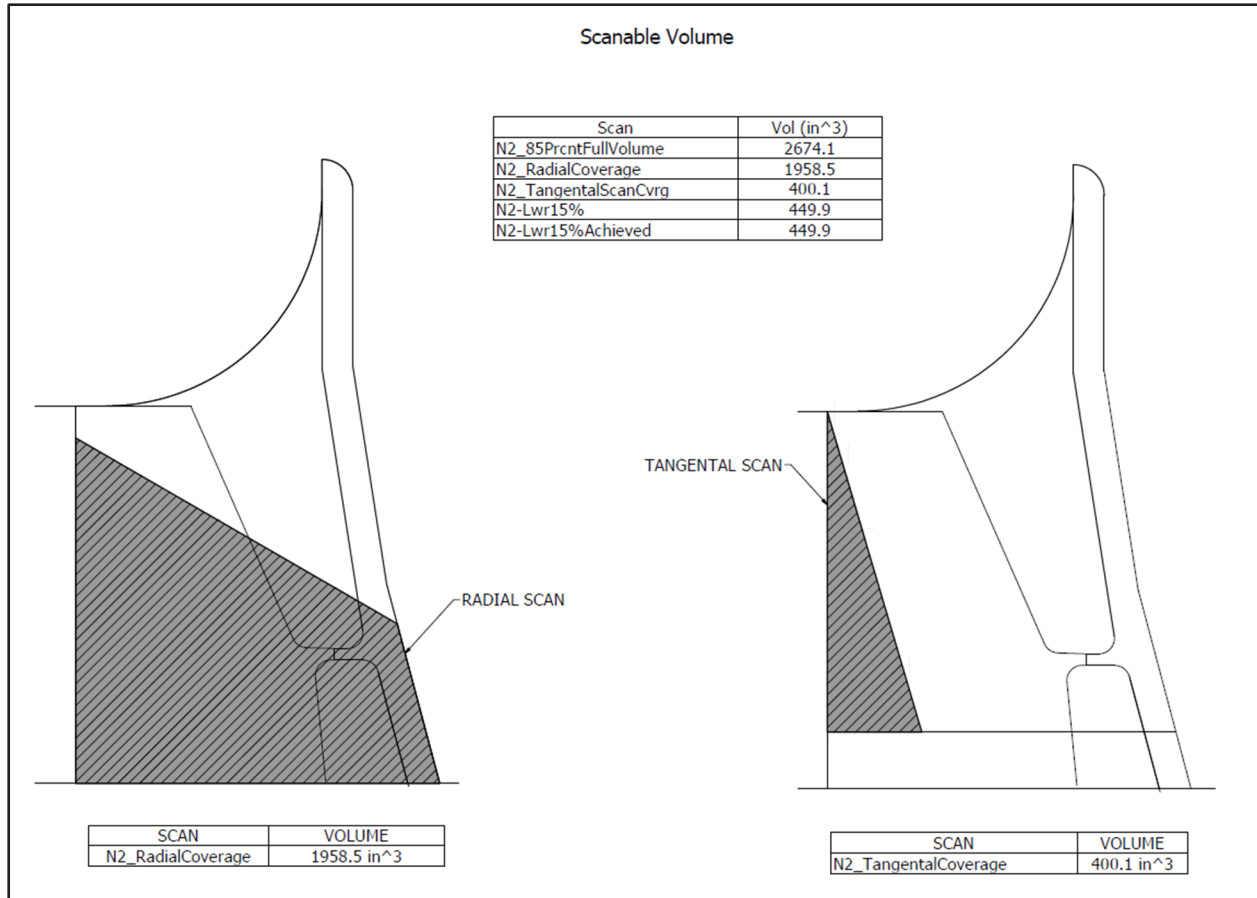


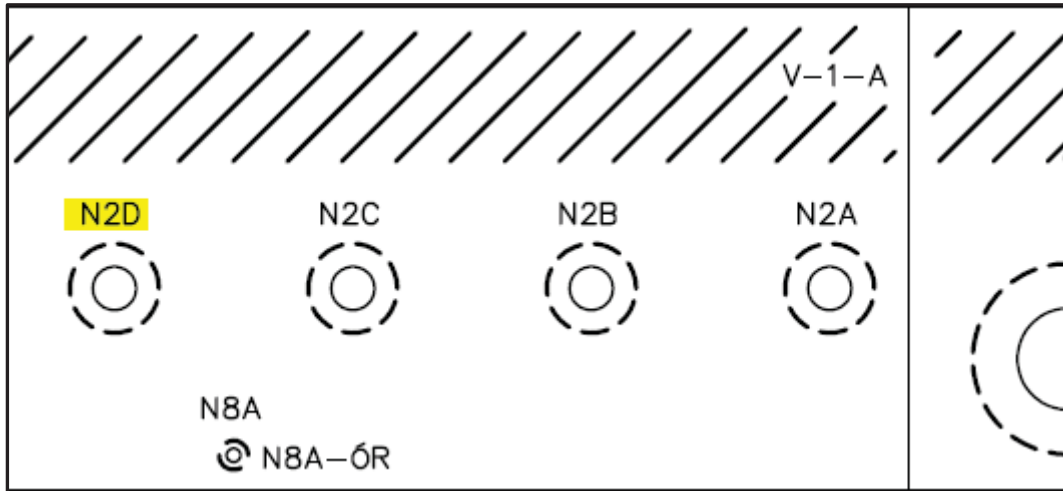
Figure 3.2-4 Weld **N2B-NV**, Outer 85% Tangential (Transverse) and Radial Coverage Achieved

Table 3.2-1 Weld **N2B-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3124.0	449.9	2674.1	3124.0
Exam Volume Achieved (in <sup>3</sup> )	1958.5	449.9	400.1	850.0
% Coverage Achieved	(A) 62.7%	100.0%	15.0%	(B) 27.2%
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.0%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

3.3 Weld **N2D-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 3.3-1 Weld **N2D-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-073A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.0 percent as described in Table 3.3-1 and combined with Figure 3.3-2 through 3.3-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-081 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.



Enclosure 1

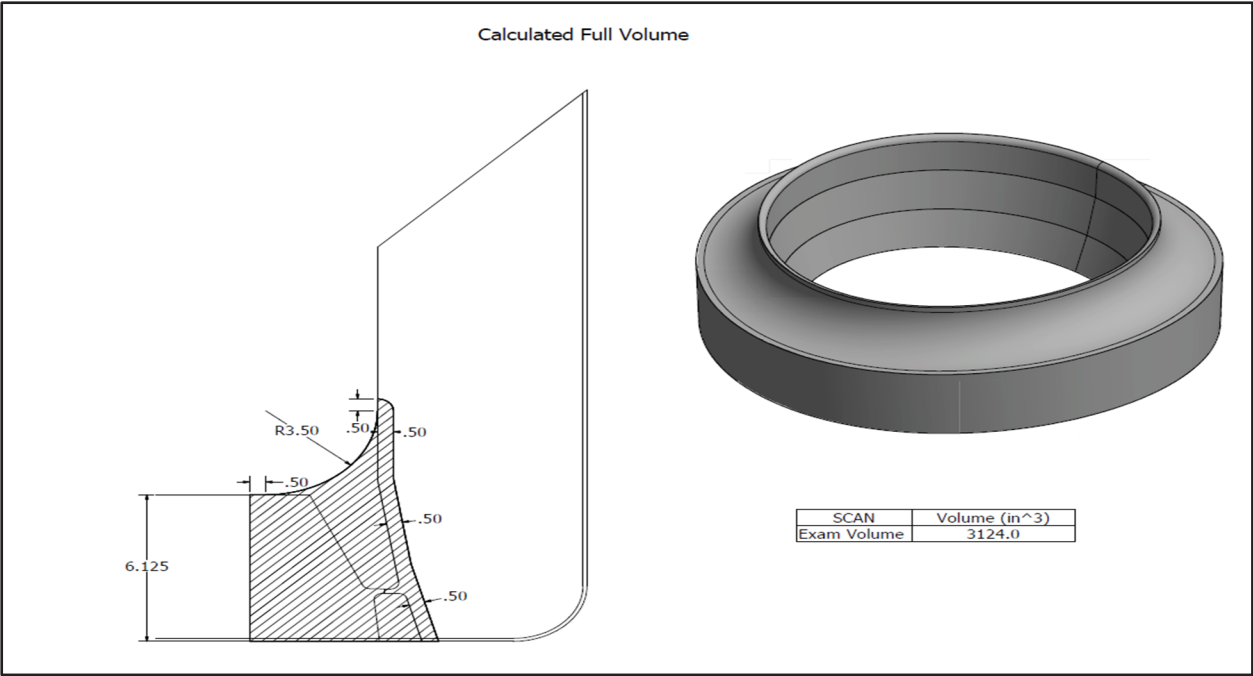


Figure 3.3-2 Weld **N2D-NV**, Required Exam Full Volume Coverage

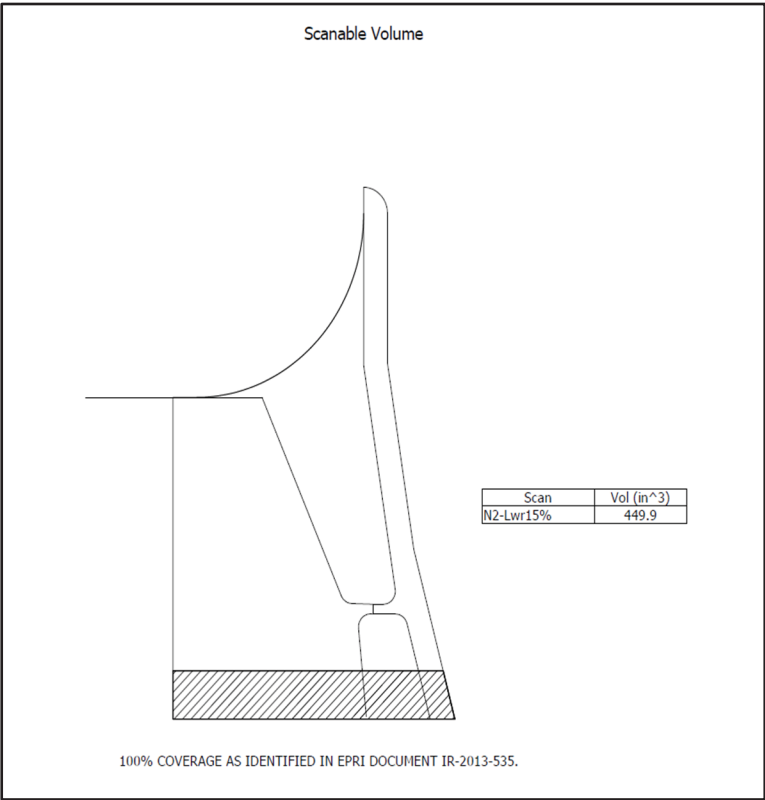


Figure 3.3-3 Weld **N2D-NV**, Inner 15%  
Achieved Coverage

# Enclosure 1

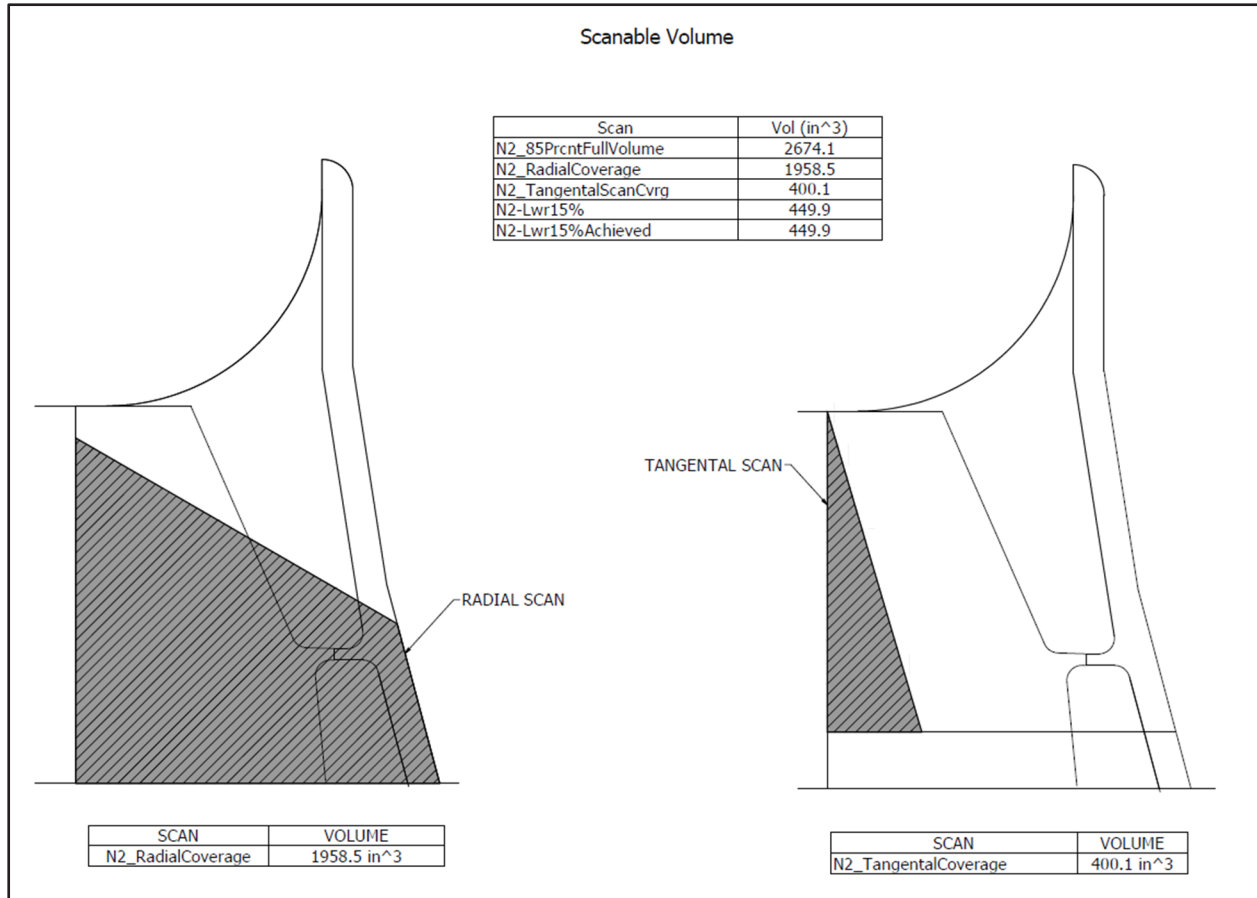


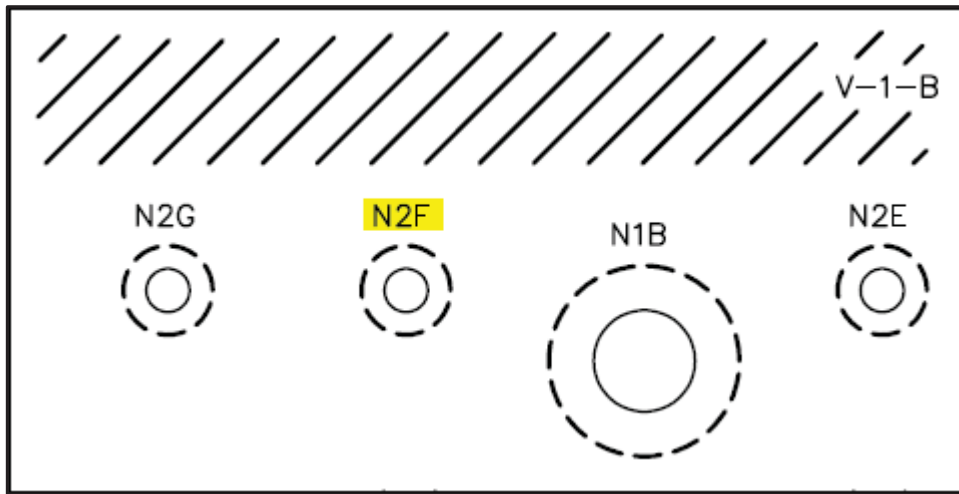
Figure 3.3-4 Weld **N2D-NV**, Outer 85% Tangential (Transverse) and Radial Coverage Achieved

Table 3.3-1 Weld **N2D-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3124.0	449.9	2674.1	3124.0
Exam Volume Achieved (in <sup>3</sup> )	1958.5	449.9	400.1	850.0
% Coverage Achieved	<b>(A) 62.7%</b>	100.0%	15.0%	<b>(B) 27.2%</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.0%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

3.4 Weld **N2F-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 3.4-1 Weld **N2F-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-074A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.0 percent as described in Table 3.4-1 and combined with Figure 3.4-2 through 3.4-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-082 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

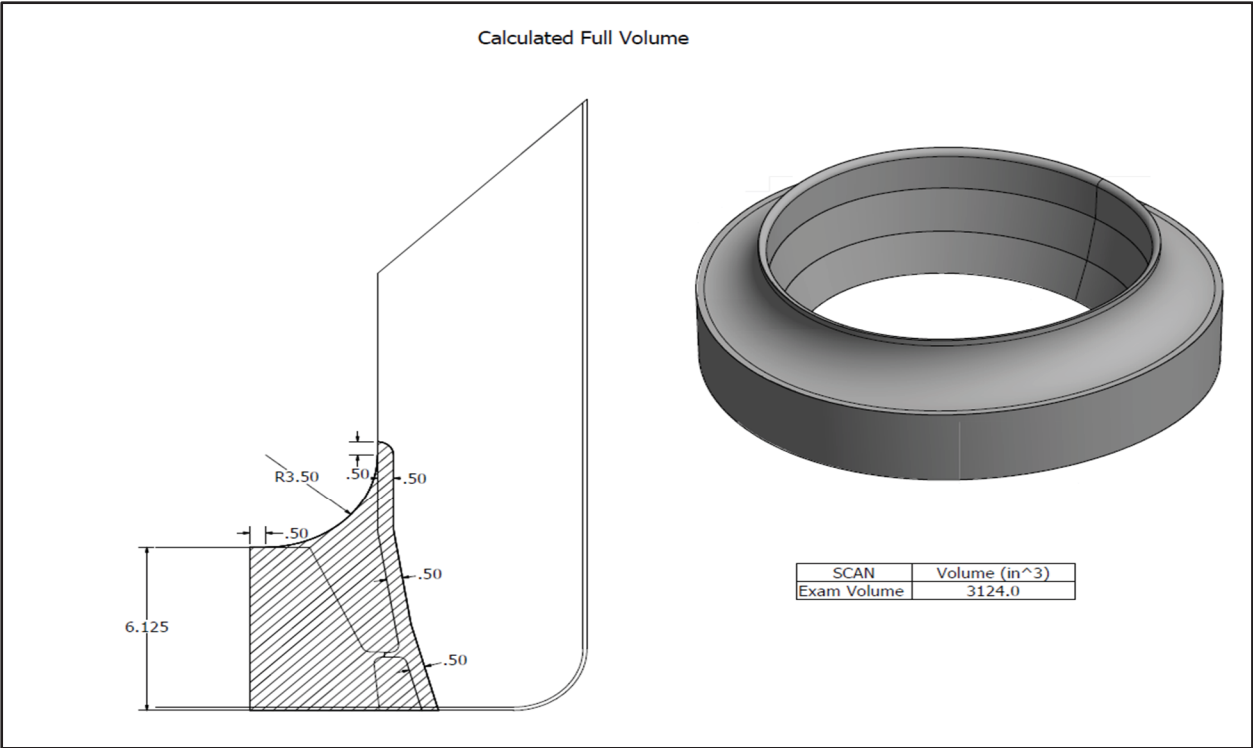


Figure 3.4-2 Weld **N2F-NV**, Required Exam Full Volume Coverage

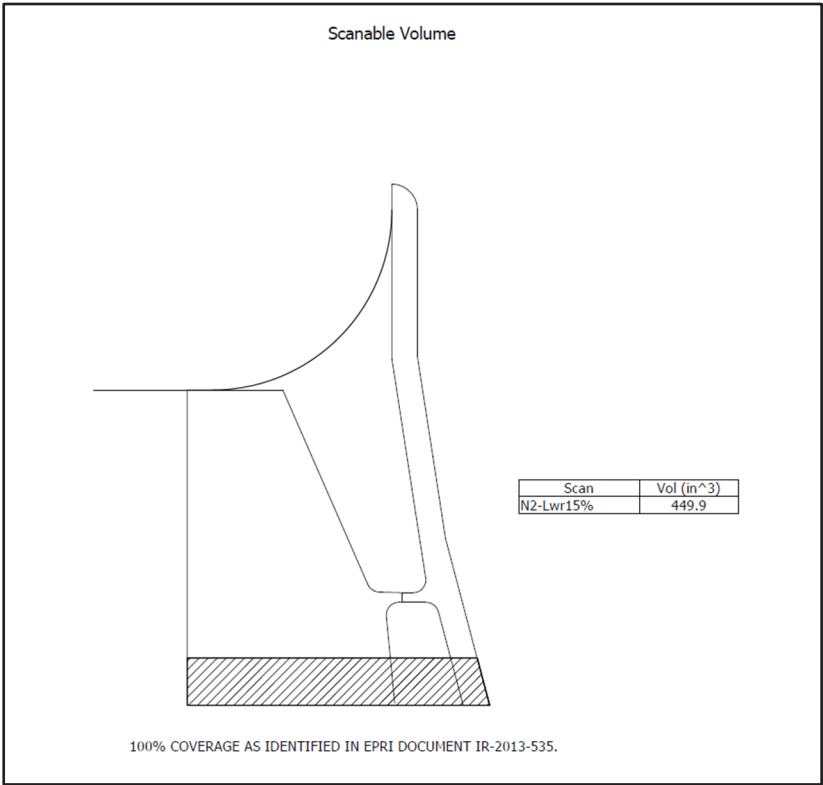


Figure 3.4-3 Weld **N2F-NV**, Inner 15%  
Achieved Coverage

# Enclosure 1

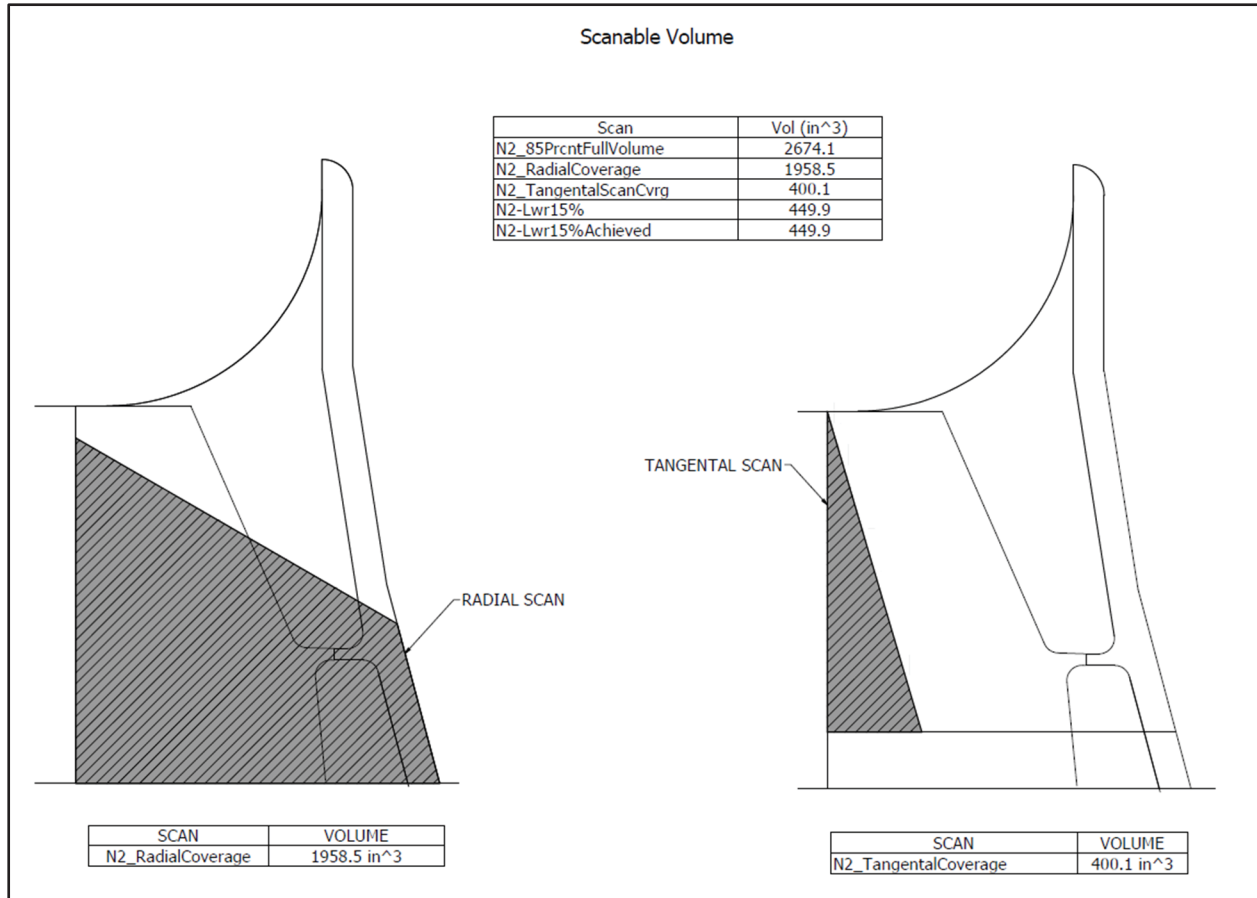


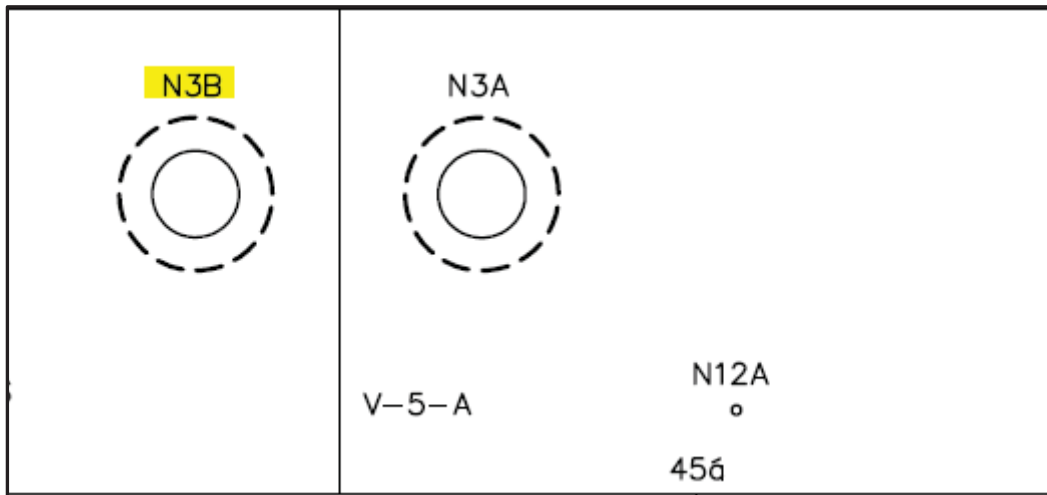
Figure 3.4-4 Weld **N2F-NV**, Outer 85% Tangential (Transverse) and Radial Coverage Achieved

Table 3.4-1 Weld **N2F-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3124.0	449.9	2674.1	3124.0
Exam Volume Achieved (in <sup>3</sup> )	1958.5	449.9	400.1	850.0
% Coverage Achieved	<b>(A) 62.7%</b>	100.0%	15.0%	<b>(B) 27.2%</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.0%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

3.5 Weld **N3B-NV** – 26" Steam Outlet Nozzle to Shell WeldFigure 3.5-1 Weld **N3B-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-078A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 42.3 percent as described in Table 3.5-1 and combined with Figure 3.5-2 through 3.5-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-083 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

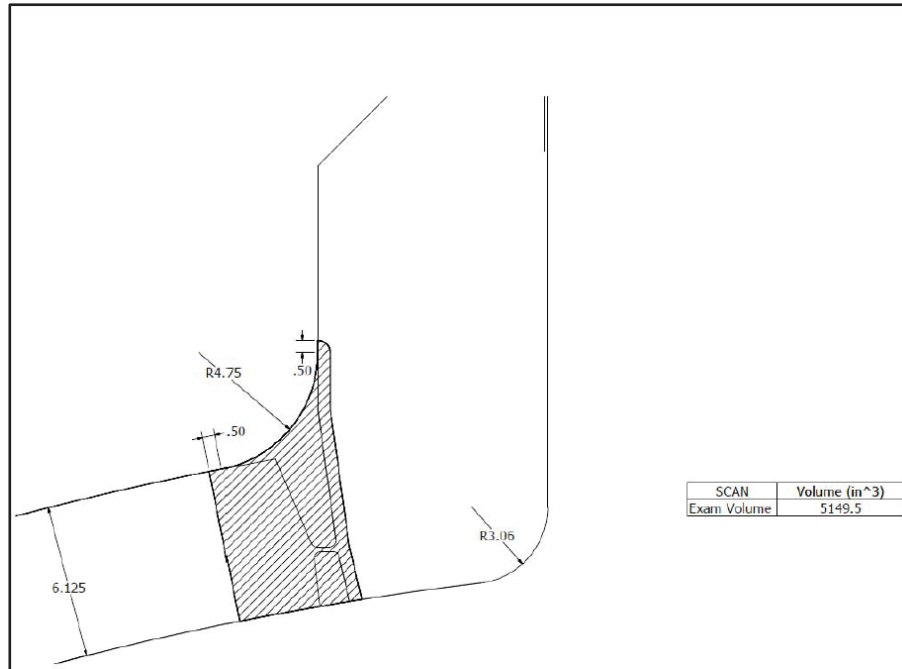


Figure 3.5-2 Weld **N3B-NV**, Calculated Full Volume Coverage

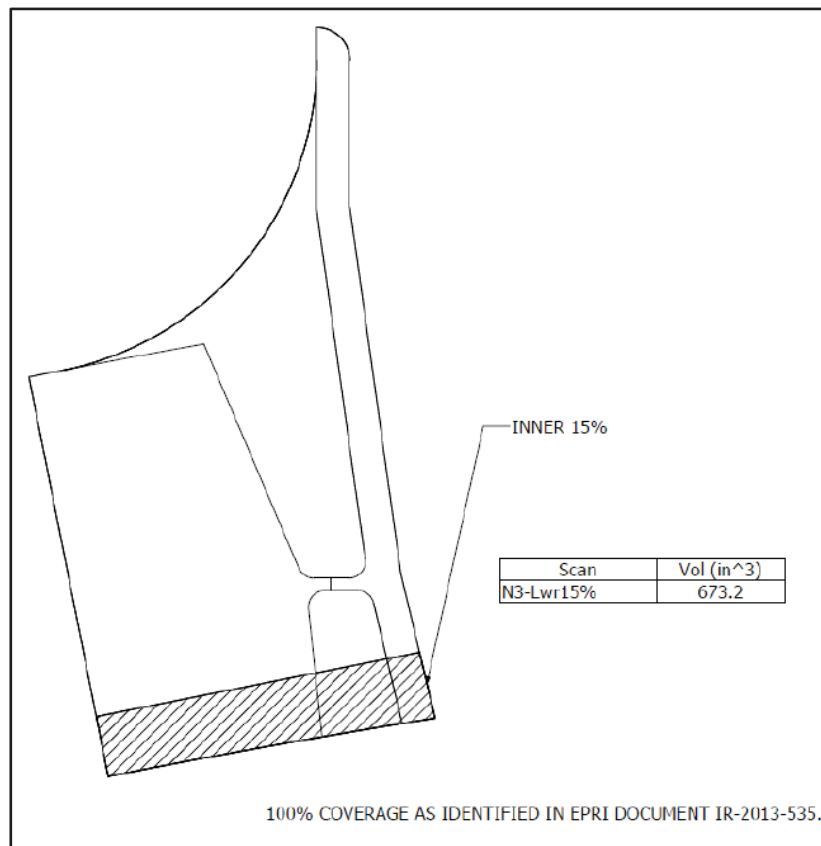


Figure 3.5-3 Weld **N3B-NV**, Achievable Inner 15% Tangential Coverage

# Enclosure 1

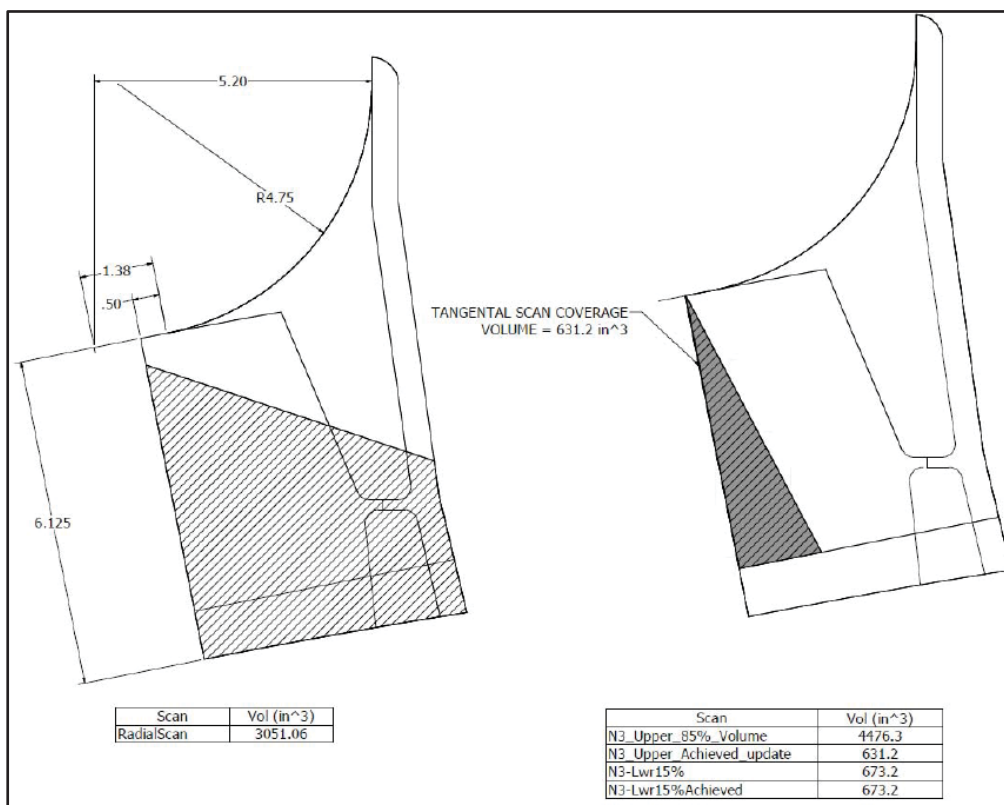


Figure 3.5-4 Weld **N3B-NV**, Radial and Tangential Achieved Coverage

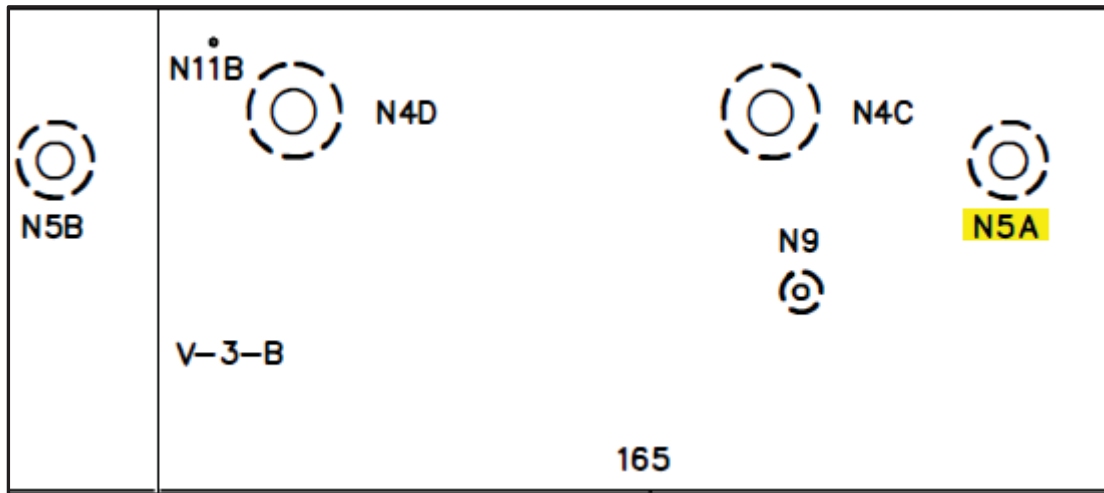
Table 3.5-1 Weld **N3B-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	5149.5	673.2	4476.3	5149.5
Exam Volume Achieved (in <sup>3</sup> )	3051.1	673.2	631.2	1304.4
% Coverage Achieved	(A) 59.3	100	14.1	(B) 25.3
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 42.3%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, 50°, Shear and 60° Refracted Longitudinal.3.6



