



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-17-013

January 31, 2017

10 CFR 50.55a

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

Browns Ferry Nuclear Plant, Unit 3
Renewed Facility Operating License No. DPR-68
NRC Docket No. 50-296

Subject: **Browns Ferry Nuclear Plant Unit 3, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Inservice Inspection (ISI) Program, Unit 3 Third Ten Year Interval Request for Relief for 3-ISI-28 and 3-ISI-29**

Reference: 1.TVA letter to NRC, "American Society of Mechanical Engineers, Code Section XI Inservice Inspection Program for the Unit 1 Second Ten-Year Inspection Interval, Unit 2 Fourth Ten-Year Inspection Interval and Unit 3 Third Ten-Year Inspection Interval, Request For An Alternative ISI-45," dated September 12, 2014 (ML14260A365)

2.NRC letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Relief from the Requirements of American Association of Mechanical Engineers Code Section XI Inservice Inspection Program, Request for an Alternative ISI-45 (TAC Nos. MF4854, MF4855, and MF4856)," dated August 6, 2015 (ML15191A372)

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 a relief request for Nuclear Regulatory Commission (NRC) approval for the Browns Ferry Nuclear Plant (BFN) Unit 3 third ten-year inspection (ISI) interval. The BFN Unit 3 third ten-year inspection interval ended on January 31, 2016. In References 1 and 2 the NRC approved a relief request to align the ISI interval dates for BFN Units 1, 2, and 3.

Enclosure 1 provides relief request 3-ISI-28 that requests relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Code Class 1, Table IWB-2500-1, which requires a volumetric examination of essentially 100 percent (%) of the volume. The specific item numbers from Table IWB-2500-1, for which relief is requested, are shown in Enclosure 1.

Similarly, Enclosure 2 provides relief request 3-ISI-29 that requests relief from the requirements of the ASME B&PV Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components, ASME Code Class 1, Table IWB-2500-1, ASME Code Class 2, Table IWC-2500-1, and Table 1 to Code Case N-577, Section N-577-2500 which require a volumetric examination of essentially 100% of the weld volume. The specific item numbers from Tables IWB-2500-1 IWC-2500-1, and Table 1 to Code Case N-577 for which relief is requested, are shown in Table 1 of Enclosure 2.

The ASME B&PV Code, Section XI, 2001 Edition through 2003 Addenda is the code of record for BFN Unit 3.

The definition of "essentially 100%" is provided by NRC Information Notice 98-42, "Implementation of 10 CFR 50.55a(g) Inservice Inspection Requirements," and Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1," which requires examination coverage of "more than 90 percent of the specified examination volume" in lieu of "essentially 100%."

10 CFR 50.55a(g)(6) authorizes the NRC to grant relief for determinations under 10 CFR 50.55a(g)(5) when Code requirements are impractical. TVA is requesting relief on the basis that the Code-required "essentially 100%" examination coverage is impractical due to physical obstructions and limitations imposed by design, geometry, or physical obstructions for the welds and associated components listed in Table 1 to Enclosure 1 and Table 1 to Enclosure 2. As an alternative, TVA has invoked ASME Section XI Code Case N-460, which states: "when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage on any Class 1 or Class 2 weld may be accepted provided the reduction in coverage for that weld is less than 10%." Therefore, TVA is requesting relief only for those welds that were inspected and received Code examination coverage of 90% or less.

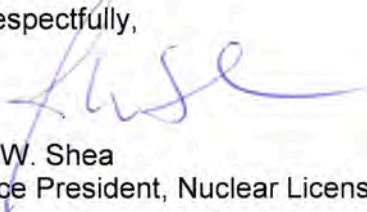
Examination coverage of greater than 90% was not achieved for the welds listed in the proposed relief requests and the applicable coverage percentage is specified in the relief request for each weld (Table 1 to Enclosure 1 and Table 1 to Enclosure 2). The examination coverage achieved for the subject welds in conjunction with acceptable examinations provides reasonable assurance that unallowable flaws do not exist in the subject component welds and that the welds are acceptable for service. Thus, an acceptable level of quality and safety was achieved and public health and safety was not endangered by allowing the proposed alternative examination coverage in lieu of the Code requirement.

Enclosure 3 provides the supporting information for relief request 3-ISI-28. Enclosure 4 provides the supporting information for relief request 3-ISI-29.

TVA requests approval of these relief requests within six months from the date of this letter.

There are no regulatory commitments associated with this submittal. Please address any questions regarding this request to Edward D. Schrull at 423-751-3850.

Respectfully,



J. W. Shea
Vice President, Nuclear Licensing

Enclosures:

1. Browns Ferry Nuclear Plant, Unit 3 Inservice Inspection Program Third Ten Year Interval Request for Relief 3-ISI-28
2. Browns Ferry Nuclear Plant, Unit 3 Inservice Inspection Program Third Ten Year Interval Request for Relief 3-ISI-29
3. Request for Relief 3-ISI-28, Attachment A - "Sketches," and Attachment B - "Examination Data Reports"
4. Request for Relief 3-ISI-29, Attachment A - "Inservice Inspection Drawings," and Attachment B - "Examination Data Reports"

cc (w/Enclosures):

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

Enclosure 1

Browns Ferry Nuclear Plant, Unit 3

**Inservice Inspection Program
Third Ten Year Interval**

Request for Relief 3-ISI-28

Enclosure 1
Tennessee Valley Authority
Browns Ferry Nuclear Plant Unit 3
Request for Relief 3-ISI-28

Summary

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), the Tennessee Valley Authority (TVA) is requesting relief from weld examination coverage requirements specified in the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI for nine reactor pressure vessel (RPV) nozzle-to-vessel full penetration weld and one inside radius section. Ultrasonic (UT) examinations were performed during the third ten-year interval. This relief is requested for the Browns Ferry Nuclear Plant (BFN) Unit 3 third ten-year inspection interval which began November 19, 2012 and ended January 31, 2016.

ASME Code Components Affected:

Relief is requested for the following RPV nozzle-to-vessel full penetration welds:

- N1B-NV
- N4A-NV
- N4B-NV
- N4C-NV
- N4D-NV
- N4E-NV
- N4F-NV
- N8A-NV
- N9-NV
- N10-NV

Relief is also requested for the following RPV inside radius weld:

- N10-IR

Refer to Table 1 of this enclosure for additional weld information.

ASME Code Class:

ASME Code Class 1 (Equivalent)

Section XI Edition:

2001 Edition, 2003 Addenda

Code Table:

IWB-2500-1

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Code Examination Category:

B-D, "Full Penetration Welds of Nozzles in Vessels"

Code Examination Item Number:

B3.90, "Reactor Vessel Nozzle-to-Vessel Welds" and B3.100, "Nozzle Inside Radius Section"

Code Requirements from Which Relief Is Requested:

ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.90 and B3.100 requires a volumetric examination of essentially 100 percent (%) of the weld and adjacent base material and inside radius as depicted in Figure IWB-2500-7.

Relief is requested from the requirement of ASME Section XI Code, Table IWB-2500-1, Examination Category B-D, Item No. B3.90 and B3.100 to perform essentially 100% volumetric examination of the weld and adjacent base material.

As an alternative, TVA has invoked ASME Section XI Code Case N-460, which states: "when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage on any Class 1 or Class 2 weld may be accepted provided the reduction in coverage for that weld is less than 10%." Therefore, TVA is requesting relief only for those welds that were inspected and received Code coverage of 90% or less.

Reason for Request:

The design configuration of the RPV nozzle-to-vessel weld areas precludes a UT examination of greater than 90% of the required volume. It is not possible to perform the volumetric UT from both sides of each weld due to the configuration of these components. The component design configuration and single side access limits UT examination coverage of the welds to the percentages listed in Table 1 of this enclosure. The achieved examination coverage for these components ranged from 25% to 90% of the required examination volume.

Proposed Alternative and Basis for Use:

TVA performed the UT examinations of the welds listed in Table 1 to the maximum extent practical for the component design configuration of the RPV nozzle-to-vessel welds and inner radius sections.

In order to examine the weld in accordance with the ASME Code requirements, the RPV would require extensive design modifications. The physical arrangement of the nozzle-to-vessel welds precludes UT examination from the nozzle side. The limitations are inherent to the nozzle-to-vessel weld design. UT scanning from the inner nozzle surfaces is ineffective due to the weld location and the asymmetrical inside surface where the nozzle and vessel converge.

The blend radius of the weld restricts the scanning movement and/or transducer contact. The areas receiving little or no examination coverage are located toward the outside surface of the

Enclosure 1
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reactor vessel in the general area of the nozzle outside blend radius. Degradation, if present, at the inside surface or inner 15% volume would have been detected by the performed UT examinations.

The welds were examined with the latest techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, in accordance with the requirements of the 2001 Edition through 2003 Addenda of the ASME Code.

UT examination of the subject areas to the maximum extent practical for the design of the nozzle-to-vessel weld joints provides an acceptable level of quality and safety. Since the inner 15% thickness was fully examined for nozzle to vessel welds and 90% of the N10 inner radius was fully examined detectable degradation, if present, would have been identified by the performed UT examinations. As a result, reasonable assurance of operational readiness of the subject welds has been provided by the performed UT examinations.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 3 third ten-year inspection interval.

Implementation Schedule:

This request for relief is applicable to the Unit 3, third ten-year interval which began on November 19, 2012 and ended January 31, 2016.

The welds and inner radius sections described above are listed in Table 1 of this enclosure. The welds and inner radius sections were examined during the second and third periods (Cycle 15 - Spring 2012 and Cycle 16 - Spring 2014 respectively) of the third ten-year interval.

Precedent:

This request for relief is similar to the following TVA relief requests for BFN and approved by the NRC:

- 3-ISI-23, NRC approved by letter dated September 24, 2008 (ML082480573)
- 3-ISI-26, NRC approved by letter dated March 14, 2012 (ML12018A086)
- 3-ISI-7, NRC approved by letter dated February 27, 2008 (ML080520006)
- 3-ISI-14 and 3-ISI-15, NRC approved by letter dated February 11, 2004 (ML040420355)
- 2-ISI-28, NRC approved by letter dated May 29, 2013 (ML13120A180)

**Enclosure 1
Tennessee Valley Authority
Browns Ferry Nuclear Plant Unit 3
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Attachments to Enclosure 3:

Attachment A - Sketches:

3-ISI-0220-C-1, RPV Nozzle Locations
SK-B3001, Reactor Pressure Vessel Assembly
SK-B3017, Weld Detail Recirculation Outlet Nozzle N1
SK-B3018, Weld Detail Recirculation N2, N3, N4, & N5 Nozzles
SK-B3019, Weld Detail Jet Pump Instrument Nozzle N8
SK-B3020, Weld Detail CRD Hydraulic Control Nozzle N9
SK-B3022, Weld Detail Differential Pressure and Liquid Control Nozzle N10

Attachment B - Examination Data Reports:

The documents in Appendix B of Enclosure 3 consists of the data sheets that provide the examination volume calculations for the subject limited volume examinations and are taken from the below examination data reports are available for NRC review.

- N1B-NV
- N4A-NV
- N4B-NV
- N4C-NV
- N4D-NV
- N4E-NV
- N4F-NV
- N9-NV
- N10-NV
- N10-IR
- N8A-NV

Enclosure 1 Tennessee Valley Authority - Browns Ferry Nuclear Plant Unit 3 Request for Relief 3-ISI-28 Table 1							
Weld Number (Description)	Nominal Size (NPS)	Sketch (Report Number)	Examination Coverage Percent (Nearest %)	Unit/Cycle Inspection Performed	Nozzle Material	Weld Material	Comments
N1B-NV (Recirc Outlet)	28"	SK-B3017 (VE-12-010)	25	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. The alternative examination volume defined in Code Case N-613-1 which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side was applied. Coverage obtained during radial scans was limited due to the nozzle and weld configuration. There were no recordable indications.
N4A-NV (Feedwater)	12"	SK-B3018 (VE-12-011)	32	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration, proximity of N11A nozzle, and crown configuration of circumferential weld C-3-4 for a distance of 28.69 degrees. There were no recordable indications.
N4B-NV (Feedwater)	12"	SK-B3018 (VE-12-013)	32	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and crown configuration of circumferential weld C-3-4 for a distance of 28.69 degrees. There were no recordable indications.
N4C-NV (Feedwater)	12"	SK-B3018 (VE-12-015)	32	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and crown configuration of circumferential weld C-3-4 for a distance of 28.69 degrees. There were no recordable indications.
N4D-NV (Feedwater)	12"	SK-B3018 (VE-12-017)	32	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration, proximity of N11B nozzle, and crown configuration of circumferential weld C-3-4 for a distance of 28.69 degrees. There were no recordable indications.
N4E-NV (Feedwater)	12"	SK-B3018 (VE-12-019)	32	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and crown configuration of circumferential weld C-3-4 for a distance of 28.69 degrees. There were no recordable indications.

Enclosure 1 Tennessee Valley Authority - Browns Ferry Nuclear Plant Unit 3 Request for Relief 3-ISI-28 Table 1							
Weld Number (Description)	Nominal Size (NPS)	Sketch (Report Number)	Examination Coverage Percent (Nearest %)	Unit/Cycle Inspection Performed	Nozzle Material	Weld Material	Comments
N4F-NV (Feedwater)	12"	SK-B3018 (VE-12-021)	32	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and crown configuration of circumferential weld C-3-4 for a distance of 28.69 degrees. There were no recordable indications.
N8A-NV (Jet Pump Instrumentation)	4"	SK-B3019 (UT-14-057)	77	U3C16 (Spring 2014)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and nozzle blend radius. There were no recordable indications.
N9-NV (CRD)	4"	SK-B3020 (VE-12-029)	27	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and permanent insulation support ring for a distance of 92 degrees. There were no recordable indications.
N10-NV (SLC)	2"	SK-B3022 (VE-12-030)	74	U3C15 (Spring 2012)	A508 CL2	E9016G	This ultrasonic examination was performed in accordance with the criteria of 10 CFR 50.55a(b)(2)(xv)(G) and the minimum coverage requirements of 10 CFR 50.55a(b)(2)(xv)(K) was achieved to the maximum extent possible. Code Case N-613-1 was applied which reduces the area to be examined per IWB-2500-7 to the weld plus a 1/2" on each side. Coverage obtained was limited due to nozzle configuration and permanent insulation support bracket. There were no recordable indications.
N10-IR (SLC)	2"	SK-B3022 (VE-12-031)	90	U3C15 (Spring 2012)	A508 CL2	E308/E309	Nozzle to vessel weld (SLC Nozzle Inside Radius) was examined using a 65 and 70 degree shear wave mode. The examination was conducted from the vessel outside diameter surface. Scanning was restricted due to nozzle configuration. This weld was examined using PDI qualified personnel, procedures, and equipment. There were no recordable indications.

Enclosure 2

Browns Ferry Nuclear Plant, Unit 3

**Inservice Inspection Program
Third Ten Year Interval**

Request for Relief 3-ISI-29

Enclosure 2

TENNESSEE VALLEY AUTHORITY Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29

Summary:

In accordance with 10 CFR 50.55a, "Codes and Standards," paragraphs (g)(5)(iii) and (g)(6), TVA is requesting relief from weld examination coverage requirements specified in the ASME B&PV Code, Section XI for ten full penetration austenitic stainless piping welds. UT was performed during the third ten-year interval. This relief is requested for BFN Unit 3 third ten-year inspection interval which began November 19, 2012 and ended January 31, 2016.

ASME Code Components Affected Welds:

Relief is requested for the following welds:

Four Residual Heat Removal (RHR) System full penetration piping welds;

- DRHR-3-12
- DRHR-3-19
- DSRHR-3-5A
- TRHR-3-191

One Reactor Water Recirculation (RECIRC) System full penetration piping weld:

- GR-3-63

Two High Pressure Coolant Injection (HPCI) full penetration piping welds:

- HPCI-3-019-018 (Pre-Service)
- HPCI-3-019-019 (Pre-Service)

Three Reactor Water Cleanup (RWCU) System full penetration piping welds:

- RWCU-3-001-070
- RWCU-3-007-003 (Pre-Service)
- RWCU-3-007-011 (Pre-Service)

Refer to Table 1 of this enclosure for additional weld information.

ASME Code Class:

ASME Code Class 1 and Class 2 (Equivalent)

Section XI Edition:

2001 Edition, 2003 Addenda

Enclosure 2

TENNESSEE VALLEY AUTHORITY Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29

Code Tables:

Code Case N-577, N-577-2500, Table 1
IWB-2500-1
IWC-2500-1

Code Examination Categories:

R-A, Risk Informed Piping Examinations
B-J, Pressure Retaining Welds in Piping
C-F-2, Pressure Retaining Welds in Carbon or Low Alloy Steel

Code Examination Item Numbers:

R1.11, Elements Subject to Thermal Fatigue
R1.16, Elements Subject to intergranular stress corrosion cracking (IGSCC)
B9.11, Circumferential Welds
C3.20, Circumferential Welds

Code Requirements from Which Relief Is Requested:

Code Case N-577-1, Section N-577-2500, Table 1, Examination Categories R1.11 and R1.16 require volumetric examination of 100% of the weld and adjacent base material as depicted in Figure IWB-2500-8(c), Tables IWB-2500-1 and IWC-2500-1 requires volumetric examination of essentially 100% of the weld length.

Relief is requested from the requirement of ASME Section XI Code, Table IWB-2500-1, Examination Categories R-A, B-J, and C-F-2, Item Nos. R1.11, R1.16, B9.11, and C3.20 to perform essentially 100% volumetric examination of the weld and adjacent base material.