3.6 Weld **N5A-NV** – 10" Core Spray Nozzle to Shell WeldFigure 3.6-1 Weld **N5A-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-086A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration and permanent insulation support ring interference resulting in total UT coverage 33.7 percent as described in Table 3.6-1 and combined with Figure 3.6-2 through 3.6-6.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-088 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

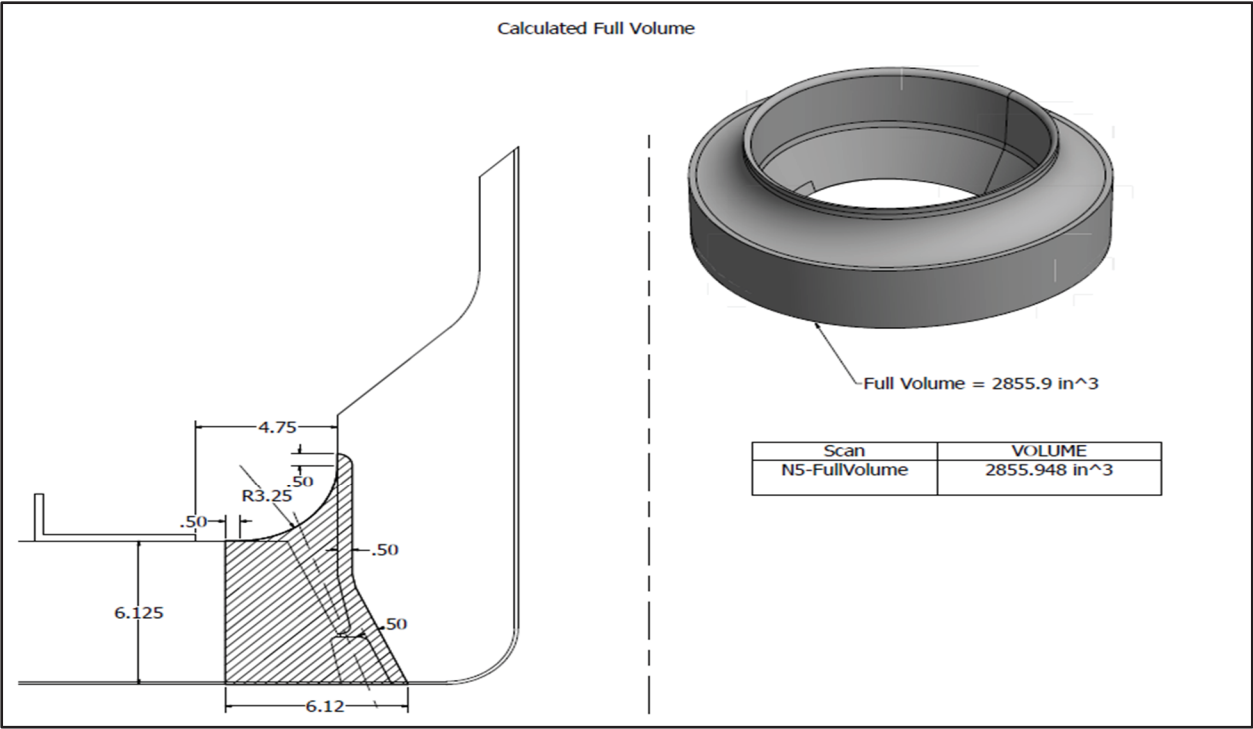


Figure 3.6-2 Weld **N5A-NV**, Achievable Radial Coverage

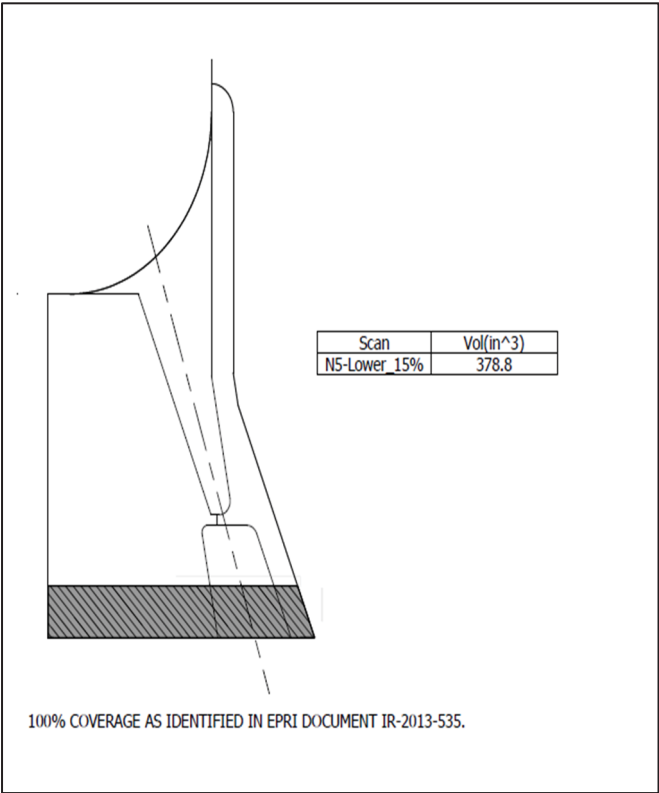


Figure 3.6-3 Weld **N5A-NV**, Inner 15% Achieved Tangential (Transverse) Coverage

# Enclosure 1

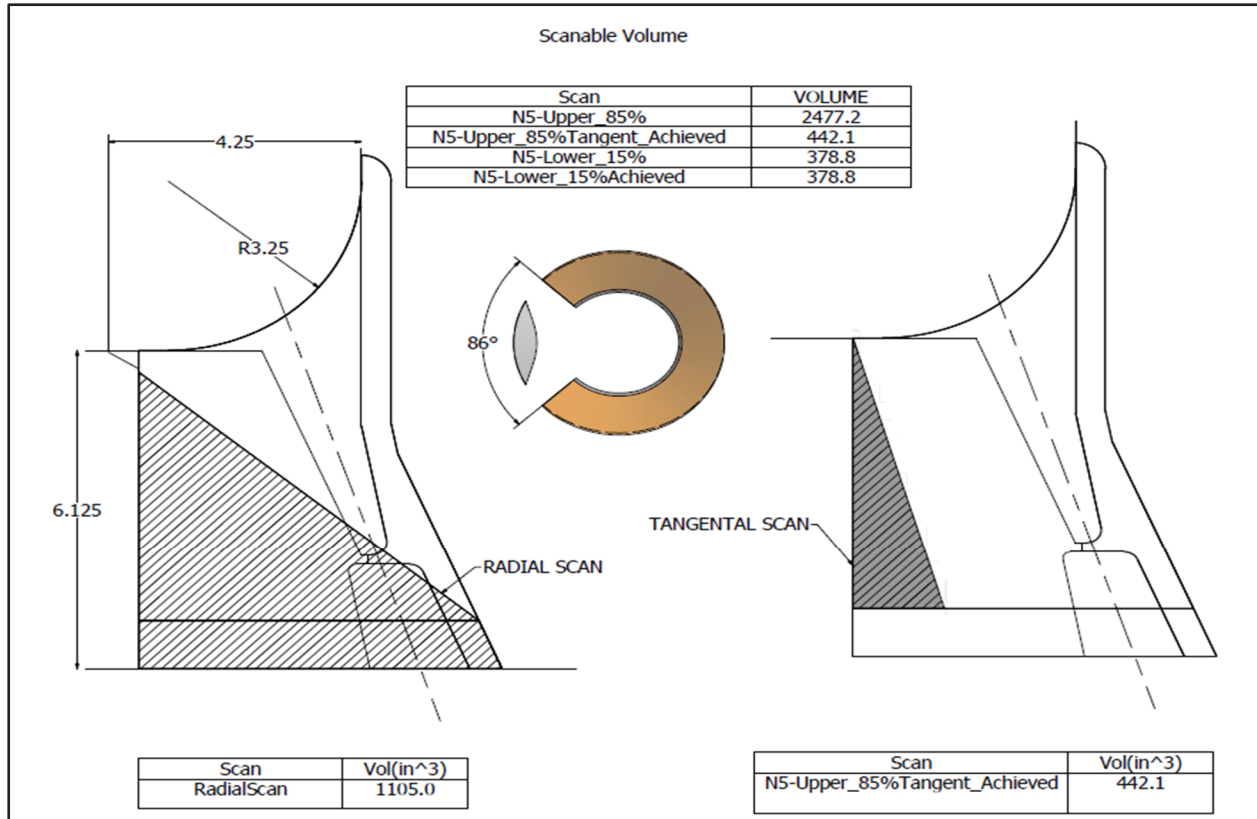


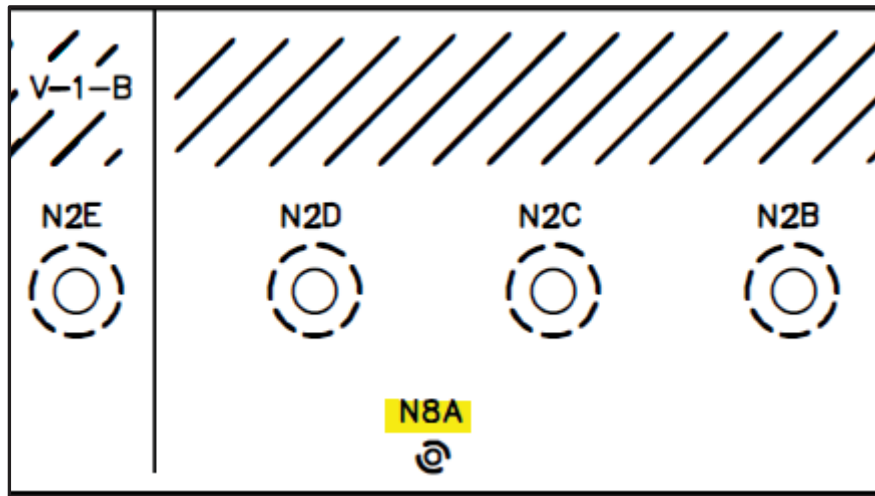
Figure 3.6-4 Weld **N5A-NV**, Restricted Radial and Tangential Coverage Due to Insulation Support Ring

Table 3.6-1 Weld **N5A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	2855.9	378.8	2477.2	2855.9
Exam Volume Achieved (in <sup>3</sup> )	1105.0	378.8	442.1	820.9
% Coverage Achieved	<b>(A) 38.7</b>	100	17.8	<b>(B) 28.7</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 33.7%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

3.7 Weld **N8A-NV** – 4" Jet Pump Instrumentation Nozzle to Shell WeldFigure 3.7-1 Weld **N8A-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R17 refueling outage in 2016. The NDE data can be found on UT Report No. R-060. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 81.0 percent as described in Table 3.7-1 and combined with Figure 3.7-2 through 3.7-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-089 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

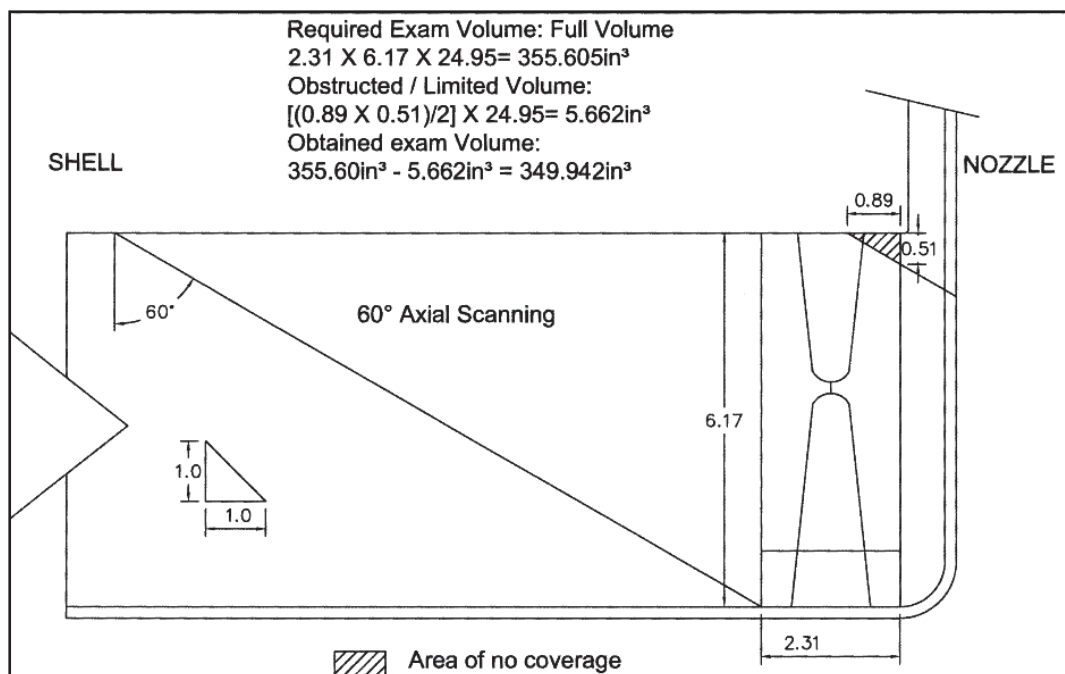


Figure 3.7-2 Weld **N8A-NV**, Achievable Radial Coverage

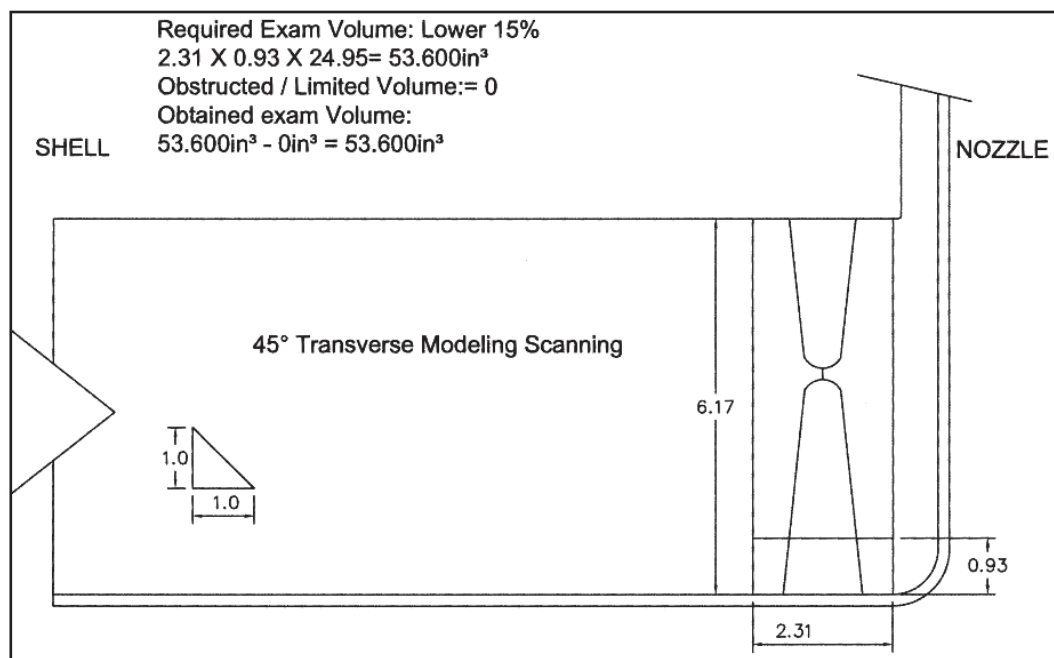


Figure 3.7-3 Weld **N8A-NV**, Radial Modeling Coverage

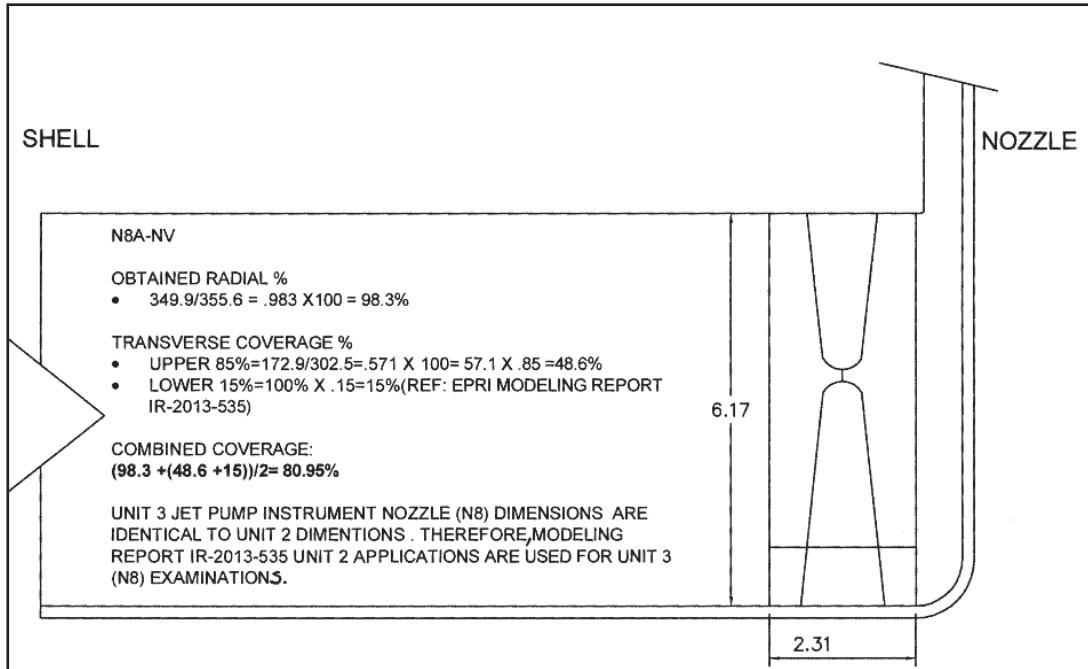


Figure 3.7-4 Weld **N8A-NV**, Radial and Tangential Achieved Coverage Upper 85%

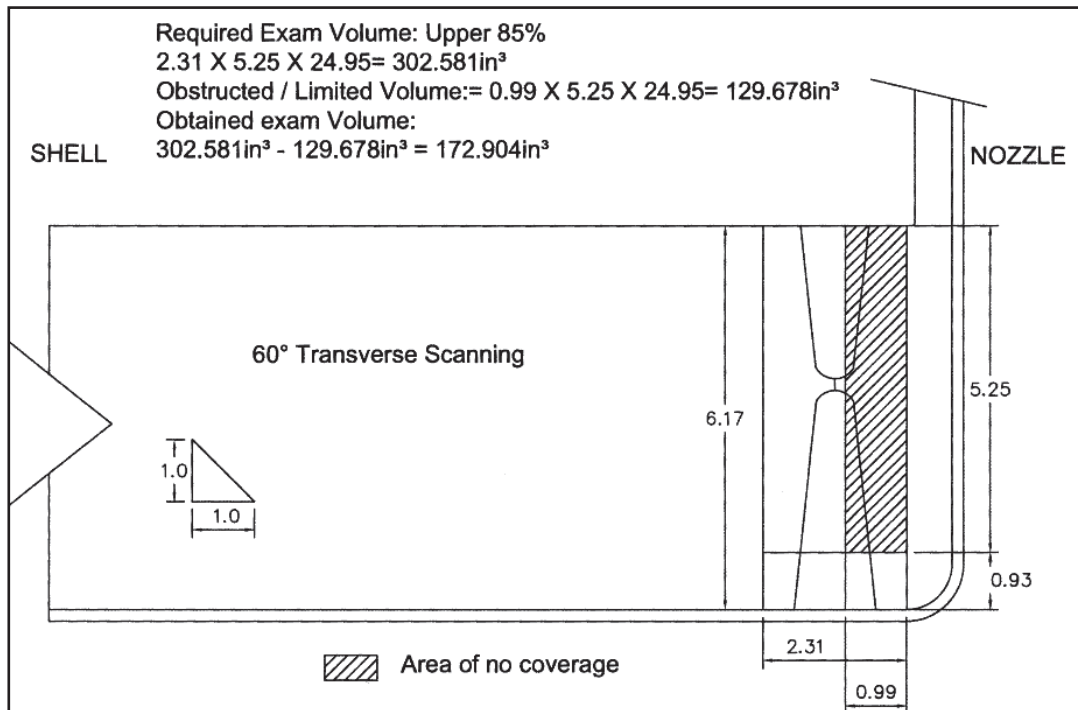


Figure 3.7-5 Weld **N8A-NV**, Achieved Upper 85% Tangential (Transverse) Coverage

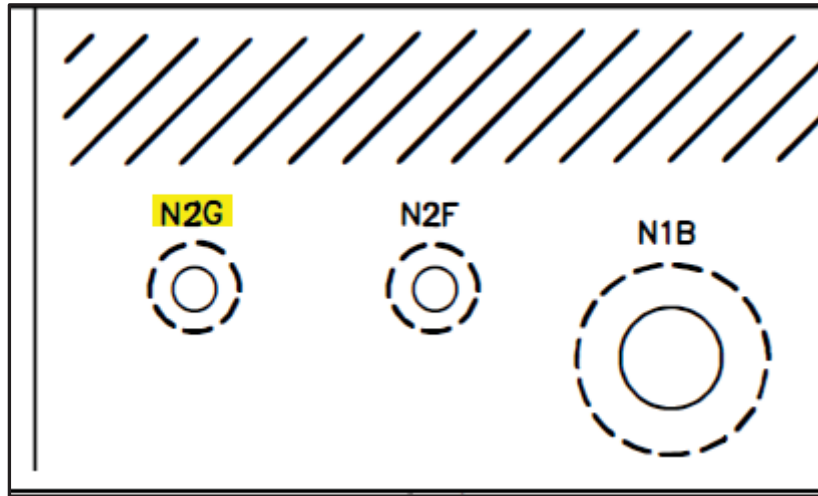
Enclosure 1

Table 3.7-1 Weld **N8A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	355.6	53.6	302.6	356.2
Exam Volume Achieved (in <sup>3</sup> )	349.9	53.6	172.9	226.5
% Coverage Achieved	<b>(A)98.4</b>	100.0	57.1	<b>(B) 63.6</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 81.0%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 45° Shear and 60° Refracted Longitudinal.

3.8 Weld **N2G-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 3.8-1 Weld **N2G-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R18 refueling outage in 2018. The NDE data can be found on UT Report No. R-093A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.8 percent as described in Table 3.8-1 and combined with Figure 3.8-2 through 3.8-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-070 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.



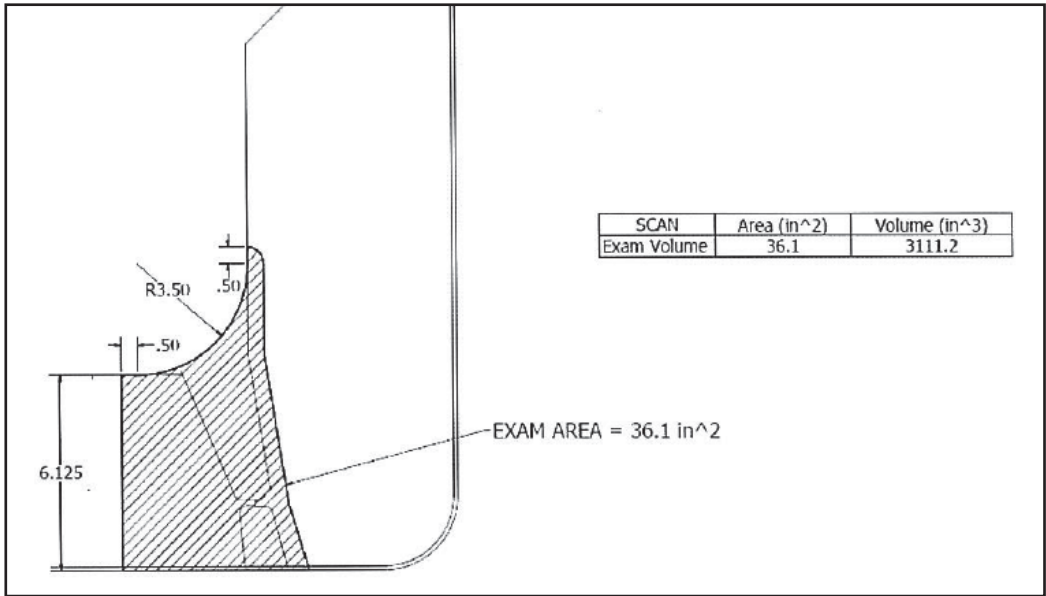


Figure 3.8-2 Weld **N2G-NV**, Calculated Full Volume

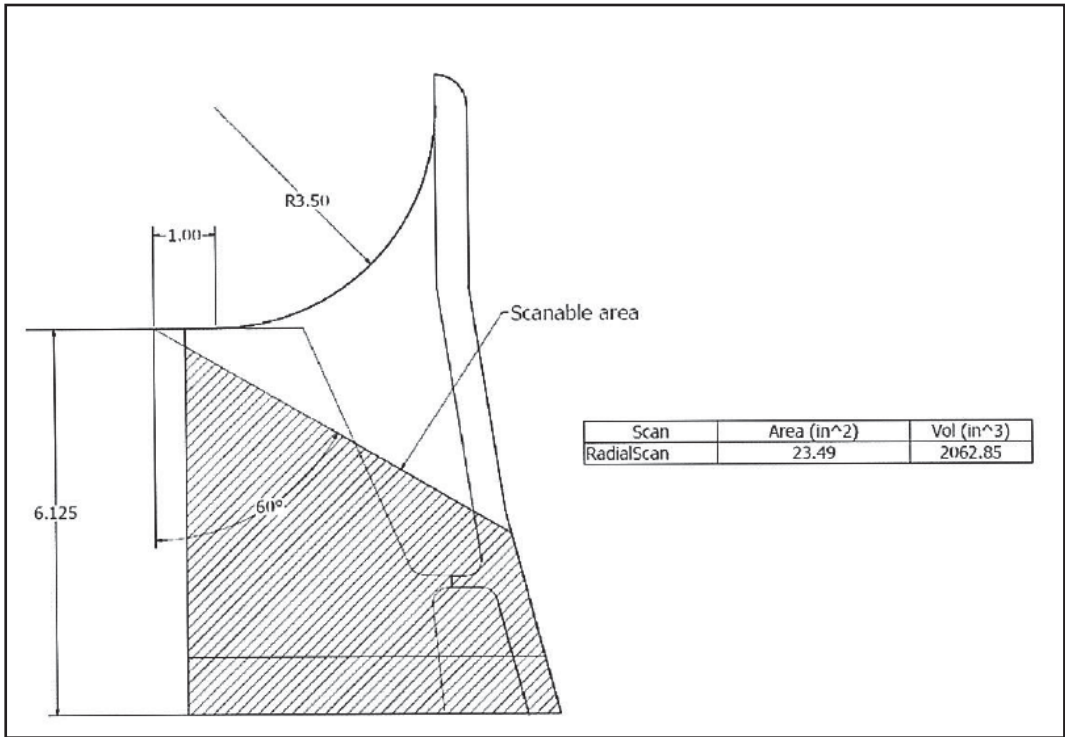


Figure 3.8-3 Weld **N2G-NV**, Achievable Radial Coverage

# Enclosure 1

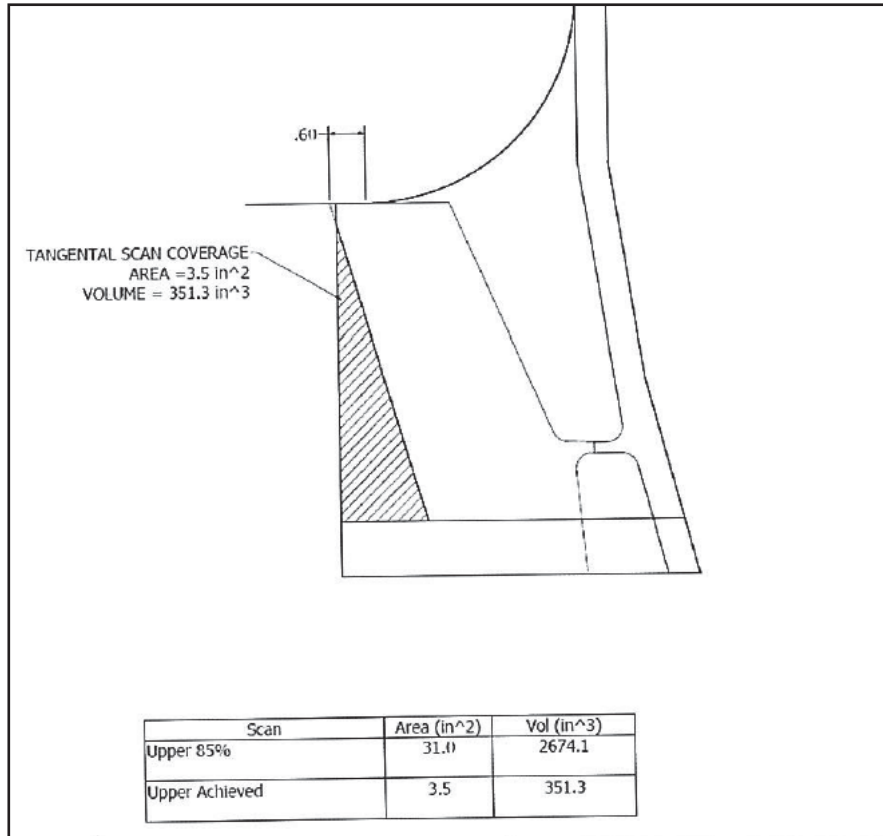


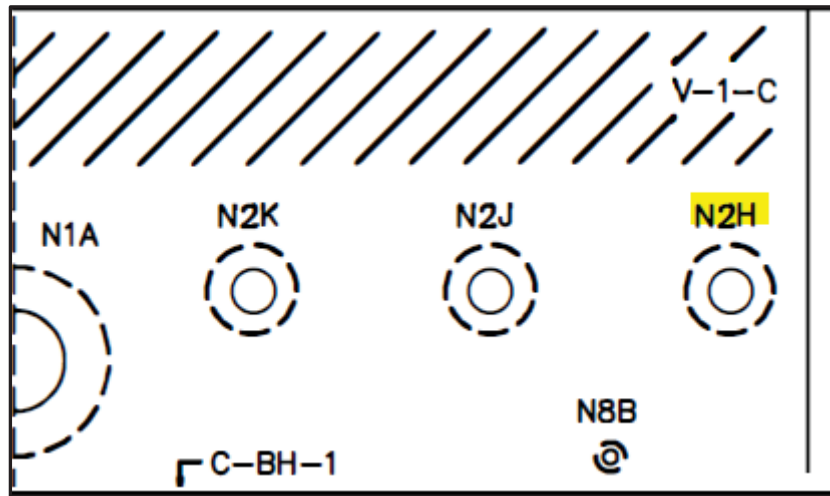
Figure 3.8-4 Weld **N2G-NV**, Upper 85% Achieved Tangential (Transverse) Coverage

Table 3.8-1 Weld **N2G-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3111.2	437.2	2674.1	3111.3
Exam Volume Achieved (in <sup>3</sup> )	2062.85	437.2	351.3	788.5
% Coverage Achieved	(A) 66.30	100	13.14	(B) 25.34
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.8%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

3.9 Weld **N2H-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 3.9-1 Weld **N2H-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R18 refueling outage in 2018. The NDE data can be found on UT Report No. R-124A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.8 percent as described in Table 3.9-1 and combined with Figure 3.9-2 through 3.9-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-071 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

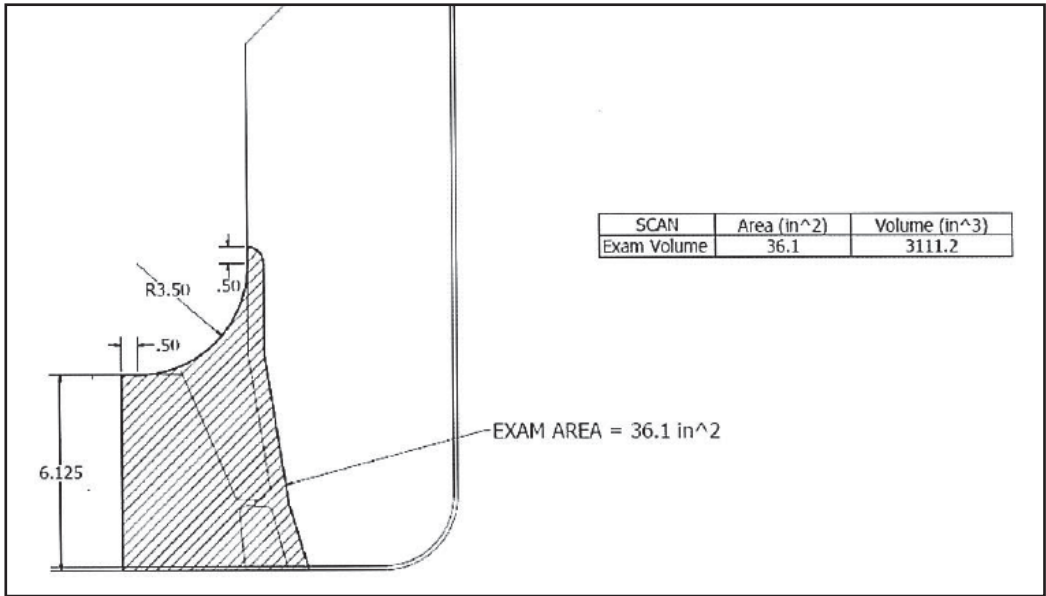


Figure 3.9-2 Weld **N2H-NV**, Calculated Full Volume

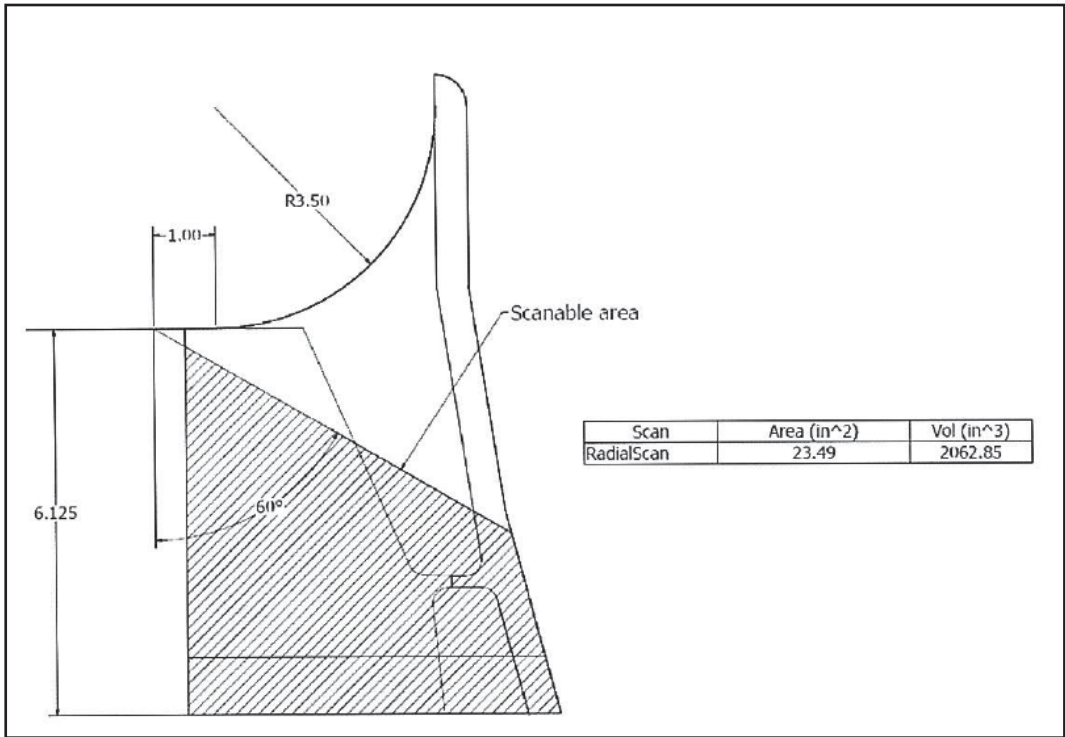


Figure 3.9-3 Weld **N2H-NV**, Achievable Radial Coverage

# Enclosure 1

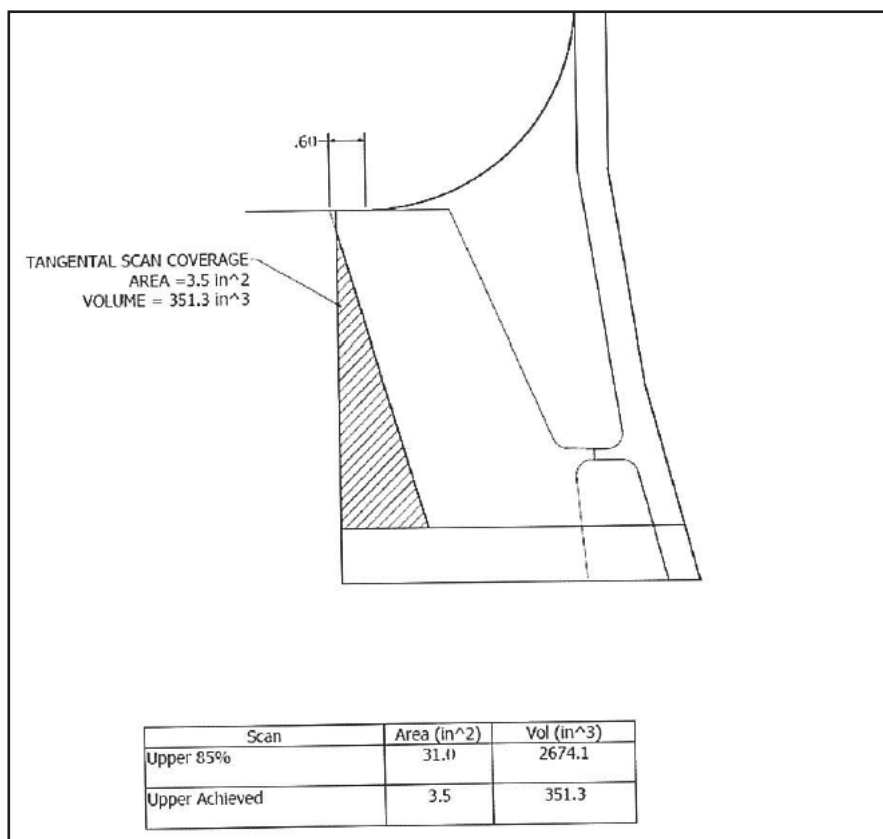


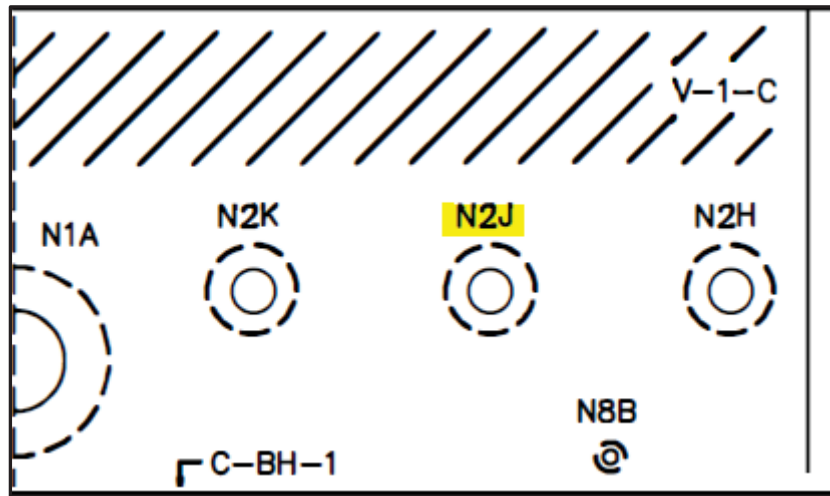
Figure 3.9-4 Weld **N2H-NV**, Upper 85% Achieved Tangential (Transverse) Coverage

Table 3.9-1 Weld **N2H-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3111.2	437.2	2674.1	3111.3
Exam Volume Achieved (in <sup>3</sup> )	2062.85	437.2	351.3	788.5
% Coverage Achieved	(A) 66.3	100	13.14	(B) 25.34
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.8%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.