As an alternative, TVA has invoked ASME Section XI Code Case N-460, which states: "when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage on any Class 1 or Class 2 weld may be accepted provided the reduction in coverage for that weld is less than 10%." Therefore, TVA is requesting relief only for those welds that were inspected and received Code coverage of 90% or less.

Reason for Request:

The design configurations of the listed welds preclude a UT examination of greater than 90% of the required volume. It is not possible to perform the volumetric UT from both sides of each weld due to the configuration of these components. The component design configuration limits UT examination coverage of the welds to the percentages shown in Table 1 based on limitations discussed in Table 1. The achieved examination coverage for these components ranged from 30% to 89% of the required examination volume.

Enclosure 2

TENNESSEE VALLEY AUTHORITY Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29

Proposed Alternative and Basis for Use:

TVA performed the UT examination of the welds listed in Table 1 to the maximum extent practical for the component design configuration of the piping welds.

The welds were examined with the latest UT techniques, procedures, equipment, and personnel qualified to the requirements of the PDI Program. These examinations were of the accessible areas to the maximum extent practical due to the design configuration of the weld joints.

The "Comments" column of Table 1 of this enclosure describes coverage limitations due to the inability to examine welds from both sides, when applicable.

These examinations provide an acceptable level of quality and safety because the information and data obtained provides sufficient information to judge the overall integrity of the piping welds. Additionally, these welds are part of a larger population of welds examined for which the required examination coverage is attained. When considered in aggregate with the entire sample population, an adequate level of inspection was performed to provide reasonable assurance that a pattern of IGSCC degradation that, if present, could affect the overall integrity of the components would be detected. The performed examinations provide an acceptable level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 3 third ten-year ISI inspection interval limited examinations.

Implementation Schedule:

This request for relief is applicable to the Unit 3, third ten-year Interval which began on November 19, 2005, and ended on February 1, 2016.

The welds described above are listed in Table 1 of this enclosure. The welds were examined during the second inspection period (Cycle 15 - Spring 2012), and the third inspection period (Cycle 16 - Spring 2014) of the third ten-year inspection interval.

Precedent:

This request for relief is similar to the following TVA relief requests for BFN and approved by NRC:

- 3-ISI-25, NRC approved by letter dated January 20, 2012 (ML12003A081)
- 3-ISI-22, NRC approved by letter dated May 20, 2008 (ML080080524)
- 3-ISI-12, NRC Approved by letter dated August 3, 2006 (ML061560090)

Enclosure 2

TENNESSEE VALLEY AUTHORITY Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29

Attachments to Enclosure 4:

Attachment A - Inservice Inspection Drawings:

- 3-ISI-0330-C-1
- 3-ISI-0328-C-2
- 3-ISI-0332-C-1
- 3-ISI-0332-C-2
- 3-CHM-2407-C-2

Attachment B - Examination Data Reports:

The documents in Appendix B of Enclosure 4 consists of the data sheets that provide the examination volume calculations for the subject limited volume examinations and are taken from the examination data reports. Full copies of the examination data reports are available for NRC review.

- UT 12-024
- UT-12-031
- UT-14-039
- UT-14-027
- UT-14-031
- UT-14-036
- UT-14-001
- UT-14-002
- UT-12-046
- UT-12-047

Enclosure 2 Tennessee Valley Authority - Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29 Table 1								
Weld Number (System)	IGSCC Category	Nominal Pipe Size (NPS)	ISI Drawing Number (Weld Report)	Examination Coverage Percent (Nearest %)	Unit / Cycle Inspection Performed	Joint Configuration	Weld Material	Comments
DRHR-3-12 (RHR System)	D	24"	3-ISI-0330-C-1 (UT-12-031)	30	U3C15	A182 F304 Flued Head to A351 CF8M Cast Valve.	ER308	Examination coverage limitations are due to the physical configuration of a wrought fluted head penetration to a cast valve configuration that restricts the ultrasonic examination on both sides of the weld. This configuration limited the scan surface to only a portion of the fluted head side of the weld. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-2, for austenitic metal welds. The qualified procedure requires examination techniques be applied that are intended to interrogate the far side of the weld. However, the generic ultrasonic procedure (or any other existing procedure) is not qualified for detection of flaws on the far side of the weld in austenitic material. Therefore, no examination credit was applied for the far side of the weld that was inaccessible. The ultrasonic examination was conducted to the maximum extent practical. There were no recordable indications.
DRHR-3-19 (RHR System)	C	20"	3-ISI-0330-C-1 (UT-14-039)	59	U3C16	A403 WP304 Tee to A358 GR304 Pipe	ER308	Examination coverage limitations are due to the physical configuration of a tee to pipe configuration that restricts the ultrasonic examination on both sides of the weld. This configuration limited the scan surface to only a portion of the tee side of the weld. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-2, for austenitic metal welds. The qualified procedure requires examination techniques be applied that are intended to interrogate the far side of the weld. However, the generic ultrasonic procedure (or any other existing procedure) is not qualified for detection of flaws on the far side of the weld in austenitic material. Therefore, no examination credit was applied for the far side of the weld that was inaccessible. The ultrasonic examination was conducted to the maximum extent practical. There were no recordable indications.
DSRHR-3-5A (RHR System)	C	24"	3-ISI-0330-C-1 (UT-14-027)	76	U3C16	A358 GR304 Pipe to A403 WP304 Elbow.	ER308	Examination coverage limitations are due to the physical configuration of this pipe to elbow weld. This configuration limited the scan surface to a portion of the pipe side of the weld due to adjacent weld DSRHR-3-5 that limited axial coverage. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-2, for austenitic metal welds. There were no recordable indications.

Enclosure 2 Tennessee Valley Authority - Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29 Table 1								
Weld Number (System)	IGSCC Category	Nominal Pipe Size (NPS)	ISI Drawing Number (Weld Report)	Examination Coverage Percent (Nearest %)	Unit / Cycle Inspection Performed	Joint Configuration	Weld Material	Comments
TRHR-3-191 (RHR System)	C	20"	3-ISI-0330-C-1 (UT-14-031)	54	U3C16	A351 CF8M Valve to A234 GR WPB Elbow	ER308	Examination coverage limitations are due to the physical configuration of a Cast Stainless Steel Valve to a Carbon Steel Elbow configuration that restricts the ultrasonic examination on both sides of the weld. This configuration limited the scan surface to the Elbow side of the weld. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic procedure for dissimilar metal welds, EPRI-DMW-PA-1. The qualified procedure requires examination techniques be applied that are intended to interrogate the far side of the weld. However, the generic ultrasonic procedure (or any other existing procedure) is not qualified for detection of flaws on the far side of the weld in austenitic material. Therefore, no examination credit was applied for the far side of the weld that was inaccessible. The ultrasonic examination was conducted to the maximum extent practical. There were no recordable indications.
GR-3-63 (RECIRC System)	E	28"	3-ISI-0328-C-2 (UT-12-024)	50	U3C15	A358 TP 304 stainless steel Pipe to A351 CF8 Cast steel Valve.	ER308	Examination coverage limitations are due to the physical configuration of this pipe to cast valve configuration that restricts the ultrasonic examination to one side of the weld. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-2, for austenitic metal welds. The qualified procedure requires examination techniques be applied that are intended to interrogate the far side of the weld. However, the generic ultrasonic procedure (or any other existing procedure) is not qualified for detection of flaws on the far side of the weld in austenitic material. Therefore, no examination credit was applied for the far side of the weld that was inaccessible. The ultrasonic examination was conducted to the maximum extent practical. There was no change in the existing indication when compared to the previous examination for this IGSCC Category E weld. Two indications were identified. Both were acceptable by evaluation and subsequent examinations were performed.
RWCU-3-001-070 (RWCU System)	A	6"	3-ISI-0332-C-1 (UT-14-036)	49	U3C16	A403 WP304 stainless steel Sweep-o-let to A351 CF8M Cast Valve.	ER308L	Examination coverage limitations are due to the physical configuration of a wrought piping branch connection to a cast valve configuration that restricts the ultrasonic examination on both sides of the weld. This configuration limited the scan surface to only a portion of the branch connection side of the weld. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-2, for austenitic metal welds. The qualified procedure requires examination techniques be applied that are intended to interrogate the far side of the weld. However, the generic ultrasonic procedure (or any other existing procedure) is not qualified for detection of flaws on the far side of the weld in austenitic material. Therefore, no examination credit was applied for the far side of the weld that was inaccessible. The ultrasonic examination was conducted to the maximum extent practical. There were no recordable indications.

Enclosure 2 Tennessee Valley Authority - Browns Ferry Nuclear Plant, Unit 3 Request for Relief 3-ISI-29 Table 1								
Weld Number (System)	IGSCC Category	Nominal Pipe Size (NPS)	ISI Drawing Number (Weld Report)	Examination Coverage Percent (Nearest %)	Unit / Cycle Inspection Performed	Joint Configuration	Weld Material	Comments
HPCI-3-019-018 (HPCI System)	N/A	10"	3-CHM-2407-C-2 (UT-14-001)	87	U3C16	SA106 GR B Pipe to SA105 Flange	ER7056	Pre-Service Exam. Examination coverage limitations are due to the physical configuration of this pipe to flange weld that restricts the ultrasonic examination to one side of the weld. No examination on flange side could be performed due to the configuration resulting in a single sided exam. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-1. RT was acceptable. Voluntary pre-service UT and MT were performed. There were no recordable indications.
HPCI-3-019-019 (HPCI System)	N/A	10"	3-CHM-2407-C-2 (UT-14-002)	78	U3C16	SA 216 WCB Valve to SA106 GR B Pipe	ER70S6	Pre-Service Exam. Examination coverage limitations are due to the physical configuration of this valve to pipe weld that restricts the ultrasonic examination to one side of the weld. No examination on flange side could be performed due to the configuration resulting in a single sided exam. Examinations were conducted in accordance with an ASME Section XI, Appendix VIII qualified generic PDI procedure, PDI-UT-1. RT was acceptable. Voluntary pre-service UT and MT were performed. There were no recordable indications.
RWCU-3-007-003 (RWCU System)	N/A	4"	3-ISI-0332-C-2 (UT-12-046)	58	U3C15	A420 GR WPL1 Tee to ASTM A333 GR 1 Pipe	ER70S6	Pre-Service Exam. N-UT-76. Examination coverage limitations are due to the physical configuration of this valve to pipe weld that limits circumferential scanning to one side at the tee. RT and PT was acceptable. Voluntary pre-service UT performed. There were no recordable indications.
RWCU-3-007-011 (RWCU System)	N/A	4"	3-ISI-0332-C-2 (UT-12-047)	89	U3C15	SA105 Valve to ASTM A333 GR 1 Pipe	ER70S6	Pre-Service Exam. N-UT-76. PT Performed. Examination coverage limitations are due to the physical configuration of this valve to pipe weld that limits circumferential scanning to one side at the valve. RT and PT was acceptable. Voluntary pre-service UT performed. There were no recordable indications.

Enclosure 3

**Tennessee Valley Authority
Browns Ferry Nuclear Plant Unit 3
Request for Relief 3-ISI-28**

**Attachment A
Sketches**

3-ISI-0220-C-1, RPV Nozzle Locations

SK-B3001, Reactor Pressure Vessel Assembly

SK-B3017, Weld Detail Recirculation Outlet Nozzle N1

SK-B3018, Weld Detail Recirculation N2, N3, N4, & N5 Nozzles

SK-B3019, Weld Detail Jet Pump Instrument Nozzle N8

SK-B3020, Weld Detail CRD Hydraulic Control Nozzle N9

SK-B3022, Weld Detail Differential Pressure and Liquid Control Nozzle N10

REFERENCE DRAWINGS (GE)
 SKETCHES - RPV EXAMINATION PLAN (GE)
 SK-B3001 SK-B3005 SK-B3010
 SK-B3003 SK-B3007
 SK-B3004 SK-B3006

○ VESSEL NOZZLE
○ FULL PENETRATION NOZZLE WELD

W 0 360 270 180 90 0 W

N1X - 583.5"
N8X - 610"

Y MATING SURFACE

FLANGE

C-5-FLG 330°

210° 90°

COURSE 5

N3D N3C V-5-B N3B N3A

V-5-C N12B V-5-A N12A

C-4-5 285° 165° 45°

COURSE 4

347° C-3-4 227° 107°

V-4-A V-4-C V-4-B

COURSE 3

N4F N4E N5B N11B N4D N4C N5A N9 N9-IR N4B N11A N4A

V-3-C V-3-B V-3-A

C-2-3 285° 165° 45°

COURSE 2

N16B N16A

V-2-C V-2-B V-2-A

C-1-2 260° 140° 20°

COURSE 1

N1A N2K N2J N2H N2G N2F N1B N2E N2D N2C N2B N2A

V-1-C V-1-B V-1-A

C-BH-1 N8B N8B-IR N8A N8A-IR

TANGENT LINE/LOWER HEAD WELD

BOTTOM HEAD

VESSEL 0.00°

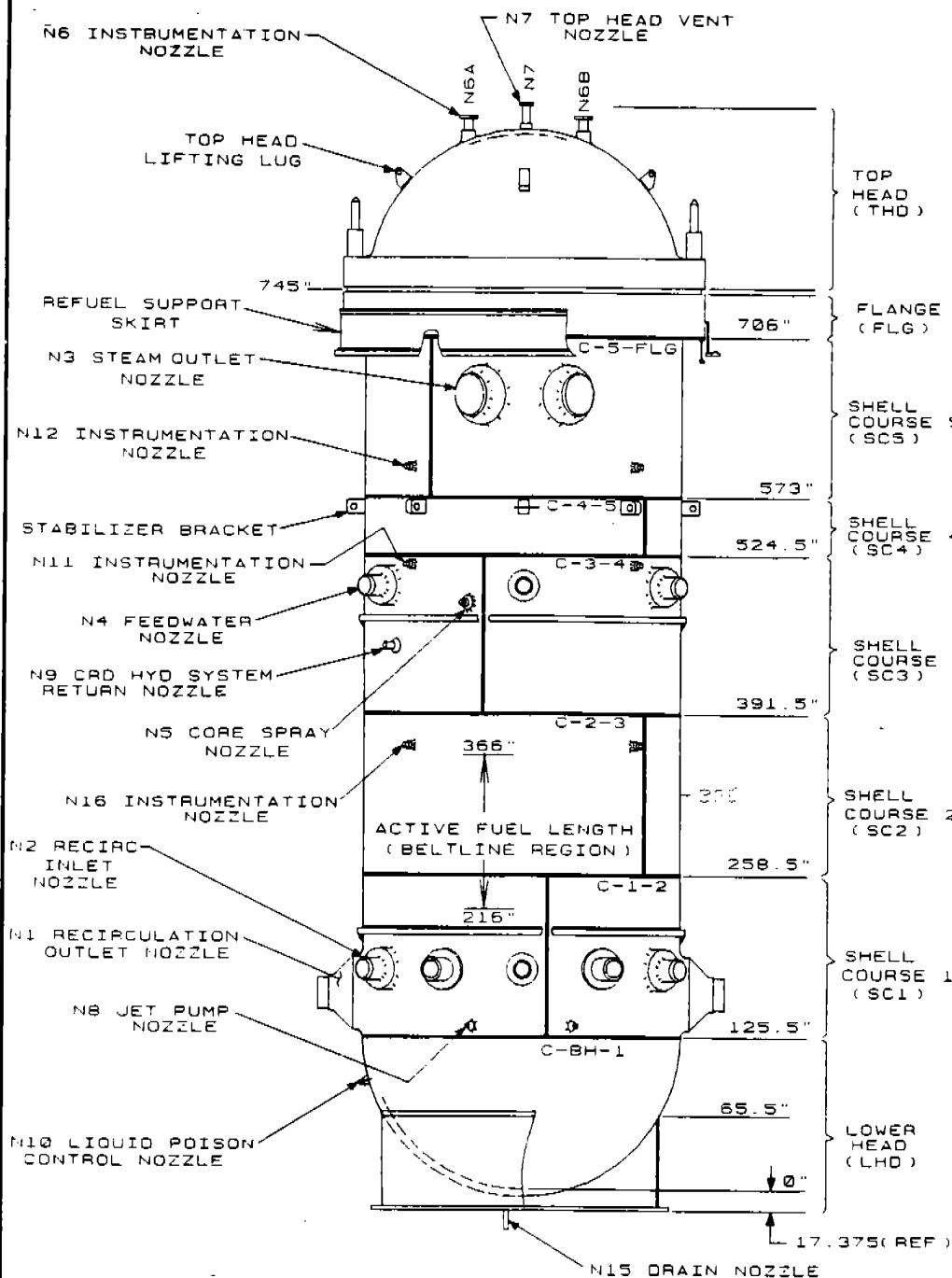
706" 573" 524.5" 391.5" 366" 258.5" 216" 125.5"

- NOTES:
1. REFER TO RPV MANUAL FOR MATERIAL SPECIFICATIONS AND THICKNESS OF MATERIAL.
 2. NOZZLES N-11A, N-11B, N-12A, N-12B, N-16A, AND N-16B ARE CATEGORY B-E.