3.10 Weld **N2J-NV** – 12" Reactor Water Recirculation Inlet Nozzle to Shell WeldFigure 3.10-1 Weld **N2J-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R18 refueling outage in 2018. The NDE data can be found on UT Report No. R-127A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 45.8 percent as described in Table 3.10-1 and combined with Figure 3.10-2 through 3.10-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-072 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

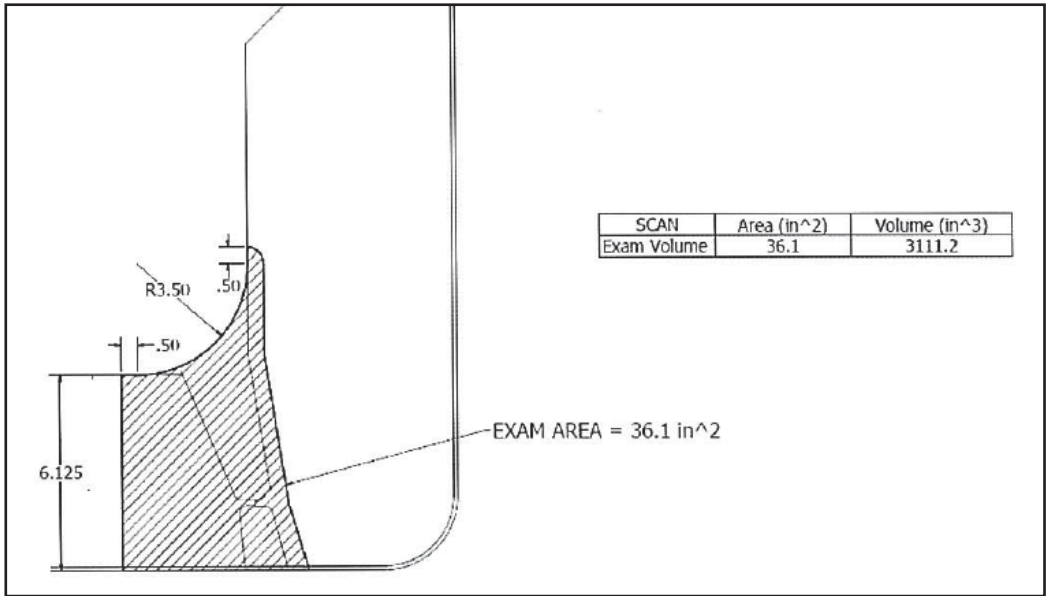


Figure 3.10-2 Weld **N2J-NV**, Calculated Full Volume

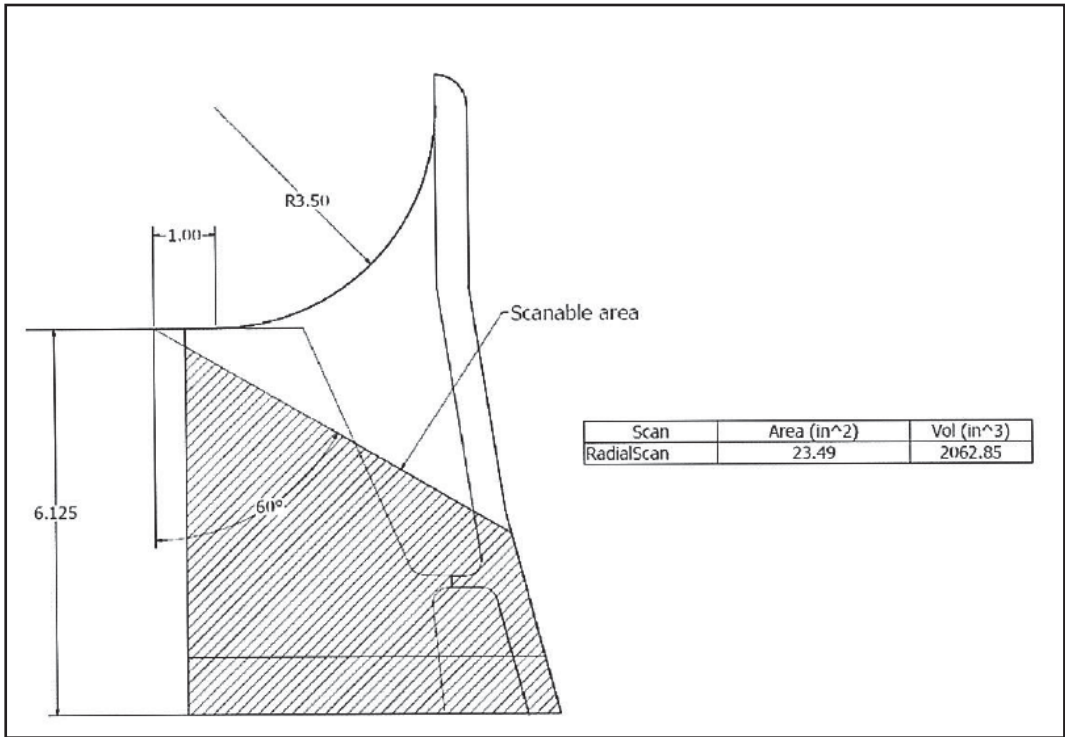


Figure 3.10-3 Weld **N2J-NV**, Achievable Radial Coverage

# Enclosure 1

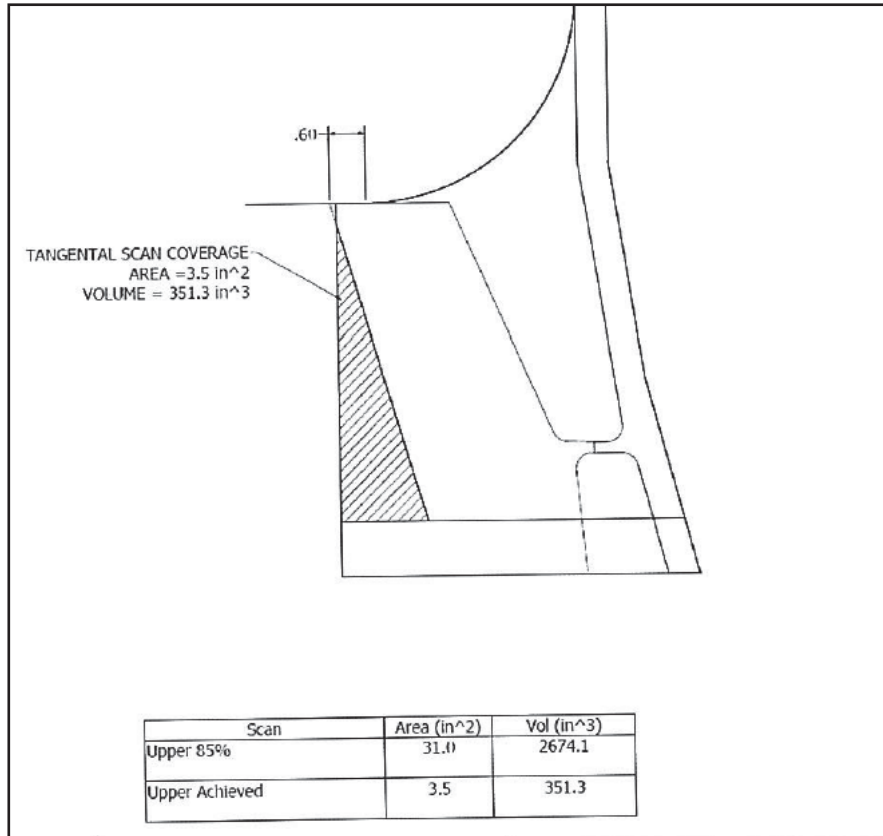


Figure 3.10-4 Weld **N2J-NV**, Upper 85% Achieved Tangential (Transverse) Coverage

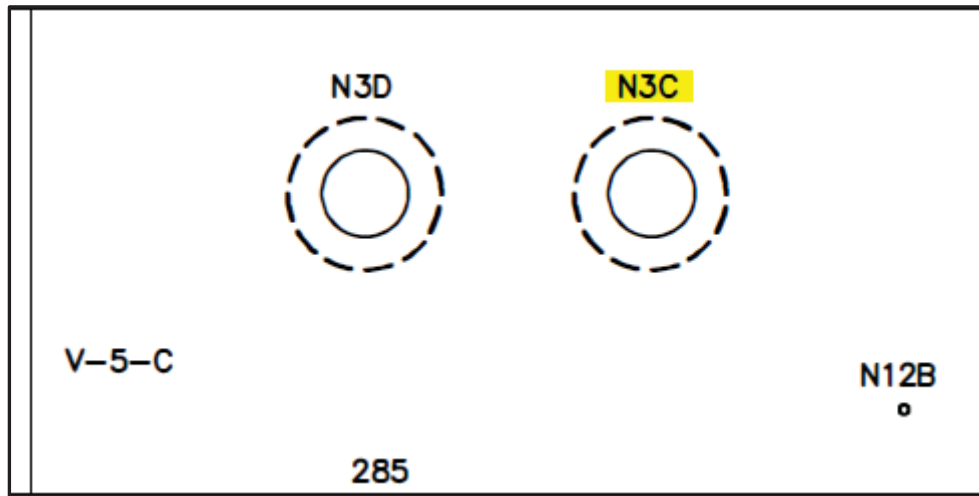
Table 3.10-1 Weld **N2J-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	3111.2	437.2	2674.1	3111.3
Exam Volume Achieved (in <sup>3</sup> )	2062.85	437.2	351.3	788.5
% Coverage Achieved	(A) 66.3	100	13.14	(B) 25.34
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 45.8%</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 45°, Shear and 60° Refracted Longitudinal.



3.11 Weld **N3C-NV** – 26" Steam Outlet Nozzle to Shell WeldFigure 3.11-1 Weld **N3C-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R18 refueling outage in 2018. The NDE data can be found on UT Report No. R-087A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 42.3 percent as described in Table 3.11-1 and combined with Figure 3.11-2 through 3.11-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-074 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Enclosure 1

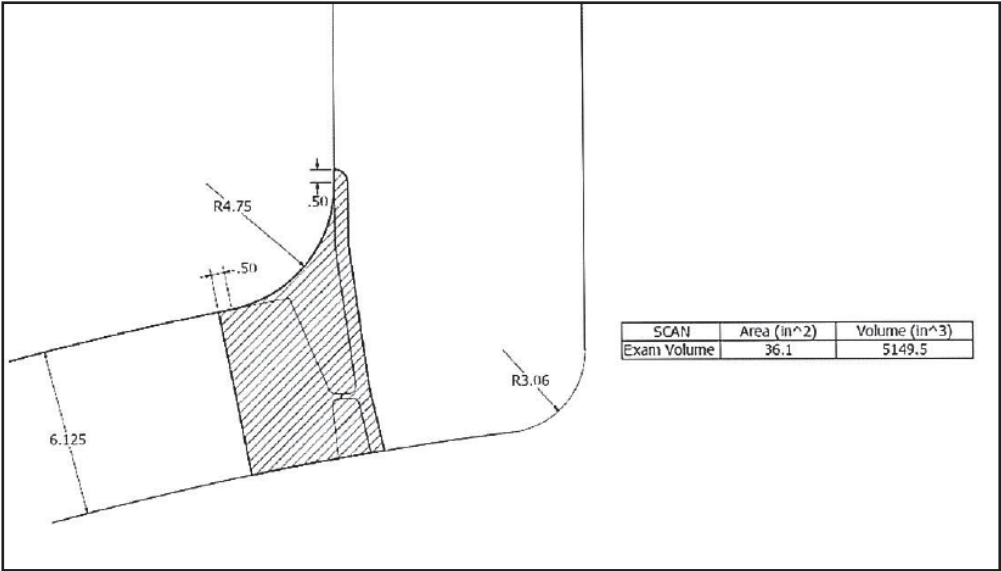


Figure 3.11-2 Weld **N3C-NV**, Calculated Full Volume

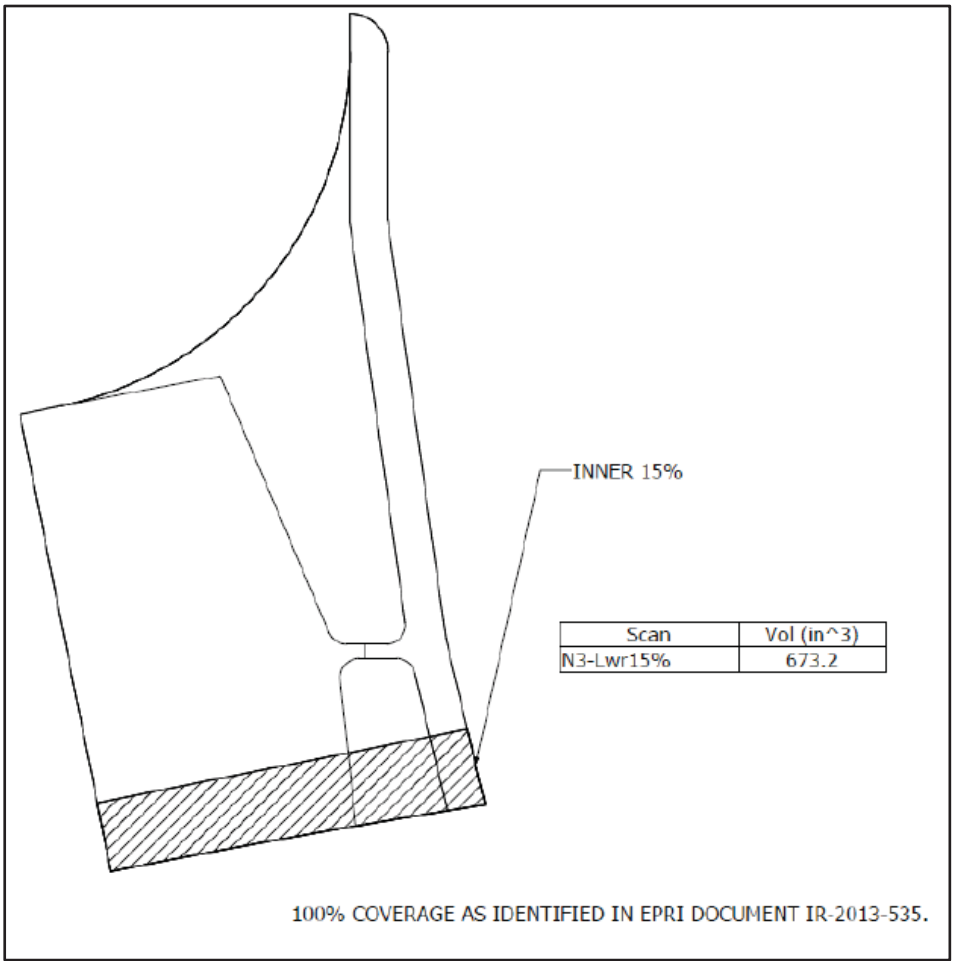
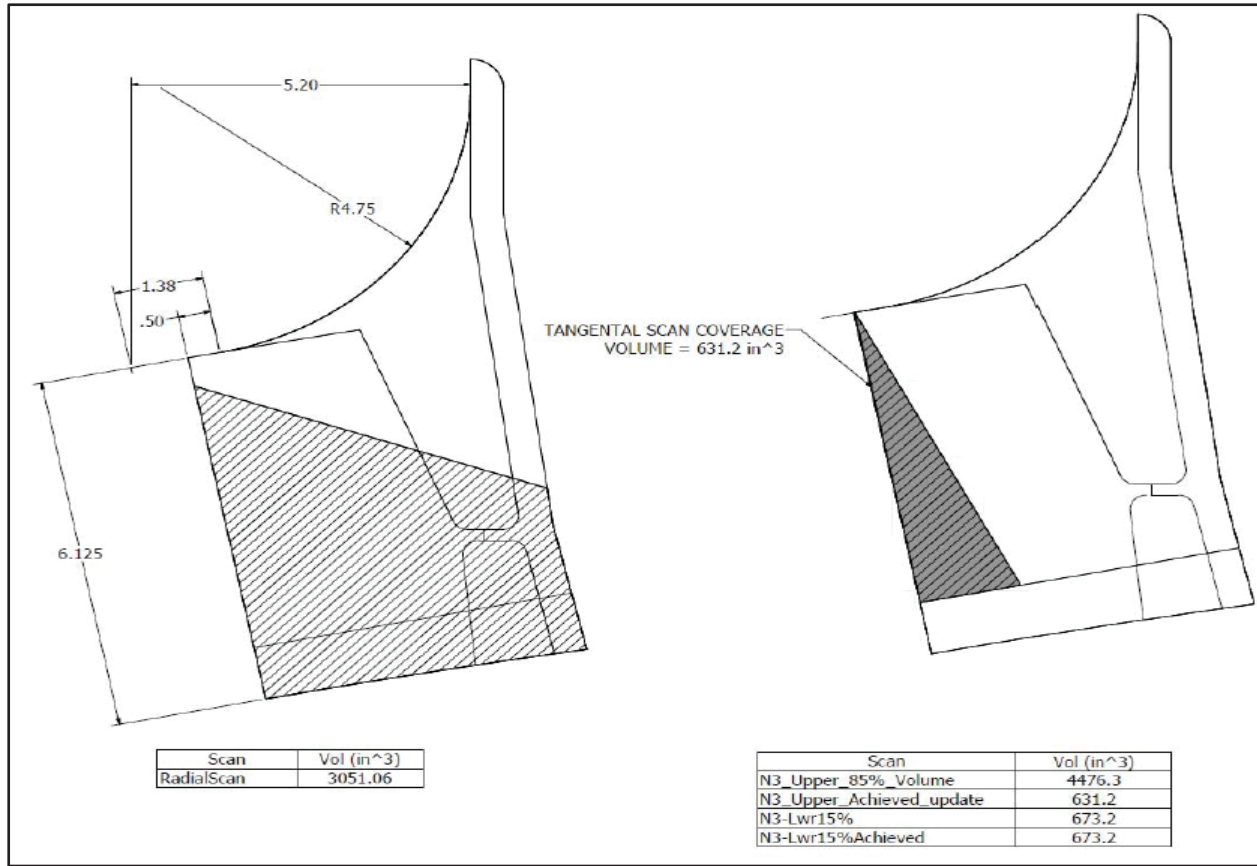


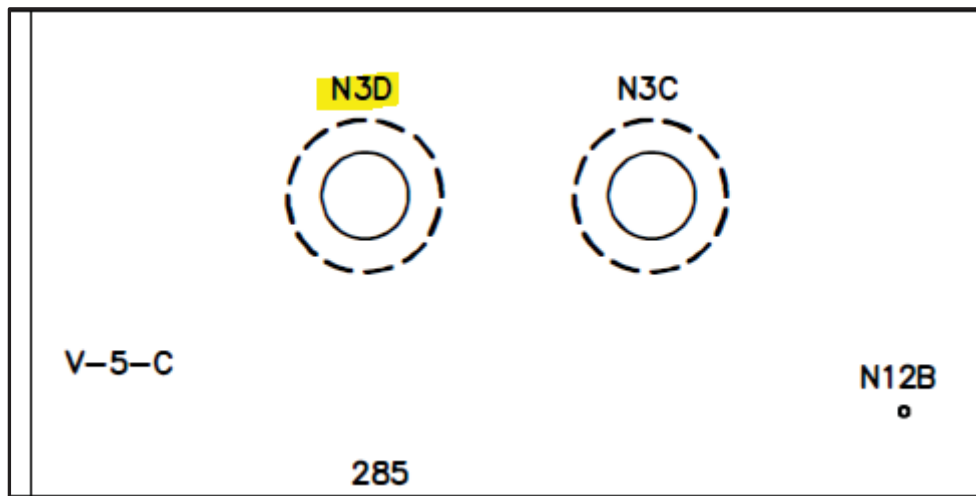
Figure 3.11-3 Weld **N3C-NV**, Achievable Inner 15% Tangential Coverage

Figure 3.11-4 Weld **N3C-NV**, Radial and Outer 85% Tangential Achieved CoverageTable 3.11-1 Weld **N3C-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	5149.5	673.2	4476.3	5149.5
Exam Volume Achieved (in <sup>3</sup> )	3051.06	673.2	631.2	1304.4
% Coverage Achieved	(A) 59.2	100	14.1	(B) 25.3
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 42.3 %</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 50°, 70° Shear and 60° Refracted Longitudinal.

3.12 Weld **N3D-NV** – 26" Steam Outlet Nozzle to Shell WeldFigure 3.12-1 Weld **N3D-NV** (Extracted from Reference Drawing 3-ISI-0220-C-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R18 refueling outage in 2018. The NDE data can be found on UT Report No. R-085A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 42.3 percent as described in Table 3.12-1 and combined with Figure 3.12-2 through 3.12-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R12, UT R-075 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

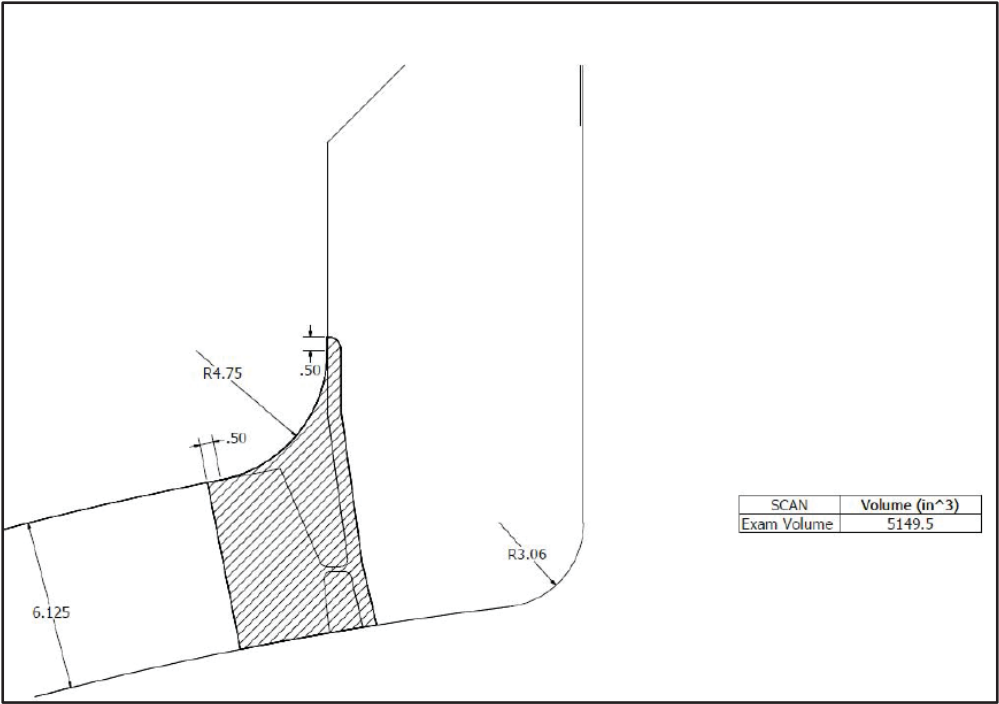


Figure 3.12-2 Weld **N3D-NV**, Calculated Full Volume

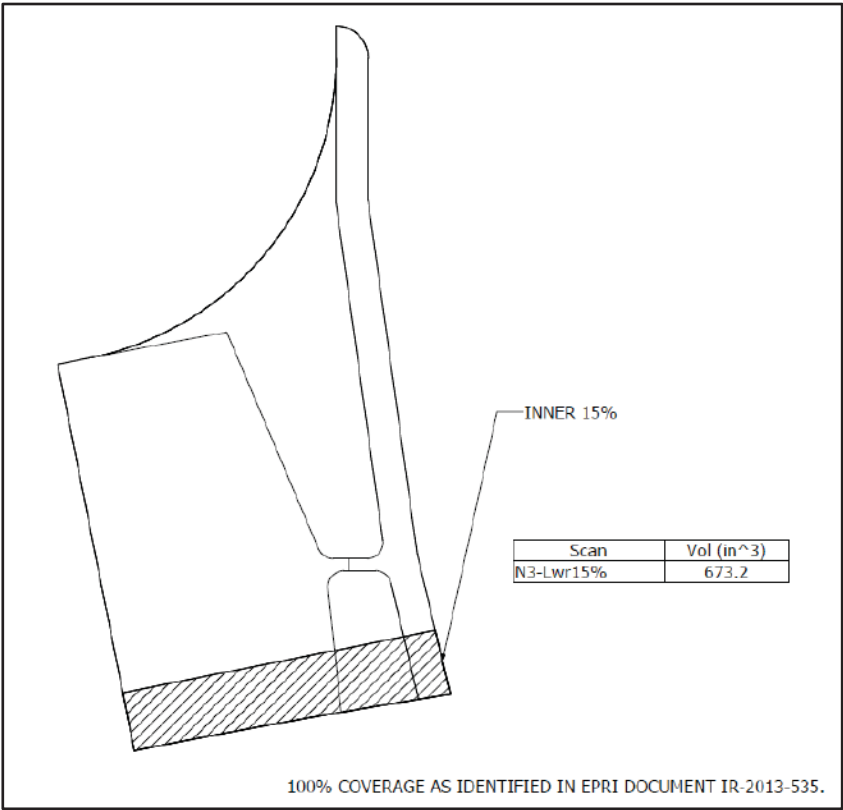


Figure 3.12-3 Weld **N3D-NV**, Achievable Inner 15% Tangential Coverage

# Enclosure 1

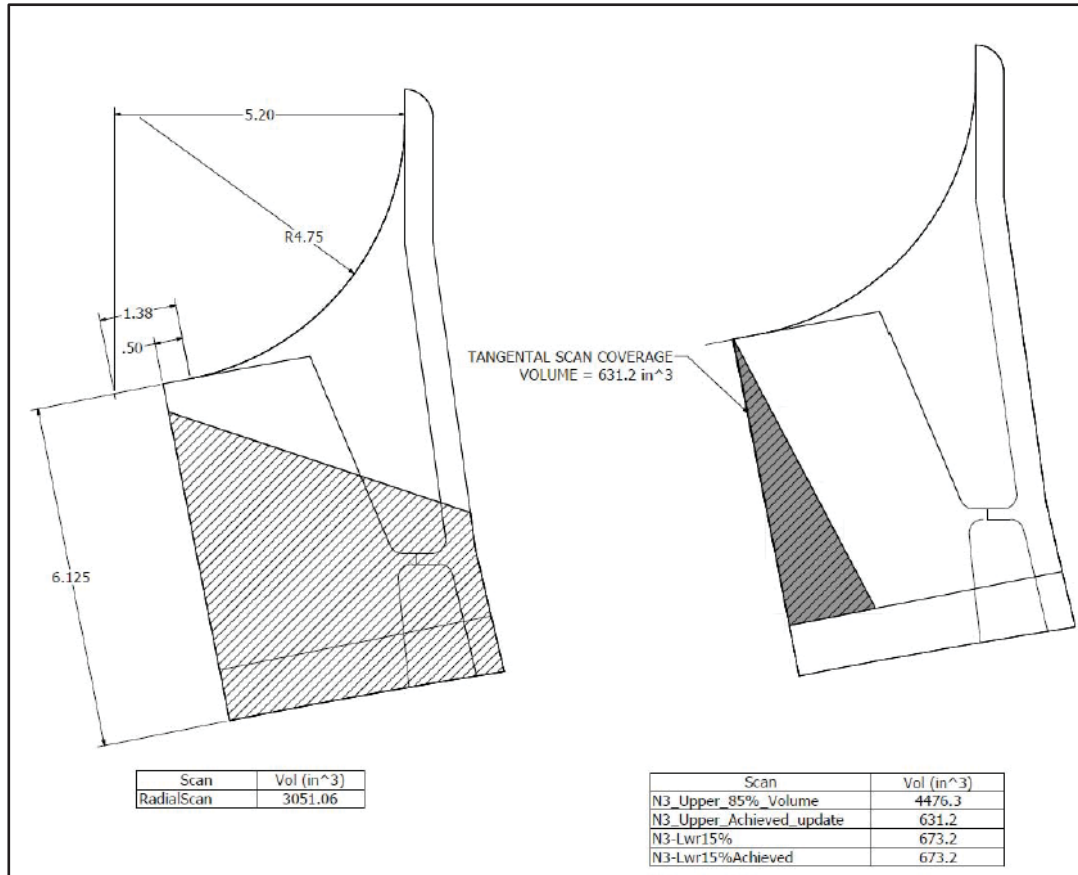
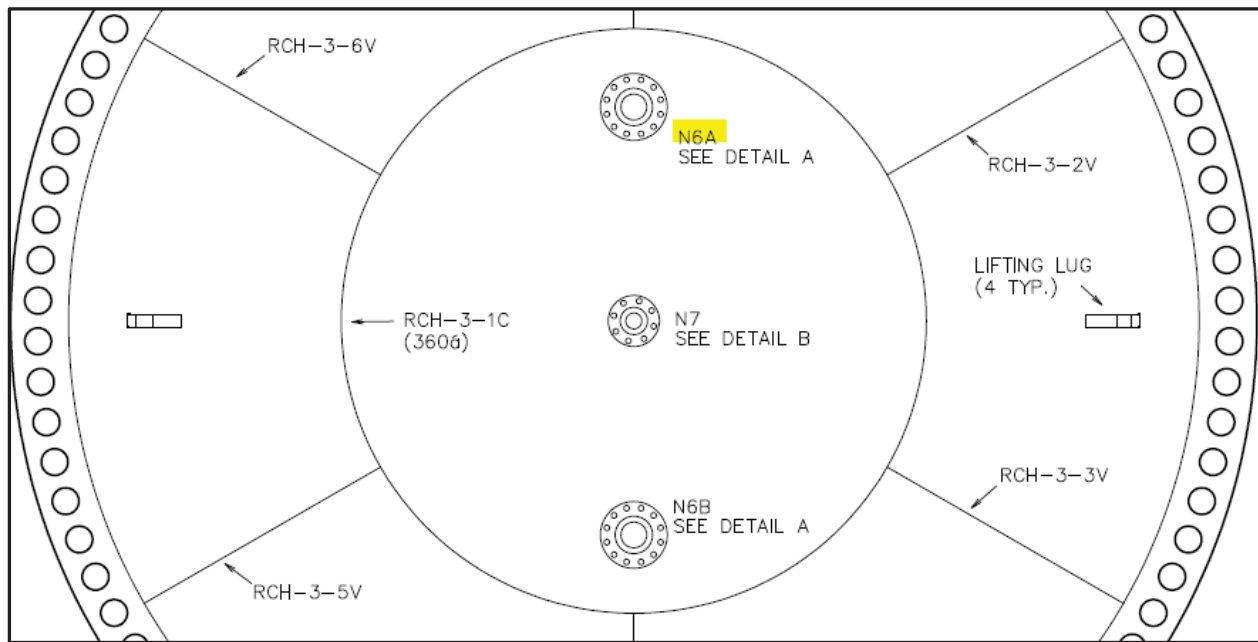


Table 3.12-1 Weld **N3D-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in <sup>3</sup> )	5149.5	673.2	4476.3	5149.5
Exam Volume Achieved (in <sup>3</sup> )	3051.1	673.2	631.2	1304.4
% Coverage Achieved	<b>(A) 59.3</b>	100	14.1	<b>(B) 25.3</b>
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 42.3 %</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535. Wave Modes Used = 40°, 50°, 70° Shear and 60° Refracted Longitudinal.