PCADAM

ALL A/D HISTORY RESEARCHED AT R000

CCD



BROWNS FERRY 3

REFERENCE B&W DRAWING NO. 25469F-8

SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	11-30-92	M MCLAVERTY	K. TROTTER	K7	R. HOOPER	R08	

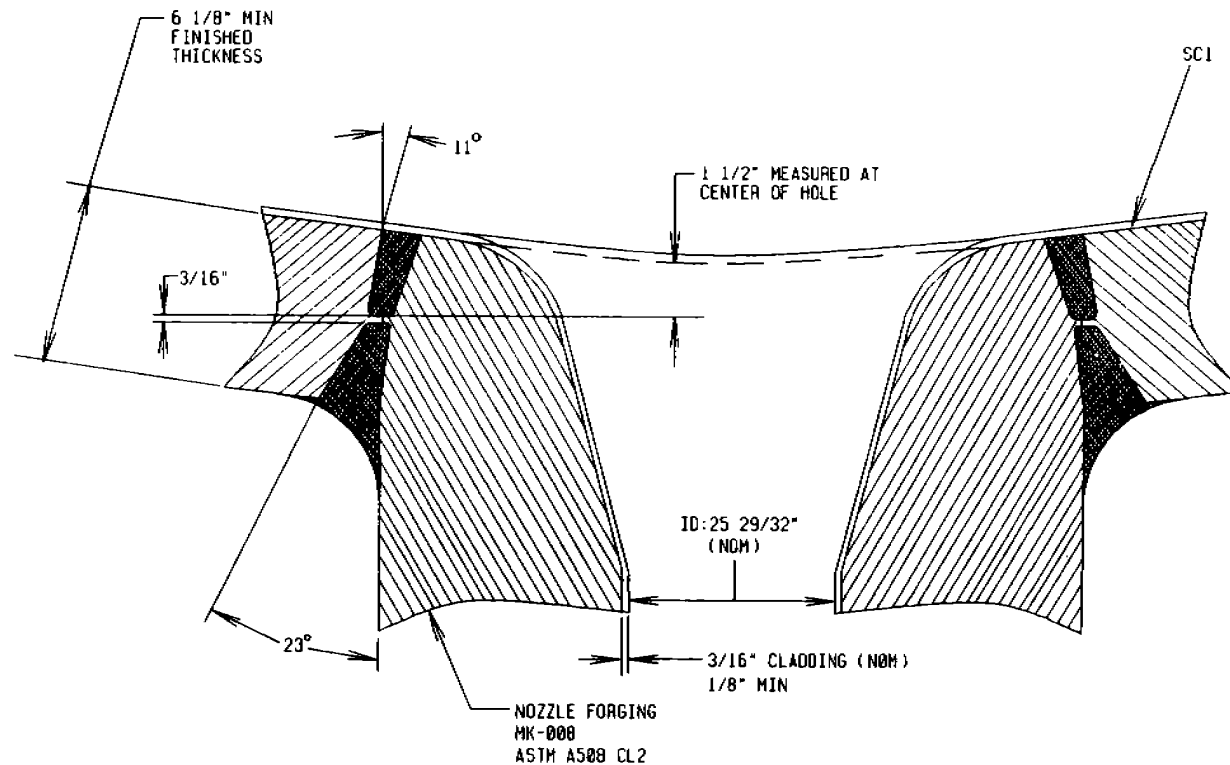
NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

DE DWG NO. A00-5306

PROJECT BROWNS FERRY 3

TITLE REACTOR PRESSURE VESSEL ASSEMBLY

SKETCH NO. SK-B3001



REFERENCE B&W DRAWING NO. 131839E-4 (DETAIL B)
AND NO. 151866E-0 FOR FORGING CONFIGURATION

NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND
SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

DE ORF NO.
A00-5306

PROJECT
BROWNS FERRY 3

TITLE
WELD DETAIL RECIRCULATION OUTLET NOZZLE #1

SKETCH NO
SK-B3017

SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INT	PURPOSE
0	12-1-92	M MCLAVERTY	K TROTTER		R HOOPER		

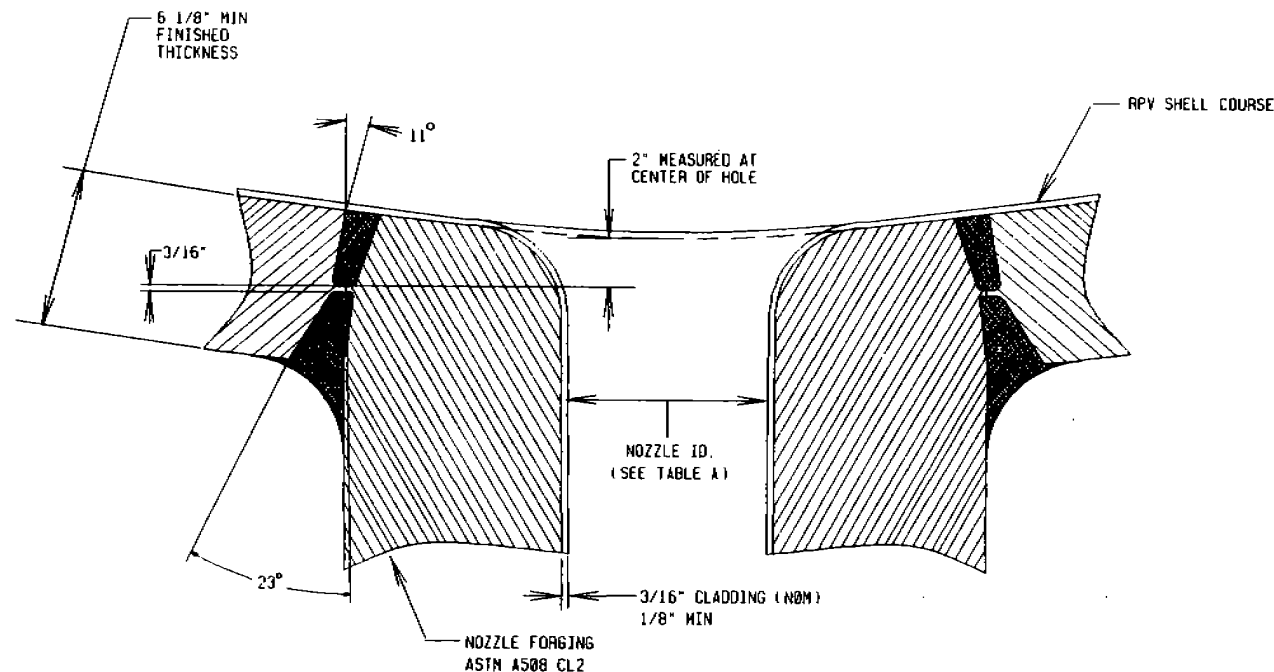


TABLE A

NOZZLE NO.	NOZZLE DESCRIPTION	B&W MK- #	NOZZLE ID. (NOM)	SHELL COURSE	COMMENTS
N2	RECIRCULATION INLET	MK-007	11.56"	SC1	
N3	STEAM OUTLET	MK-014	23.75"	SC5	
N4	FEEDWATER INLET	MK-010	11.76"	SC3	CLADDING REMOVED BY PLANT MODIFICATION
N5	CORE SPRAY	MK-011	8.78"	SC3	

REFERENCE B&W DRAWING NO. 131839E-4 (DETAIL B)
AND NO. 151866E-0

NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND
SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

DE ORF NO.
A00-5306

PROJECT
BROWNS FERRY 3

TITLE
WELD DETAIL N2, N3, N4, & N5 NOZZLES

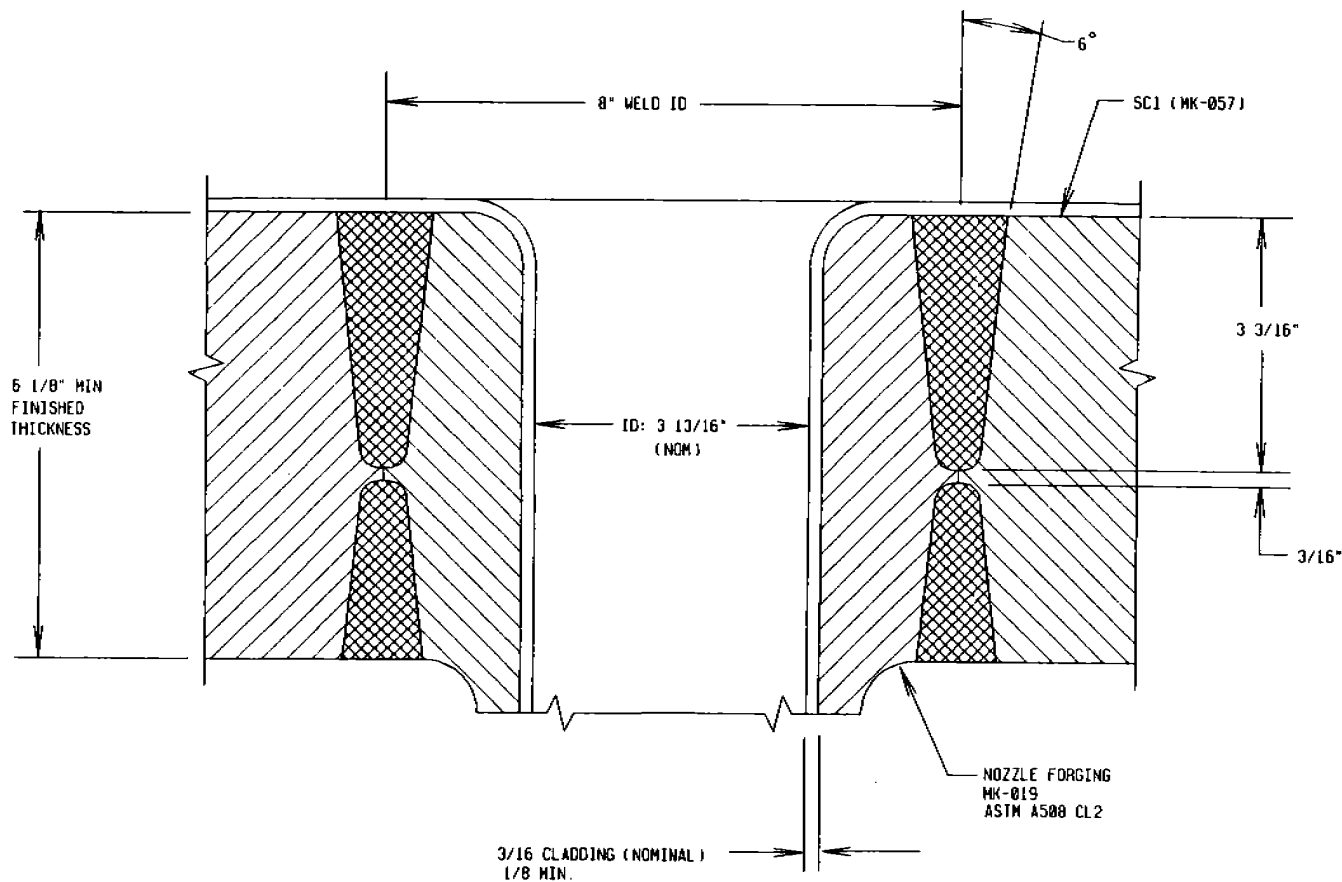
SKETCH NO
SK-B3018

SKETCH RELEASE RECORD

PURPOSE

REV DATE PREPARED REVIEWED INIT APPROVED DATE

0 11-25-92 M MCLAVERITY K. TROTTER R. HOOPER



REFERENCE B&W DRAWING NO. J31839E-4 (DETAIL C)
AND NO. J31867E-0

SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT
0	11-25-92	M MCLAVERTY	K. TROTTER			
			R. HOOPER			

PURPOSE

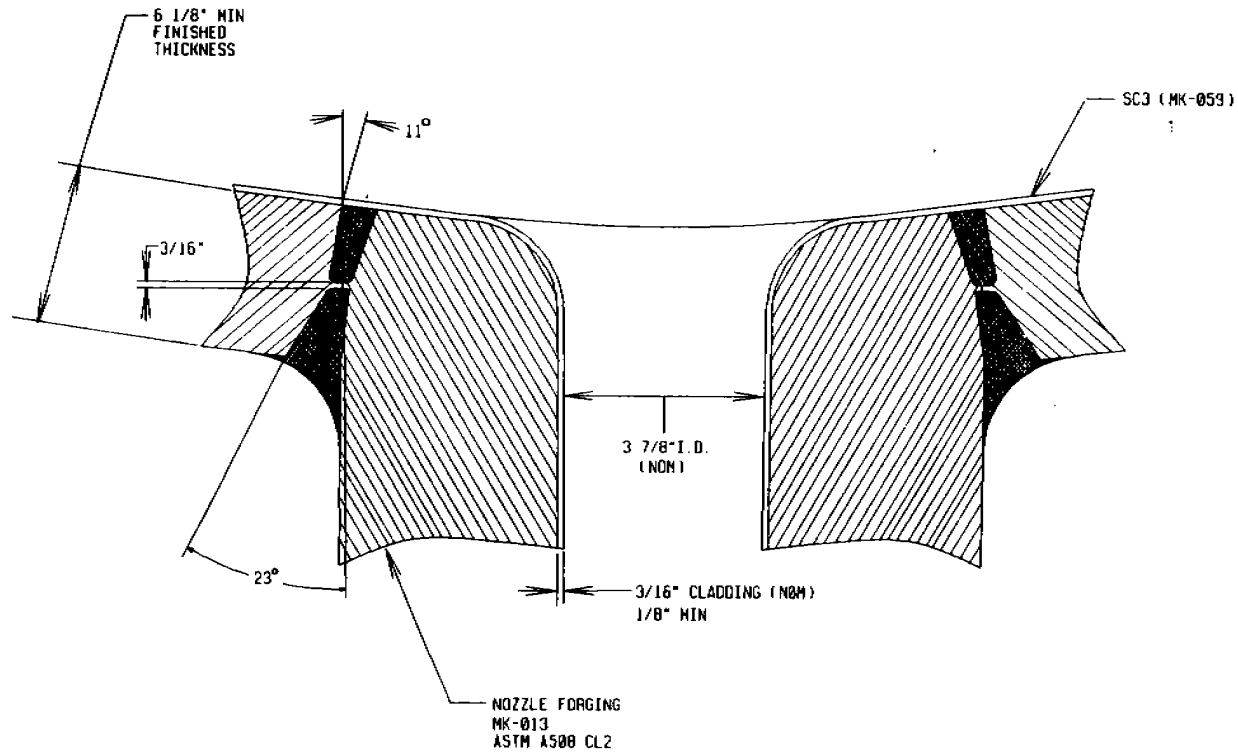
NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND
SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

GE DRP NO.
A00-5306

PROJECT
BROWNS FERRY 3

TITLE
WELD DETAIL JET PUMP
INSTRUMENTATION NOZZLE NB

SKETCH NO
SK-B3019



REFERENCE B&V DRAWING NO. 131840E-5 (DETAIL C)
AND NO. 131847E-4

SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED
0	11-25-92	M MCLAVERITY	K. TROTTER	W R. HOOPER	CA

PURPOSE

NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND
SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

DE OPF NO.

A00-5306

PROJECT

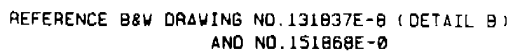
BROWNS FERRY 3

TITLE

WELD DETAIL ORD HYDRAULIC CONTROL
NOZZLE #9

SKETCH NO

SK-B3020



NOTE: THIS SKETCH IS FOR ISI PROGRAM USE ONLY AND SHALL NOT BE USED FOR FABRICATION/INSTALLATION.

DE DAF NO.
A00-5306

PROJECT	BROWNS FERRY 3
---------	----------------

WELD DETAIL DIFFERENTIAL PRESSURE
AND LIQUID CONTROL NOZZLE N10

SK-83022

SKETCH RELEASE RECORD

[illegible]

Enclosure 3

**Tennessee Valley Authority
Browns Ferry Nuclear Plant Unit 3
Request for Relief 3-ISI-28**

Attachment B

Examination Data Reports:

VE-12-10, N1B-NV

VE-12-11, N4A-NV

VE-12-13, N4B-NV

VE-12-15, N4C-NV

VE-12-17, N4D-NV

VE-12-19, N4E-NV

VE-12-21, N4F-NV

VE-12-29, N9-NV

VE-12-30, N10-NV

VE-12-31, N10-IR

UT-14-057, N8A-NV



Ultrasonic Examination

000171

Site/Unit:	BFN / 3	Procedure:	N-UT-78	Outage No.:	U3RF15
Summary No.:	00160-ISI-BFN3	Procedure Rev.:	5	Report No.:	VE-12-010
Workscope:	ISI	Work Order No.:	3-SI-4.6.G	Page:	1 of 1
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0328-C-02	Description:	SHL - NOZ		
System ID:	329 - Reactor Vessel				
Component ID:	N1B-NV	Size/Length:	28 /	Thickness/Diameter:	6.6 / 28
Limitations:	Limitattions due to joint design and configuration				

Comments:

See Original report book for UT data. 25.27% coverage attained. No recordable Indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **NO**

Reviewed Previous Data: **YES**

Examiner	Level	III	Signature	Date	Reviewer	Signature	Date
Mazyck, Edward				4/19/2012	Damon Priestley		4/23/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
NA					F.W.Froschello Jr.	<i>F.W. Froschello Jr.</i>	5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Sam Flood		4/24/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N1B-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N1B-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