3.13 Weld **N6A-NV** – 6" Head Spray Nozzle to Shell WeldFigure 3.13-1 Weld **N6A-NV** (Extracted from Reference Drawing 3-ISI-0295-A-01)

This weld was UT examined in the fourth 10-Year ISI Interval, first period, during the U3R18 refueling outage in 2018. The NDE data can be found on UT Report No. R-048A. The required examination volume was based on Code Case N-613-1 Figure 1, exam volume A-B-C-D-E-F-G-H. The UT examination was limited based on the joint configuration resulting in total UT coverage 44.9 percent as described in Table 3.13-1 and combined with Figure 3.13-2 through 3.13-4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R13, UT R-054 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2110 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 1

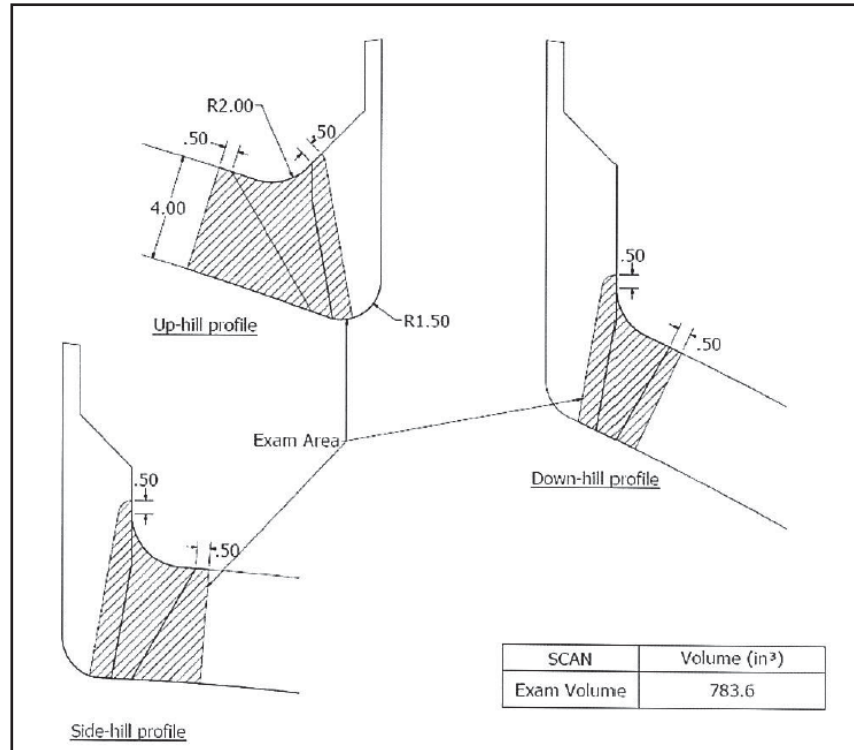


Figure 3.13-2 Weld **N6A-NV**, Calculated Full Volume

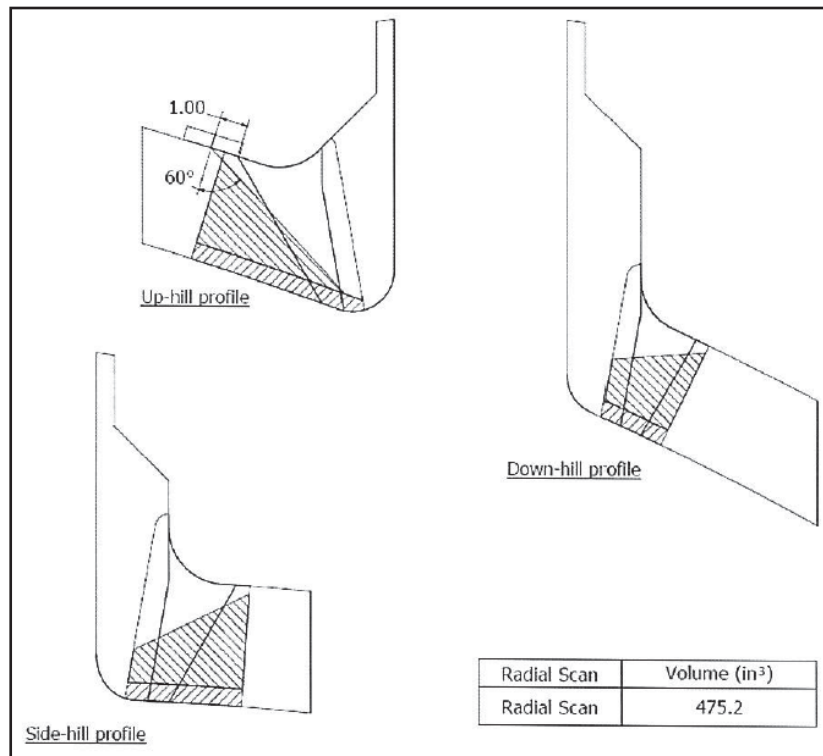


Figure 3.13-3 Weld **N6A-NV**, Achievable Radial Coverage



# Enclosure 1

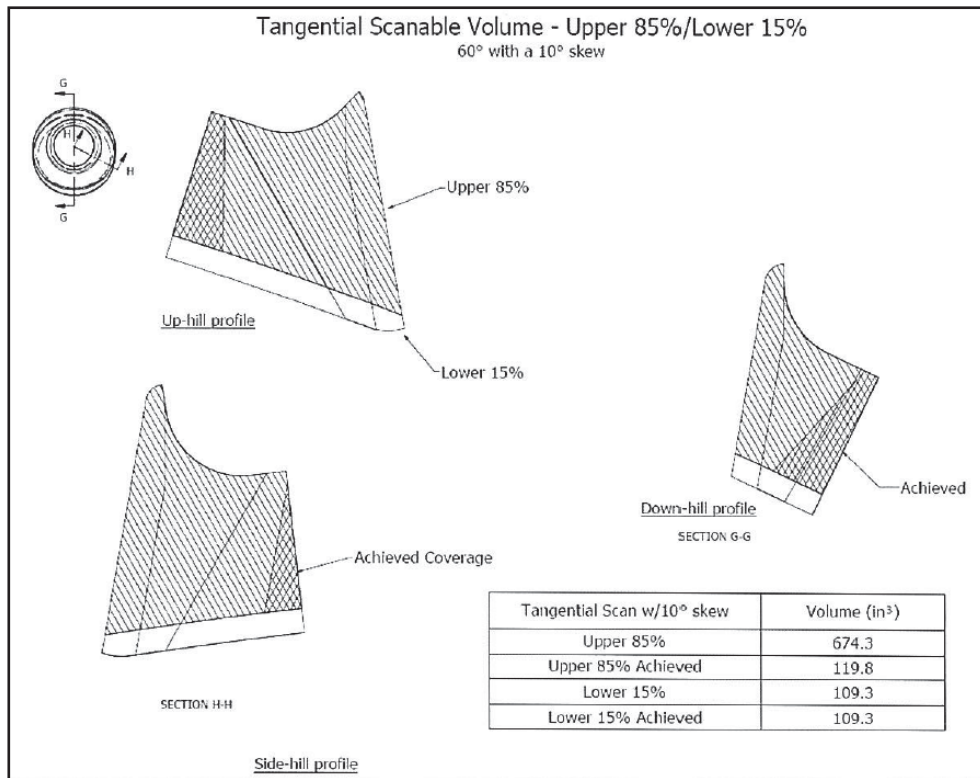


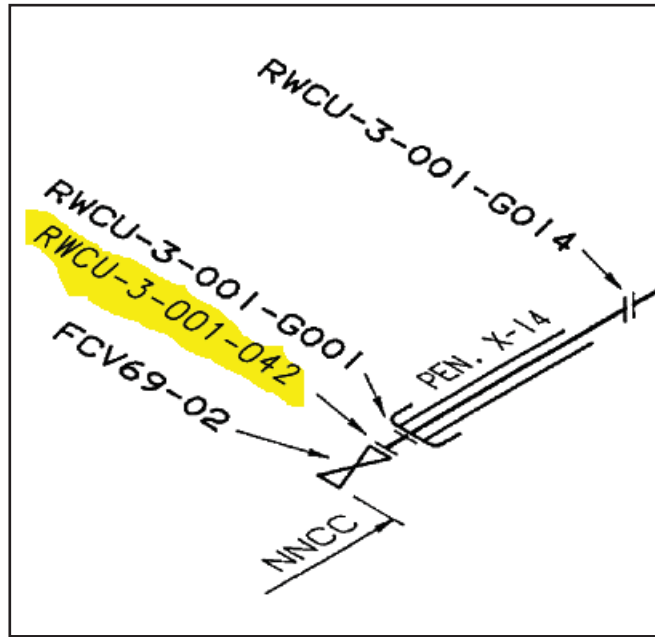
Figure 3.13-4 Weld **N6A-NV**, Upper 85%/Lower 15%  
Achieved Tangential (Transverse) Coverage

Table 3.13-1 Weld **N6A-NV**, Scan Coverage and Scan Summary

	Radial Scans	Tangential Scans		
	100% Thickness	Inner 15% (Note 1)	Outer 85%	Sub-Totals "Tangential"
Required Exam Volume (in³)	783.6	109.3	674.3	783.6
Exam Volume Achieved (in³)	475.2	109.3	119.8	229.1
% Coverage Achieved	(A) 60.6	100	17.77	(B) 29.2
<b>TOTAL Coverage Claimed</b>	<b>(A + B)/2 = 44.9 %</b>			

Note:

1) Examination angles and coverage areas based on EPRI Modeling Report IR- 2013-535.  
Wave Modes Used = 22°, 26°, 35°, 40°, 50° Shear and 60° Refracted Longitudinal.

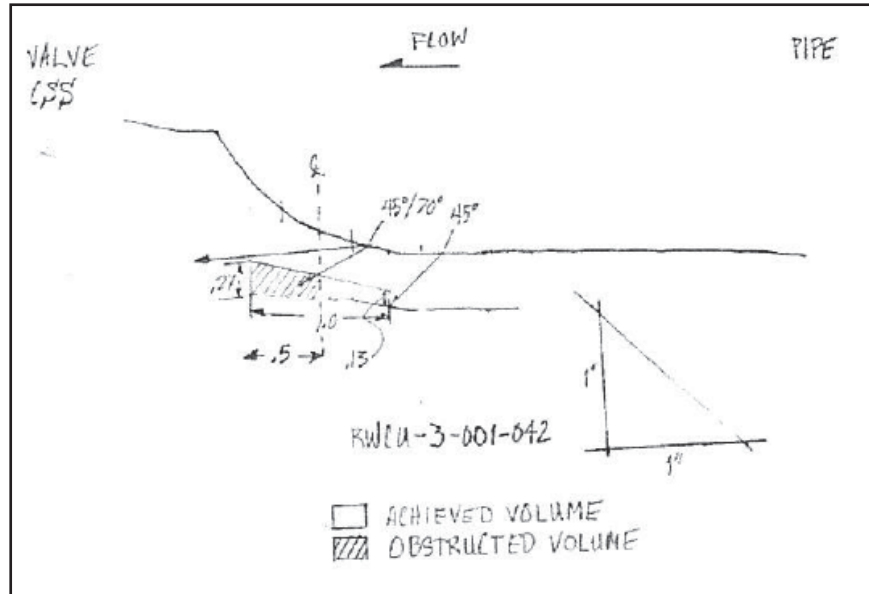
3.14 Weld **RWCU-3-001-042** – 6" Reactor Water Cleanup Pipe to Valve WeldFigure 3.14-1 Weld **RWCU-3-001-042** (Extracted from Reference Drawing 3-ISI-0332-C-01)

This weld was UT examined in the fourth 10-year ISI Interval, first period, during the U3R18 refueling outage in 2018 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No: R1.20, "Welds Not Subject to a Degradation Mechanism". The NDE data can be found on UT Report No. R-094. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam volume C-D-E-F. The UT examination was limited on the downstream side due to the cast stainless steel valve configuration resulting in total UT coverage of 37.6 percent as described in Table 3.14-1 and combined with Figure 3.14-2.

Examination of an alternate Risk Informed selection was not practical. There are three similar welds in the same Risk Informed grouping. However, each of them has exam history with limited coverage or were not examined because of similar configuration limitations. During U3R18, there were two additional welds examined on the same line of piping as RWCU-3-001-042 that obtained 100 percent coverage with zero indications identified. These two welds were examined for Code Case N-716-1 credit (R1.20) and provide additional assurance that IGSCC is not occurring in a similar operating environment.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U3R8, UT R-087 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Figure 3.14-2 Weld **RWCU-3-001-042**, Weld Profile Axial ScanTable 3.14-1 Weld **RWCU-3-001-042** Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	50.12%
Downstream Side	0%
Circ CW	50.12%
Circ CCW	50.12%

CUMULATIVE % COVERAGE =  
 $150.36\% \div 4 \text{ SCANS} = 37.59\%$  or  
 TOTAL COVERAGE % = 37.6%

Notes: Wave Modes Used = 45°, 70° Shear.

**Enclosure 2**

**Sequoyah Nuclear Plant, Unit 1 and 2**

**American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI**

**Request for Relief Number SQN-19-ISI-1**

## Sequoyah Nuclear Plant, Units 1 and 2

### American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI

#### Request for Relief Number SQN-19-ISI-1

#### **Introduction**

This request, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii) and (g)(6), is applicable to examinations performed during the Sequoyah Nuclear Plant (SQN) Unit 1 and Unit 2 first period of the fourth interval, for which limited examination coverage was obtained. For both units, the first period ended on July 3, 2019. This enclosure contains the figures and tables that depict the limitations and calculations used for obtained coverage, materials and product forms, ultrasonic examination angles and wave modes used, and the examination results for the welds associated with this request for relief, including any applicable previous examination history used. The following Tables (Table 1 for SQN Unit 1 and Table 2 for SQN Unit 2) identify the welds within the scope of this request and summarize the extent of examination coverage achieved for each weld.

Frequently, ultrasonic testing (UT) scan numbers were used in the original nondestructive examination (NDE) data sheets to determine and describe the examinations performed and coverage percentages obtained. In the detailed examination data that follows, UT scan number identifiers have been omitted for clarity, and replaced with specific descriptions of weld configurations and scan directions. When referring to NDE datasheets, the scan numbers, if used, have been applied as described in Figure I-1 for Vessels as extracted from Procedure N-GP-18.

#### **I. ASME Code Components Affected**

The SQN Units 1 and 2, Class 1 and 2 welds with limited examinations requiring relief during the first period of the fourth 10-year inservice inspection (ISI) interval are listed in Table 1 and Table 2 of this enclosure. The content of this request includes the insights gained from guidance provided in Nuclear Regulatory Commission (NRC) presentation, "Coverage Relief Requests," Reference 1. The following Code Classes, Examination Categories, and Item Numbers apply.

Code Classes:	1
Examination Categories:	B-D
Item Numbers:	B3.110

#### **II. Applicable Code Edition and Addenda**

During the fourth 10-year ISI interval, the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC) of Record (Code) is ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2007 Edition through 2008 Addenda, as modified by 10 CFR 50.55a, "Codes and Standards." The Appendix VIII requirements and use of the performance demonstration initiative (PDI) requirements at SQN

## Enclosure 2

were in accordance with the 2007 Edition through 2008 Addenda of Section XI, as modified by 10 CFR 50.55a for the limited examinations contained in this request.

For both units, the first period of the SQN fourth 10-year ISI interval ended on July 3, 2019. The limited examinations contained in this request are required to be submitted to the NRC within 12 months of the end of the interval, currently scheduled for September 3, 2025.

### III. Applicable Code Requirements

In accordance with 10 CFR 50.55a(g)(5)(iii) and (g)(6), Tennessee Valley Authority (TVA) is requesting relief from weld examination coverage requirements specified in the ASME BPVC, Section XI for the following examination categories.

Exam Cat.	Item No.	Class 1 Weld Examination Coverage Requirements
B-D	B3.110	100% examination of the pressurizer nozzle-to vessel welds per figure IWB-2500-7(a) through (d) as applicable.

ASME Section XI, IWA-2200(c) states that when performing VT-1 surface, radiographic, or ultrasonic examination on a component with defined surface or volume, essentially 100 percent coverage is achieved when the applicable examination coverage is greater than 90 percent. The component examinations in the scope of this relief request are those for which greater than 90 percent of the required examination volume or surface area could not be achieved.

#### Limited Class 1 Nozzle Welds

Examinations performed per Table IWB-2500-1, Examination Category B-D, "Full Penetration Welded Nozzles in Vessels" Item No. B3.110, "Pressurizer Nozzle-to-Vessel Welds," encountered limitations on two welds during the first period of the fourth ten-year ISI interval at SQN. The welds were the Unit 1 Pressurizer Surge Nozzle to Head Shell Weld and the Unit 2 Pressurizer Spray Nozzle to Head Shell Weld. These welds were examined to meet the volumetric requirements depicted in Figure IWB-2500-7(b). Limited UT examinations have been determined to exist by demonstrated experience as documented in the attachment to this enclosure when performing examinations of these two welds.

### IV. Reason for Request

Pursuant to 10 CFR 50.55a(g)(5)(iii) and (g)(6), TVA has determined that compliance with the code requirements of achieving essentially 100 percent coverage of the welds listed in this request is impractical. 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. Impracticality of Compliance

The construction permit application for SQN Unit 1 and Unit 2 were issued on May 27, 1970 and falls under the provisions of 10 CFR 50.55a(g)(1). Under these provisions, Code Class 1 and 2 components and their supports need not meet the design and access provisions of ASME Section XI.

## Enclosure 2

The design of SQN Unit 1 and Unit 2 provides access for examinations to the extent practical. However, component design configurations with conditions resulting in examination limitations (for example, those from support interference, geometric configurations of welds and materials such as fitting, 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. Therefore, this relief request addresses those conditions. Details of examination restrictions and reductions in required examination coverage are provided in Table 1 and Table 2 of this enclosure.

When examined, the welds listed in this enclosure of this request did not receive the required code volume coverage due to their component design configurations. This condition resulted in scanning access limitations that prohibited obtaining essentially 100 percent examination coverage (greater than 90 percent) of the required examination volumes. When this situation occurred, 100 percent of the accessible volumes of each weld were covered to the extent practicable.

### Burden Caused by Compliance

For each weld in the scope of this request, it is not possible to obtain UT interrogation of greater than 90 percent of the required code examination volume without extensive weld or component design modifications. Examinations have been performed to the maximum extent possible. Using radiography as an alternative would result in numerous work-related stoppages and increased radiation 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.

The UT examination techniques used for welds in this request for relief were reviewed to determine if additional coverage could be achieved by improving those techniques. No improvements could be identified, and the examinations have been performed to the maximum extent possible. Therefore, TVA has determined that obtaining essentially 100 percent coverage is not feasible and is impractical without adding additional burden consisting of significant redesign work, increased radiation exposure, and/or potential damage to the plant or the component itself.

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

### Proposed Alternative

- 1) Periodic system pressure tests and VT-2 visual examinations will continue to be performed on Class 1 pressure retaining welds and items during each refueling outage in accordance with Examination Category B-P of Table IWB-2500-1.
- 2) UT examinations are conducted to the maximum extent possible using demonstrated techniques as required by ASME Section XI or the RI-ISI Programs.

### Basis for Use

Regulation 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, except design and access provisions and preservice examination requirements, set forth in the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction. This request for relief has been written to address areas where a component is found to have conditions that limit the required examination volume or surface area and, thus, the amount of coverage was reduced below the minimum acceptable. TVA has performed the weld examinations listed in this request to the maximum extent possible for each of the welds identified with limitations in the attachment to this enclosure.

Both welds in the scope of this request are located inside the containment. Even though their examination did not meet the essentially 100 percent Code required volume coverage requirement, each of these locations is subject to a system pressure test as described above. In addition, there is continuous monitoring instrumentation in place to assure that early detection of any reactor coolant system (RCS) pressure boundary leakage is identified. This is accomplished by leakage detection instrumentation inside containment, where the RCS leakage detection instrumentation is required to be operable by SQN Technical Specification (TS) 3.4.15, "RCS Leakage Detection Instrumentation,". SQN TS 3.4.15 requires that the following RCS leakage detection instrumentation shall be operable:

- one containment pocket sump level monitor
- one lower containment atmosphere particulate radioactivity monitor

The instruments listed above are used to quantify any unidentified leakage from the RCS and to meet SQN TS 3.4.13, "RCS Operational LEAKAGE," that states that RCS operational leakage shall be limited to:

- a) No pressure boundary leakage;
- b) One gallon per minute (gpm) unidentified leakage;
- c) 10 gpm identified leakage; and
- d) 150 gallons per day primary-to-secondary leakage through any one steam generator

Based upon the extent of the required UT examination volume achieved for each of the welds within this request for relief and coupled with applicable leakage monitoring and required system pressure tests with VT-2 visual examinations, no further action can be taken by TVA at this time to improve these examinations without applying impractical options. The proposed alternative in this request for relief will provide assurance of an acceptable level of quality and safety by providing reasonable assurance of structural integrity.

## **VII. Duration of Proposed Alternative**

This request for relief is for the limited coverage examinations performed during the first period of the SQN Unit 1 and Unit 2 fourth 10-Year ISI interval. The fourth interval began on May 1, 2016 and is scheduled to end on September 3, 2025.



## VIII. Precedents

**Note:** Industry requests for relief due to impracticality 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:

- NRC Letter to TVA, “Sequoyah Nuclear Plant, Units 1 and 2 - Relief Request No. 17-ISI-1 Regarding the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (CAC Nos. MF9690 and MF9691; EPID L-2017-LLR-0025),” dated January 26, 2018 (ML18008A068)
- NRC Letter to Virginia Electric & Power Company, “Surry Power Station, Unit No 2 - Requests for Relief LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, AND LMT-C04 - For Limited Coverage Examinations Performed in the Fourth 10-Year Inservice Inspection Interval (CAC Nos. MF7718, MF7719, MF7720, MF7721, MF7722, MF7723, MF7724 and MF7725),” dated February 17, 2017 (ML16365A118)
- NRC Letter to Pacific Gas & Electric Company, “Diablo Canyon Power Plant, Unit No. 1 - Relief Request NDE-SIF-U1 to Allow Use of Alternate American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI Examination Requirements for the Third Inservice Inspection Interval (CAC NO. MF7552),” dated July 27, 2016 (ML16207A397)
- NRC Letter to Dominion Nuclear Connecticut, Inc. “Millstone Power Station, Unit No. 2 - Relief Requests for Limited Coverage Examinations Performed in the Fourth 10-Year Inservice Inspection Interval (CAC NOS. MF6567, MF6568, and MF6569),” dated July 13, 2016 (ML16172A135)
- NRC Letter to PPL Susquehanna, LLC, “Susquehanna Steam Electric Station, Units 1 and 2 - Relief Requests for the Third 10-Year Inservice Inspection Interval (CAC NOS. MF6302, MF6303, MF6304, MF6305, MF6306, and MF6307),” dated May 10, 2016 (ML16069A199)

## IX. References

1. NRC presentation “Coverage Relief Requests,” Industry/NRC NDE Technical Information Exchange Public Meeting January 13-15, 2015 (ML15013A266)
2. ASME Code Case N-716-1, “Alternative Classification and Examination Requirements, January 27, 2013

FIGURE I-1 – SCANNING NOMENCLATURE IDENTIFICATION FOR VESSELS

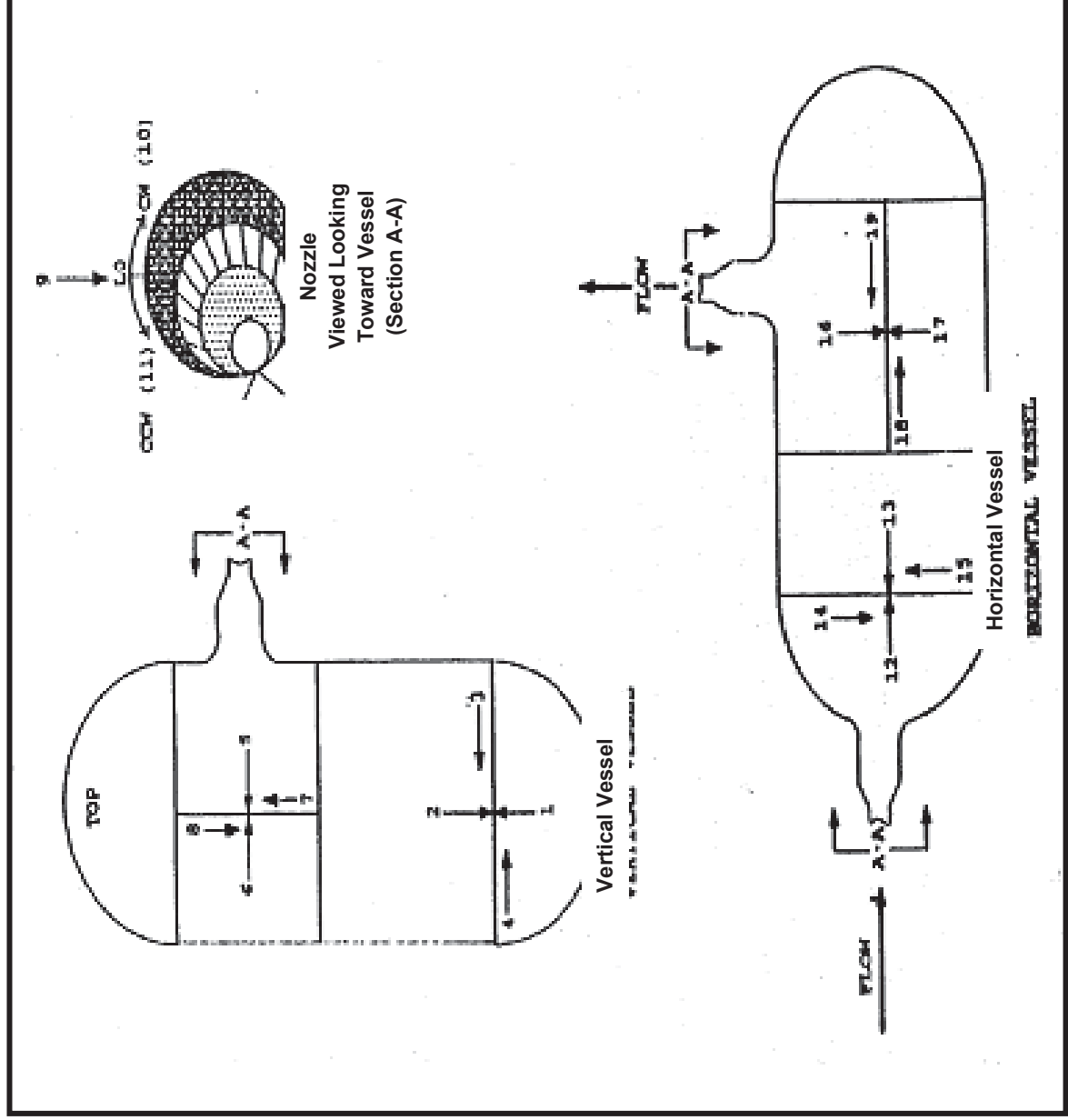
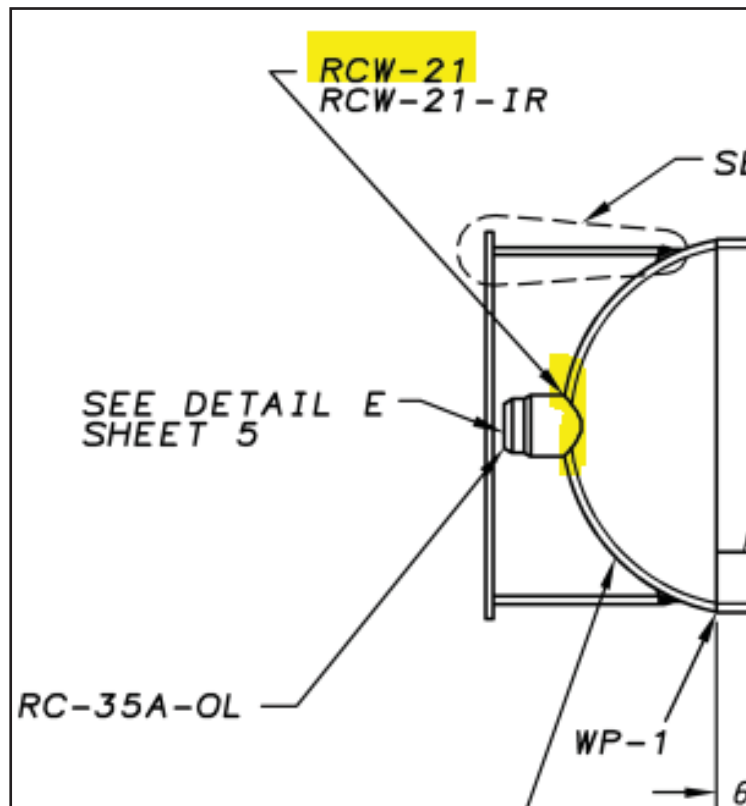


TABLE 1 – SQN UNIT 1 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained	Examination Limitations and Results	Applicable Tables and Figures
1.1 RCW-21 U1R21	1 B-D B3.110	14" Pressurizer Surge Nozzle to Head Shell Weld  Head T <sup>NOM</sup> = 3.0" Cladding T <sup>NOM</sup> = 0.190"	Nozzle: A-508 Class 2 Alloy Steel Forging	Weld: Ferritic Steel	Head: SA-533 Class 2 Alloy Steel Plate with Austenitic Stainless Steel Cladding	56.7%	Geometric Nozzle Design Configuration No Recordable Indications	Table 1.1-1  Figures 1.1-1 through 1.1-7

1.1 Weld **RCW-21** – 14" Pressurizer Surge Nozzle to Head Shell WeldFigure 1.1-1 Weld **RCW-21** (Extracted from Reference Drawing ISI-0394-C-01)

This weld was UT examined in the first inspection period of the fourth interval during the U1R21 refueling outage in 2016. The NDE data can be found on UT Report No. R-0090A. The ASME Code required volume was determined based on Section XI, Figure IWB-2500-7(b), exam volume A-B-C-D-E-F-G-H. The UT examination was limited from the nozzle side of the weld due to the geometric configuration resulting in total UT coverage of 56.7 percent as described in Table 1.1-1 and combined with Figures 1.1-2 thru 1.1.4.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from Cycle 15, UT report R-0073 was reviewed. No recordable indications were noted. This review did not note any laminations on the head that could interfere with the angle beam examinations performed on this weld.

Section XI Mandatory Appendix I, I-2120 that implements Article 4 of Section V as supplemented by Table I-2000-1 was used for this ultrasonic examination.