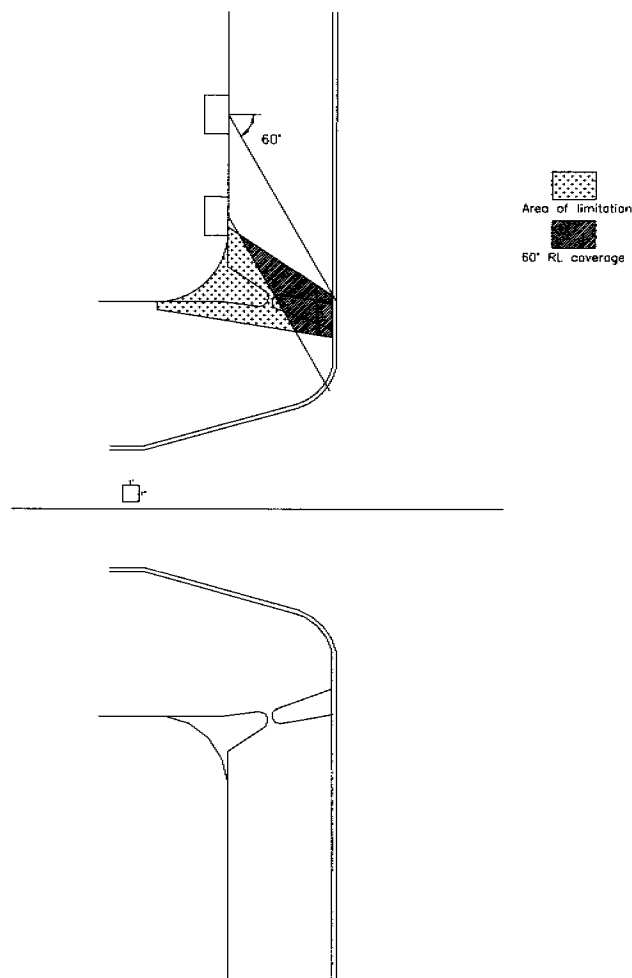
Radial Exam Coverage 100% t

Total examination Area = 38.28 in²

1st Limitation = 24.68 in²

Area Covered = 13.60 in²

Total Examination Coverage = 35.53%





UT Coverage Data Sheet

Report No.: 3-TVA-N1B-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N1B-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage
Outer 85%t exam coverage

Total examination Area = 35.58 in²

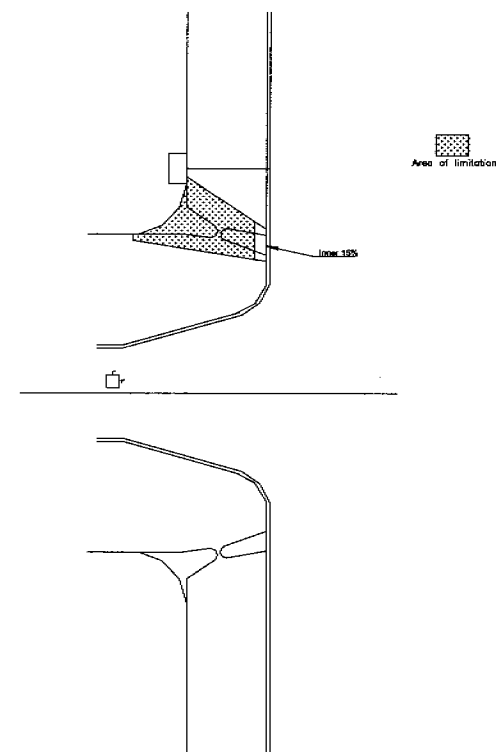
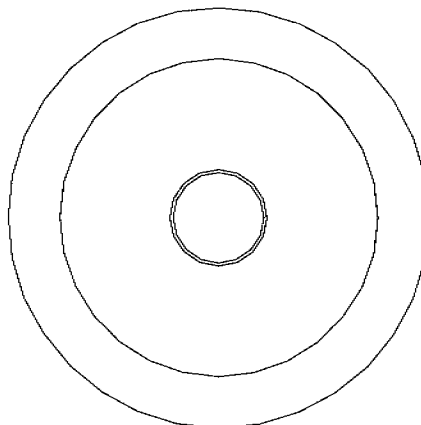
Area of Limitation = 35.58 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area = 0.00%

Total Examination Coverage:

0.00 in² / 35.58 in² = 0.00%



Inner 15% Circ. Exam Coverage

Total examination Area = 2.70 in²

Total Examination Coverage = 2.70 in²

Total Examination Coverage = 100%



RPV Coverage Work Sheet

Report Number: 3-TVA-N1B-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N1B-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	2.15	Weld Width Inches	2.15	Weld Width Inches	2.15
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H I) in ²	38.28
Exam Area (A B C D E F G H I) in ²	38.28	Exam Area (A B C D E F G H I) in ²	38.28	Inner 15% t area in ²	2.70
Area Scanned in ²	13.60	Upper 85% t area in ²	35.59	Area Scanned	2.70
Percentage of Area Scanned	35.53	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	35.53	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: $(35.53\% + 0.00\% + 15.00\%) \div 2 = 25.27\%$

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as defined by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2007-266.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

The exam/coverage area calculations were derived from a CAD drawing based on the available dimensions from TVA supplied drawing number 131840.

Examiner: Nathan Bauman

Sign:

Level: II

Date: 04/19/12

Examiner: Edward P. Mayzck

Sign:

Level: III

Date: 04/19/12

Reviewed By: Victor Morton

Sign:

Level: III

Date: 04/19/12

Page 10 of 10

000210

VE-12-010



Ultrasonic Examination

000173

Site/Unit:	BFN / 3	Procedure:	N-UT-78	Outage No.:	U3RF15
Summary No.:	00175-ISI-BFN3	Procedure Rev.:	5	Report No.:	VE-12-011
Workscope:	ISI	Work Order No.:	3-SI-4.6.G	Page:	1 of 1
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0327-C-01	Description:	NOZ - SHL		
System ID:	329 - Reactor Vessel				
Component ID:	N4A-NV	Size/Length:	12 /	Thickness/Diameter:	6.6 / 12
Limitations:	Limitations due to joint geometry and configuration.				

Comments:

See Original report book for UT data. 32.31% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **NO**

Reviewed Previous Data: **YES**

Examiner	Level	II	Signature	Date	Reviewer	Signature	Date
Gatica, James				4/15/2012	Damon Priestley		4/21/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
A					F.W. Froscello Jr.	<i>F.W. Froscello Jr.</i>	5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Daniel Williams		4/22/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N4A-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4A-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100%t

Total examination Volume = 2251.20³

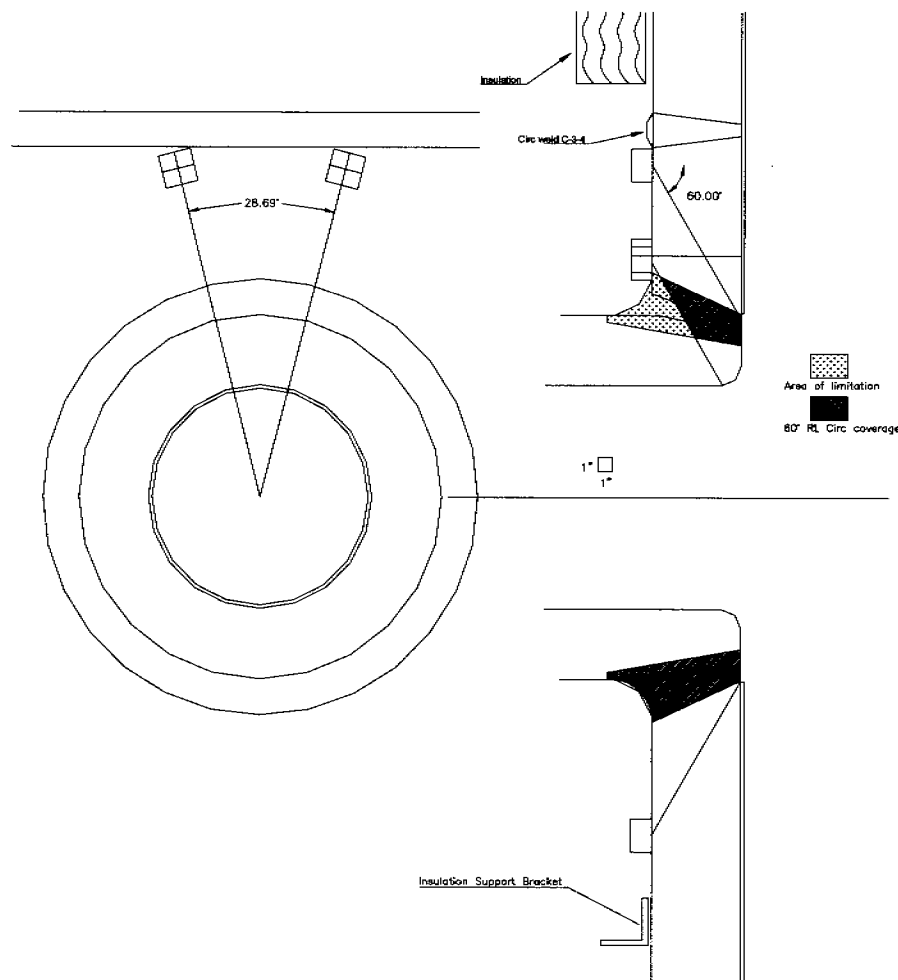
1st Limitation = 1130.95³

2nd Limitation = 0.35³

3rd Limitation = 3.16³

Volume Covered = 1116.74 in³

Total Examination Coverage = 49.61%





UT Coverage Data Sheet

Report No.: 3-TVA-N4A-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

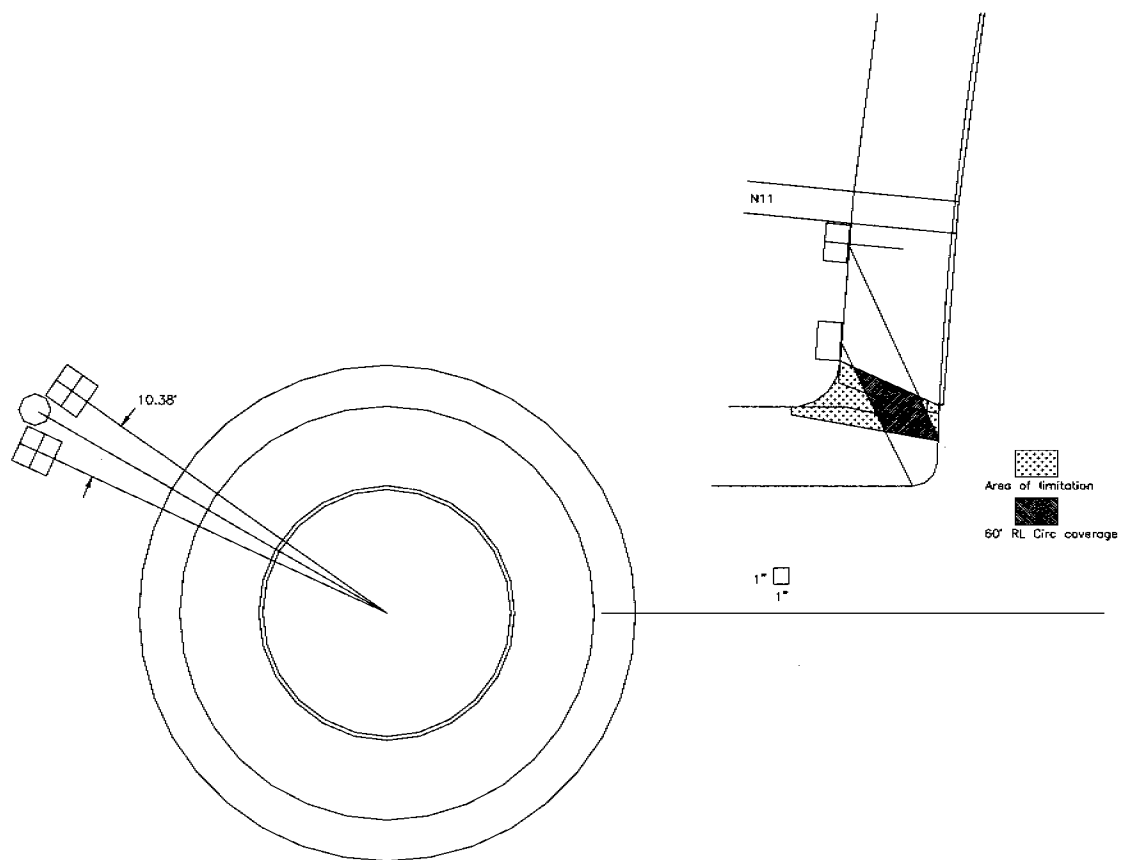
Component Information

Weld ID: N4A-NV

Configuration: Nozzle to Shell

Radial Examination Coverage Limitation in N11 nozzle Area

*See Page 9 for Volumetric Details





UT Coverage Data Sheet

Report No.: 3-TVA-N4A-NV

Coverage Data Sheet No.: CDS-03

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4A-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage 85%t

Total examination Area = 24.38 in²

Area of Limitation = 24.38 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area = 0.00%

Total Examination Coverage:

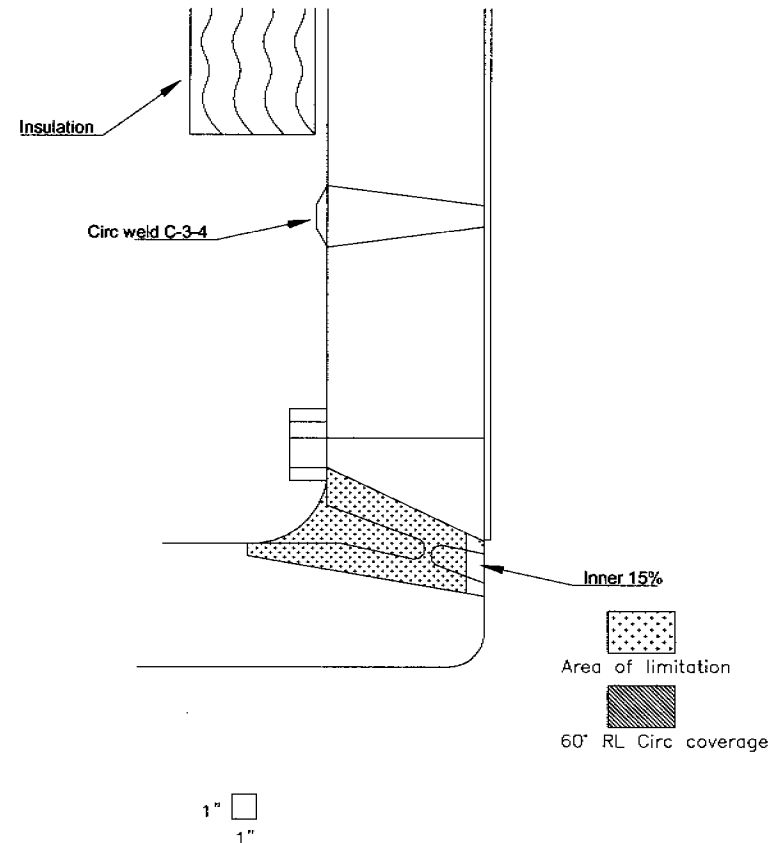
$0.00 \text{ in}^2 / 24.38 \text{ in}^2 = 0.00\%$

Lower 15% Circ. Exam Coverage

Total examination Area = 1.73 in²

Total Examination Coverage = 1.73 in²

Total Examination Coverage = 100%





RPV Coverage Work Sheet

Report Number: 3-TVA-N4A-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N4A-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	2.50	Weld Width Inches	2.50	Weld Width Inches	2.50
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H) in ²	26.11
Exam Area (A B C D E F G H) in ²	2251.20	Exam Area (A B C D E F G H) in ²	26.11	Inner 15% t area in ²	1.73
Area Scanned in ²	1116.74	Upper 85% t volume in ²	24.38	Area Scanned	1.73
Percentage of Area Scanned	49.61	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	49.61	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: $(49.61 + 0.00\% + 15.00\%) \div 2 = 32.31\%$

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as defined by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

Examiner: George Chapman
Sign:

Level: II

Date: 04/15/12

Examiner: James Galica
Sign:

Level: II

Date: 04/15/12

Reviewed By: Victor Morton
Sign:

Level: III

Date: 04/16/12

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VE-12-011
000223



Ultrasonic Examination

000176

Site/Unit:	BFN / 3	Procedure:	N-UT-78	Outage No.:	U3RF15
Summary No.:	00176-ISI-BFN3	Procedure Rev.:	5	Report No.:	VE-12-013
Workscope:	ISI	Work Order No.:	3-SI-4.6.G	Page:	1 of 1
<hr/>					
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0327-C-01	Description:	NOZ - SHL		
System ID:	329 - Reactor Vessel				
Component ID:	N4B-NV	Size/Length:	12 /	Thickness/Diameter:	6.6 / 12
Limitations:	Limitations due to joint design and configuration				

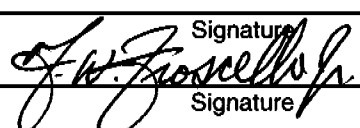
Comments:

See Original report book for UT data. 32.38% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No**

Reviewed Previous Data: **Yes**

Examiner	Level	II	Signature	Date	Reviewer	Signature	Date
Gatica, James				4/18/2012	Damon Priestley		4/21/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
A					F.W. Froscello Jr.		5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Daniel Williams		4/23/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N4B-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4B-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100% t

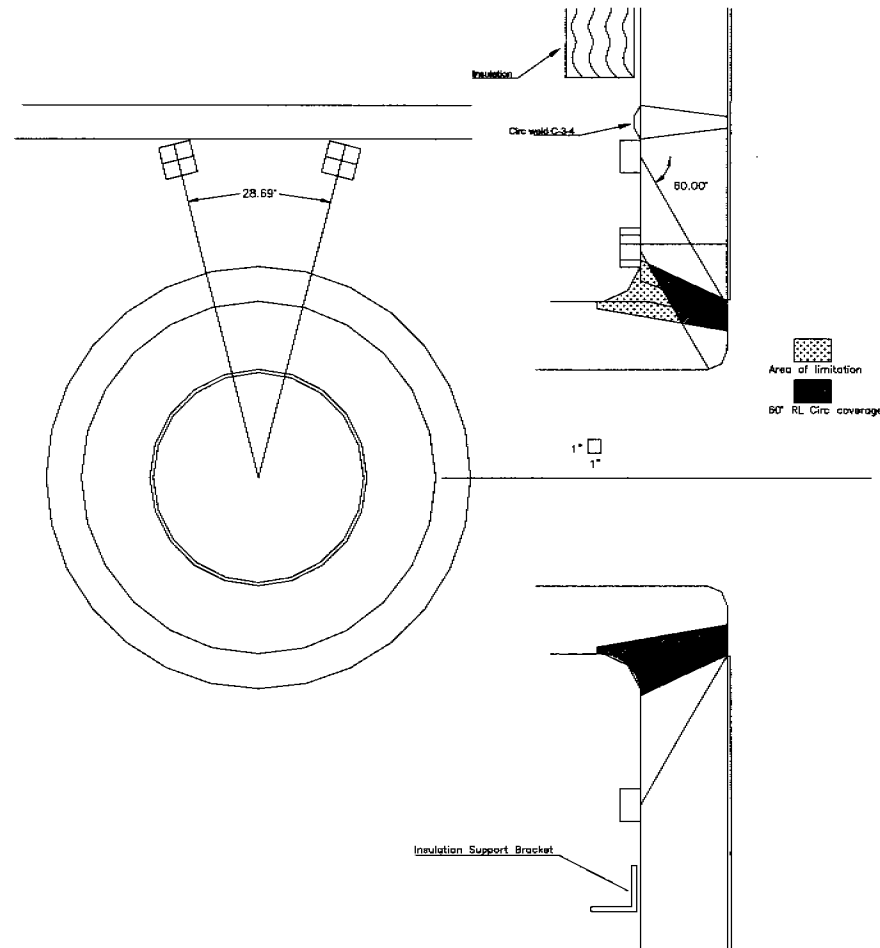
Total examination Volume = 2251.20 in³

1st Limitation = 1130.95 in³

2nd Limitation = 0.35 in³

Volume Covered = 1119.90 in³

Total Examination Coverage = 49.75%





UT Coverage Data Sheet

Report No.: 3-TVA-N4B-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4B-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage
Outer 85%t exam coverage

Total examination Area = 24.38 in²

Area of Limitation = 24.38 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area
= 0.00%

Total Examination Coverage:

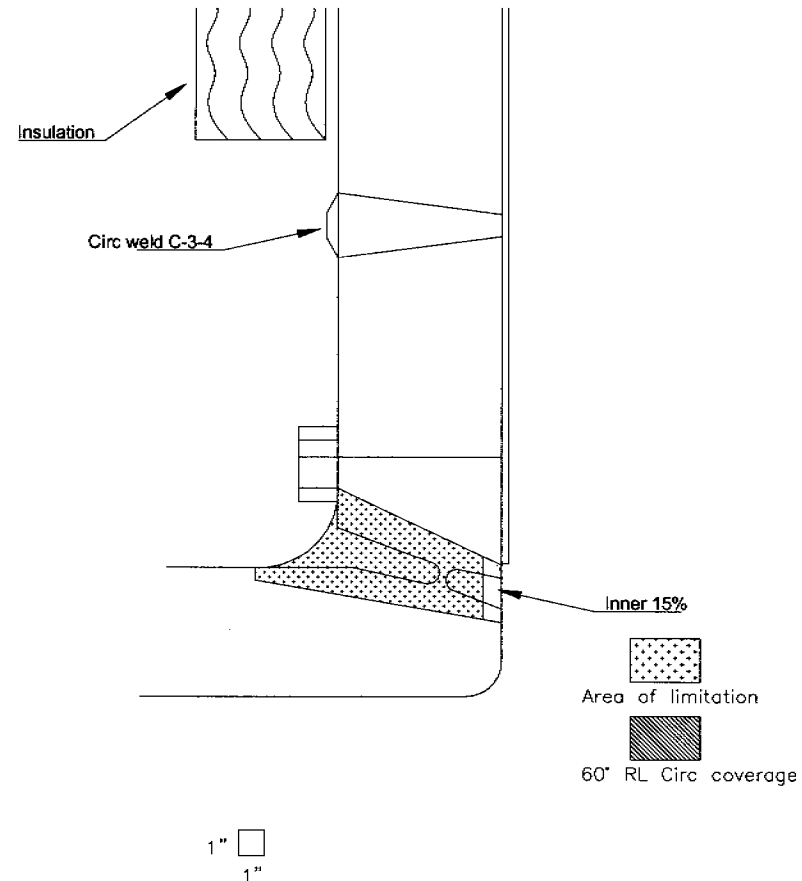
0.00 in² / 25.06 in² = 0.00%

Inner 15% Circ. Exam Coverage

Total examination Area = 1.73 in²

Total Examination Coverage = 1.73 in²

Total Examination Coverage = 100%





RPV Coverage Work Sheet

Report Number: 3-TVA-N4B-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N4B-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	2.50	Weld Width Inches	2.50	Weld Width Inches	2.50
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H I) in ²	26.11
Exam Area (A B C D E F G H I) in ³	2251.20	Exam Area (A B C D E F G H I) in ²	26.11	Inner 15% t area in ²	1.73
Area Scanned in ³	1119.90	Upper 85% t area in ²	24.38	Area Scanned	1.73
Percentage of Area Scanned	49.75	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	49.75	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: $(49.75\% + 0.00\% + 15.00\%) \div 2 = 32.38\%$

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as define by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

The exam/coverage area calculations were derived from a CAD drawing based on the available dimensions from TVA supplied drawing number 131840.

Examiner: George Chapman
Sign:

Level: II

Date: 04/18/12

Examiner: James Gatica
Sign:

Level: II

Date: 04/18/12

Reviewed By: Victor Morton
Sign:

Level: III

Date: 04/19/12

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VE-12-013
000245



Ultrasonic Examination

000179

Site/Unit: BFN / 3 Procedure: N-UT-78 Outage No.: U3RF15
Summary No.: 00177-ISI-BFN3 Procedure Rev.: 5 Report No.: VE-12-015
Workscope: ISI Work Order No.: 3-SI-4.6.G Page: 1 of 1
Code: Section XI 2001 Ed/2003 Add Cat./Item: B-D/B3.90 Location: REACTOR BUILDING-DRYWELL
Drawing No.: 3-ISI-0327-C-01 Description: NOZ - SHL
System ID: 329 - Reactor Vessel
Component ID: N4C-NV Size/Length: 12 / Thickness/Diameter: 6.6 / 12
Limitations: Limitations due to joint design and configuration

Comments:

See Original report book for UT data. 32.38% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%:

No

Reviewed Previous Data:

Yes

Examiner	Level	III	Signature	Date	Reviewer	Signature	Date
Kleijan, David				4/14/2012	Damon Priestley		4/23/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
NA					F.W.Froschello Jr.	<i>F.W. Froschello Jr.</i>	5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Daniel Williams		4/24/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N4C-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4C-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100% t

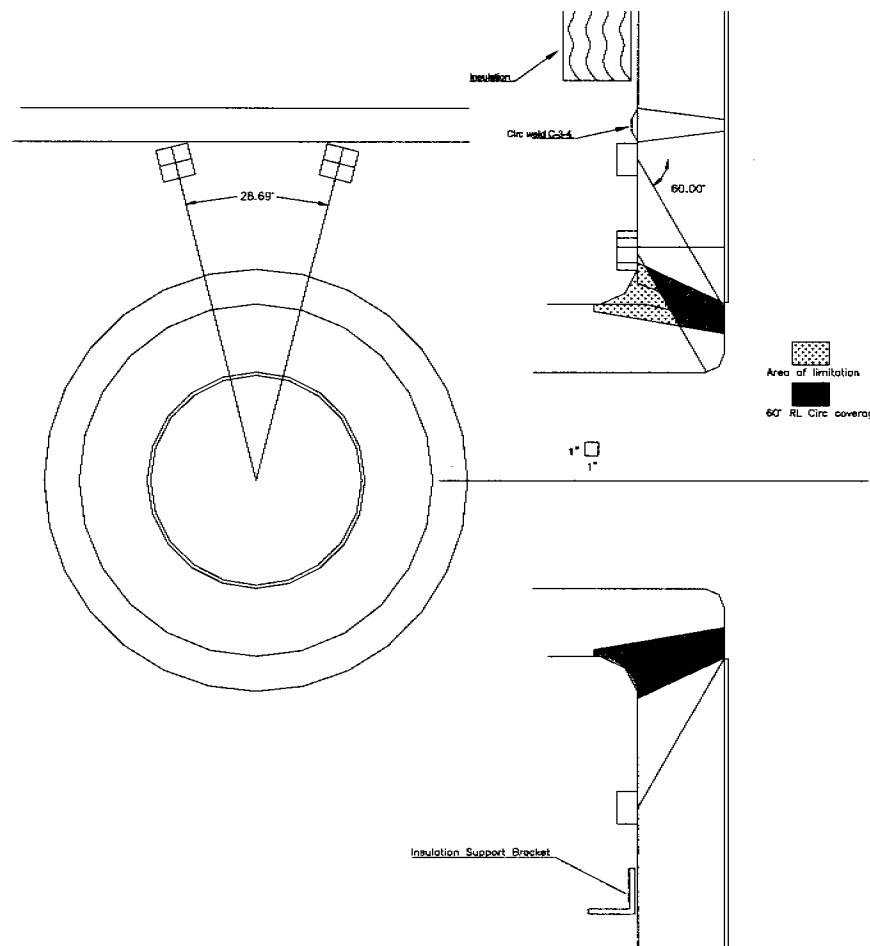
Total examination Volume = 2251.20 in³

1st Limitation = 1130.95 in³

2nd Limitation = 0.35 in³

Volume Covered = 1119.90 in³

Total Examination Coverage = 49.75%





UT Coverage Data Sheet

Report No.: 3-TVA-N4C-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4C-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage Outer 85%t exam coverage

Total examination Area = 24.38 in²

Area of Limitation = 24.38 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area = 0.00%

Total Examination Coverage:

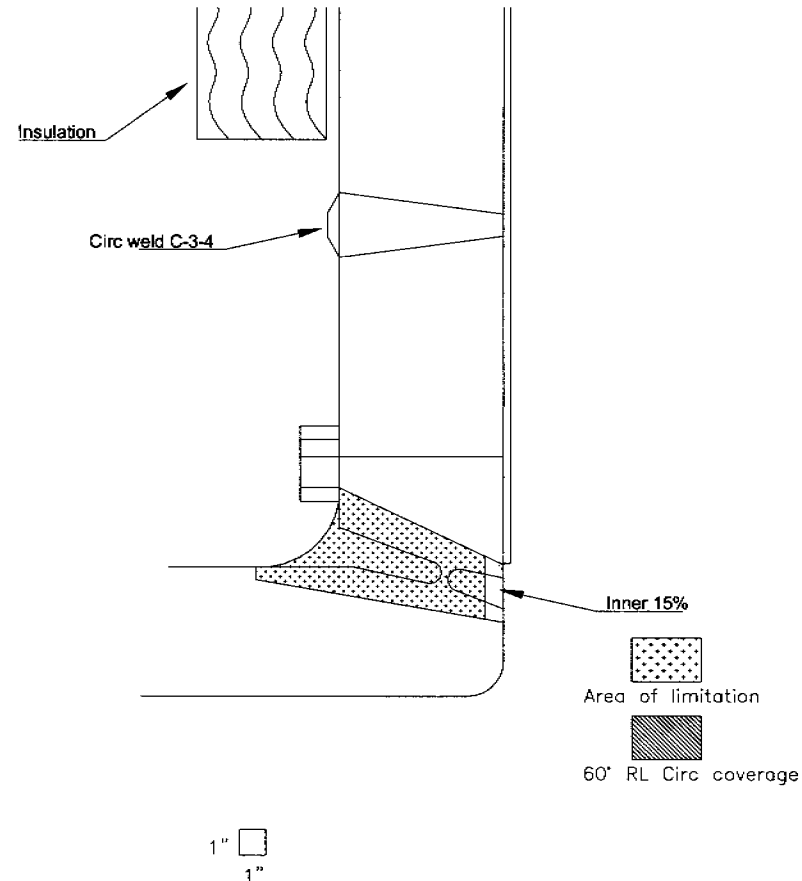
$0.00 \text{ in}^2 / 24.38 \text{ in}^2 = 0.00\%$


Inner 15% Circ. Exam Coverage

Total examination Area = 1.73 in²

Total Examination Coverage = 1.73 in²

Total Examination Coverage = 100%



	RPV Coverage Work Sheet				Report Number: 3-TVA-N4C-NV	
Customer Information					Component Information	
Utility: TVA	Plant: BFN	Unit: 3	Outage: U3R15	Weld ID: N4C-NV	Work Sheet Number: CWS-01	

60°RL Radial Scan (N-UT-78-0005) 100% t volume Thickness (ts) Inches 6.60 Weld Width Inches 2.50 Code Case N-613-1 Exam Area (A B C D E F G H I) in ² 2251.20 Area Scanned in ² 1119.90 Percentage of Area Scanned 49.75 Coverage Radial Scan 100% t Volume 49.75	60°RL Circ Scan (N-UT-78-0005) 85% t volume Thickness (ts) Inches 6.60 Weld Width Inches 2.50 Code Case N-613-1 Exam Area (A B C D E F G H I) in ² 26.11 Upper 85% t area in ² 24.38 Area Scanned 0.00 Percentage of Area Scanned 0.00 Coverage Circ Scan Upper 85% t Volume 0.00	Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled) Thickness (ts) Inches 6.60 Weld Width Inches 2.50 Exam Area (A B C D E F G H I) in ² 26.11 Inner 15% t area in ² 1.73 Area Scanned 1.73 Percentage of Area Scanned 100.0 Coverage Circ Scan Inner 15% t Volume 15.00
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Total Coverage Radial and Circ Scans: (49.75% + 0.00% + 15.00%) ÷ 2 = 32.38%
(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as define by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

The exam/coverage area calculations were derived from a CAD drawing based on the available dimensions from TVA supplied drawing number 131840.

Examiner: Nathan Bauman Sign: 	Level: II	Date: 04/14/12	Examiner: David Kleinjan Sign: 	Level: III	Date: 04/14/12
Reviewed By: Victor Morton Sign: 	Level: III	Date: 04/14/12	Page 11 of 11		

VE-12-015-000267



Ultrasonic Examination

000182

Site/Unit: **BFN / 3**

Procedure: **N-UT-78**

Outage No.: **U3RF15**

Summary No.: **00178-ISI-BFN3**

Procedure Rev.: **5**

Report No.: **VE-12-017**

Workscope: **ISI**

Work Order No.: **3-SI-4.6.G**

Page: **1** of **1**

Code: **Section XI 2001 Ed/2003 Add** Cat./Item: **B-D/B3.90** Location: **REACTOR BUILDING-DRYWELL**

Drawing No.: **3-ISI-0327-C-01** Description: **NOZ - SHL**

System ID: **329 - Reactor Vessel**

Component ID: **N4D-NV** Size/Length: **12 /** Thickness/Diameter: **6.6 / 12**

Limitations: **Limitation=s due to joint design and configuration**

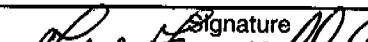
Comments:

See Original report book for UT data. 32.31% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **Yes**

Reviewed Previous Data: **Yes**

Examiner	Level		Signature	Date	Reviewer	Signature	Date
Gatica, James				4/18/2012	Damon Priestley		4/21/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
NA					F.W. Froscello Jr.		5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Daniel Williams		4/21/2012



UT Coverage Data Sheet

Report No.: 3-TVD-N4D-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4D-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100%