## Enclosure 2

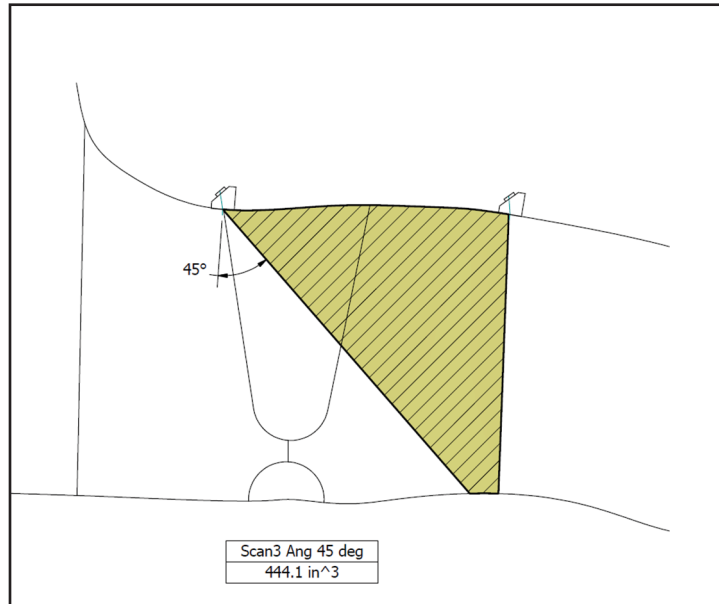


Figure 1.1-2 Weld **RCW-21**, 45° Nozzle Side Axial Scan

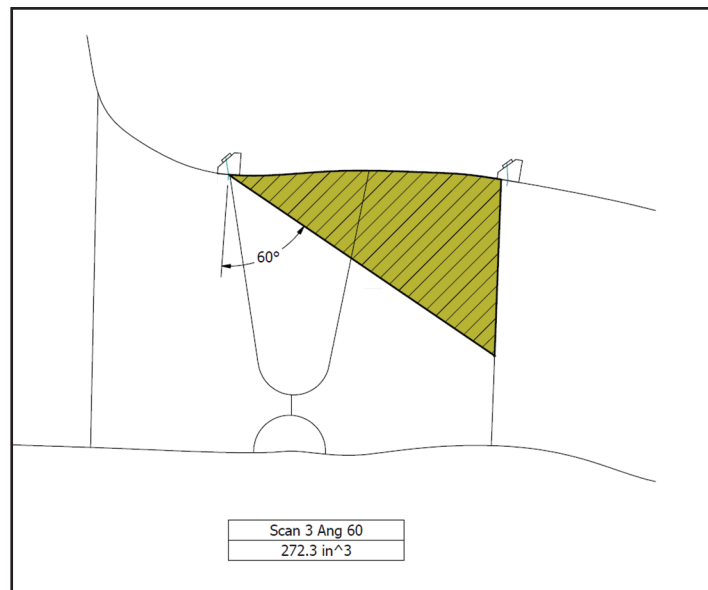


Figure 1.1-3 Weld **RCW-21**, 60° Nozzle Side Axial Scan

## Enclosure 2

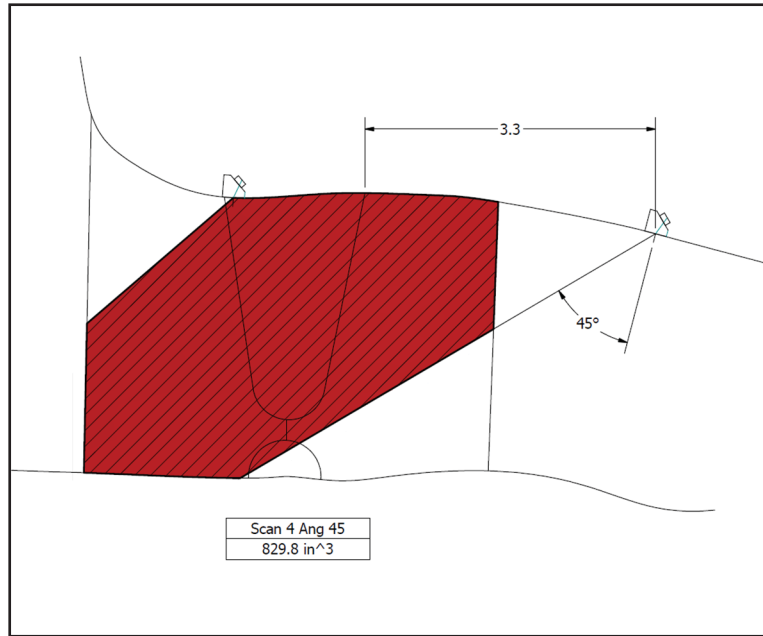


Figure 1.1-4 Weld **RCW-21**, 45° Head Side Axial Scans

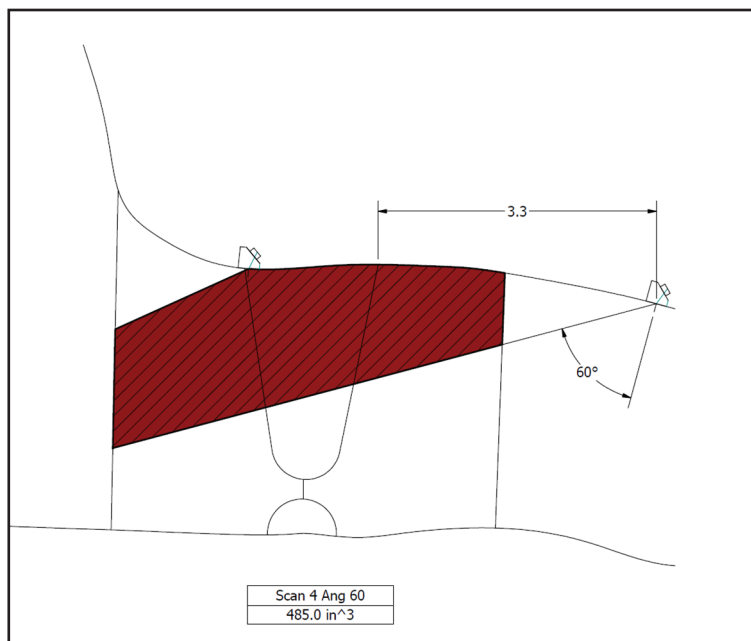


Figure 1.1-5 Weld **RCW-21**, 60° Head Side Axial Scans

## Enclosure 2

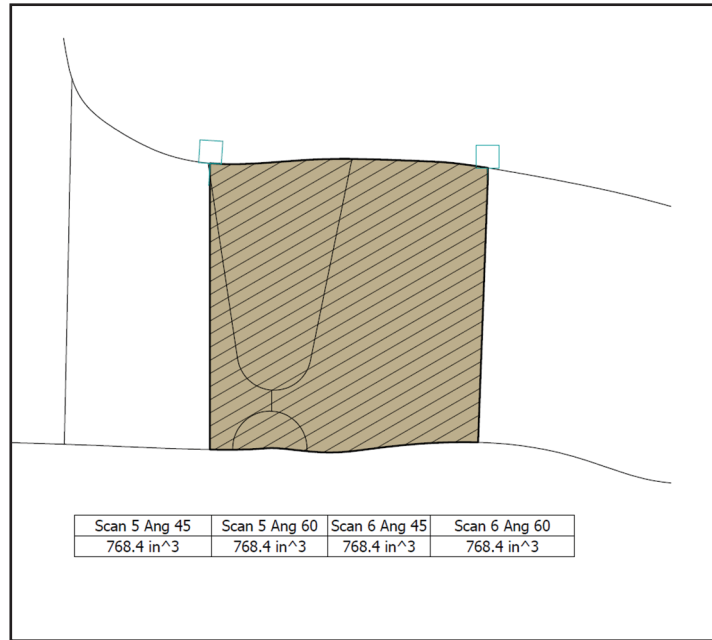


Figure 1.1-6 Weld **RCW-21**, 45° and 60° CW and CCW Scans

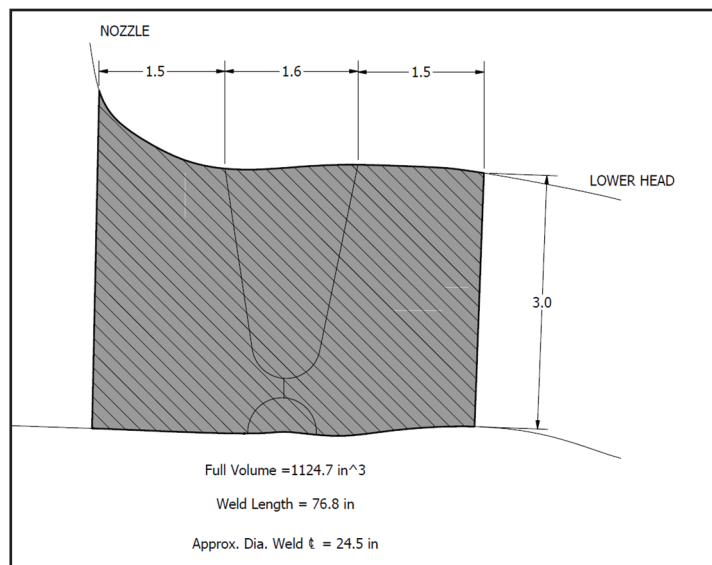


Figure 1.1-7 Weld **RCW-21**, Required Examination Volume

## Enclosure 2

Table 1.1-1 Weld **RCW-21 Scan** Coverage and Scan Summary

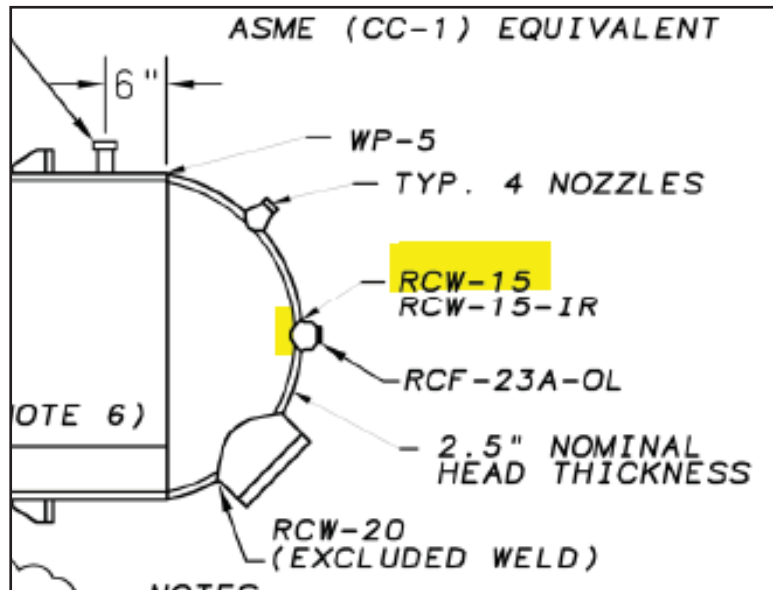
Scan	Full Volume (Cubic. In)	Actual (Cubic– In.) Achieved	Percent Achieved
45 ° Axial From Nozzle	1124.7	444.1	39.49
60 ° Axial From Nozzle	1124.7	272.3	24.21
45 ° Axial From Head	1124.7	829.8	73.78
60 ° Axial From Head	1124.7	485.0	43.12
45 ° Circ CW	1124.7	768.4	68.32
45 ° Circ CCW	1124.7	768.4	68.32
60 ° Circ CW	1124.7	768.4	68.32
60 ° Circ CCW	1124.7	768.4	68.32
TOTALS	8997.6	5104.8	453.88

CUMULATIVE % COVERAGE =  
 $453.88\% \div 8 \text{ SCANS} = 56.74\%$  or  
TOTAL COVERAGE % = 56.7%

Notes: Wave Modes Used = 45° Shear and 60° Shear.



TABLE 2 – SQN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained	Examination Limitations and Results	Applicable Tables and Figures
2.1 RCW-15 U2R22	1 B-D B3.110	4" Pressurizer Spray Nozzle to Head Shell Weld  Head T <sup>NOM</sup> ~ 2.5" Cladding T <sup>NOM</sup> ~ 0.190"	Nozzle: A-508 Class 2 Alloy Steel Forging	Weld: Ferritic Steel	Head: SA-533 Class 2 Alloy Steel Plate with Austenitic Stainless Steel Cladding	78.4%	Geometric Nozzle Design Configuration No Recordable Indications	Table 2.1-1 Figures 2.1-1 through 2.1-7

2.1 Weld **RCW-15** – 4" Pressurizer Spray Nozzle to Head Shell WeldFigure 2.1-1 Weld **RCW-15** (Extracted from Reference Drawing ISI-0396-C-01)

This weld was UT examined in the first inspection period of the fourth interval during the U2R22 refueling outage in 2018. The NDE data can be found on UT Report No. R-0204. The ASME Code required volume was determined based on Section XI, Figure IWB-2500-7(b), exam volume A-B-C-D-E-F-G-H. The UT examination was limited from the nozzle side of the weld due to the geometric configuration resulting in total UT coverage of 78.4 percent as described in Table 2.1-1 and combined with Figures 2.1-2 thru 2.1.7.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from Cycle 15, UT report R-0071 was reviewed. No recordable indications were noted. This review did not note any laminations on the head that could interfere with the angle beam examinations performed on this weld.

Section XI Mandatory Appendix I, I-2120 that implements Article 4 of Section V as supplemented by Table I-2000-1 was used for this ultrasonic examination.

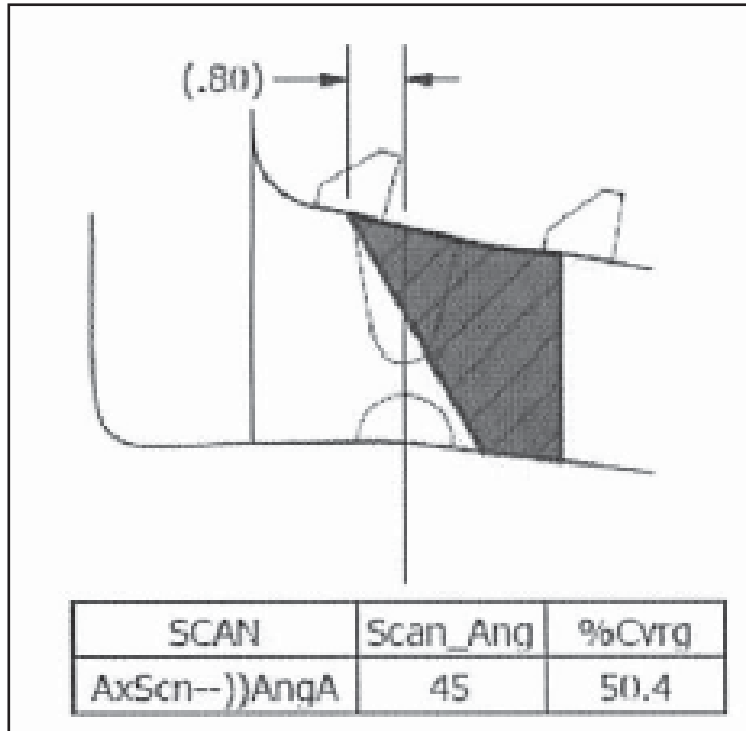


Figure 2.1-2 Weld **RCW-15**, 45° Nozzle Side Axial Scans

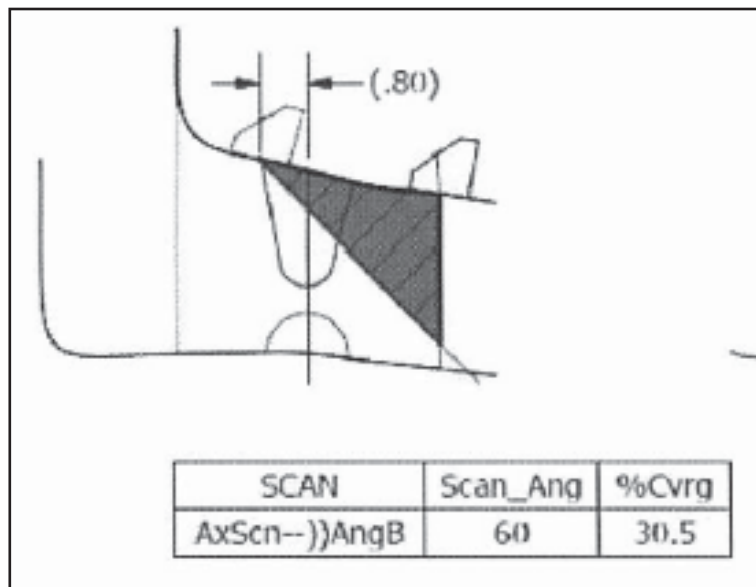
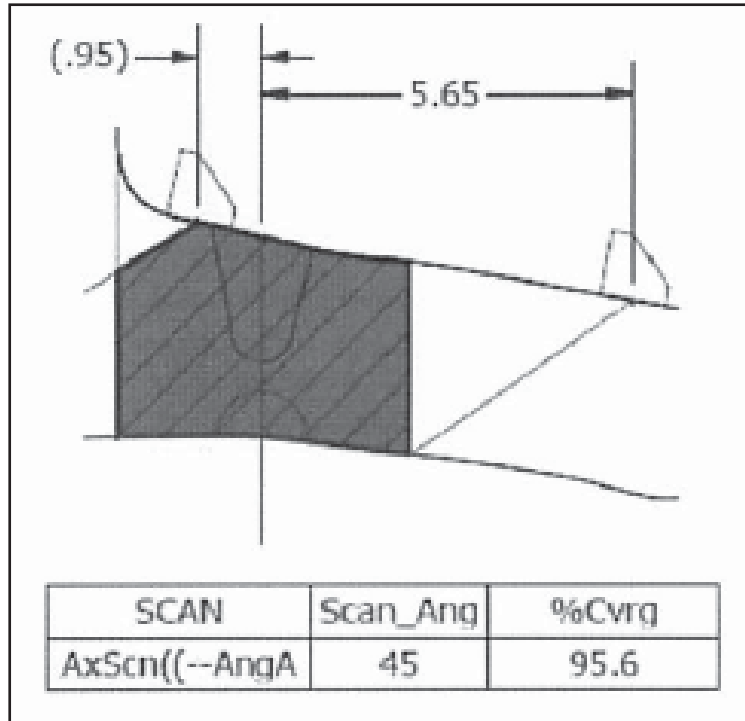
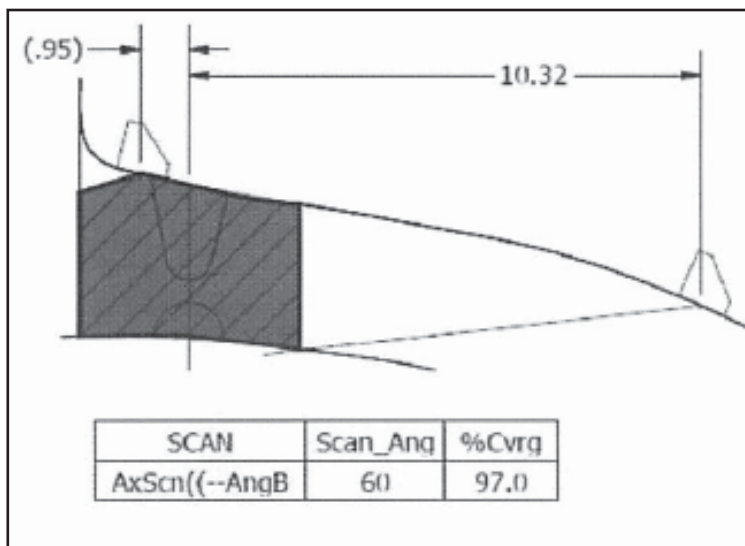


Figure 2.1-3 Weld **RCW-15**, 60° Nozzle Side Axial Scans

Figure 2.1-4 Weld **RCW-15**, 45° Head Side Axial ScansFigure 2.1-5 Weld **RCW-15**, 60° Head Side Axial Scans

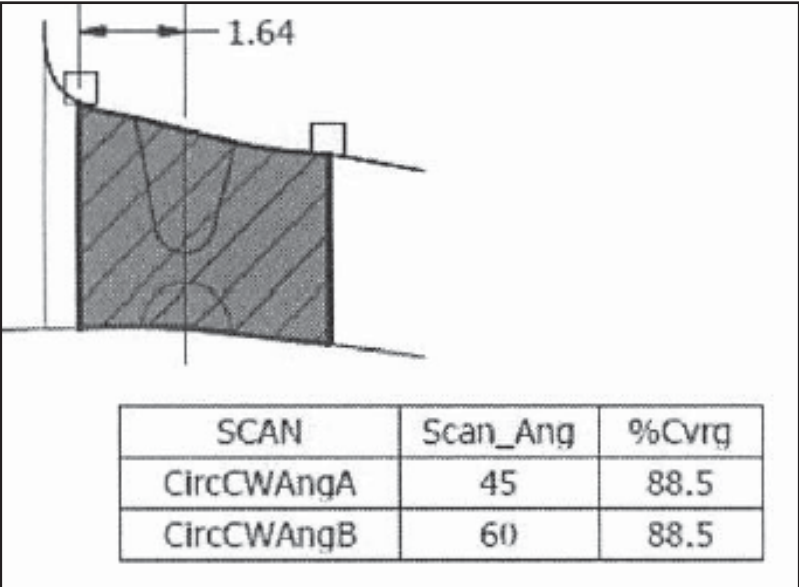


Figure 2.1-6 Weld **RCW-15**, 45° & 60° CW Circumferential Scans

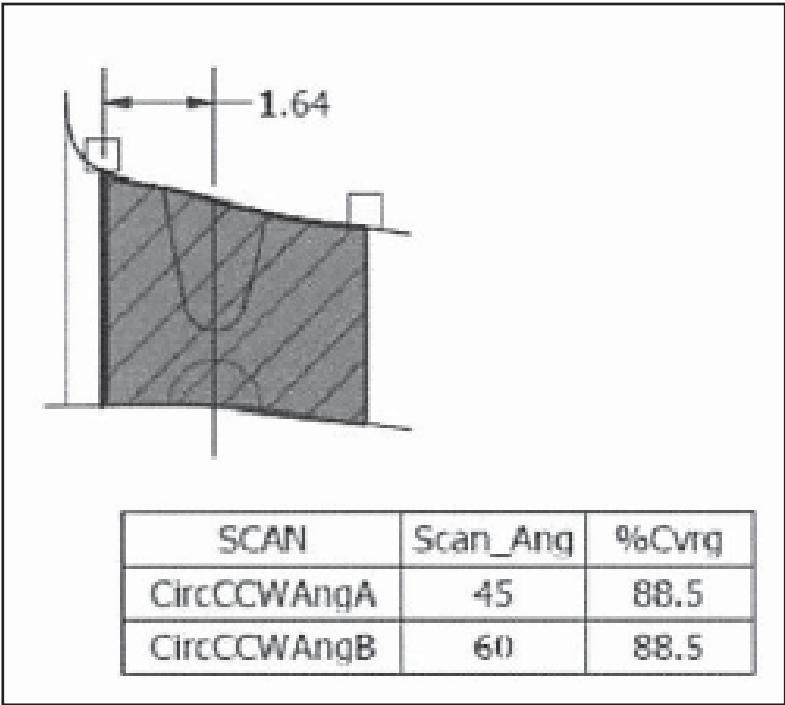


Figure 2.1-7 Weld **RCW-15**, 45° & 60° CCW Circumferential Scans

Enclosure 2

Table 2.1-1 Weld **RCW-15** Scan Coverage and Scan Summary

SCANS	% COVERAGE
45° Axial Nozzle Side	50.4
60° Axial Nozzle Side	30.5
45° Axial Head Side	95.6
60° Axial Head Side	97.0
45° Circ CW	88.5
60° Circ CW	88.5
45° Circ CCW	88.5
60° Circ CCW	88.5
TOTALS	627.5

CUMULATIVE % COVERAGE =  
 $627.5\% \div 8 \text{ SCANS} = 78.44\%$  or  
TOTAL COVERAGE % = 78.4%

Notes: Wave Modes Used = 45° Shear and 60° Shear.

**Enclosure 3**

**Watts Bar Nuclear Plant, Unit 1 and 2**

**American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI**

**Request for Relief Number WBN-19-ISI-1**

## Watts Bar Nuclear Plant, Units 1 and 2

### American Society of Mechanical Engineers, Boiler & Pressure Vessel Code, Section XI

#### Request for Relief Number WBN-19-ISI-1

#### **Introduction**

This request, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii) and (g)(6), is applicable to examinations performed during the Watts Bar Nuclear Plant (WBN) Unit 1 first period of the third interval and WBN Unit 2 first period of the first interval, for which limited examination coverage was obtained. For both units, the first period ended May 26, 2019. This Enclosure contains the figures and tables that depict the limitations and calculations used for obtained coverage, materials and product forms, ultrasonic examination angles and wave modes used, and the examination results for the welds associated with this request for relief, including any applicable previous examination history used. The following Tables (Table 1 for WBN Unit 1 and Table 2 for WBN Unit 2) identify the welds within the scope of this request and summarize the extent of examination coverage achieved for each weld.

Frequently, ultrasonic testing (UT) scan numbers were used in the original nondestructive examination (NDE) data sheets to determine and describe the examinations performed and coverage percentages obtained. In the detailed examination data that follows, UT scan number identifiers have been omitted for clarity, and replaced with specific descriptions of weld configurations and scan directions. When referring to NDE datasheets, the scan numbers, if used, have been applied as described in Figure I-1, as extracted from Procedure N-GP-18.

#### **I. ASME Code Components Affected**

The WBN Units 1 and 2, Class 1 and 2 welds with limited examinations requiring relief during the first period of the applicable 10-year inservice inspection (ISI) interval are listed in Table 1 and Table 2 of this enclosure. The content of this request includes the insights gained from guidance provided in Nuclear Regulatory Commission (NRC) presentation, "Coverage Relief Requests," Reference 1. The following Code Classes, Examination Categories, and Item Numbers apply.

Code Classes:	1 and 2
Examination Categories:	B-D, C-A, C-B, and R-A
Item Numbers:	B3.110, C1.30, C2.21, R1.11, R1.16, and R1.20

#### **II. Applicable Code Edition and Addenda**

During the Unit 1 third 10-year ISI interval and the Unit 2 first 10-year ISI interval, the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPVC) of Record (Code) is ASME Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2007 Edition through 2008 Addenda, as modified by 10 CFR 50.55a, "Codes and Standards." The Appendix VIII requirements and use of the performance demonstration initiative (PDI) requirements at WBN were in accordance with the 2007 Edition through 2008



Addenda of Section XI, as modified by 10 CFR 50.55a for the limited examinations contained in this request.

For both units, the first period of the current 10-year interval ended on May 26, 2019. The limited examinations contained in this request are required to be submitted to the NRC within 12 months of the end of the current interval, currently scheduled for May 26, 2026.

### III. Applicable Code Requirements

In accordance with 10 CFR 50.55a(g)(5)(iii) and (g)(6), Tennessee Valley Authority (TVA) is requesting relief from weld examination coverage requirements specified in the ASME BPVC, Section XI for the following examination categories.

Exam Cat.	Item No.	Class 1 Weld Examination Coverage Requirements
B-D	B3.110	100% examination of the pressurizer nozzle-to vessel welds per figure IWB-2500-7(a) through (d) as applicable.

Exam Cat.	Item No.	Class 2 Weld Examination Coverage Requirements
C-A	C1.30	100% examination of the circumferential Tubesheet to Shell weld per figure IWC-2500-2.
C-B	C2.21	100% examination of the nozzle to shell welds per figure IWC-2500-4(a), (b), or (d) as applicable.

Exam Cat.	Item No.	Class 1 and Class 2 Piping Welds / Risk-Informed Inservice Inspection Program Coverage Requirements
R-A	R1.11, R1.16	100% examination per figure IWB-2500-8(c) or IWB-2500-9, -10, -11, as applicable, plus an additional ½" beyond the base metal thickness transition or counterbore.
	R1.20	100% examination per figure IWB-2500-8(c) or IWB-2500-9, -10, -11, as applicable.

ASME Section XI, IWA-2200(c) states that when performing VT-1 surface, radiographic, or ultrasonic examination on a component with defined surface or volume, essentially 100 percent of the required surface or volume shall be examined. Essentially 100 percent coverage is achieved when the applicable examination coverage is greater than 90 percent. The component examinations in the scope of this relief request are those for which greater than 90 percent of the required examination volume or surface area could not be achieved.

#### Limited Class 1 Nozzle Welds

Examinations performed per Table IWB-2500-1, Examination Category B-D, "Full Penetration Welded Nozzles in Vessels" Item No. B3.110, "Pressurizer Nozzle-to-Vessel Welds," encountered limitations on two welds. The welds were the pressurizer spray nozzle-to-head weld and one pressurizer relief head-to-nozzle weld. These welds were examined to meet the volumetric requirements depicted in Figure IWB-2500-7(b). Limited UT examinations have been determined to exist by demonstrated experience as documented in the attachment to this enclosure when performing examinations of these two welds.

### Limited Class 2 Welds

Examinations performed per Table IWC-2500-1, Examination Category C-A, "Pressure Retaining Welds in Pressure Vessels," Item No. C1.30, "Head Circumferential Welds," encountered a limitation on the shell-to-tubesheet weld on a WBN Unit 2 Steam Generator. This weld was UT examined to meet the volume requirements of Figure IWC-2500-2. Limited UT examination coverage has been determined to exist by demonstrated experience as documented in the attachment to this enclosure when performing examinations of this weld.

Examinations performed per Table IWC-2500-1, Examination Category C-B, "Pressure Retaining Nozzle Welds in Vessels," Item No. C2.21, "Nozzle-to-Shell (Nozzle to Head or Nozzle to Nozzle) Weld," encountered a limitation on the Main Steam Nozzle to Head weld on a Unit 2 Steam Generator. This location was examined to meet the volume requirements defined by Figure IWC-2500-4(b) for nozzle-to-shell welds. A limited UT examination has been determined to exist by demonstrated experience as documented in the attachment to this enclosure when performing the examination of this weld. The surface examination of this nozzle-to-head weld, required by Table IWC-2500, was completed with no limitations.

### Limited Class 1 and Class 2 Piping Welds / Risk-Informed Inservice Inspection Programs

Class 1 and Class 2 piping welds were selected for examination during the third ten-year ISI interval under the Risk-Informed Inservice Inspection (RI-ISI) Program in accordance with ASME Code Case N-716-1.

During performance of these Category R-A Risk-Informed ISI piping examinations, coverage limitations were encountered on the following eight components:

- Two 10" Pipe to Valve Welds in the safety injection system on Unit 1
- One 6" Elbow to Pipe Weld in the safety injection system on Unit 1
- Two 6" Pipe to Valve Welds in the safety injection system on Unit 1
- One 1.5" Pipe to Nozzle Weld in the safety injection system on Unit 2
- Two 3" Valve to Pipe Welds in the Reactor Coolant System on Unit 2.

## **IV. Reason for Request**

Pursuant to 10 CFR 50.55a(g)(5)(iii) and (g)(6), TVA has determined that compliance with the code requirements of achieving essentially 100 percent coverage of the welds listed in this request is impractical. 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. Impracticality of Compliance**

The construction permit applications for WBN Unit 1 and Unit 2 were issued on January 23, 1973 and fall under the provisions of 10 CFR 50.55a(g)(2)(i). Under these provisions, Code Class 1 and 2 components and their supports must be designed and be provided with the access necessary to perform the required preservice and inservice examinations set forth in ASME Section III and Section XI.

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Although the design of WBN has provided access for examinations to the extent practical, component design configurations with conditions resulting in examination limitations (e.g., those from support interference, geometric configurations of welds and materials such as fitting, 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. Therefore, this relief request addresses those conditions. An example of such a condition is a valve to pipe weld where essentially 100 percent 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 Table 1 and Table 2 of this enclosure.

When examined, the welds listed in this enclosure of this request did not receive the required code volume coverage due to their component design configurations or interference by other items. These conditions resulted in scanning access limitations that prohibited obtaining essentially 100 percent examination coverage (greater than 90 percent) of the required examination volumes. When this situation occurred, 100 percent of the accessible volumes of each weld were covered to the extent practicable.

Every weld was examined as required by applicable procedures and regulations to the extent practicable. In those cases where UT examinations could potentially have interrogated additional area, such as the inside surface of cast stainless valves by looking through a stainless steel weld, these were considered a best effort examination. These are shown on the figures in the attachment to this enclosure by the represented angles. However, no additional coverage is credited.

#### Burden Caused by Compliance

For each weld in the scope of this request, it is not possible to obtain UT interrogation of greater than 90 percent of the required code examination volume or surface areas without extensive weld or component design modifications. Examinations have been performed to the maximum extent possible. Using radiography as an alternative would result in numerous work-related stoppages and increased radiation 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.

The UT examination techniques used for welds in this request for relief were reviewed to determine if additional coverage could be achieved by improving those techniques. No improvements could be identified, and the examinations have been performed to the maximum extent possible. Therefore, TVA has determined that obtaining essentially 100 percent coverage is not feasible and is impractical without adding additional burden consisting of significant redesign work, increased radiation exposure, and/or potential damage to the plant or the component itself.

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

### Proposed Alternative

- 1) Periodic system pressure tests and VT-2 visual examinations will continue to be performed on Class 1 pressure retaining welds and items during each refueling outage in accordance with Examination Category B-P of Table IWB-2500-1.
- 2) Class 2 pressure retaining welds and items will continue to receive system pressure tests and VT-2 visual examinations during each inspection period in accordance with Examination Category C-H of Table IWC-2500-1.
- 3) UT examinations are conducted to the maximum extent possible using demonstrated techniques as required by ASME Section XI or the RI-ISI Programs.

### Basis for Use

Regulation 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, except design and access provisions and preservice examination requirements, set forth in the ASME Code to the extent practical within the limitations of design, geometry, and materials of construction. This request for relief has been written to address areas where a component is found to have conditions that limit the required examination volume or surface area and, thus, the amount of coverage was reduced below the minimum acceptable. TVA has performed the weld examinations listed in this request to the maximum extent possible for each of the welds identified with limitations in the attachment to this enclosure.

Many of the welds in the scope of this request are located inside the containment. Even though their examination did not meet the essentially 100 percent Code required volume coverage requirement, each of these locations is subject to a system pressure test as described above. In addition, there is continuous monitoring instrumentation in place to assure that early detection of any reactor coolant system (RCS) pressure boundary leakage is identified. This is accomplished by leakage detection instrumentation inside containment, where the RCS leakage detection instrumentation is required to be operable by WBN Technical Specification (TS) 3.4.15, "RCS Leakage Detection Instrumentation." WBN TS 3.4.15 requires that the following RCS leakage detection instrumentation shall be operable:

- one containment pocket sump level monitor; and
- one lower containment atmosphere particulate radioactivity monitor

The above instruments are used to quantify any unidentified leakage from the RCS and to meet WBN TS 3.4.13, "RCS Operational LEAKAGE," that states that RCS operational leakage shall be limited to:

- a) No pressure boundary leakage;
- b) One gallon per minute (gpm) unidentified leakage;
- c) 10 gpm identified leakage; and
- d) 150 gallons per day primary-to-secondary leakage through any one steam generator

Based upon the extent of the required UT examination volume achieved for each of the welds within this request for relief and coupled with applicable leakage monitoring and required system pressure tests with VT-2 visual examinations, no further action can be taken by TVA at this time to improve these examinations without applying impractical options. The proposed alternative in this request for relief will provide assurance of an acceptable level of quality and safety by providing reasonable assurance of structural integrity.

## **VII. Duration of Proposed Alternative**

This request for relief is for the limited coverage examinations performed during the WBN Unit 1 first period of the third interval and WBN Unit 2 first period of the first interval, for which limited examination coverage was obtained. For both units, the first period ended on May 26, 2019.

## **VIII. Precedents**

**Note:** Industry requests for relief due to impracticality 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:

- NRC Letter to TVA, “Watts Bar Nuclear Plant, Unit 1 – Relief Request 1-ISI-21 from the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (EPID L-2018-LLR-0090),” dated April 12, 2019 (ML19071A009)
- NRC Letter to TVA, “Sequoyah Nuclear Plant, Units 1 and 2 - Relief Request No. 17-ISI-1 Regarding the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (CAC Nos. MF9690 and MF9691; EPID L-2017-LLR-0025),” dated January 26, 2018 (ML18008A068)
- NRC Letter to Virginia Electric & Power Company, “Surry Power Station, Unit No 2 - Requests for Relief LMT-R01, LMT-SS01, LMT-CS01, LMT-P01, LMT-C01, LMT-C02, LMT-C03, AND LMT-C04 - For Limited Coverage Examinations Performed in the Fourth 10 Year Inservice Inspection Interval (CAC Nos. MF7718, MF7719, MF7720, MF7721, MF7722, MF7723, MF7724 and MF7725),” dated February 17, 2017 (ML16365A118)
- NRC Letter to Pacific Gas & Electric Company, “Diablo Canyon Power Plant, Unit No. 1 - Relief Request NDE-SIF-U1 to Allow Use of Alternate American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI Examination Requirements for the Third Inservice Inspection Interval (CAC No. MF7552),” dated July 27, 2016 (ML16207A397)
- NRC Letter to Dominion Nuclear Connecticut, Inc. “Millstone Power Station, Unit No. 2 - Relief Requests for Limited Coverage Examinations Performed in the Fourth 10-Year Inservice Inspection Interval (CAC Nos. MF6567, MF6568, and MF6569),” dated July 13, 2016 (ML16172A135)
- NRC Letter to PPL Susquehanna, LLC, “Susquehanna Steam Electric Station, Units 1 and 2 - Relief Requests for the Third 10-Year Inservice Inspection Interval (CAC Nos. MF6302, MF6303, MF6304, MF6305, MF6306, and MF6307),” dated May 10, 2016 (ML16069A199)

## **IX. References**

1. NRC presentation, “Coverage Relief Requests,” Industry/NRC NDE Technical Information Exchange Public Meeting January 13-15, 2015 (ML15013A266)
2. ASME Code Case N-716-1, “Alternative Classification and Examination Requirements, January 27, 2013

FIGURE I-1 – SCANNING NOMENCLATURE IDENTIFICATION FOR PIPING

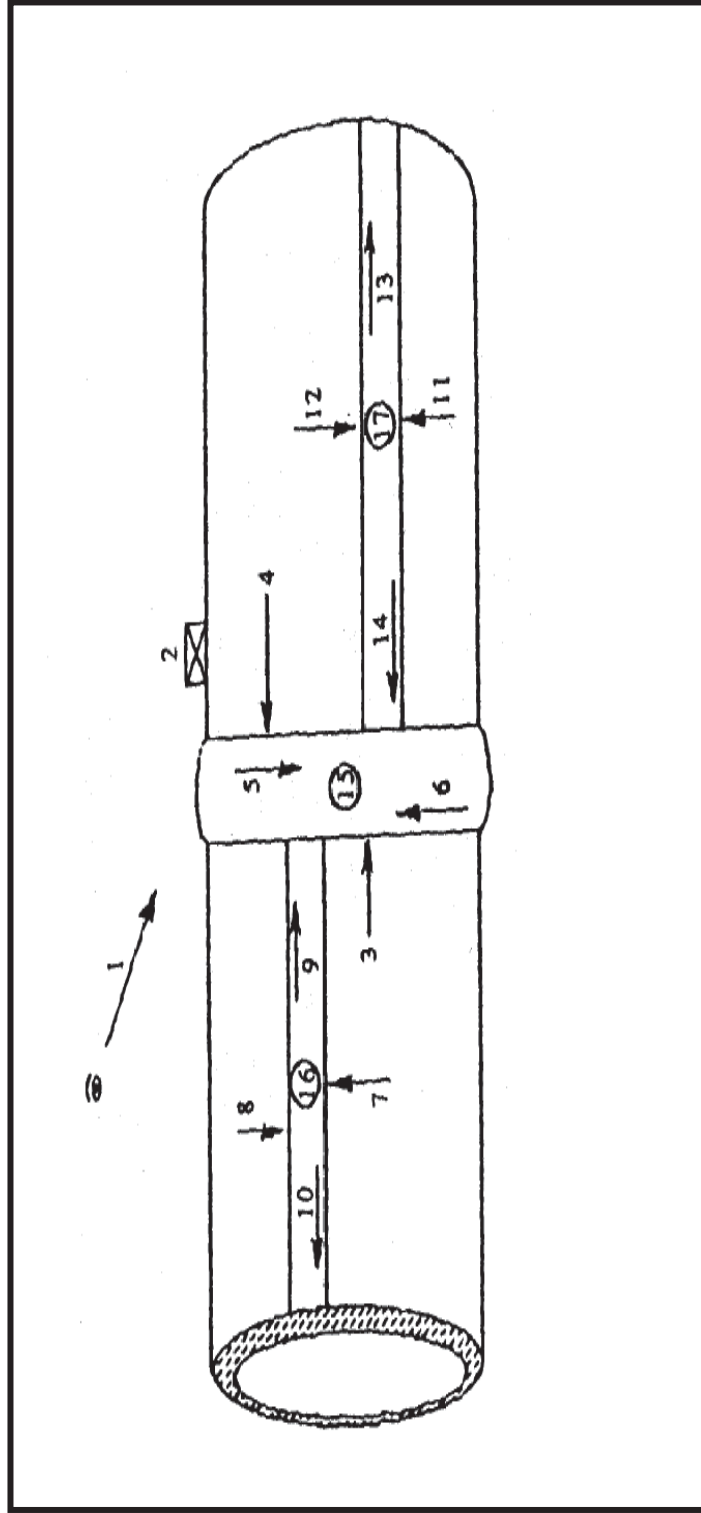
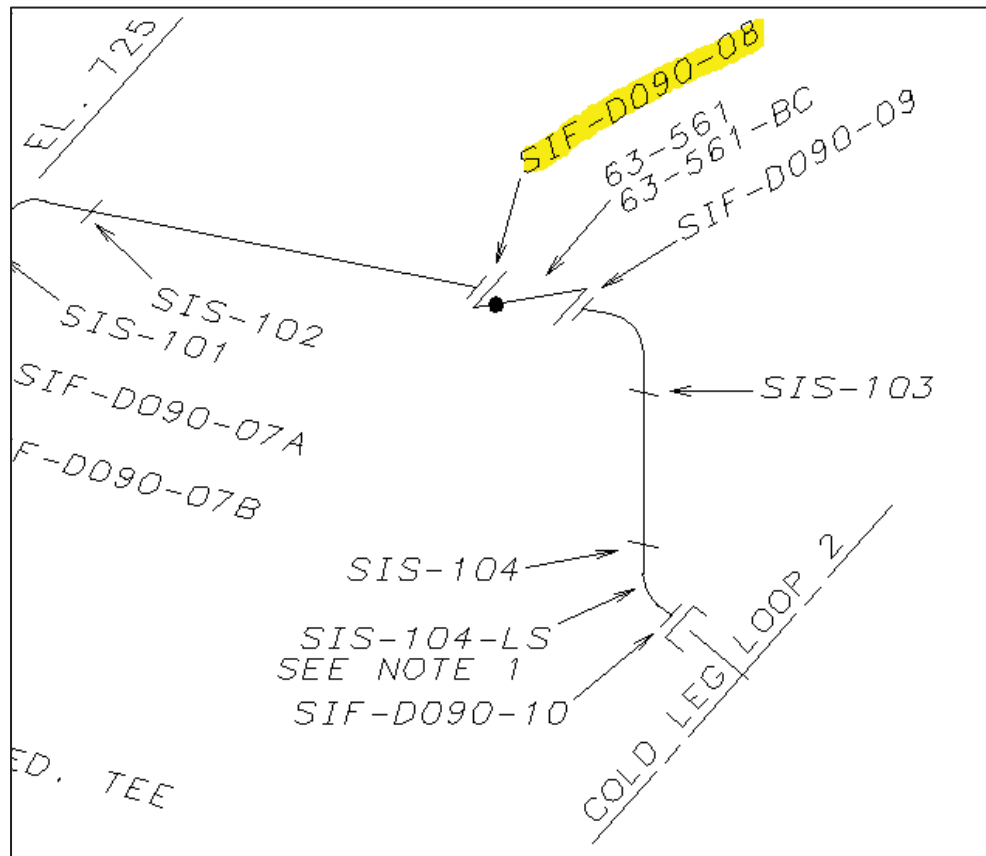