Total examination Volume = 2251.20³

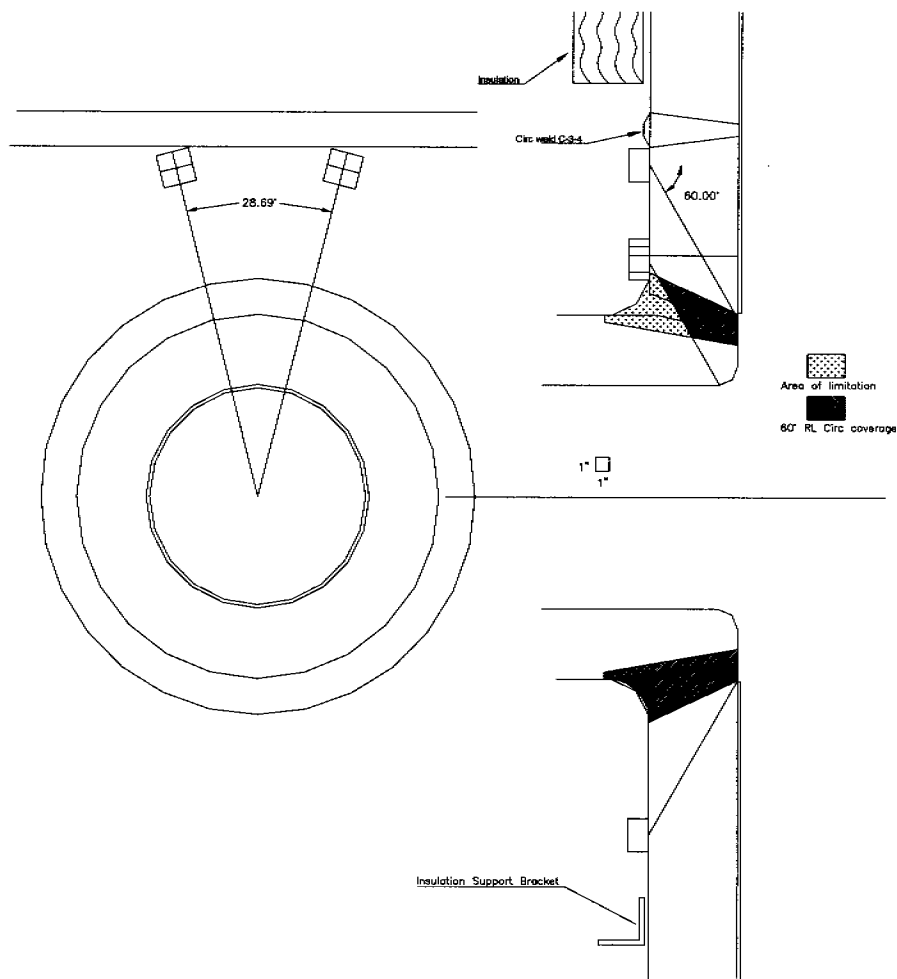
1st Limitation = 1130.95³

2nd Limitation = 0.35³

3rd Limitation = 3.16³

Volume Covered = 1116.74 in³

Total Examination Coverage = 49.61%





UT Coverage Data Sheet

Report No.: 3-TVA-N4D-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

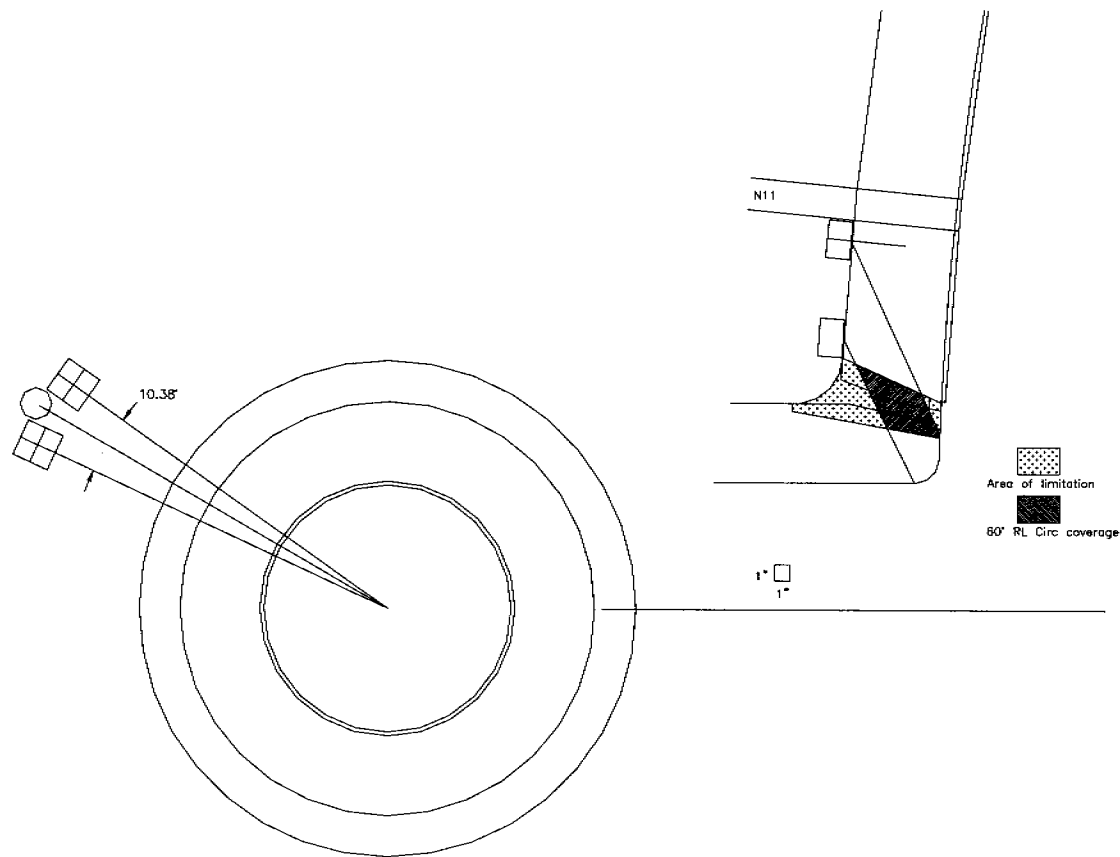
Component Information

Weld ID: N4D-NV

Configuration: Nozzle to Shell

Radial Examination Coverage Limitation in N11 nozzle Area

*See Page 9 for Volumetric Details





UT Coverage Data Sheet

Report No.: 3-TVA-N4D-NV

Coverage Data Sheet No.: CDS-03

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4D-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage 85%t

Total examination Area = 24.38 in²

Area of Limitation = 24.38 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area = 0.00%

Total Examination Coverage:

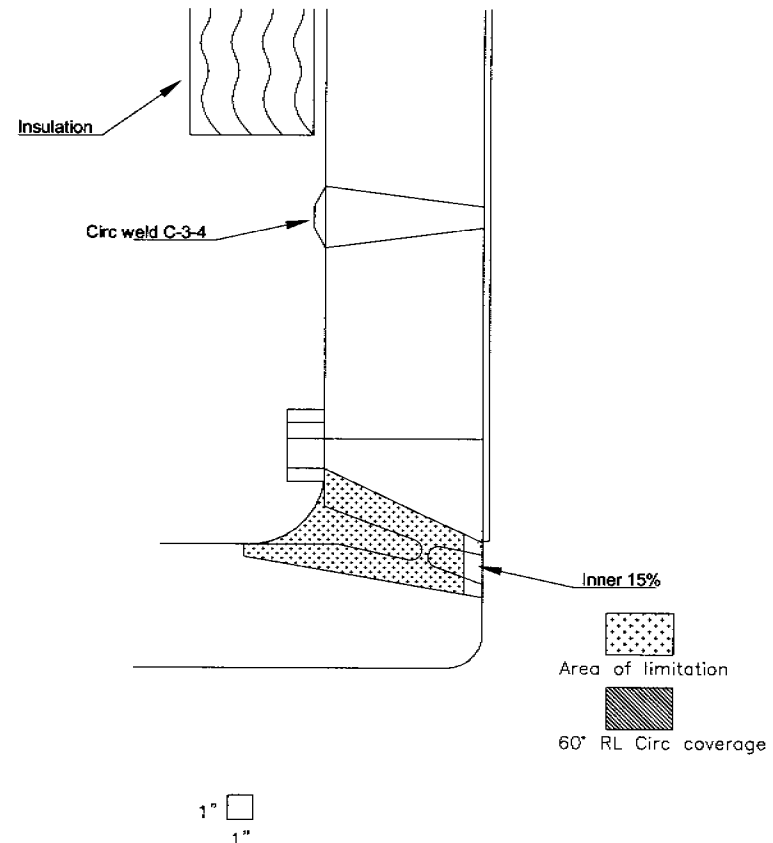
0.00 in² / 24.38 in² = 0.00%

Lower 15% Circ. Exam Coverage

Total examination Area = 1.73 in²

Total Examination Coverage = 1.73 in²

Total Examination Coverage = 100%



VE-12-017 000289



RPV Coverage Work Sheet

Report Number: 3-TVA-N4D-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N4D-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	2.50	Weld Width Inches	2.50	Weld Width Inches	2.50
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H) in ²	26.11
Exam Area (A B C D E F G H) in ³	2251.20	Exam Area (A B C D E F G H) in ²	26.11	Inner 15% t area in ²	1.73
Area Scanned in ³	1116.74	Upper 85% t volume in ²	24.38	Area Scanned	1.73
Percentage of Area Scanned	49.61	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	49.61	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: $(49.61 + 0.00\% + 15.00\%) \div 2 = 32.31\%$

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as defined by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

Examiner: George Chapman
Sign:

Level: II

Date: 04/18/12

Examiner: James Gatica
Sign:

Level: II

Date: 04/18/12

Reviewed By: Victor Morton
Sign:

Level: III

Date: 04/19/12

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VE-12-017

000290



Ultrasonic Examination

000183

Site/Unit:	BFN / 3	Procedure:	N-UT-78	Outage No.:	U3RF15
Summary No.:	00179-ISI-BFN3	Procedure Rev.:	5	Report No.:	VE-12-019
Workscope:	ISI	Work Order No.:	3-SI-4.6.G	Page:	1 of 1
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0327-C-01	Description:	NOZ - SHL		
System ID:	329 - Reactor Vessel				
Component ID:	N4E-NV	Size/Length:	12 /	Thickness/Diameter:	6.6 / 12
Limitations:	Limitations due to joint design and configuration				

Comments:

See Original report book for UT data. 32.28% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No**

Reviewed Previous Data: **Yes**

Examiner	Level	III	Signature	Date	Reviewer	Signature	Date
Kleijan, David				4/14/2012	Damon Priestley		4/23/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
A					F.W. Froscello Jr.		5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Daniel Williams		4/24/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N4E-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4E-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100% t

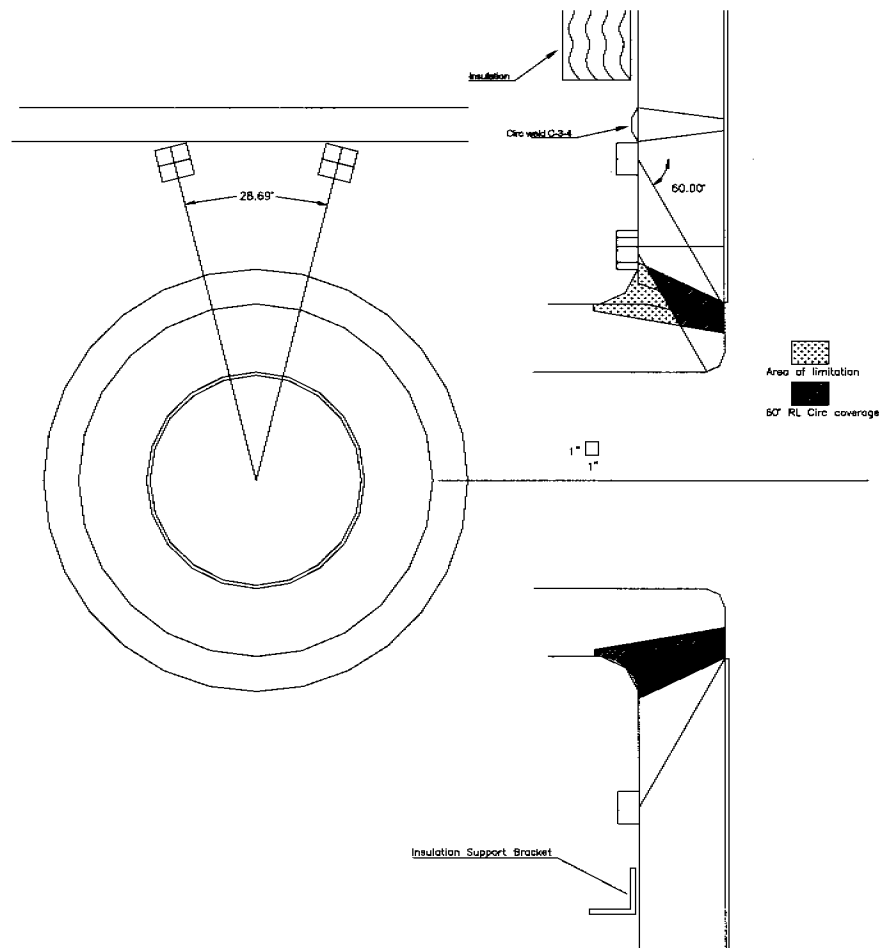
Total examination Volume = 2251.20 in³

1st Limitation = 1130.95 in³

2nd Limitation = 0.35 in³

Volume Covered = 1119.90 in³

Total Examination Coverage = 49.75%





UT Coverage Data Sheet

Report No.: 3-TVA-N4E-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4E-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage
Outer 85%t exam coverage

Total examination Area = 24.38 in²

Area of Limitation = 24.38 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area = 0.00%

Total Examination Coverage:

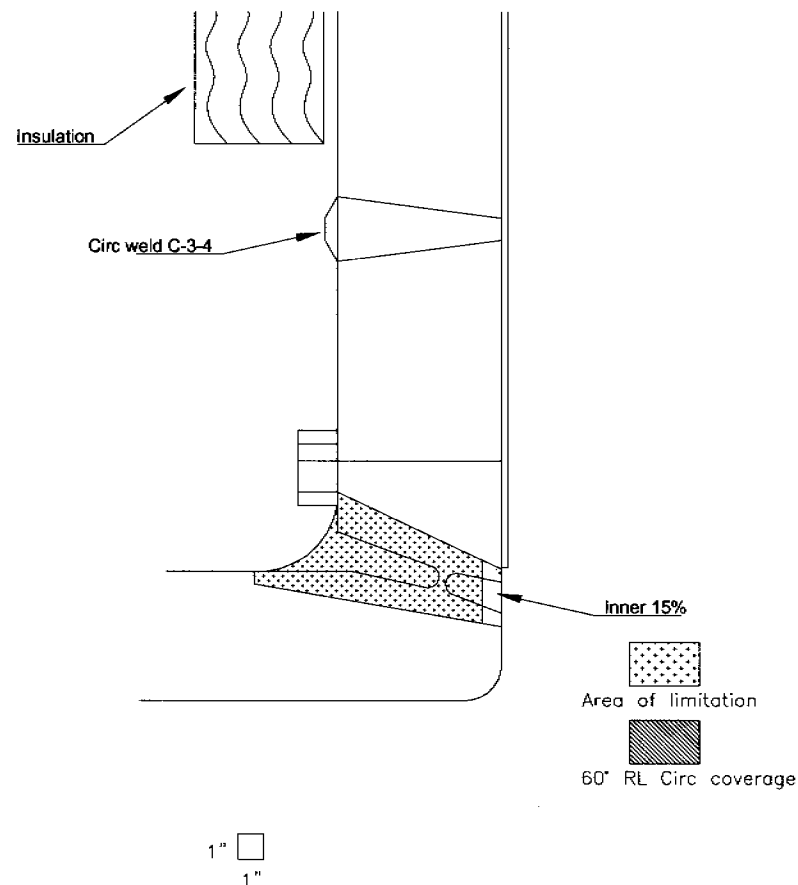
0.00 in² / 24.38 in² = 0.00%

Inner 15% Circ. Exam Coverage

Total examination Area = 1.73 in²

Total Examination Coverage = 1.73 in²

Total Examination Coverage = 100%





RPV Coverage Work Sheet

Report Number: 3-TVA-N4E-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N4E-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	2.50	Weld Width Inches	2.50	Weld Width Inches	2.50
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H I) in ²	26.11
Exam Area (A B C D E F G H I) in ²	2251.20	Exam Area (A B C D E F G H I) in ²	26.11	Inner 15% t area in ²	1.73
Area Scanned in ²	1119.90	Upper 85% t area in ²	24.38	Area Scanned	1.73
Percentage of Area Scanned	49.75	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	49.75	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: (49.75% + 0.00% + 15.00%) ÷ 2 = 32.38%*(See Radial and Circumferential coverage sheets for more detail.)*

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as defined by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

The exam/coverage area calculations were derived from a CAD drawing based on the available dimensions from TVA supplied drawing number 131840.

Examiner: Nathan Bauman

Sign:

Level: II

Date: 04/14/12

Examiner: David Kleinjan

Sign:

Level: III

Date: 04/14/12

Reviewed By: Victor Morton

Sign:

Level: III

Date: 04/15/12

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VE-12-019 000312



Ultrasonic Examination

000188

Site/Unit: **BFN / 3**

Procedure: **N-UT-78**

Outage No.: **U3RF15**

Summary No.: **00180-ISI-BFN3**

Procedure Rev.: **5**

Report No.: **VE-12-021**

Workscope: **ISI**

Work Order No.: **3-SI-4.6.G**

Page: **1** of **1**

Code: **Section XI 2001 Ed/2003 Add** Cat./Item: **B-D/B3.90** Location: **REACTOR BUILDING-DRYWELL**

Drawing No.: **3-ISI-0327-C-01** Description: **NOZ - SHL**

System ID: **329 - Reactor Vessel**

Component ID: **N4F-NV** Size/Length: **12 /** Thickness/Diameter: **6.6 / 12**

Limitations: **Limitations due to joint design and configuration**

Comments:

See Original report book for UT data. 32.28% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No**

Reviewed Previous Data: **Yes**

Examiner	Level	II	Signature	Date	Reviewer	Signature	Date
Gatica, James				4/18/2012	Damon Priestley		4/21/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
NA					F.W. froscello Jr.	<i>F.W. Froscello Jr.</i>	5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Sam Flood		4/23/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N4F-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4F-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100% t