TABLE 1 – WBN UNIT 1 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
1.1 SIF-D090-08 U1R15	1 R-A R1.16/ R1.11	10" Pipe to Valve Weld  Schedule 140 T <sup>NOM</sup> = 1.0"	Pipe: SA-376 TP 316	Weld: Stainless Steel	Valve: SA-182 F316 Forged Body	75.0%	Valve Configuration No Recordable Indications	Table 1.1-1  Figures 1.1-1 through 1.1-2
1.2 SIF-D092-10 U1R15	1 R-A R1.16/ R1.11	10" Pipe to Valve Weld  Schedule 140 T <sup>NOM</sup> = 1.0"	Pipe: SA-376 TP 316	Weld: Stainless Steel	Valve: SA-182 F316 Forged Body	75.0%	Valve Configuration No Recordable Indications	Table 1.2-1  Figures 1.2-1 through 1.2-2
1.3 SIS-075 U1R15	2 R-A R1.20	6" Elbow to Pipe Weld  Schedule 160 T <sup>NOM</sup> = 0.719"	Pipe: SA-376 TP 316	Weld: Stainless Steel	Elbow: SA-403 WP 316S	87.5%	Welded Nameplate on Pipe Side No Recordable Indications	Table 1.3-1  Figures 1.3-1 through 1.3-2
1.4 SIF-D091-04 U1R15  (PSI)	1 R-A R1.20	6" Valve to Elbow Weld  Schedule 160 T <sup>NOM</sup> = 0.719"	Elbow: SA-403 WP 316	Weld: Stainless Steel	Valve: SA-182 F316 Forged Body	75%	Valve Configuration No Recordable Indications	Table 1.4-1  Figures 1.4-1 through 1.4-2
1.5 SIF-D087-21 U1R15  (PSI)	1 R-A R1.20	6" Pipe to Valve Weld  Schedule 160 T <sup>NOM</sup> = 0.719"	Pipe: SA-376 TP 316	Weld: Stainless Steel	Valve: SA-182 F316 Forged Body	75%	Valve Configuration No Recordable Indications	Table 1.5-1  Figures 1.5-1 through 1.5-2



1.1 Weld **SIF-D090-08** – 10" Pipe to Valve WeldFigure 1.1-1 Weld **SIF-D090-08** (Extracted from Reference Drawing CHM-2758-C-08)

This weld was UT examined in the first inspection period of the third interval, during the U1R15 refueling outage in 2018 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No's: R1.11 and R1.16, "Welds Subject to Thermal Fatigue" and "Welds Subject to Intergranular or Transgranular Stress Corrosion Cracking (IGSCC or TGSCC)" degradation mechanisms. The NDE data can be found on UT Report No. R-026. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F with an additional RI-ISI requirement to increase the volume to include ½ inch beyond the base metal thickness transition or counterbore. The UT examination was limited from the valve side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 1.1-1 and combined with Figure 1.1-2.

A review of the plant's corrective action program did not note any failures at this weld. No prior examinations had been performed; therefore, no previous examination data was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.



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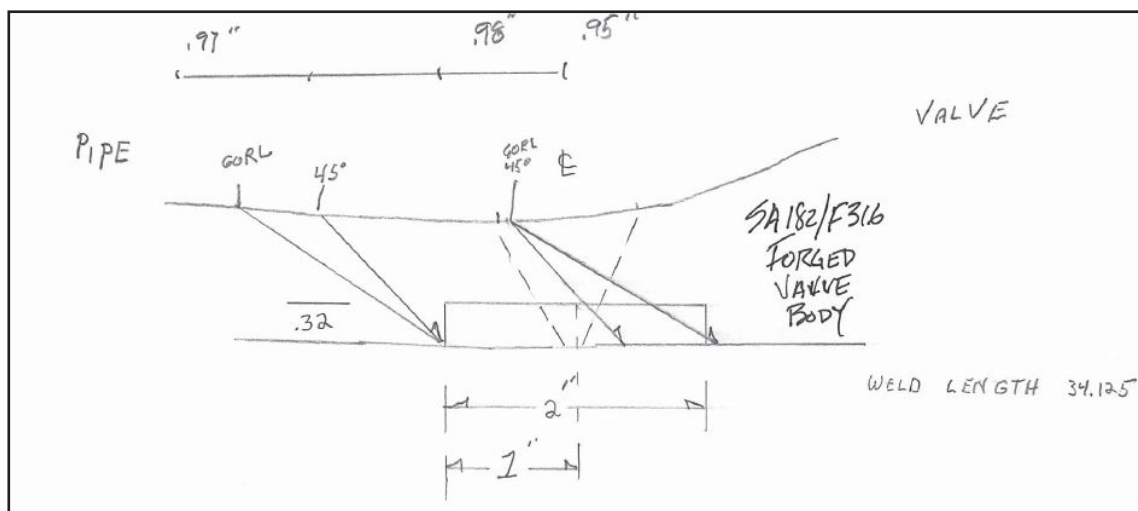


Figure 1.1-2 Weld SIF-D090-08, Weld Profile Axial Scan

Table 1.1-1 Weld SIF-D090-08 Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	100.00%
Downstream Side	0%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
 $300.00\% \div 4 \text{ SCANS} = 75.00\%$  or  
 TOTAL COVERAGE % = 75%

Notes: Wave Modes Used = 45° Shear and 60° Refracted Longitudinal.

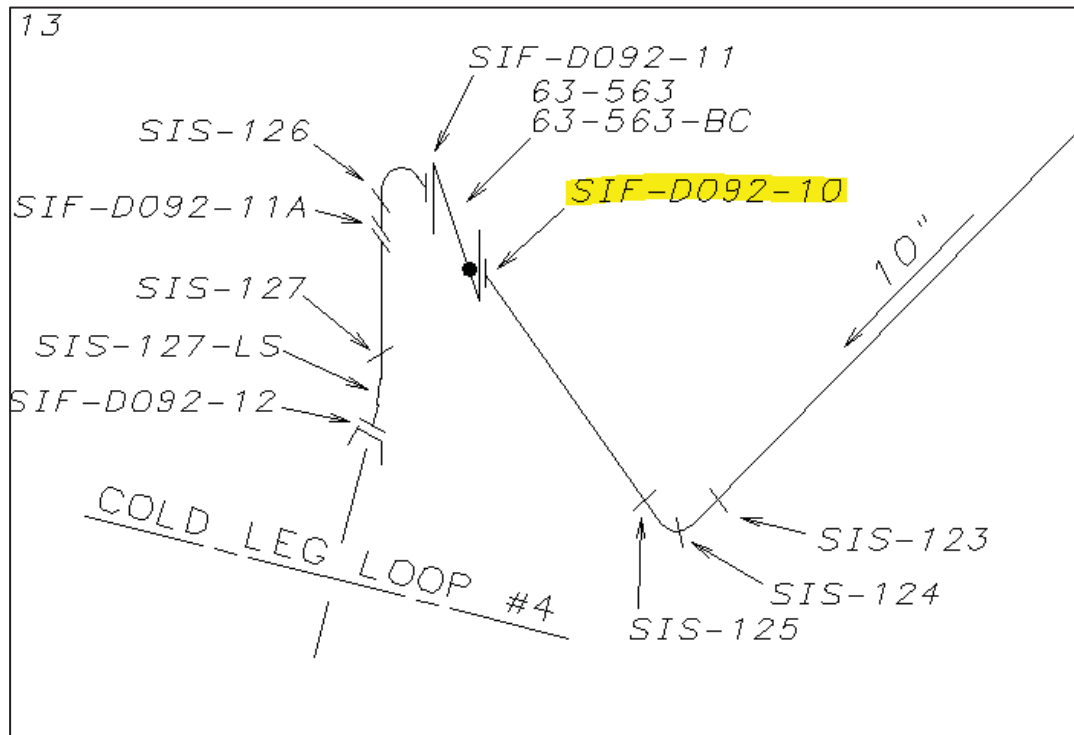
1.2 Weld **SIF-D092-10** – 10" Pipe to Valve Weld

Figure 1.2-1 Weld SIF-D092-10 (Extracted from Reference Drawing CHM-2758-C-10)

This weld was UT examined in the first inspection period of the third interval, during the U1R15 refueling outage in 2018 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No's: R1.11 and R1.16, "Welds Subject to Thermal Fatigue" and "Welds Subject to Intergranular or Transgranular Stress Corrosion Cracking (IGSCC or TGSCC)" degradation mechanisms. The NDE data can be found on UT Report No. R-029. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F with an additional RI-ISI requirement to increase the volume to include  $\frac{1}{2}$  in. beyond the base metal thickness transition or counterbore. The UT examination was limited from the valve side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 1.2-1 and combined with Figure 1.2-2.

A review of the plant's corrective action program did not note any failures at this weld. No prior examinations had been performed; therefore, no previous examination data was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

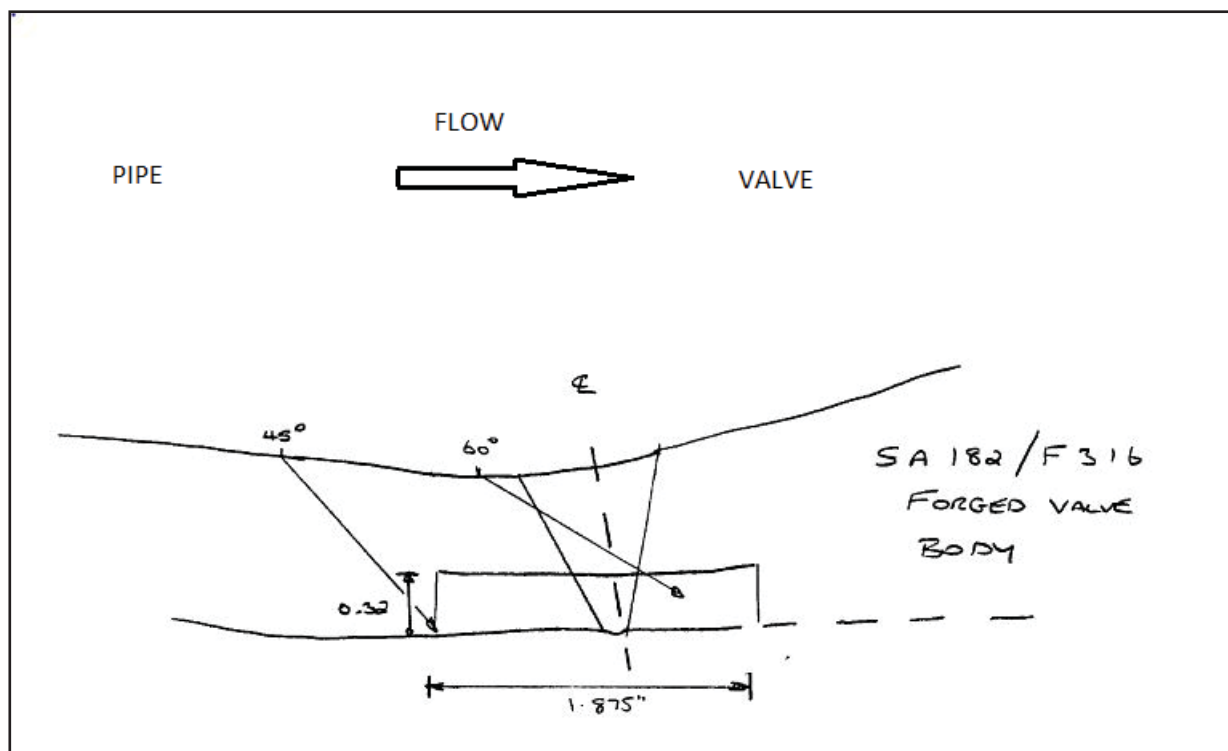


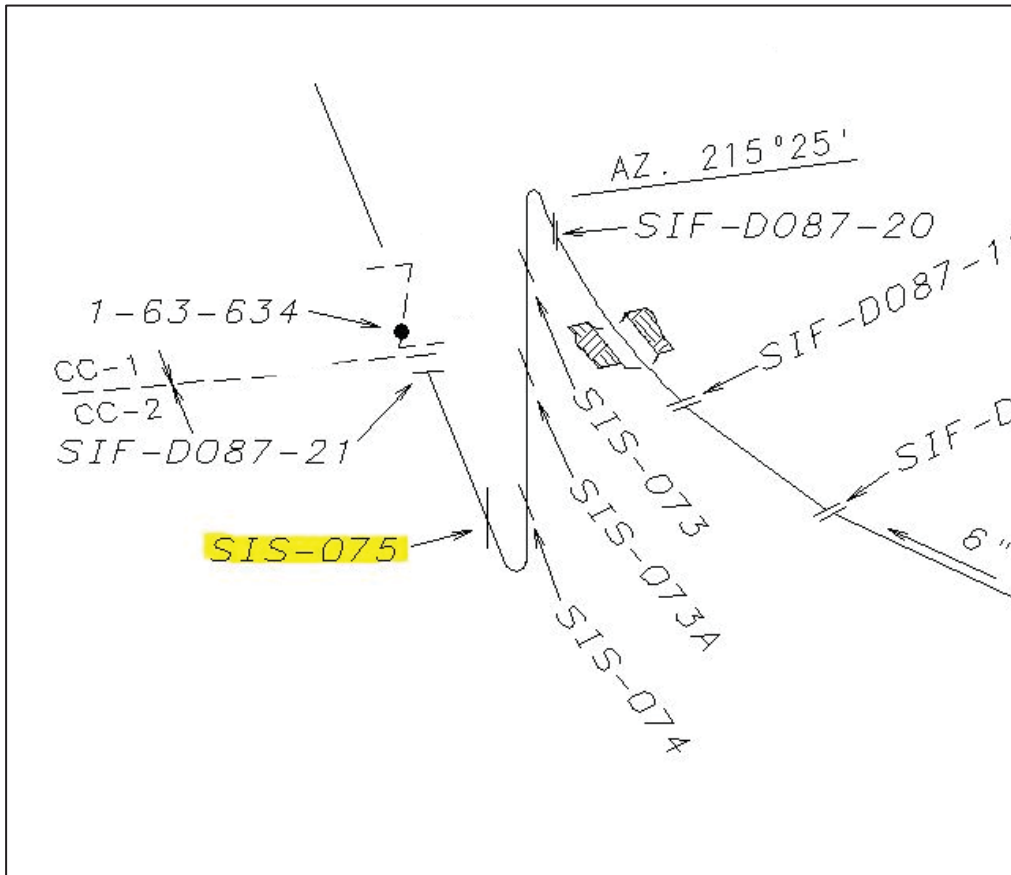
Figure 1.2-2 Weld SIF-D092-10, Weld Profile Axial Scan

Table 1.2-1 Weld SIF-D092-10 Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	100.00%
Downstream Side	0%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
 $300.00\% \div 4 \text{ SCANS} = 75.00\%$  or  
 TOTAL COVERAGE % = 75%

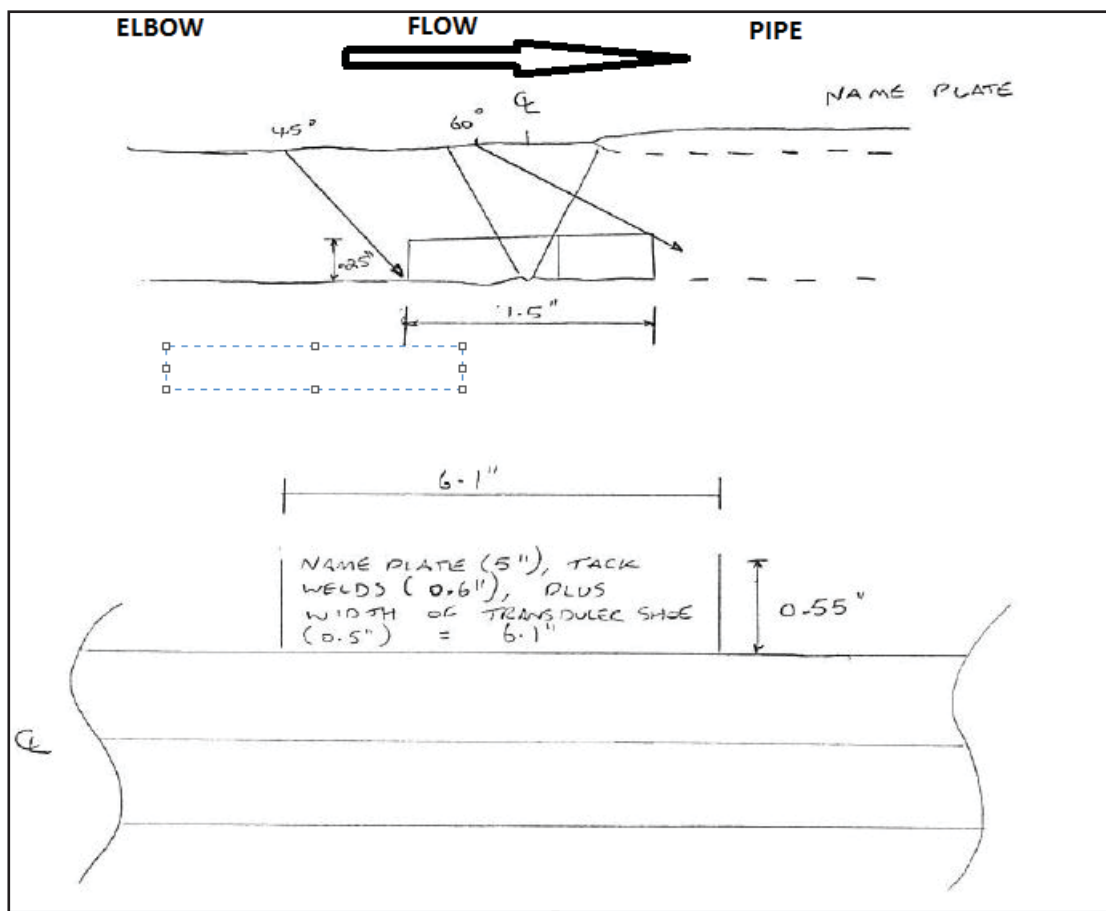
Notes: Wave Modes Used = 45° Shear and 60° Refracted Longitudinal.

1.3 Weld **SIS-075** – 6" Elbow to Pipe WeldFigure 1.3-1 Weld **SIS-075** (Extracted from Reference Drawing CHM-2758-C-05)

This weld was UT examined in the first inspection period of the third interval, during the U1R15 refueling outage in 2018 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No. R1.20 "Welds Not Subject to a Degradation Mechanism". The NDE data can be found on UT Report No. R-028. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F. The UT examination was limited from the pipe side of the weld due to a welded name plate, resulting in total UT coverage of 87.5 percent as described in Table 1.3-1 and combined with Figure 1.3-2.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from U1R09, UT R1682 report was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

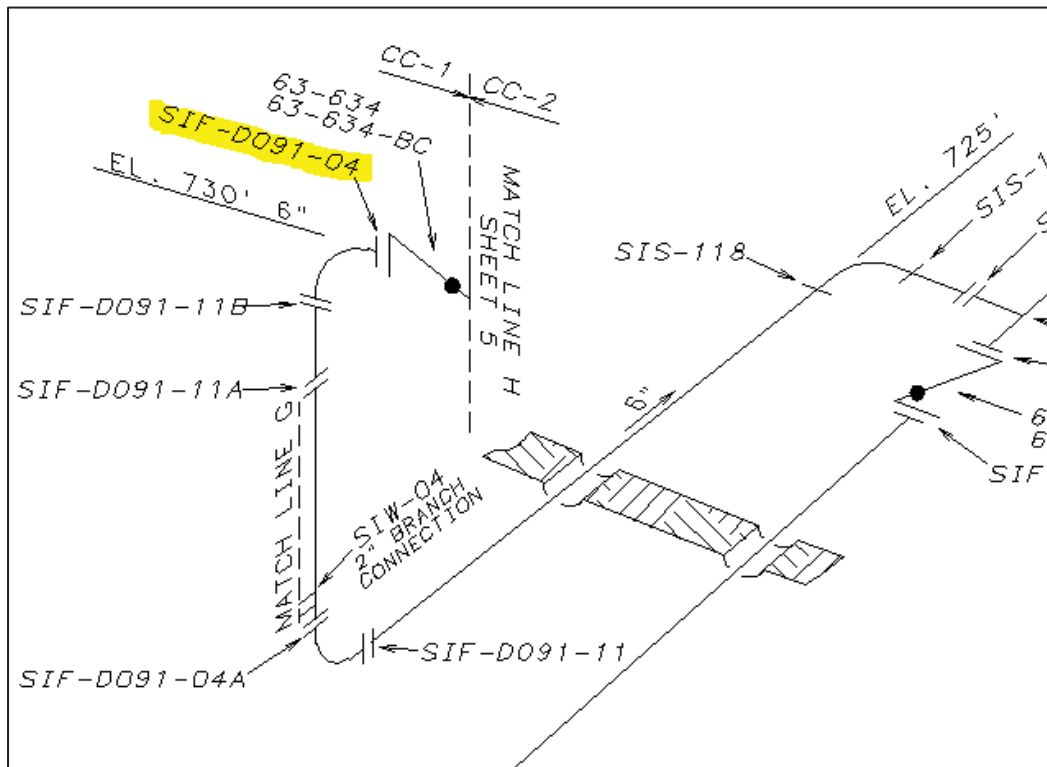
Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Figure 1.3-2 Weld **SIS-075**, Weld Profile Axial ScanTable 1.3-1 Weld **SIS-075** Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	100.00%
Downstream Side	71.1%
Circ CW	89.4%
Circ CCW	89.4%

CUMULATIVE % COVERAGE =  
 $349.9\% \div 4 \text{ SCANS} = 87.475\%$  or  
 TOTAL COVERAGE % = 87.5%

Notes: Wave Modes Used = 45° and 60° Shear and 60° Refracted Longitudinal.

1.4 Weld **SIF-D091-04** – 6" Valve to ElbowFigure 1.4-1 Weld **SIF-D091-04** (Extracted from Reference Drawing CHM-2758-C-09)

This weld was UT examined in the first inspection period of the third interval, during the U1R15 refueling outage in 2018 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No. R1.20 "Welds Not Subject to a Degradation Mechanism". The NDE data can be found on UT Report No. 087. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F. The UT examination was limited from the valve side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 1.4-1 and combined with Figure 1.4-2.

A review of the plant's corrective action program did not note any failures at this weld. No prior examinations had been performed; therefore, no previous examination data was reviewed for the UT examination per TVA procedures. No recordable indications were noted. Weld SIF-D091-04 was examined as a result of a Repair Replacement Activity in accordance with the Pre-service Examination Requirements of ASME Code Case N-716-1. As such, alternative weld selections were not possible.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

# Enclosure 3

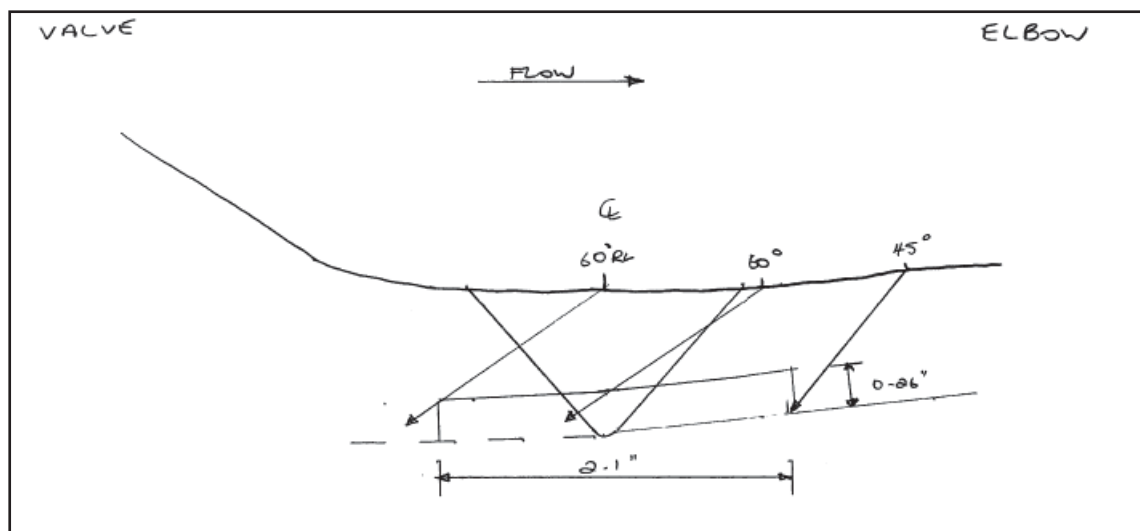


Figure 1.4-2 Weld SIF-D091-04, Weld Profile Axial Scan

Table 1.4-1 Weld SIF-D091-04 Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	0%
Downstream Side	100.00%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
 $300.00\% \div 4 \text{ SCANS} = 75.00\%$  or  
 TOTAL COVERAGE % = 75%

Notes: Wave Modes Used = 45° and 60° Shear and 60° Refracted Longitudinal.

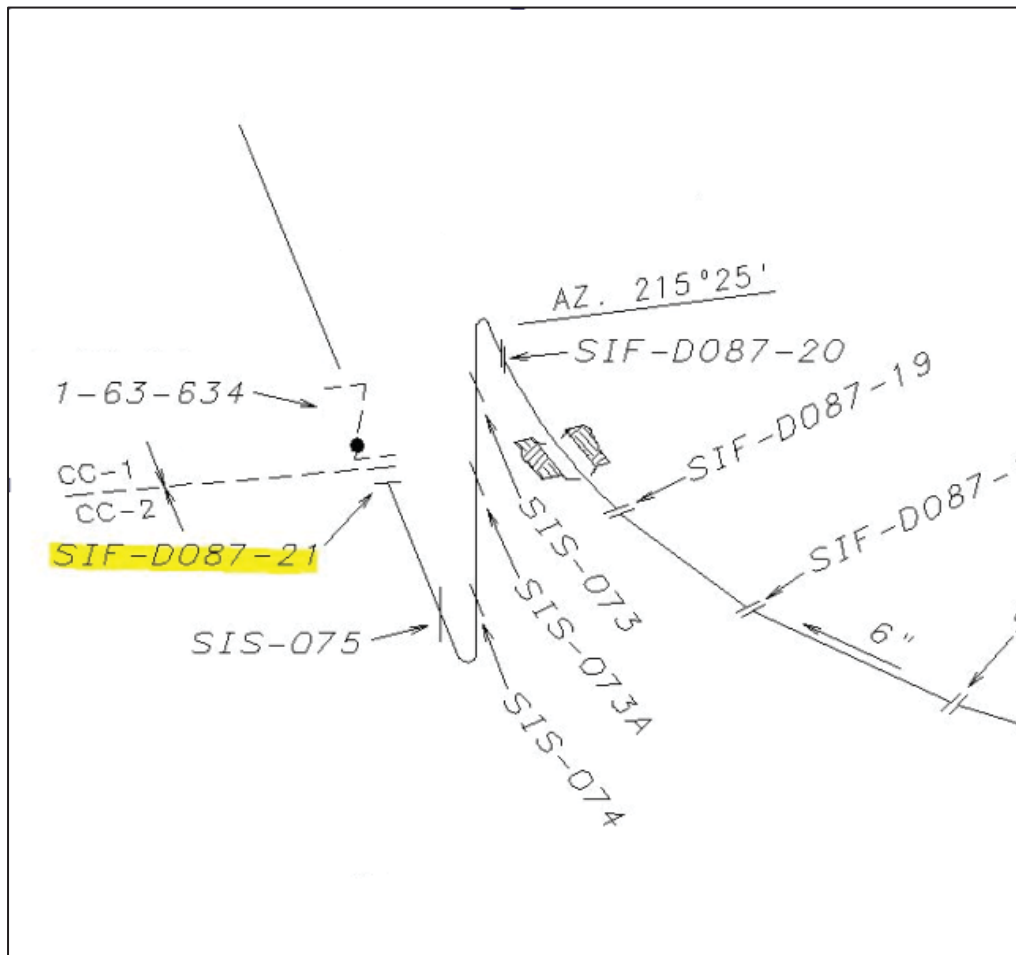
1.5 Weld **SIF-D087-21** – 6" Pipe to Valve

Figure 1.5-1 Weld **SIF-D087-21** (Extracted from Reference Drawing CHM-2758-C-05)

This weld was UT examined in the first inspection period of the third interval, during the U1R15 refueling outage in 2018 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No. R1.20 "Welds Not Subject to a Degradation Mechanism". The NDE data can be found on UT Report No. R-088. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F. The UT examination was limited from the valve side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 1.5-1 and combined with Figure 1.5-2.

A review of the plant's corrective action program did not note any failures at this weld. No prior examinations had been performed; therefore, no previous examination data was reviewed for the UT examination per TVA procedures. No recordable indications were noted. Weld SIF-D087-21 was examined as a result of a Repair Replacement Activity in accordance with the Pre-service Examination Requirements of ASME Code Case N-716-1. As such, alternative weld selections were not possible.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.



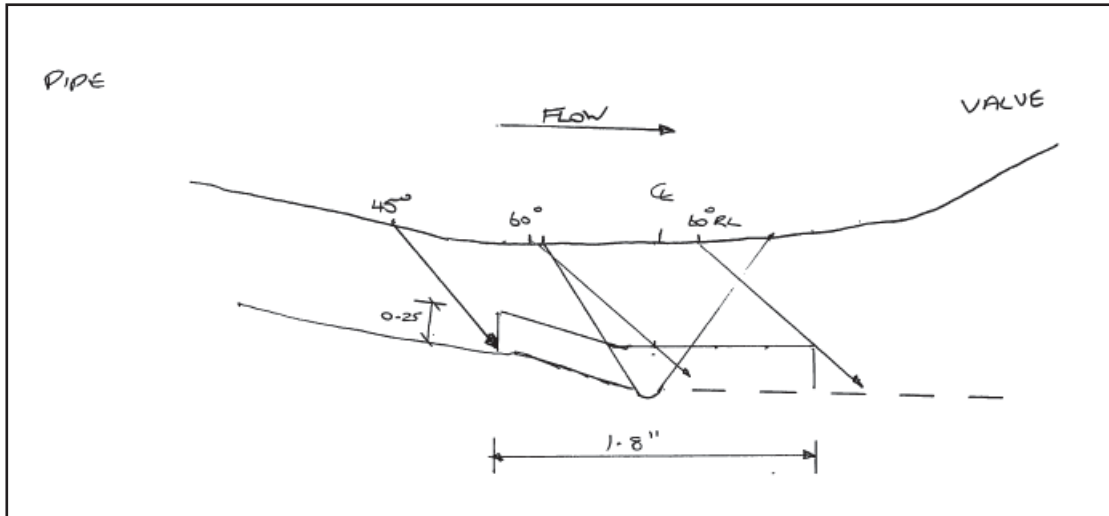


Figure 1.5-2 Weld **SIF-D087-21**, Weld Profile Axial Scan

Table 1.5-1 Weld **SIF-D087-21** Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	100.00%
Downstream Side	0%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
 $300.00\% \div 4 \text{ SCANS} = 75.00\%$  or  
 TOTAL COVERAGE % = 75%

Notes: Wave Modes Used = 45° and 60° Shear and 60° Refracted Longitudinal.