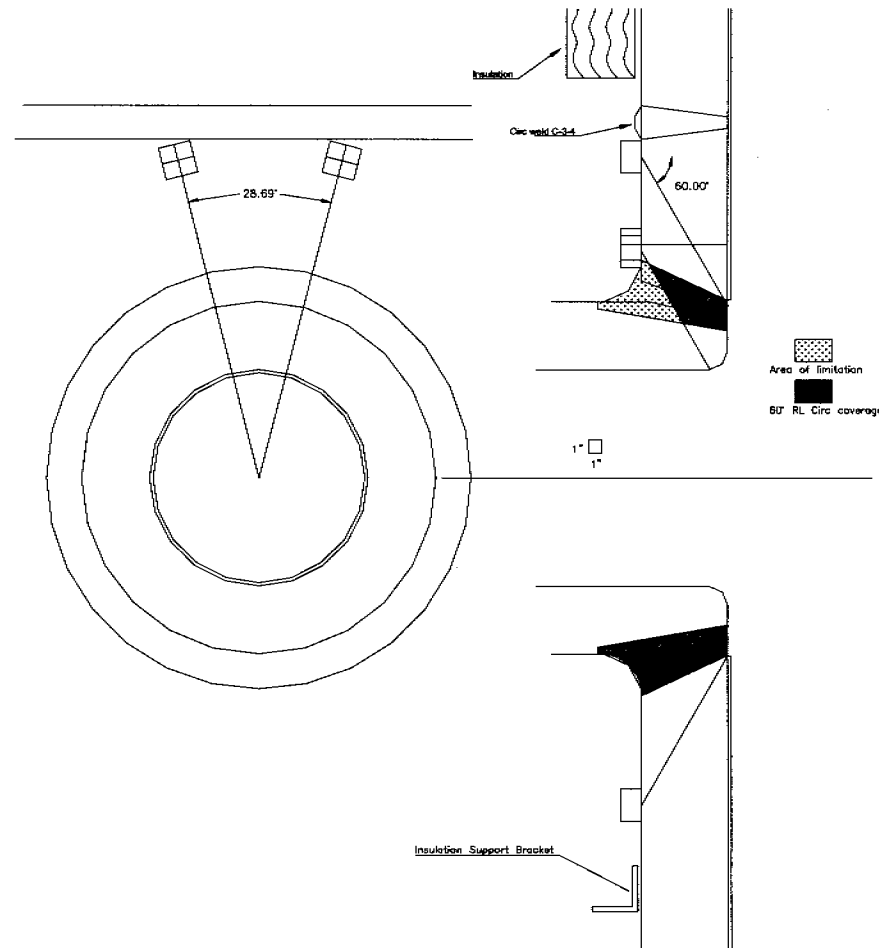
Total examination Volume = 2251.20 in³

1st Limitation = 1130.95 in³

2nd Limitation = 0.35 in³

Volume Covered = 1119.90 in³

Total Examination Coverage = 49.75%





UT Coverage Data Sheet

Report No.: 3-TVA-N4F-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N4F-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage
Outer 85%t exam coverage

Total examination Area = 24.38 in²

Area of Limitation = 24.38 in²

Area Examined = 0.00 in²

Total Area Examined / Total Area
= 0.00%

Total Examination Coverage:

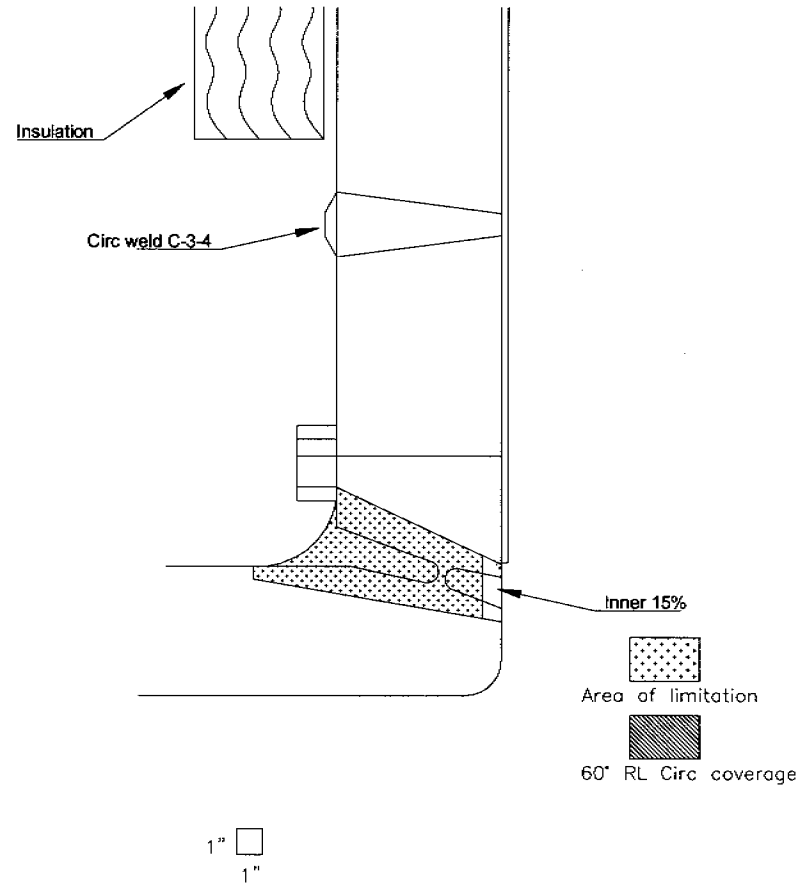
0.00 in² / 25.06 in² = 0.00%

Inner 15% Circ. Exam Coverage

Total examination Area = 1.73 in²

Total Examination Coverage = 1.73 in²

Total Examination Coverage = 100%





RPV Coverage Work Sheet

Report Number: 3-TVA-N4F-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N4F-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	2.50	Weld Width Inches	2.50	Weld Width Inches	2.50
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H I) in ²	26.11
Exam Area (A B C D E F G H I) in ²	2251.20	Exam Area (A B C D E F G H I) in ²	26.11	Inner 15% t area in ²	1.73
Area Scanned in ²	1119.90	Upper 85% t area in ²	24.38	Area Scanned	1.73
Percentage of Area Scanned	49.75	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	49.75	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: $(49.75\% + 0.00\% + 15.00\%) \div 2 = 32.38\%$

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as define by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

The exam/coverage area calculations were derived from a CAD drawing based on the available dimensions from TVA supplied drawing number 131840.

Examiner: George Chapman
Sign:

Level: II

Date: 04/18/12

Examiner: James Gatica
Sign:

Level: II

Date: 04/18/12

Reviewed By: Victor Morton
Sign:

Level: III

Date: 04/19/12

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VE-12-021 000334



Ultrasonic Examination

000191

Site/Unit:	BFN / 3	Procedure:	N-UT-78	Outage No.:	U3RF15
Summary No.:	00188-ISI-BFN3	Procedure Rev.:	5	Report No.:	VE-12-029
Workscope:	ISI	Work Order No.:	3-SI-4.6.G	Page:	1 of 1
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0220-C-01	Description:	SHL - NOZ		
System ID:	329 - Reactor Vessel				
Component ID:	N9-NV	Size/Length:	4 /	Thickness/Diameter:	6.6 / 4
Limitations:	Limitations due to joint design and configuration.				

Comments:

See Original report book for UT data. 27.96% coverage attained. No recordable indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No**

Reviewed Previous Data: **Yes**

Examiner	Level	III	Signature	Date	Reviewer	Signature	Date
KLEINJAN, DAVID R				4/16/2012	Damon Priestley		4/23/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
NA					F.W. Froscello Jr.	<i>F.W. Froscello Jr.</i>	5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Sam Flood		4/23/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N9-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

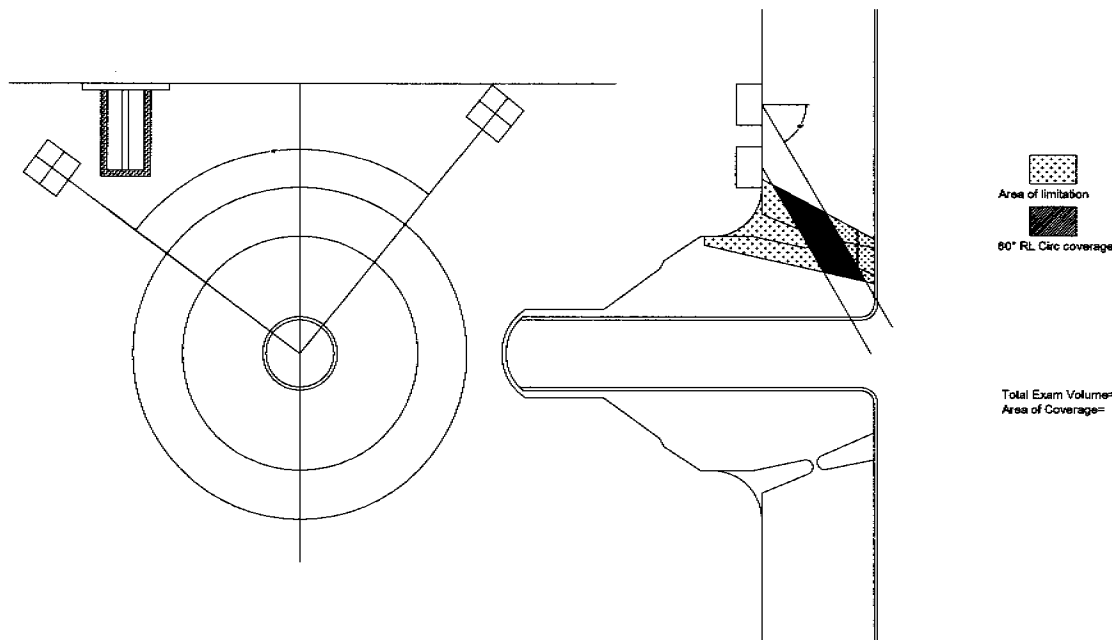
Weld ID: N9-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Exam Coverage 100% t

Total examination Area = 1412.29 in³
1st Limitation = 791.11 in³
2nd Limitation = 43.30 in³
Area Covered = 577.88 in³
Total Examination Coverage = 40.92%





UT Coverage Data Sheet

Report No.: 3-TVA-N9-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N9-NV

Configuration: Nozzle to Shell

Circumferential Examination Coverage

Circ. Examination Coverage Outer 85%t exam coverage

Total examination Area = 29.67in²

Area of Limitation = 29.67in²

Area Examined = 0.00 in²

Total Area Examined / Total Area = 0.00%

Total Examination Coverage:

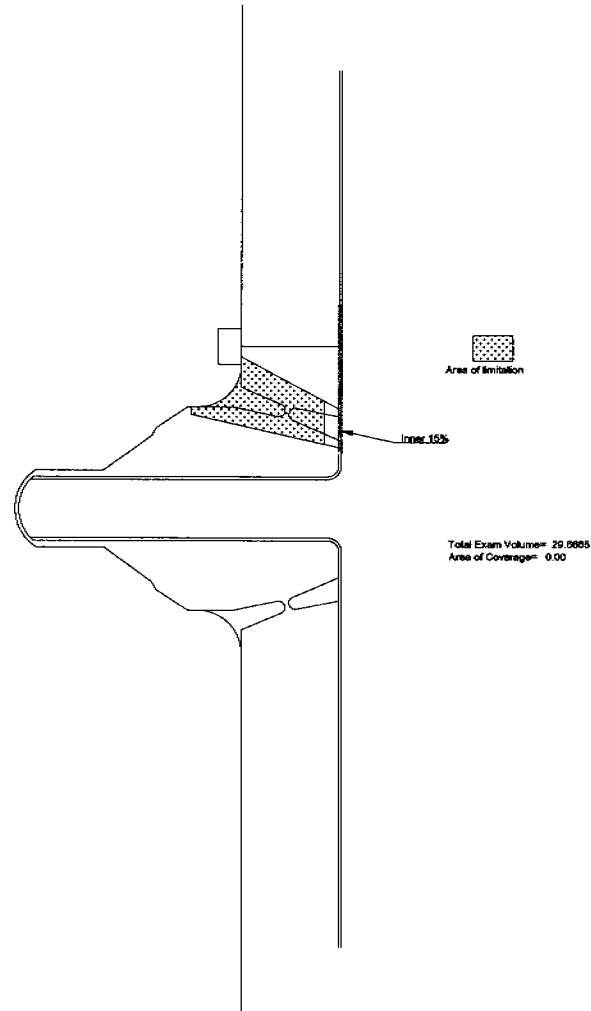
0.00 in² / 29.67in² = 0.00%

Inner 15% Circ Exam Coverage

Total Examination Area = 2.61 in²

Total Examination Coverage = 2.61 in

Total Examination Coverage = 100%



VF-12-029
000356



RPV Coverage Work Sheet

Report Number: 3-TVA-N9-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: U3R15

Weld ID: N9-NV

Work Sheet Number: CWS-01

60°RL Radial Scan (N-UT-78-0005) 100% t volume		60°RL Circ Scan (N-UT-78-0005) 85% t volume		Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60	Thickness (ts) Inches	6.60
Weld Width Inches	1.28	Weld Width Inches	1.28	Weld Width Inches	1.28
Code Case N-613-1		Code Case N-613-1		Exam Area (A B C D E F G H I) in ²	29.67
Exam Area (A B C D E F G H I) in ²	1412.29	Exam Area (A B C D E F G H I) in ²	29.67	Inner 15% t area in ²	2.61
Area Scanned in ²	577.88	Upper 85% t area in ²	27.05	Area Scanned	2.61
Percentage of Area Scanned	40.92	Area Scanned	0.00	Percentage of Area Scanned	100.0
		Percentage of Area Scanned	0.00		
Coverage Radial Scan 100% t Volume	40.92	Coverage Circ Scan Upper 85% t Volume	0.00	Coverage Circ Scan Inner 15% t Volume	15.00

Total Coverage Radial and Circ Scans: $(40.92\% + 0.00\% + 15.00\%) \div 2 = 27.96\%$

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as define by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2006-236.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

The exam/coverage area calculations were derived from a CAD drawing based on the available dimensions from TVA supplied drawing number 131840.

Examiner: Nathan Bauman

Sign:

Level: II

Date: 04/14/12

Examiner: David Kleinjan

Sign:

Level: III

Date: 04/14/12

Reviewed By: Victor Morton

Sign:

Level: III

Date: 04/14/12

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VE-12-029
000257



Ultrasonic Examination

000193

Site/Unit:	BFN / 3	Procedure:	N-UT-78	Outage No.:	U3RF15
Summary No.:	00158-ISI-BFN3	Procedure Rev.:	5	Report No.:	VE-12-030
Workscope:	ISI	Work Order No.:	3-SI.4.6.G	Page:	1 of 1
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0445-C-01	Description:	NOZ - SHL		
System ID:	329 - Reactor Vessel				
Component ID:	N10-NV	Size/Length:		Thickness/Diameter:	
Limitations:	Limitations due to joint design and configuration				

Comments:

See Original report book for UT data. 74.10% coverage attained. No recordable Indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No**

Reviewed Previous Data: **Yes**

Examiner	Level	III	Signature	Date	Reviewer	Signature	Date
Kleijan, David				4/9/2012	Damon Priestley		4/13/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
NA					F.W. Froscello Jr.		5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
NA					Daniel Williams		4/17/2012



UT Coverage Data Sheet

Report No.: 3-TVA-N10-NV

Coverage Data Sheet No.: CDS-01

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N10-NV

Configuration: Nozzle to Shell

Radial Examination Coverage

Radial Examination Coverage

Weld Length = 18.64"
Exam Area = 5.78"x 2.83"
Total examination Volume = 304.90ⁱⁿ³

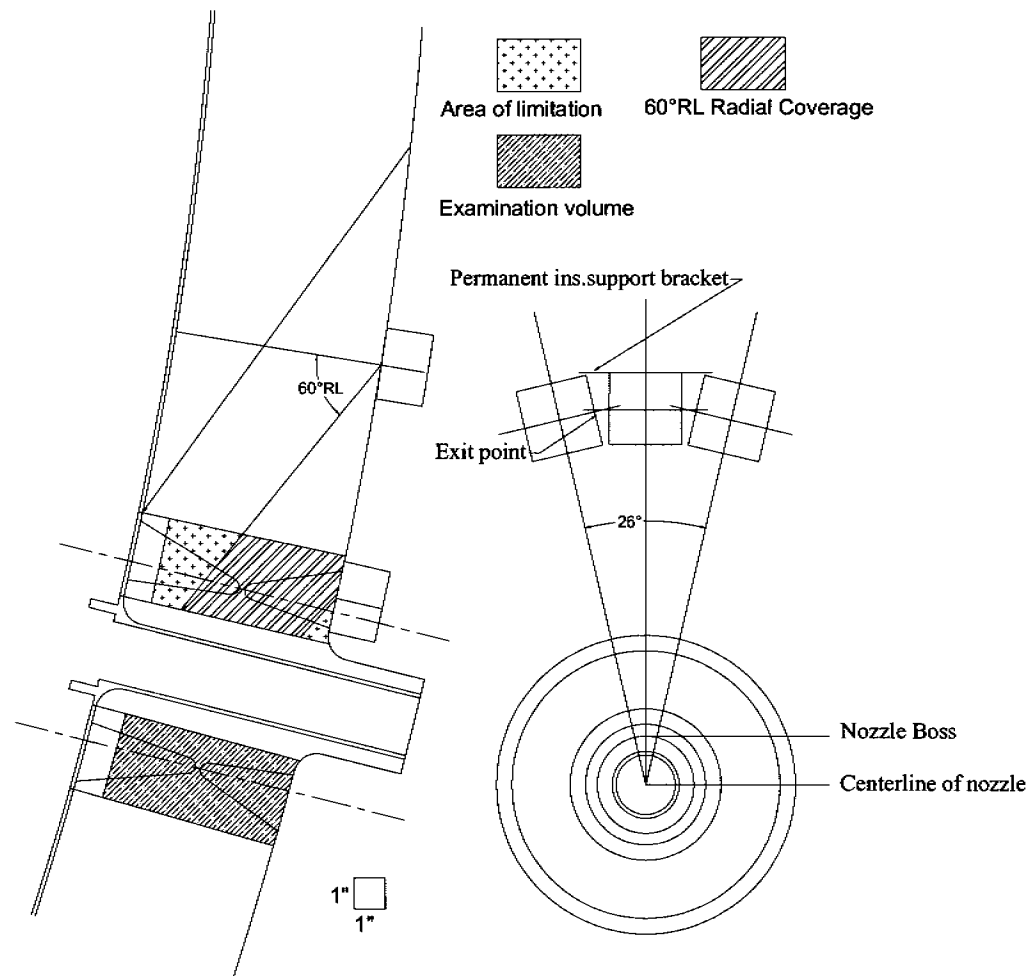
Volume of 1st Limitation = 13.05ⁱⁿ³
Volume of 2nd Limitation = 6.16ⁱⁿ³