TABLE 2 – WBN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
2.1 WP-11 U2R2	1 B-D B3.110	4" Pressurizer Spray Nozzle to Head Weld Head T <sup>NOM</sup> ~ 1.9" Cladding T <sup>NOM</sup> ~ 0.190"	Nozzle: SA-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: SA-533 Gr. A Class 2 Alloy Steel	63.8%	Geometric Nozzle Design Configuration No Recordable Indications	Table 2.1-1 Figures 2.1-1 through 2.1-6
2.2 WP-12 U2R2	1 B-D B3.110	6" Pressurizer Relief Nozzle to Head Weld Head T <sup>NOM</sup> ~ 1.9" Cladding T <sup>NOM</sup> ~ 0.190"	Nozzle: SA-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: SA-533 Gr. A Class 2 Alloy Steel	63.7%	Geometric Nozzle Design Configuration No Recordable Indications	Table 2.2-1 Figures 2.2-1 through 2.2-6
2.3 SG-2-3-2 U2R2	2 C-A C1.30	Steam Generator Shell to Tube Sheet Weld Shell T <sup>NOM</sup> = 3.31"	Shell: SA-533 Gr. A Class 2 Alloy Steel	Weld: Carbon Steel	Tube Sheet: SA-508 Class 2 Alloy Steel Forging	88.8%	Obstructions from Sludge Lance Ports, Bottom Blowdowns and Shell Drains No Recordable Indications	Table 2.3-1 Figures 2.3-1 through 2.3-5
2.4 SGMS-2 U2R2	2 C-B C2.21	32" Main Steam Nozzle to Head Weld Head T <sup>NOM</sup> = 3.82"	Nozzle: SA-508 Class 2 Alloy Steel Forging	Weld: Carbon Steel	Head: SA-533 Gr. A Class 2 Alloy Steel	75.0%	Geometric Nozzle Design Configuration No Recordable Indications	Table 2.4-1 Figures 2.4-1 through 2.4-3
2.5 SIF-B-T095-01 U2R2	1 R-A R1.11	1.5" Pipe to Nozzle Weld Schedule 160 T <sup>NOM</sup> = 0.281"	Pipe: SA-376 TP 304	Weld: Stainless Steel	Nozzle: SA-182 F-304	75.0%	Geometric Nozzle Design Configuration No Recordable Indications	Table 2.5-1 Figures 2.5-1 through 2.5-2

TABLE 2 – WBN UNIT 2 WELDS WITH LIMITED EXAMINATIONS								
Seq. Number Weld Identification Cycle	Class Category Item No.	Weld Description	Material 1 Product Form	Material 2 Weld	Material 3 Product Form	Code Coverage Obtained <sup>2</sup>	Examination Limitations and Results	Applicable Tables and Figures
2.6 RCF-D144-07 U2R2	1 R-A R1.11	3" Valve to Pipe Weld  Schedule 160 $T^{NOM} = 0.438"$	Valve: SA-182 F316	Weld: Stainless Steel	Pipe: SA-376 TP 304	75.0%	Valve Configuration No Recordable Indications	Table 2.6-1 Figures 2.6-1 through 2.6-2
2.7 RCF-D144-03 U2R2	1 R-A R1.11	3" Valve to Pipe Weld  Schedule 160 $T^{NOM} = 0.438"$	Valve: SA-182 F316	Weld: Stainless Steel	Pipe: SA-376 TP 304	75.0%	Valve Configuration No Recordable Indications	Table 2.7-1 Figures 2.7-1 through 2.7-2

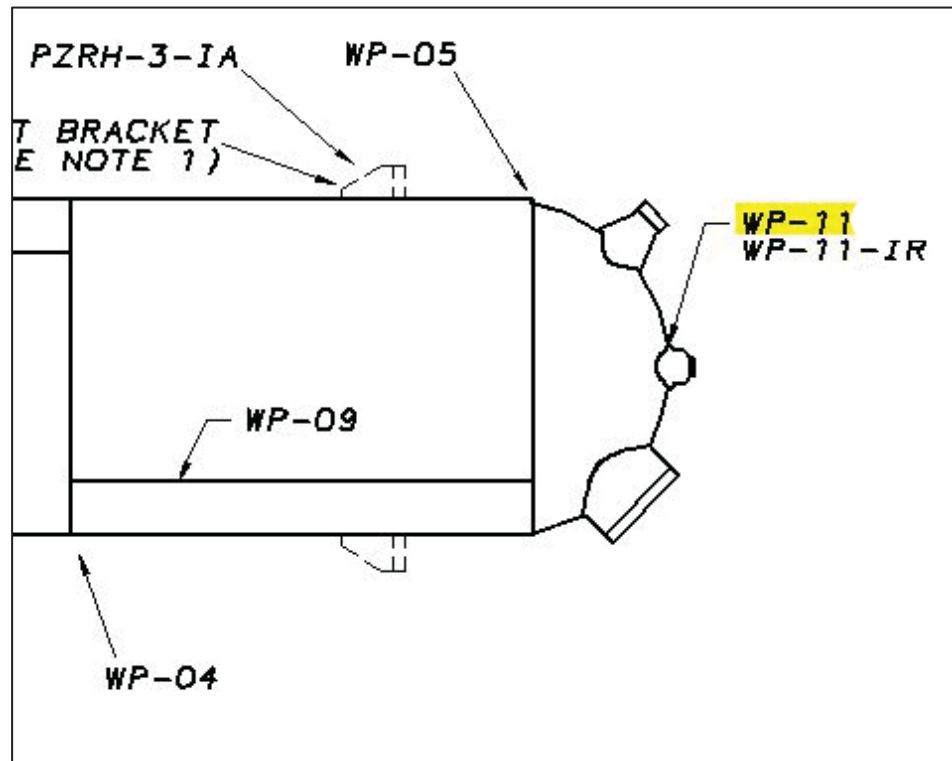
2.1 Weld **WP-11** – 4" Pressurizer Spray Nozzle to Head Weld

Figure 2.1-1 Weld WP-11 (Extracted from Reference Drawing ISI-2068C-E-01)

This weld was UT examined in the first inspection period of the first interval during the U2R2 refueling outage in 2019. The NDE data can be found on UT Report No. R-108. The ASME Code required volume was determined based on Section XI, Figure IWB-2500-7(b), exam Volume A-B-C-D-E-F-G-H. The UT examination was limited from the nozzle side of the weld due to the geometric configuration resulting in total UT coverage of 63.8 percent as described in Table 2.1-1 and combined with Figures 2.1-2 thru 2.1.6.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from pre-service, UT report P1283 was reviewed. No recordable indications were noted. This review did not note any laminations on the head that could interfere with the angle beam examinations performed on this weld.

Section XI Mandatory Appendix I, I-2120 that implements Article 4 of Section V as supplemented by Table I-2000-1 was used for this ultrasonic examination.

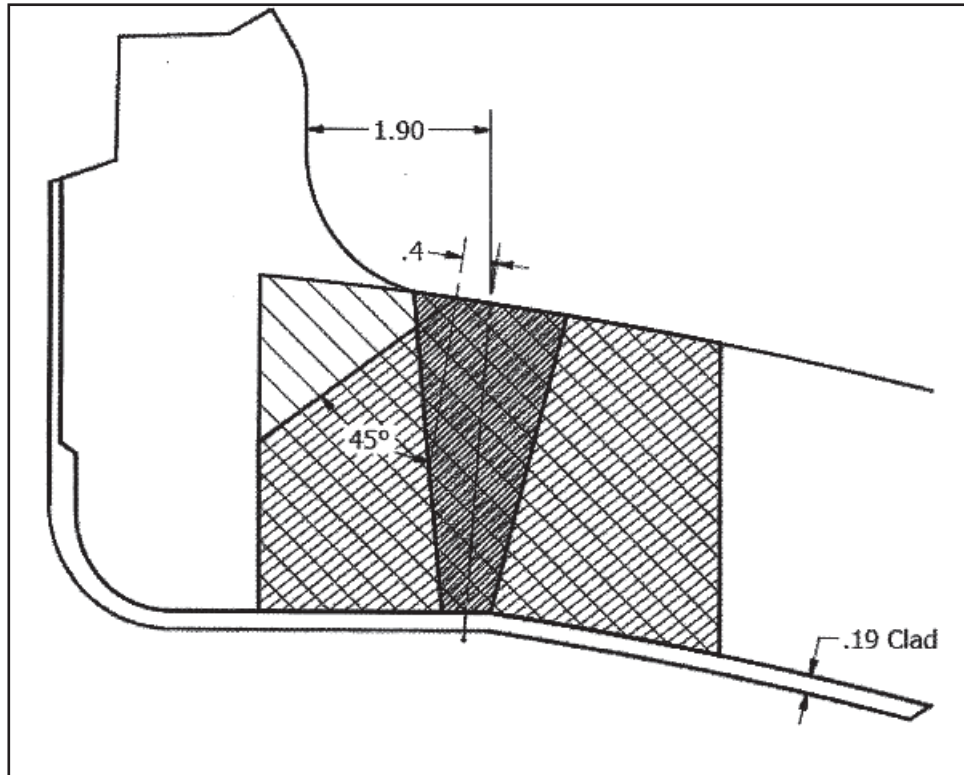


Figure 2.1-2 Weld WP-11, 45° Head Side Axial Scans

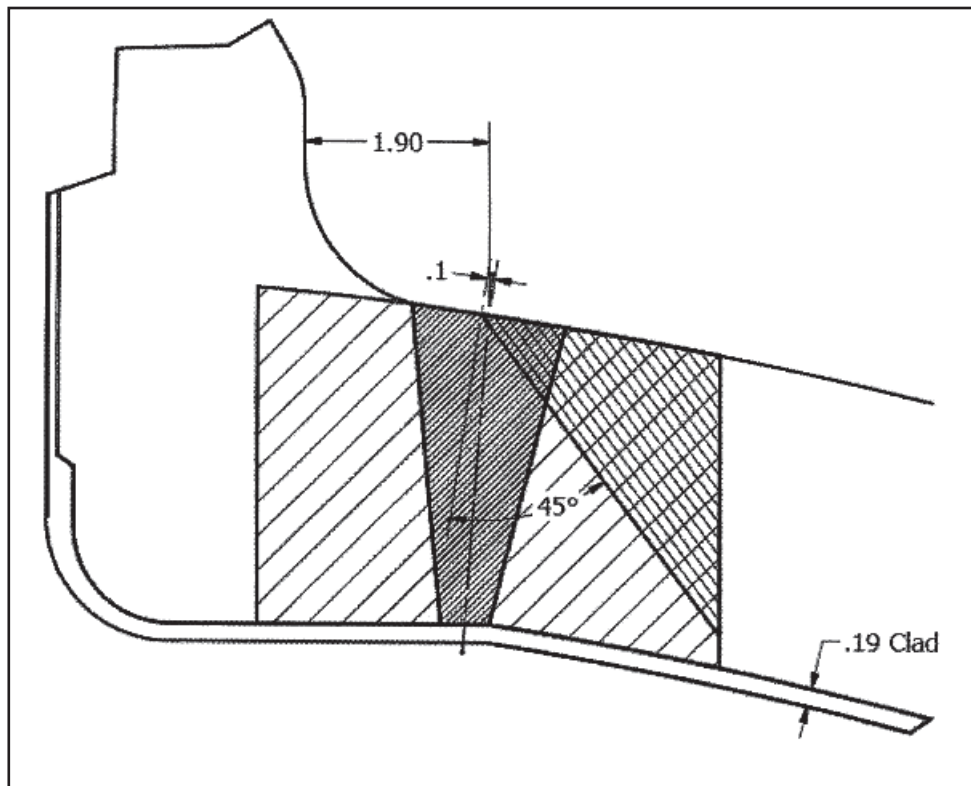


Figure 2.1-3 Weld WP-11, 45° Nozzle Side Axial Scans

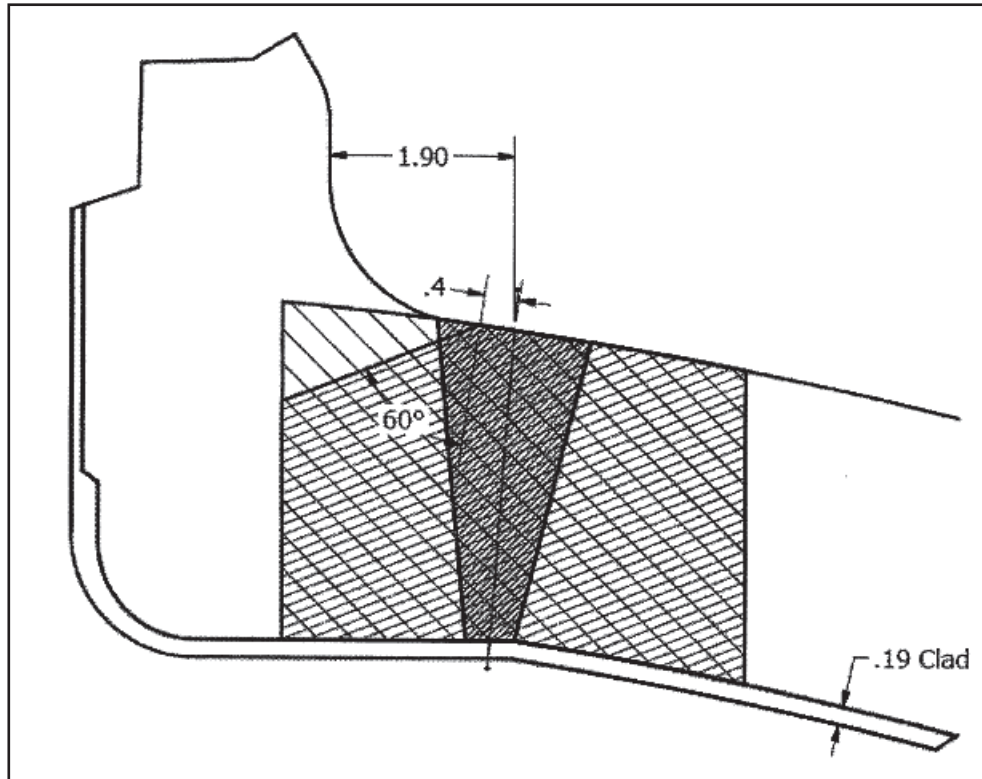


Figure 2.1-4 Weld WP-11, 60° Head Side Axial Scans

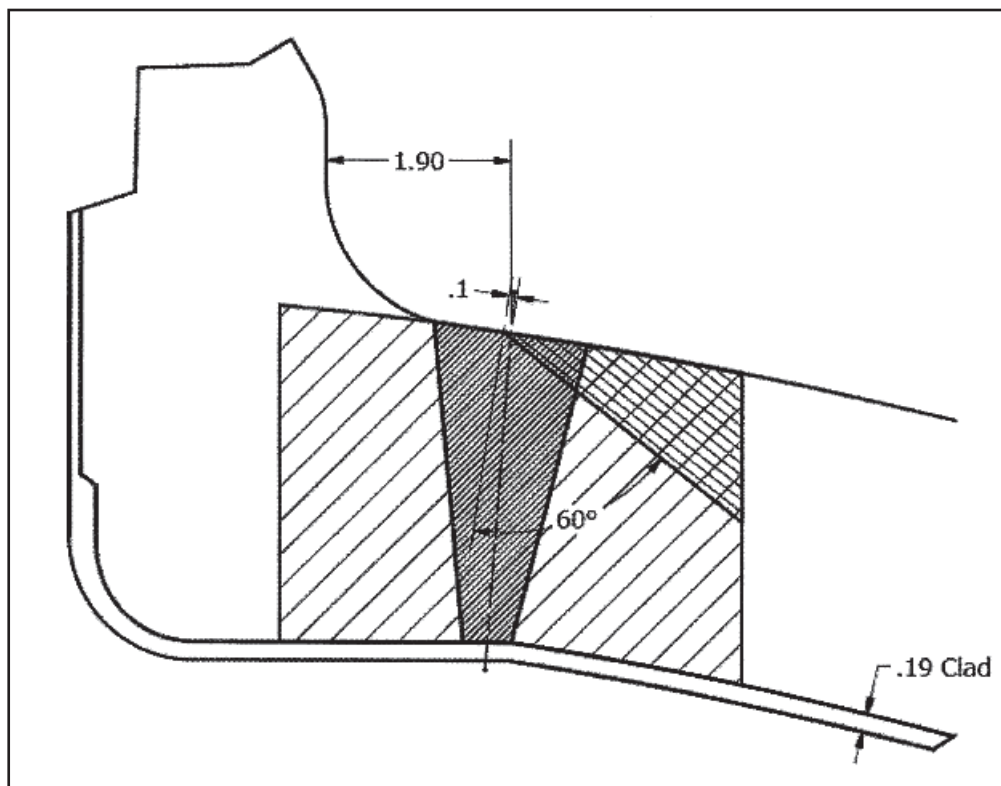


Figure 2.1-5 Weld WP-11, 60° Nozzle Side Axial Scans

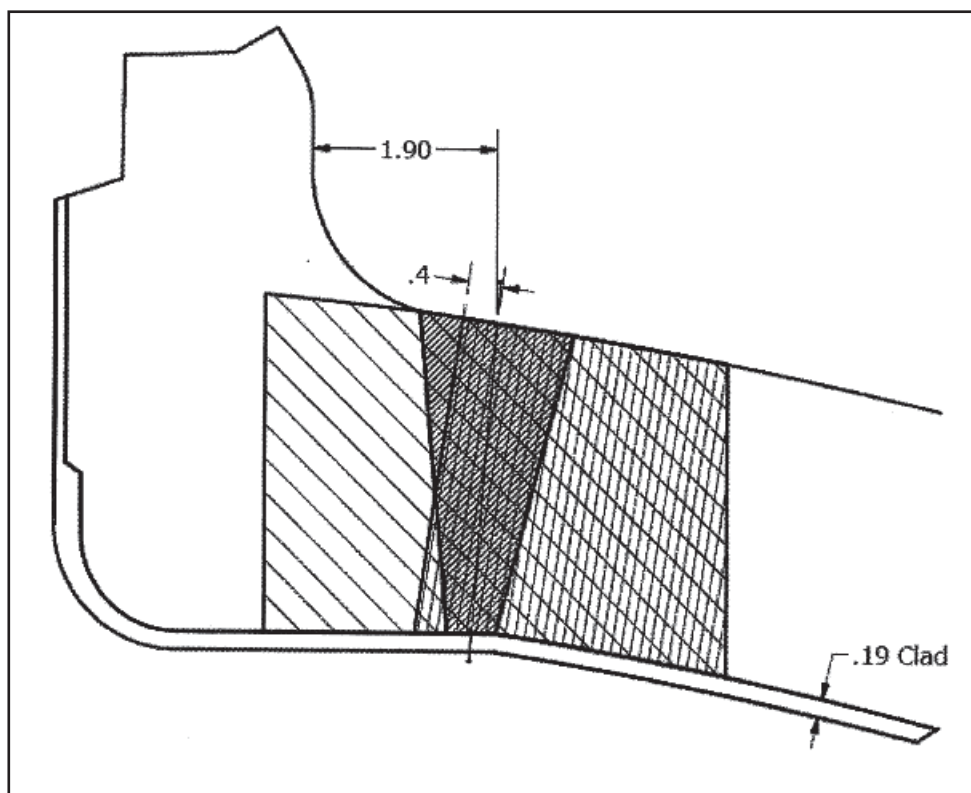


Figure 2.1-6 Weld WP-11, 45° &amp; 60° CW-CCW Scans

Table 2.1-1 Weld WP-11 Scan Coverage and Scan Summary

Scan	Full Volume (in <sup>3</sup> )	Actual (in <sup>3</sup> )
60 ° Axial From Head	628.59	596.97
45 ° Axial From Head	628.59	575.95
60 ° Axial From Nozzle	628.59	96.45
45 ° Axial From Nozzle	628.59	180.60
60 ° Circ CW	628.59	439.99
45 ° Circ CCW	628.59	439.99
60 ° Circ CW	628.59	439.99
45 ° Circ CCW	628.59	439.99
TOTALS	5028.72	3209.93

TOTAL COVERAGE= 63.83%

Notes: Wave Modes Used = 45° Shear and 60° Shear.

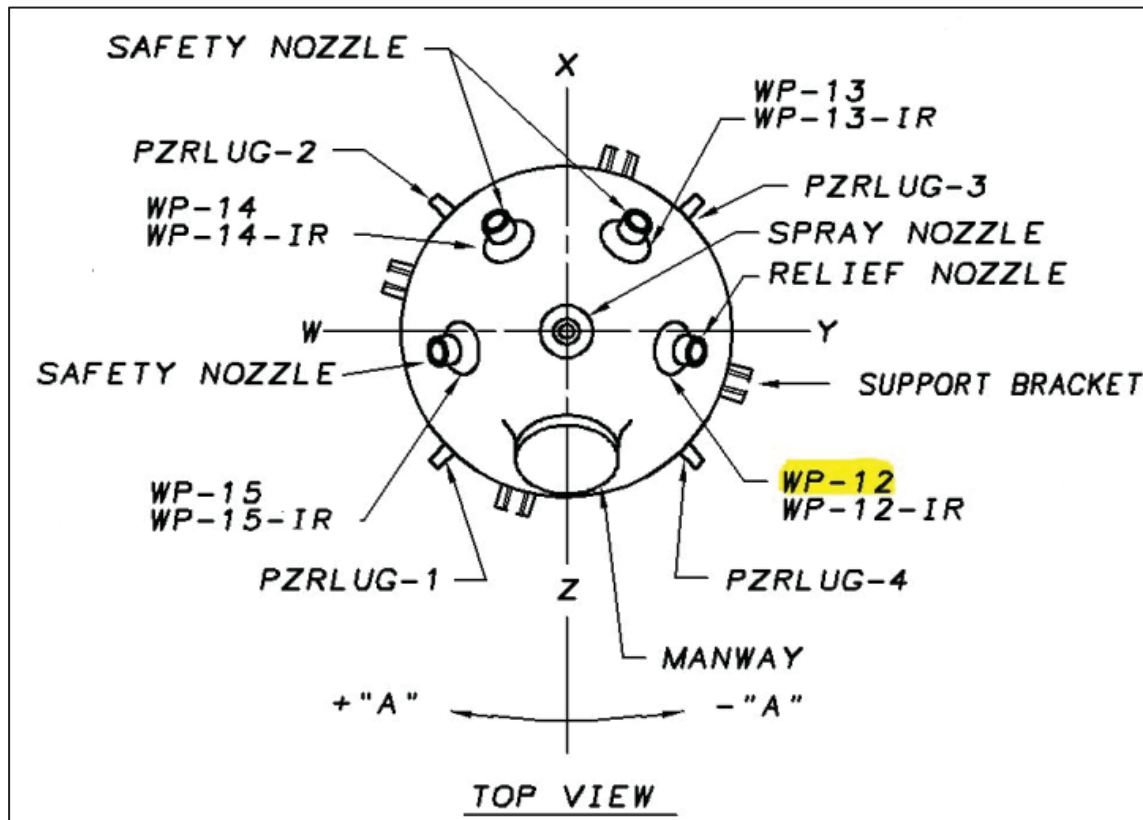
2.2 Weld **WP-12** – 6" Pressurizer Relief Nozzle to Head Weld

Figure 2.2-1 Weld WP-12 (Extracted from Reference Drawing ISI-2068C-E-01)

This weld was UT examined in the first inspection period of the first interval during the U2R2 refueling outage in 2019. The NDE data can be found on UT Report No. R-093. The ASME Code required volume was determined based on Section XI, Figure IWB-2500-7(b), exam Volume A-B-C-D-E-F-G-H. The UT examination was limited from the nozzle side of the weld due to the geometric configuration resulting in total UT coverage of 63.7 percent as described in Table 2.2-1 and combined with Figures 2.2-2 thru 2.2-6.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from pre-service, UT report P1282 was reviewed. No recordable indications were noted. This review did not note any laminations on the head that could interfere with the angle beam examinations performed on this weld.

Section XI Mandatory Appendix I, I-2120 that implements Article 4 of Section V as supplemented by Table I-2000-1 was used for this ultrasonic examination.



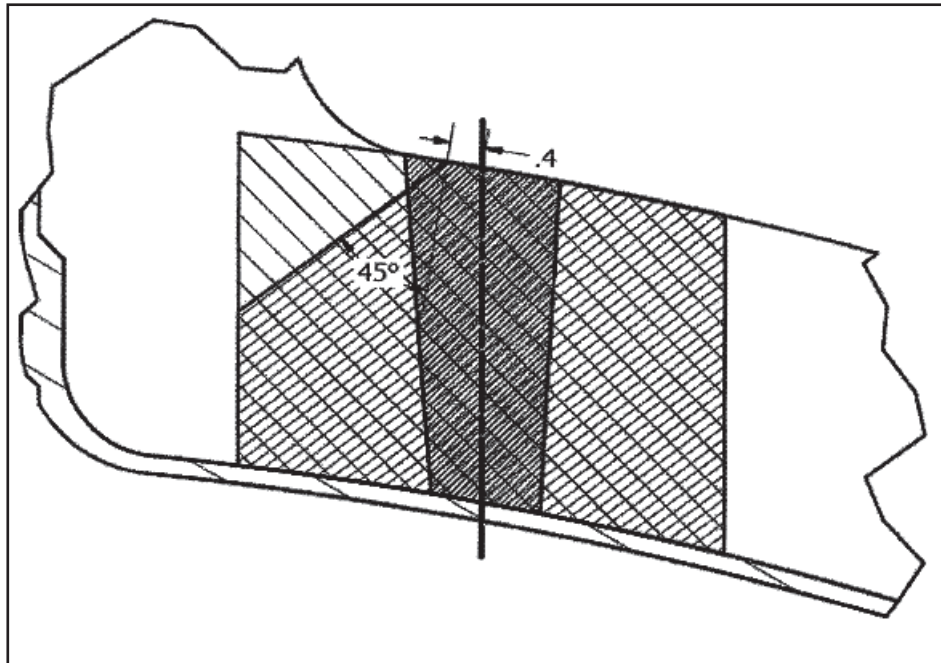


Figure 2.2-2 Weld WP-12, 45° Head Side Axial Scans

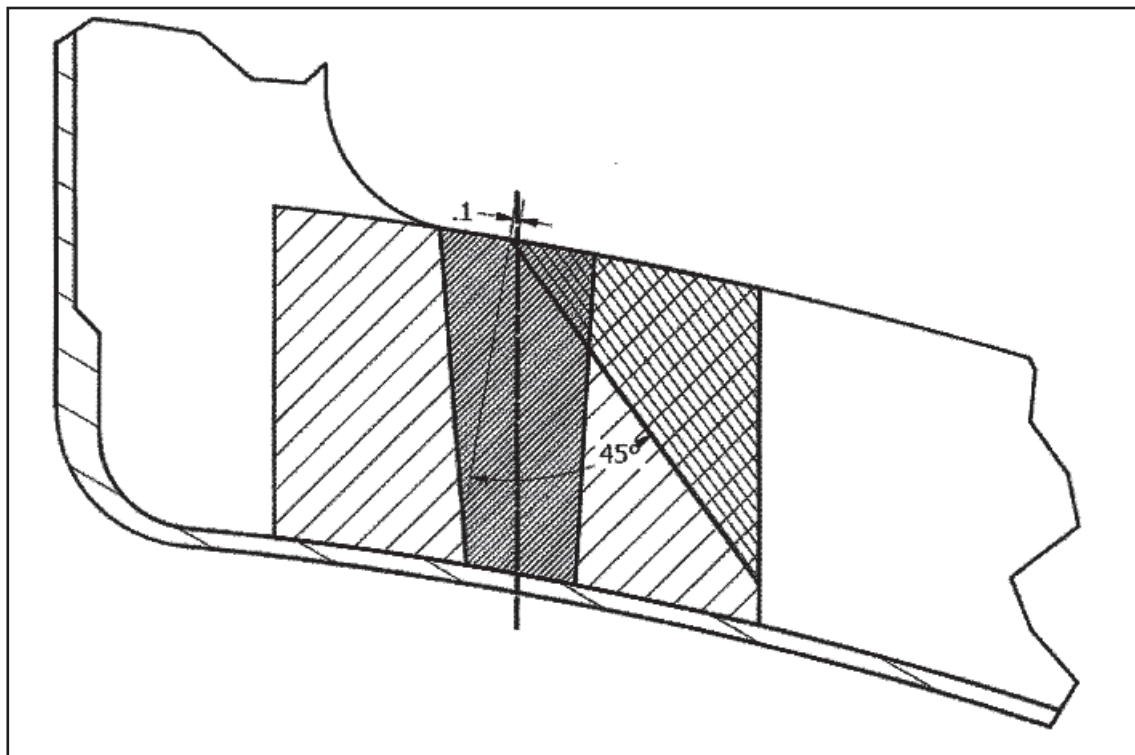


Figure 2.2-3 Weld WP-12, 45° Nozzle Side Axial Scans

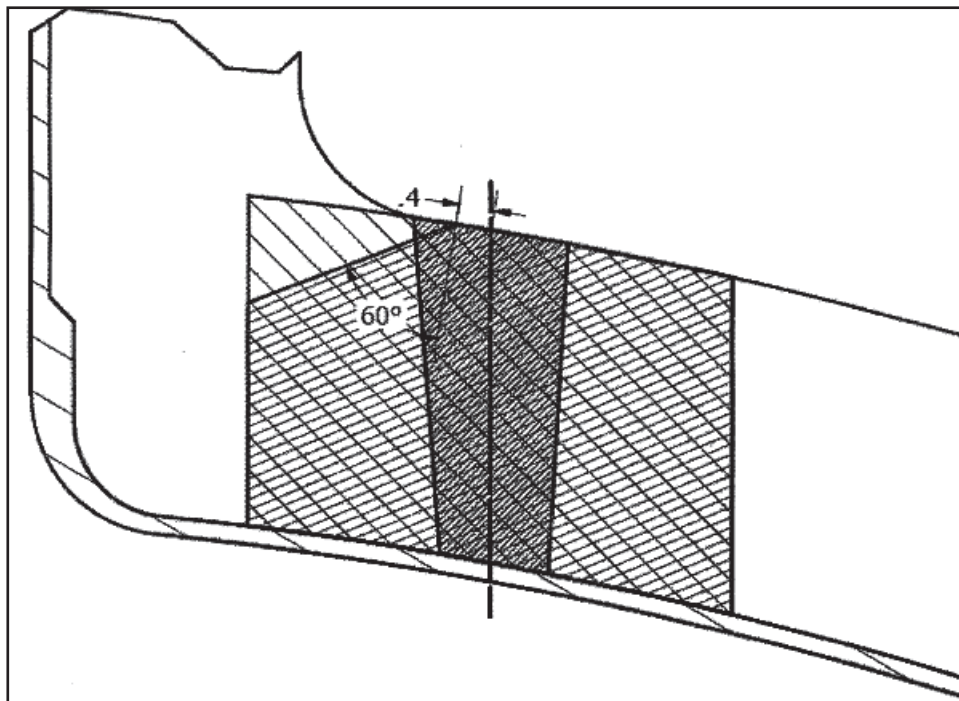


Figure 2.2-4 Weld WP-12, 60° Head Side Axial Scans

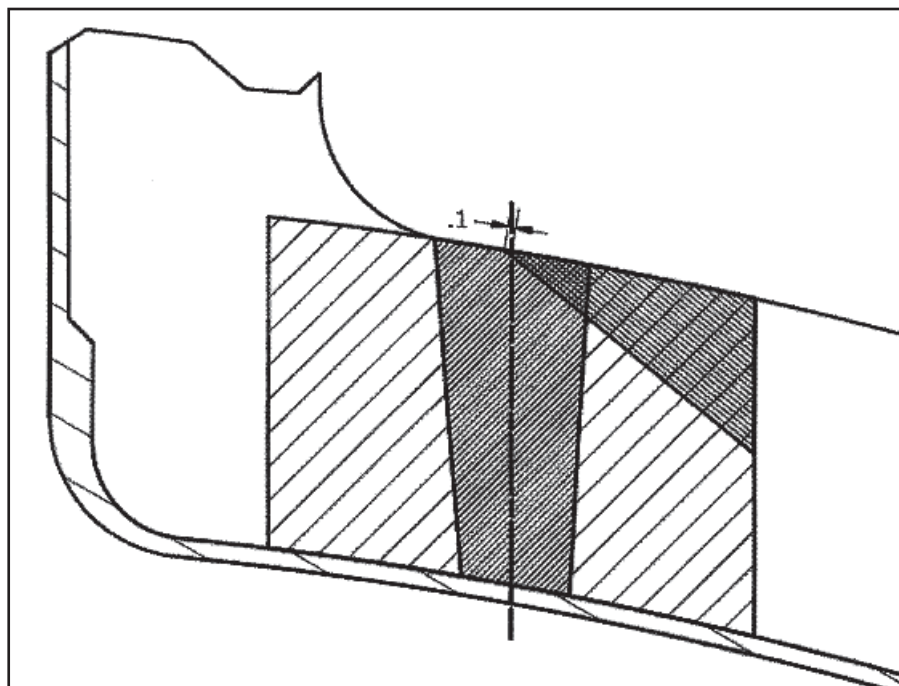


Figure 2.2-5 Weld WP-12, 60° Nozzle Side Axial Scans

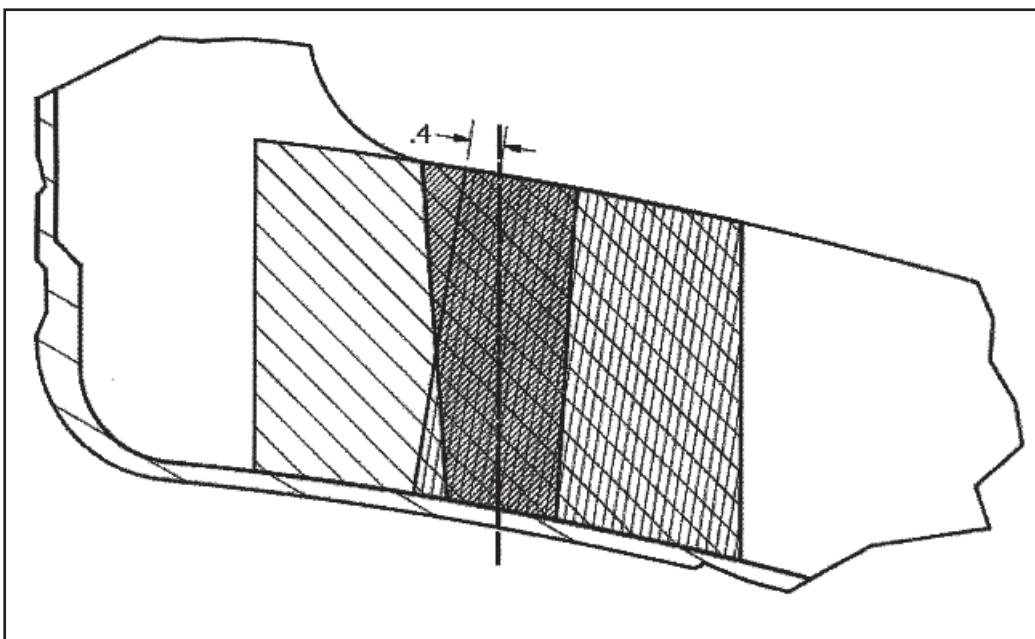


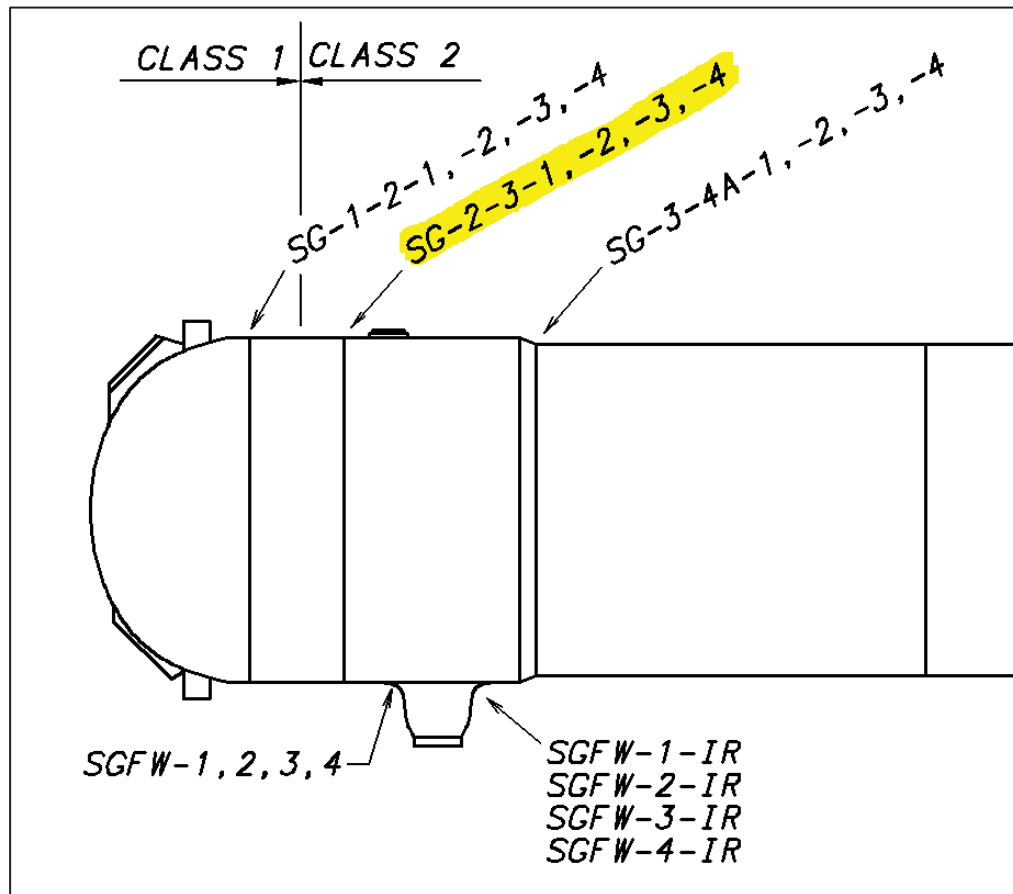
Figure 2.2-6 Weld WP-12, 45° &amp; 60° CW-CCW Scans

Table 2.2-1 Weld WP-11 Scan Coverage and Scan Summary

Scan	Full Volume (in <sup>3</sup> )	Actual (in <sup>3</sup> )
60 ° Axial From Head	824.11	780.38
45 ° Axial From Head	824.11	752.01
60 ° Axial From Nozzle	824.11	122.24
45 ° Axial From Nozzle	824.11	232.32
60 ° Circ CW	824.11	578.31
45 ° Circ CW	824.11	578.31
60 ° Circ CCW	824.11	578.31
45 ° Circ CCW	824.11	578.31
TOTALS	6592.88	4200.19

TOTAL COVERAGE= 63.71%

Notes: Wave Modes Used = 45° Shear and 60° Shear.

2.3 Weld **SG-2-3-2** – Steam Generator Shell to Tube Sheet WeldFigure 2.3-1 Weld **SG-2-3-2** (Extracted from Reference Drawing ISI-2001-E-01)

This weld was UT examined in the first inspection period of the first interval during the U2R2 refueling outage in 2019. The NDE data can be found on UT Report No. R-079. The ASME Code required volume was determined based on Section XI, Figure IWC-2500-2, exam volume E-F-G-H. The UT examination was limited due to obstructions associated with the sludge lance ports, bottom blowdowns, and shell drains resulting in total UT coverage of 88.8 percent as described in Table 2.3-1 and combined with Figures 2.3-2 thru 2.3-5.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from pre-service, UT report P2455 was reviewed. No recordable indications were noted. This review did not note any laminations on the head that could interfere with the angle beam examinations performed on this weld.

Section XI Mandatory Appendix I, I-2120 that implements Article 4 of Section V as supplemented by Table I-2000-1 was used for this ultrasonic examination.

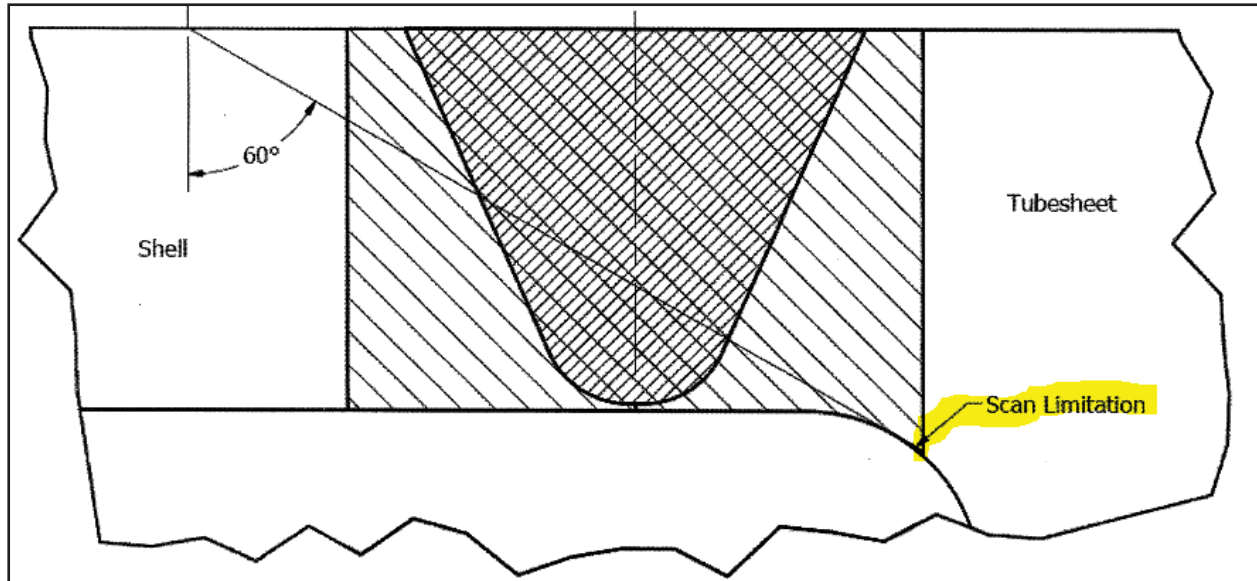


Figure 2.3-2 Weld **SG-2-3-2** – 60° Scan Limitation (1.0 in<sup>3</sup>)

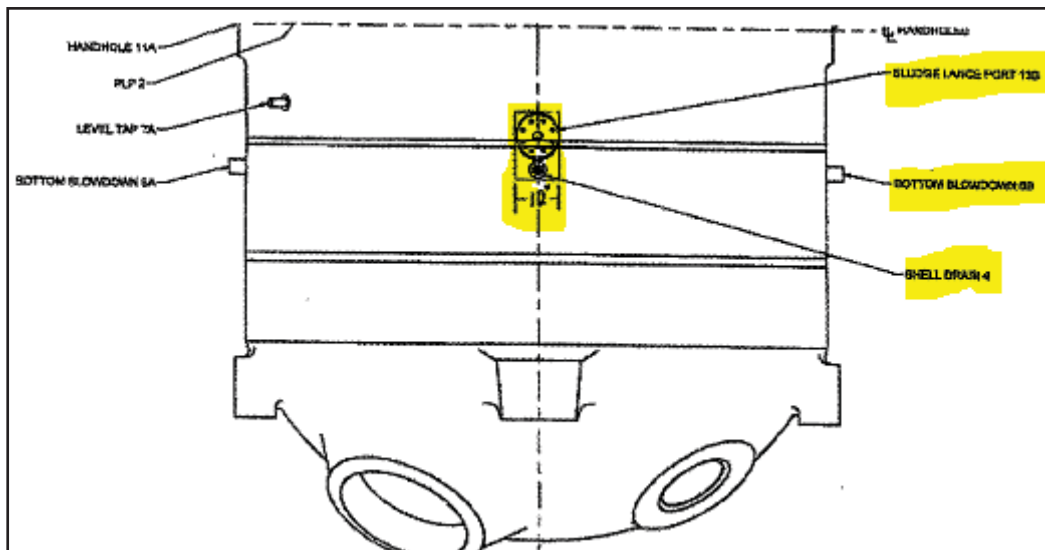


Figure 2.3-3 Weld **SG-2-3-2** – Sludge Lance Port, Bottom Blowdown, Shell Drain Limitations

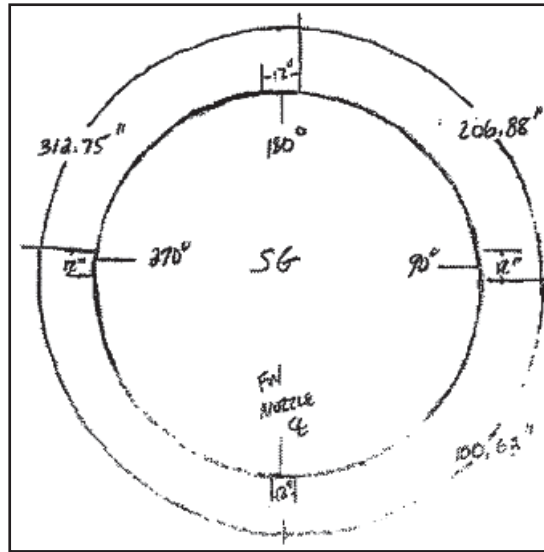


Figure 2.3-4 Weld **SG-2-3-2** – Sludge Lance Port, Bottom Blowdown, Shell Drain Limitations (Plan View)

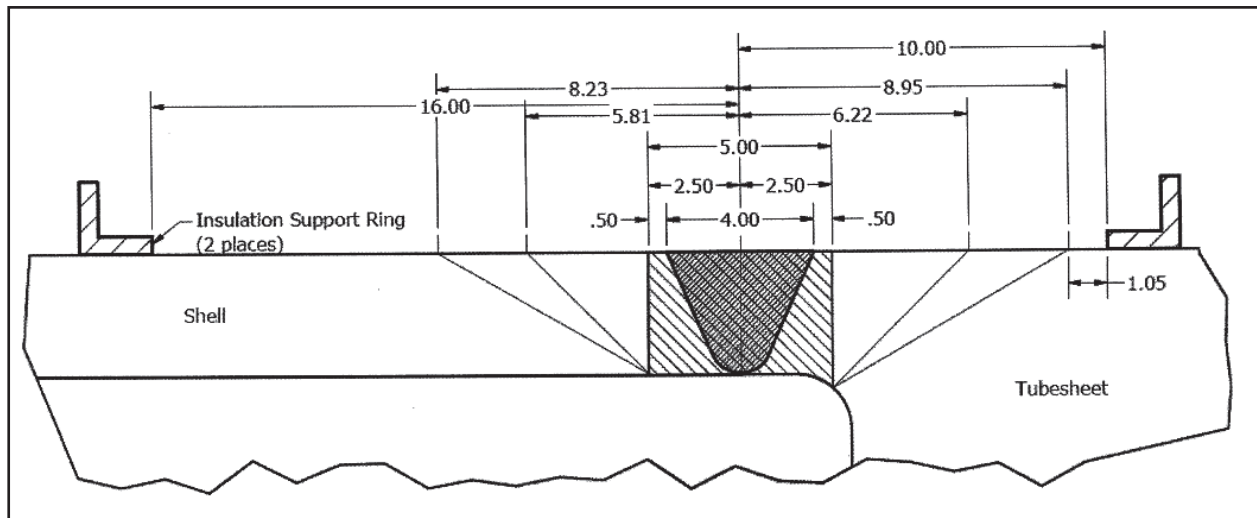


Figure 2.3-5 Weld **SG-2-3-2**, 45° & 60° Axial and Circ Scans

### Enclosure 3

Table 2.3-1 **SG-2-3-2**, Scan Coverage and Scan Summary

Scan	Full Volume (in <sup>3</sup> )	Actual (in <sup>3</sup> )
45 ° Axial From Tubesheet	7011.81	6224.41
45 ° Axial From Shell	7011.81	6224.41
60 ° Axial From Tubesheet	7011.81	6224.41
60° Axial From Shell	7011.81	6223.35
60 ° Circ CW	7011.81	6224.41
60 ° Circ CCW	7011.81	6224.41
45 ° Circ CW	7011.81	6224.41
45 ° Circ CCW	7011.81	6224.41
TOTALS	56094.48	49794.22

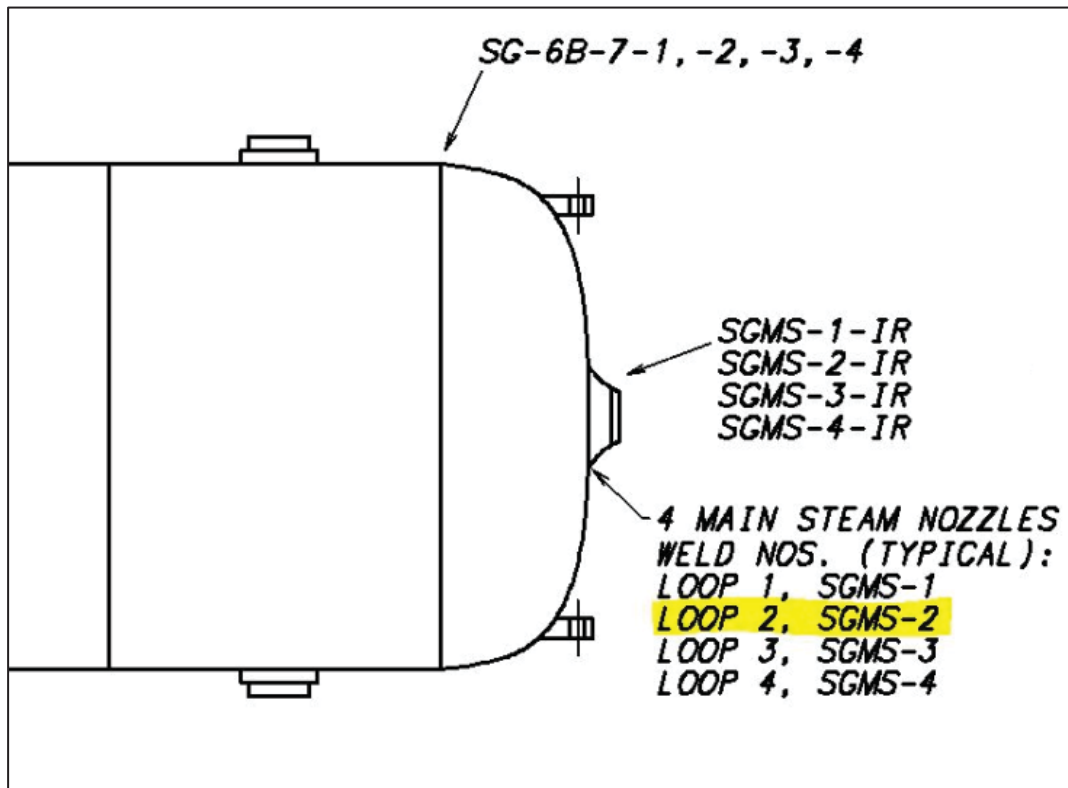
TOTAL COVERAGE= 88.8%

NOTES:

- 1) 48" Nozzle Obstruction (12" 4 places) all scans 787.40 in <sup>3</sup>
- 2) 60° Limitation Shell Side – 1.01 in <sup>3</sup>

Notes: Wave Modes Used = 45° Shear and 60° Shear.



2.4 Weld **SGMS-2** – 32" Main Steam Nozzle to Head WeldFigure 2.4-1 Weld **SGMS-2** (Extracted from Reference Drawing ISI-2001-E-01)

This weld was UT examined in the first inspection period of the first interval during the U2R2 refueling outage in 2019. The NDE data can be found on UT Report No. R-121. The ASME Code required volume was determined based on Section XI, Figure IWC-2500-4(a), exam Volume C-D-E-F. The UT examination was limited from the nozzle side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 2.4-1 and combined with Figures 2.4-2 thru 2.4-3. No scans from the nozzle side were credited for Code coverage based on the nozzle taper. However, 45 and 60 degree scans were performed on the nozzle side that resulted in less than optimum ID impingement angles. A supplemental 70 degree shear wave achieved an optimum impingement angle, but only a limited portion of the Code volume could be scanned due to access limitations.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from pre-service, UT report P-2453 was reviewed. No recordable indications were noted. This review did not note any laminations on the head that could interfere with the angle beam examinations performed on this weld.

Section XI Mandatory Appendix I, I-2120 that implements Article 4 of Section V as supplemented by Table I-2000-1 was used for this ultrasonic examination.



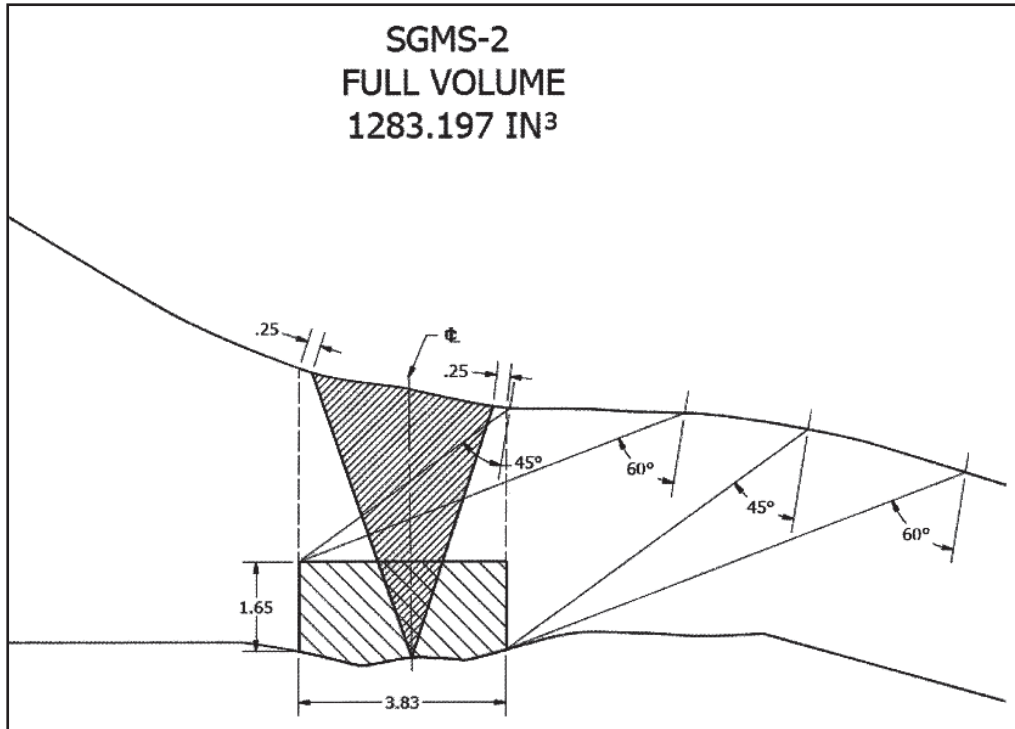


Figure 2.4-2 Weld **SGMS-2**, 45° & 60° Shell Side Axial Scans

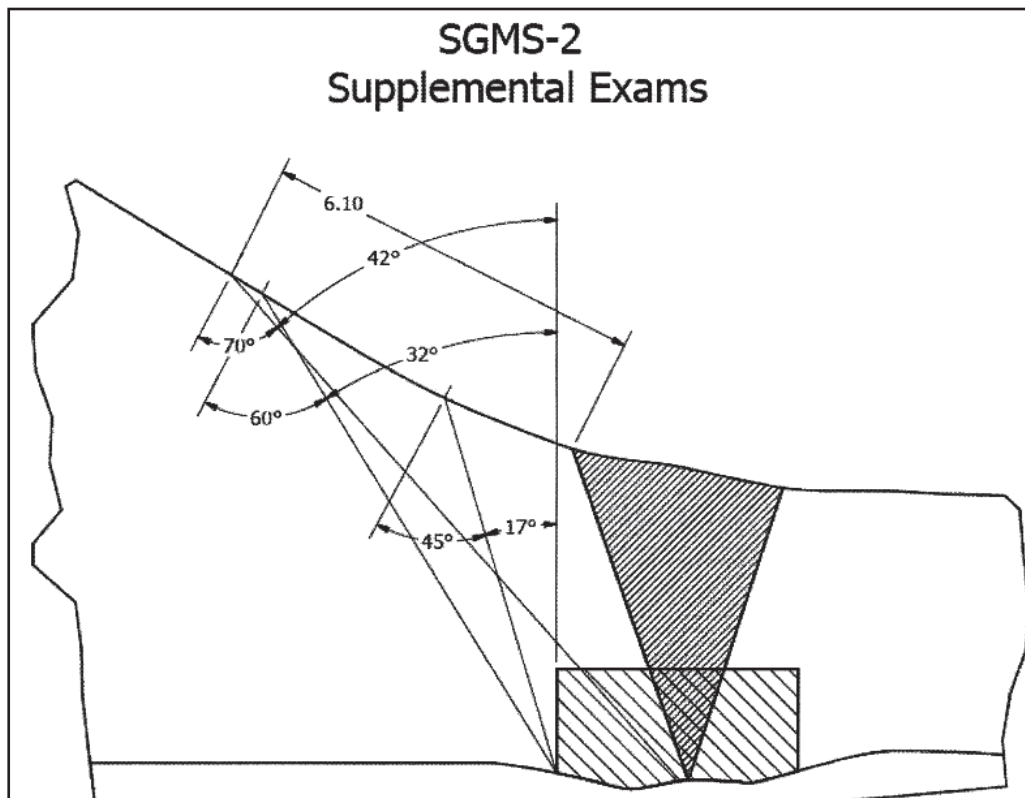


Figure 2.4-3 Weld **SGMS-2**, 45°, 60°, and 70° Nozzle Side Axial Scans – Supplemental Exams

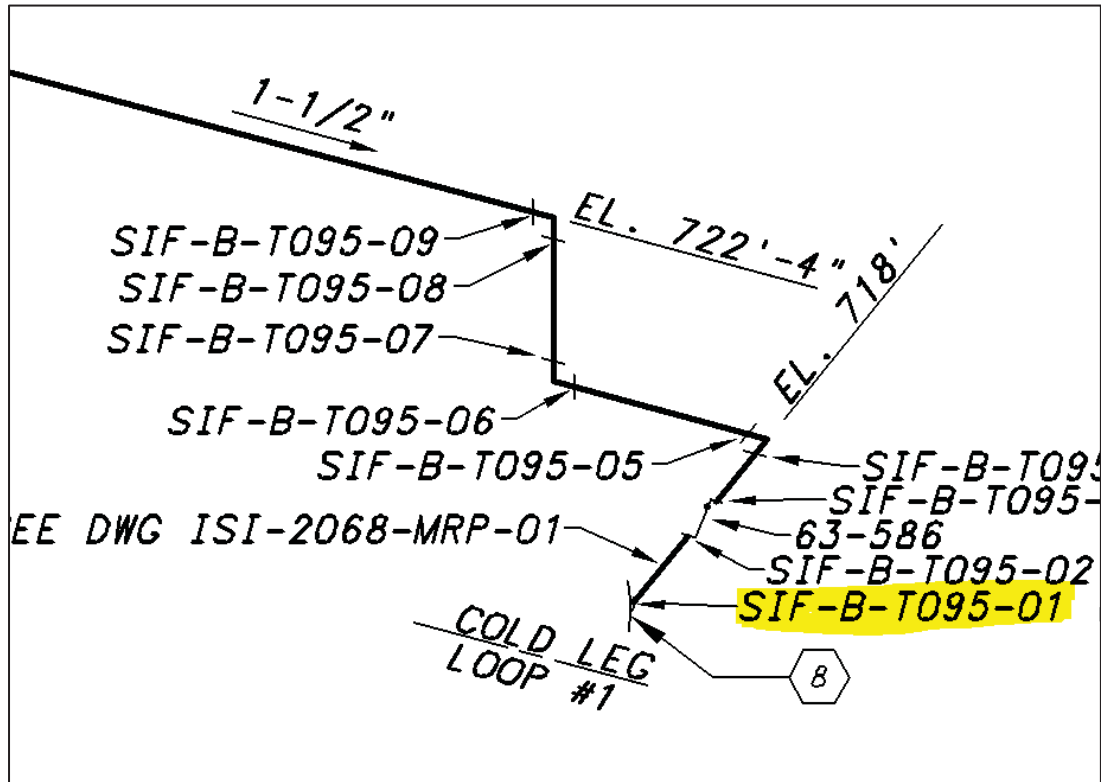
Enclosure 3

Table 2.4-1 **SGMS-2** Scan Coverage and Scan Summary

Scan	Full Volume (in <sup>3</sup> )	Actual (in <sup>3</sup> )
60 ° Axial From Nozzle	1283.20	0.00
45 ° Axial From Nozzle	1283.20	0.00
60 ° Axial From Shell	1283.20	1283.20
45 ° Axial From Shell	1283.20	1283.20
45 ° Circ CW	1283.20	1283.20
60 ° Circ CW	1283.20	1283.20
45 ° Circ CCW	1283.20	1283.20
60 ° Circ CCW	1283.20	1283.20
TOTALS	10265.6	7699.2

TOTAL COVERAGE= 75.0%

Notes: Wave Modes Used = 45° Shear and 60° Shear.

2.5 Weld **SIF-B-T095-01** – 1.5" Pipe to Nozzle WeldFigure 2.5-1 Weld **SIF-B-T095-01** (Extracted from Reference Drawing ISI-2063-W-12)

This weld was UT examined in the first inspection period of the first interval during the U2R2 refueling outage in 2019 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No: R1.11, "Welds Subject to Thermal Fatigue" degradation mechanisms. The NDE data can be found on UT Report No. R-026. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F with an additional RI-ISI requirement to increase the volume to include 1/2 inch beyond the base metal thickness transition or counterbore. The UT examination was limited from the nozzle side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 2.5-1 and combined with Figure 2.5-2.

A review of the plant's corrective action program did not note any failures at this weld. Previous examination data from pre-service, UT report P0588 was reviewed. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

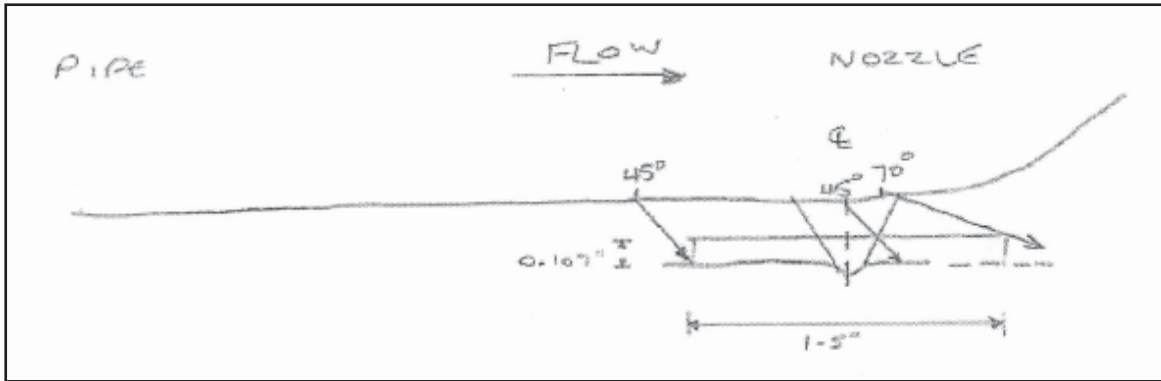


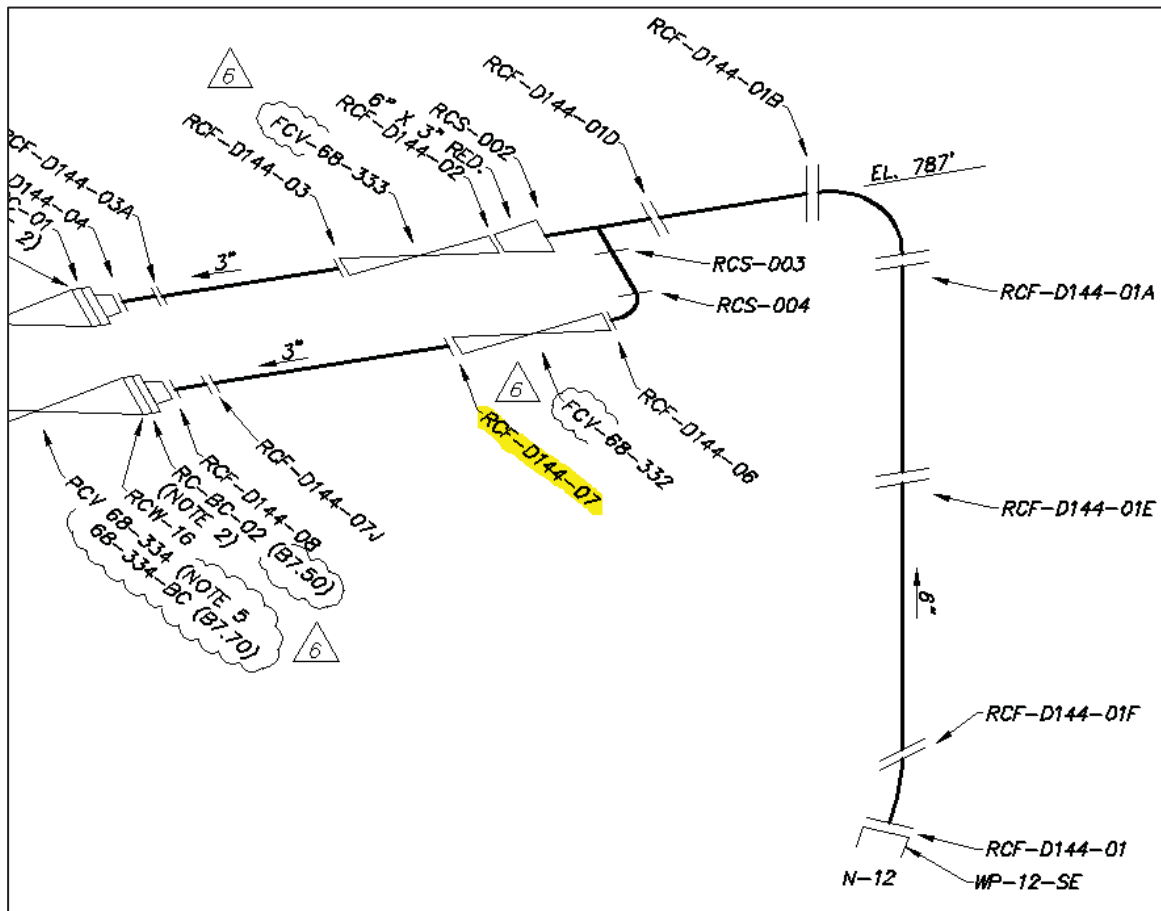
Figure 2.5-2 Weld SIF-B-T095-01, Weld Profile Axial Scan

Table 2.5-1 Weld SIF-B-T095-01 Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	100.00%
Downstream Side	0%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
 $300.00\% \div 4 \text{ SCANS} = 75.00\%$  or  
 TOTAL COVERAGE % = 75%

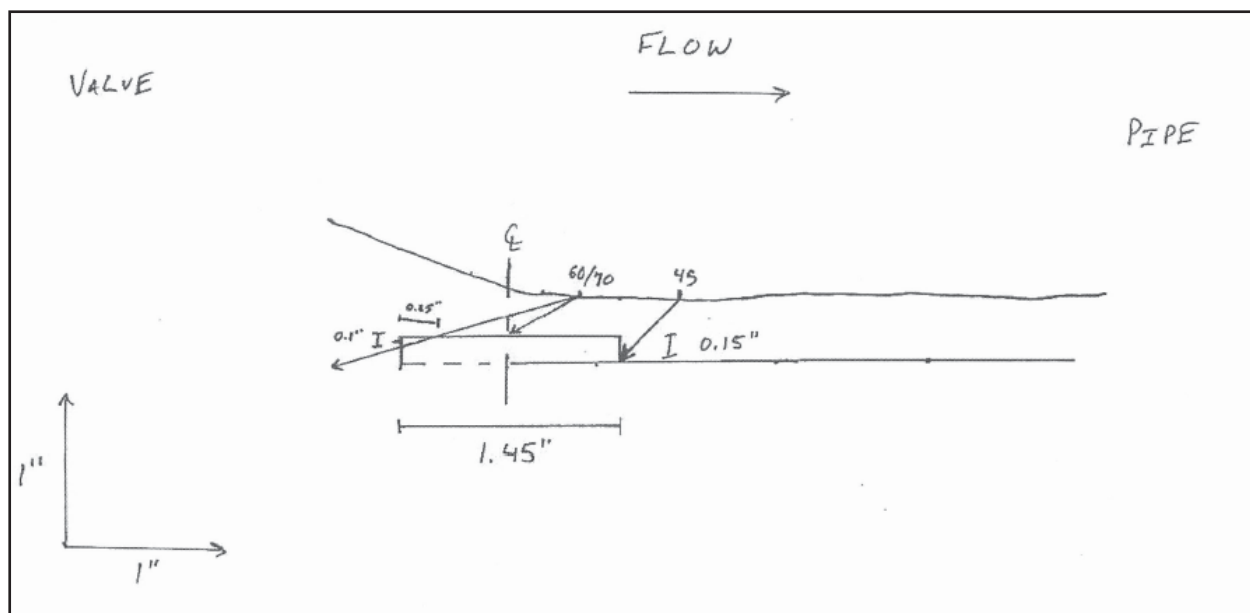
Notes: Wave Modes Used = 45° Shear and 70° Shear.

2.6 Weld **RCF-D144-07** – 3" Valve to Pipe WeldFigure 2.6-1 Weld **RCF-D144-07** (Extracted from Reference Drawing ISI-2068-W-04)

This weld was UT examined in the first inspection period of the first interval during the U2R2 refueling outage in 2019 to meet the requirements of the RI-ISI Program under ASME Code Case N-716-1. The weld was examined under Item No: R1.11, "Welds Subject to Thermal Fatigue" degradation mechanisms. The NDE data can be found on UT Report No. R-104. Per Code Case N-716-1, the required volume was determined based on ASME Section XI, Figure IWB-2500-8(c), exam Volume C-D-E-F with an additional RI-ISI requirement to increase the volume to include  $\frac{1}{2}$  inch beyond the base metal thickness transition or counterbore. The UT examination was limited from the valve side of the weld due to the geometric configuration resulting in total UT coverage of 75.0 percent as described in Table 2.6-1 and combined with Figure 2.6-2.

A review of the plant's corrective action program did not note any failures at this weld. No prior examinations had been performed; therefore, no previous examination data was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

Section XI, Mandatory Appendix I, I-2220 implements the Appendix VIII, Performance Demonstration Program, for this ultrasonic examination.

Figure 2.6-2 Weld **RCF-D144-07**, Weld Profile Axial ScanTable 2.6-1 Weld **RCF-D144-07** Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	0%
Downstream Side	100.00%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
 $300.00\% \div 4 \text{ SCANS} = 75.00\%$  or  
 TOTAL COVERAGE % = 75%

Notes: Wave Modes Used = 45°, 60°, and 70° Shear.



A review of the plant's corrective action program did not note any failures at this weld. No prior examinations had been performed; therefore, no previous examination data was reviewed for the UT examination per TVA procedures. No recordable indications were noted.

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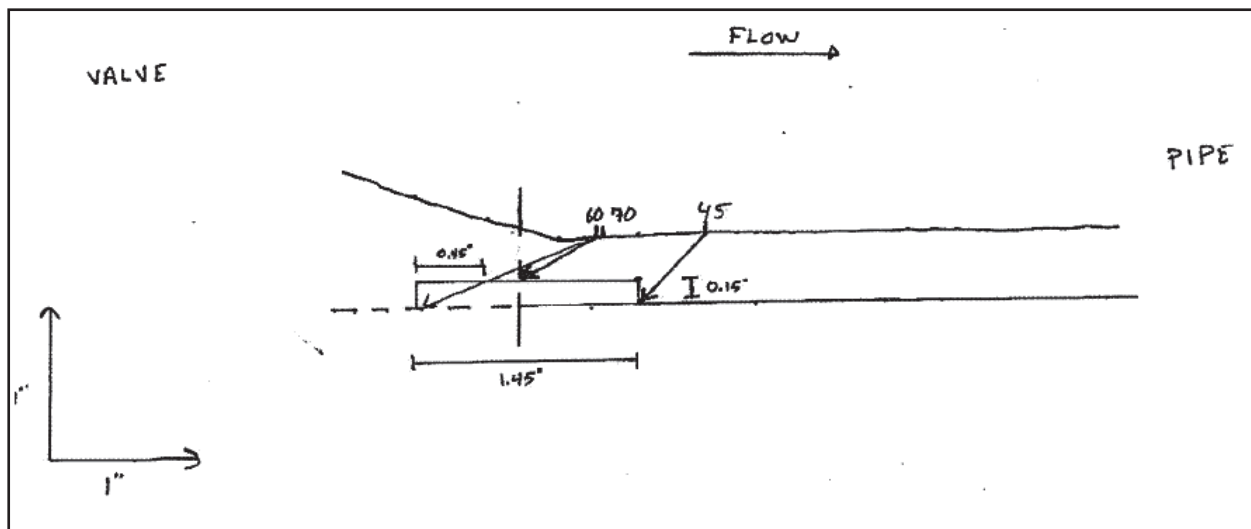


Figure 2.7-2 **RCF-D144-03**, Weld Profile Axial Scan

Table 2.7-1 Weld **RCF-D144-03** Scan Coverage and Scan Summary

SCANS	% COVERAGE
Upstream Side	0%
Downstream Side	100.00%
Circ CW	100.00%
Circ CCW	100.00%

CUMULATIVE % COVERAGE =  
300.00% ÷ 4 SCANS = 75.00% or  
TOTAL COVERAGE % = 75%

Notes: Wave Modes Used = 45°, 60°, and 70° Shear.