Volume Examined = 285.74 in³

Total Volume Examined / Total Volume = 93.70%

Total Examination Coverage:

285.74 in³ / 304.95 in³ = **93.70%**





UT Coverage Data Sheet

Report No.: 3-TVA-N10-NV

Coverage Data Sheet No.: CDS-02

Customer Information

Utility: TVA

Plant: Browns Ferry

Unit: 3

Component Information

Weld ID: N10-NV

Configuration: Nozzle to Shell

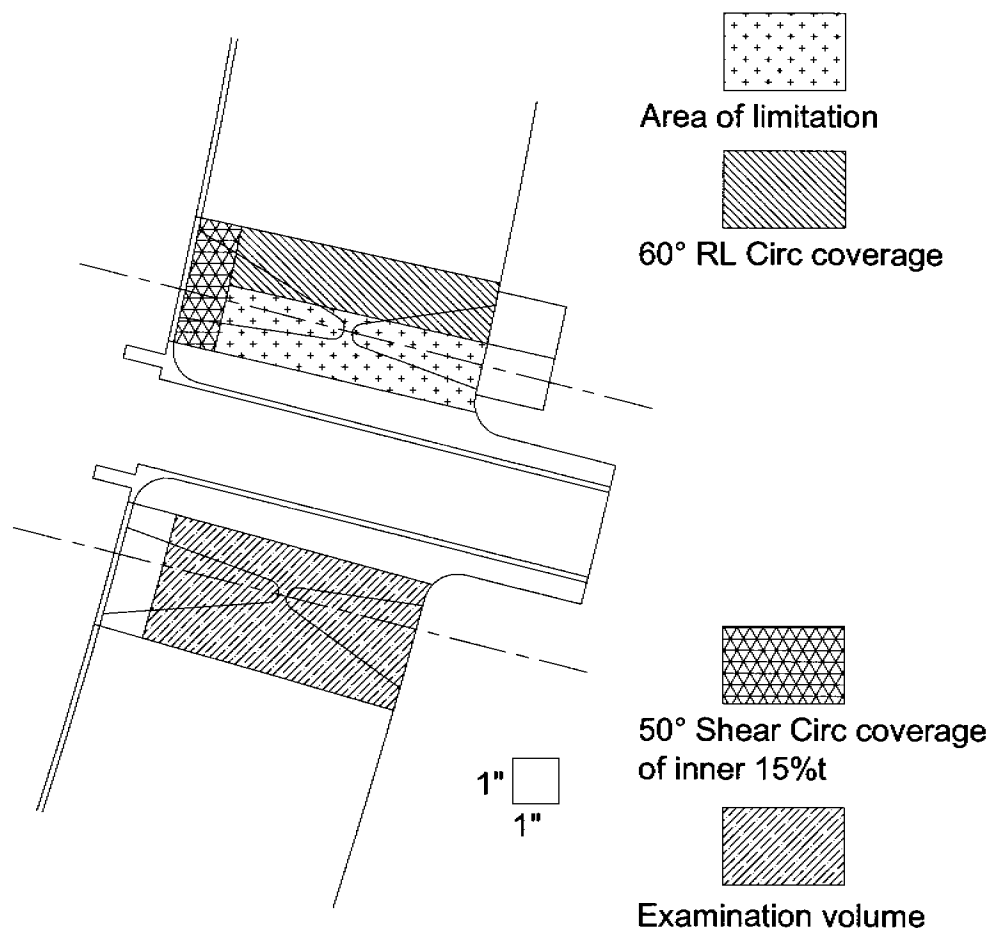
Circumferential Examination Coverage


Upper 85% Circ. Exam Coverage

Total examination Area = 16.49in^2
Area Covered = 7.75in^2
Total Examination Coverage = 47%

Lower 15% Circ. Exam Coverage

Total examination Area = 2.49in^2
Total Examination Coverage = 2.42in^2
Total Examination Coverage = 97%



		RPV Coverage Work Sheet		Report Number: 3-TVA-N10-NV	
Customer Information				Component Information	
Utility: TVA	Plant: BFN	Unit: 3	Outage: U3R15	Weld ID: N10-NV	Work Sheet Number: CWS-03

60°RL Radial Scan (N-UT-76-0005) 100% t volume	60°RL Circ Scan (N-UT-76-0005) 85% t volume	50° ±(13° to 40°) Circ Scan (54-ISI-850-007) Inner 15% t volume (Modeled)
Thickness (ts) Inches 6.80	Thickness (ts) Inches 6.80	Thickness (ts) Inches 6.80
Weld Width Inches 1.80	Weld Width Inches 1.80	Weld Width Inches 1.80
Code Case N-613-1	Code Case N-613-1	Exam Volume (A B C D E F G H) in ² 18.90
Exam Volume (A B C D E F G H) in ³ 304.95	Exam Volume (A B C D E F G H) in ² 18.90	Inner 15% t area in ² 2.49
Area Scanned in ² 285.74	Upper 85% t volume in ² 16.49	Area Scanned 2.42
Percentage of Area Scanned 93.70	Area Scanned 7.75	Percentage of Area Scanned 97.0
	Percentage of Area Scanned 47.0	
Coverage Radial Scan 100% t Volume 93.70	Coverage Circ Scan Upper 85% t Volume 47.0	Coverage Circ Scan Inner 15% t Volume 12.80

85% t (85% x 47%) = 39.95%




15% t (15% x 97%) = 14.55%

Total Coverage Radial and Circ Scans: (93.70% + 39.95% + 14.55%) ÷ 2 = 74.1%
 (See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0005). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness and base material when scanning in the perpendicular direction to the weld. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above (N-UT-78-0005) and has been demonstrated for detection of flaws located in the upper 85%-t of the weld and base material when scanning in the parallel and tangential direction to the weld. Coverage was also limited due to nozzle configuration. To achieve additional coverage in the circumferential scan direction, examinations were also performed with a procedure (54-ISI-850-007) qualified for nozzle to shell weld inner 15% thickness region. This procedure has been demonstrated for detection of flaws in the inner 15%-t only when scanning in the parallel and tangential direction as define by the modeling. The nozzle to shell weld inner 15%-t examination techniques were performed in accordance with the scanning parameters identified in EPRI modeling report IR-2003-31.

Scanning was performed to the maximum extent possible. The total coverage achieved for examination scans performed, is a conservative estimate derived from the physical limitation caused by the nozzle and weld configuration.

Examiner: Nathan Bauman Sign: 	Level: II	Date: 04/09/12	Examiner: David Kleinjan Sign: 	Level: III	Date: 04/09/12
Reviewed By: Victor Morton Sign: 	Level: III	Date: 04/09/12	Page 9 of 9		

 VE-12-030
 000367



Ultrasonic Examination

000194

Site/Unit:	BFN / 3	Procedure:	VENDOR UT	Outage No.:	U3RF15
Summary No.:	00127-ISI-BFN3	Procedure Rev.:	000	Report No.:	VE-12-031
Workscope:	ISI	Work Order No.:	3-SI-4.6.G	Page:	1 of 1
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.100	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	ISI-0445-C-01	Description:	NOZ IR		
System ID:	329 - Reactor Vessel				
Component ID:	N10-IR	Size/Length:	1.5 /	Thickness/Diameter:	6.6 / 1.5
Limitations:	Limitations noted due to joint deisgn and configuration				

Comments:

See Original report book for UT data. 90% coverage attained. No recordable Indications noted.

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No**

Reviewed Previous Data: **Yes**

Examiner	Level	II	Signature	Date	Reviewer	Signature	Date
Bauman, Nathan				4/9/2012	Damon Priestley		4/10/2012
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					F.W. froscello Jr.	<i>F.W. Froscello Jr.</i>	5/7/2012
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					Daniel Williams		4/17/2012



Supplemental Report

Report No.: UT-12-023

Page: 3 of 3

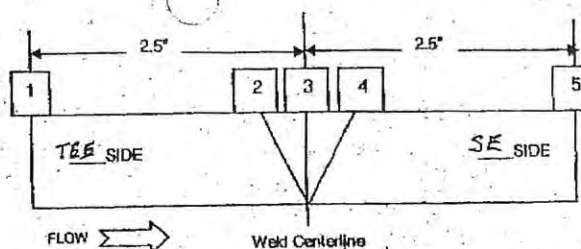
Summary No.: 00077-ISI-BFN3

Sketch or Photo: O:\Ideal_Server\Ideal_BFN\Documentation\U3R18 Scanned Data\N10-1 TC.JPG

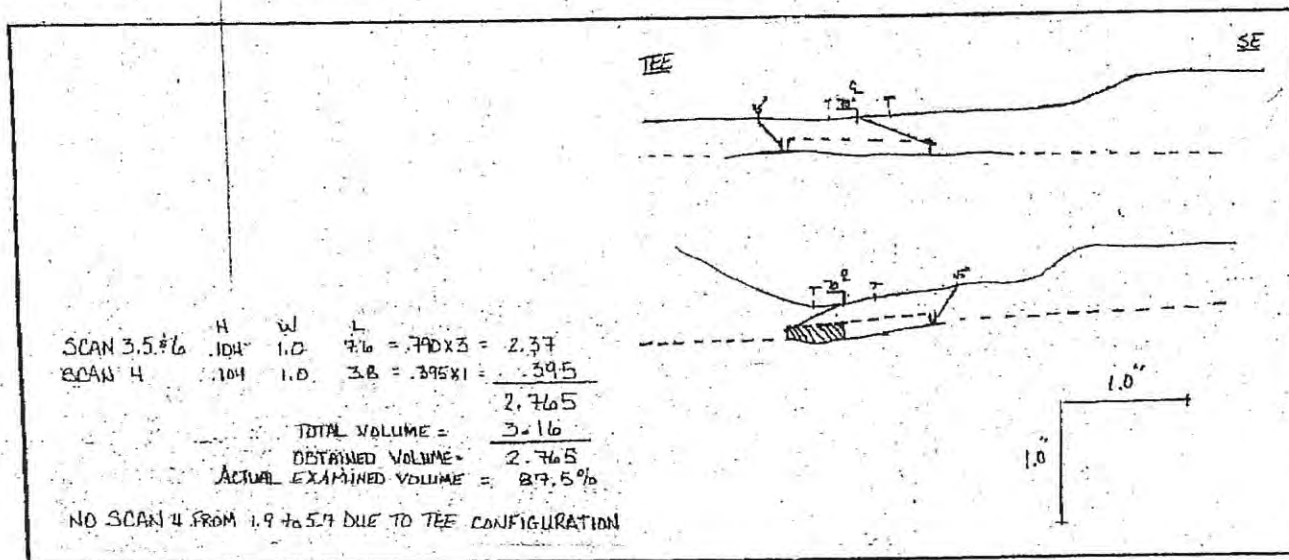
THICKNESS AND CONTOUR

Position	0	90	180	270
1	313			
2*	300			
3	300			
4*	290			
5	270			

* Weld edge



Examiner: <u>ED FISH</u>	Reviewer: <u>Matthew #11/12</u>	ANII:
Print name: <u>ED FISH</u>	Date: <u>4/11/12</u>	Print name: <u>MATT NELCH</u>
COMPONENT ID: <u>N10-1</u>	WELD LENGTH: <u>7.5"</u>	
CROWN WIDTH: <u>0.5</u>	DIAMETER: <u>2.0"</u>	
CROWN HEIGHT: <u>FLUSH</u>		





Ultrasonic Examination

Site/Unit:	BFN / 3	Procedure:	VENDOR UT	Outage No.:	U3RF16
Summary No.:	00186-ISI-BFN3	Procedure Rev.:	000	Report No.:	UT-14-057
Workscope:	ISI	Work Order No.:	114699848	Page:	1 of 1
<hr/>					
Code:	Sec XI 2001 Ed/2003 Add	Cat./Item:	B-D/B3.90	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0411-C-01	Description:	SHL - NOZ		
System ID:	329 - Reactor Vessel				
Component ID:	N8A-NV	Size/Length:	4 /	Thickness/Diameter:	6.6 / 4
Limitations:	N/A				

Comments:

See Attached Vendor Report

Results: Accept ☒ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: **N/A**

Reviewed Previous Data: **N/A**

Examiner	Level	Signature	Date	Reviewer	Signature	Date
N/A			3/11/2014	N/A		
Examiner	Level	Signature	Date	Site Review	Signature	Date
N/A	N/A			N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			N/A		



RPV Circumferential Scan Coverage Work Sheet

Report Number: 3-TVA-N8A-NV

Customer Information

Utility: TVA

Plant: BFN

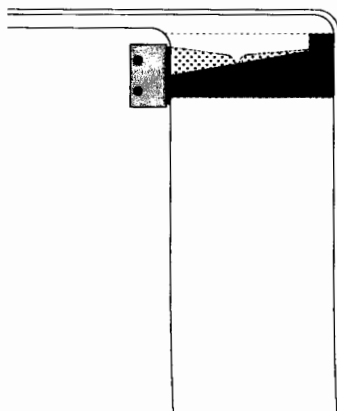
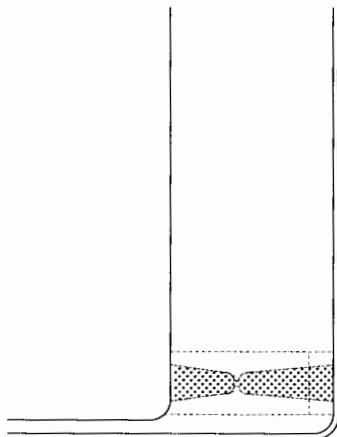
Unit: 3

Outage: R16

Component Information

Component ID: N8A-NV

Work Sheet Number: CWS-02



N8 Nozzle to Shell Weld Circumferential Scan Coverage Calculations

Total Area: = 14.57 in²

Total Area: 2.38" x 6.12" = 14.57 in²

Upper 85% t of Vessel Shell Coverage: = 44.82%

0.80" x 5.20" = 4.16 in²

0.91" x 5.20" / 2 = 2.37 in²

4.16 + 2.37 = 6.53 in²

(6.53 / 14.57) x 100 = 44.82

Lower 15% t of Vessel Shell Coverage: = 15.00%

0.92" x 2.38" = 2.19 in² (Modeled)

(2.19 + 14.57) x 100 = 15.00% of Total Area

Total Circumferential Exam Coverage: = 44.82% + 15.00% = 59.82%

UT-14-0517



RPV Coverage Work Sheet

Report Number: 3-TVA-N8A-NV

Customer Information

Component Information

Utility: TVA

Plant: BFN

Unit: 3

Outage: R16

Component ID: N8A-NV

Work Sheet Number: CWS-03

60°RL Radial Scan (N-UT-78-0007) 100% t volume		60°RL Circ Scan (N-UT-78-0007) Upper 85% t volume		50° ±(15° to 45°) Circ Scan (54-ISI-850-008) Inner 15% t volume (Modeled)	
Thickness (ts) Inches	6.12	Thickness (ts) Inches	6.12	Thickness (ts) Inches	6.12
Weld Width Inches	1.38	Weld Width Inches	1.38	Weld Width Inches	1.38
Exam Area (A B C D E F G H) Sq. Inches	14.57	Exam Area (A B C D E F G H) Sq. Inches	14.57	Exam Area (A B C D E F G H) Sq. Inches	14.57
Area Scanned Sq. Inches	13.95	Upper 85% "T" Area Sq. Inches	12.38	Inner 15% "T" Area Sq. Inches	2.19
Percentage of Area Scanned	95.74%	Area Scanned	6.53	Area Scanned	2.19
		Percentage of Area Scanned	52.75%	Percentage of Area Scanned	100%
Percentage of Total Volume	95.74%	Percentage of Total Volume	44.82%	Percentage of Total Volume	15.00%
Coverage Radial Scan 100% t volume	95.74%	Coverage Circ Scan upper 85% t volume	44.82%	Coverage Circ Scan Inner 15% t volume	15.00%

Total Coverage Radial and Circ Scans: (95.74% + 44.82% + 15.00%) ÷ 2 = 77.78%

(See Radial and Circumferential coverage sheets for more detail.)

Radial scans were performed with a procedure qualified for the examination of vessel nozzle to shell welds (N-UT-78-0007 (PDI-UT-6 Rev H)). This procedure has been demonstrated for detection of flaws located throughout the entire weld thickness. Coverage obtained during radial scans was limited due to the nozzle and weld configuration.

In the circumferential scan direction the outer 85%-t is examined with the same vessel procedure as mentioned above and coverage was also limited due to the nozzle configuration. To achieve additional coverage in the circumferential scan direction a second examination was performed with a procedure qualified for the nozzle to shell weld inner 15% thickness region (54-ISI-850-008). This procedure has been demonstrated for detection of flaws in the inner 15%-t only. The nozzle to shell weld inner 15% thickness examination techniques were performed in accordance with the parameters identified in EPRI modeling report IR-2003-19.

Scanning was performed to the maximum extent possible. The total coverage achieved for scans performed in accordance with procedure N-UT-78-0007 is a conservative estimate derived from the physical limitation caused by the nozzle configuration at the vertical sections of the nozzle and does not include additional volume obtained at the horizontal sections of the nozzle. Scanning with the 60° RL was also taken back to the limit of one half inch from the toe of the weld as measured from the OD weld radius tip and projected to the ID perpendicular to the surface.

The total examination coverage differs from the previous examination coverage due to variances in calculating the examination coverage and utilizing single-sided access techniques and personnel qualified for single sided examination.

UT-14-057

Enclosure 4

**TENNESSEE VALLEY AUTHORITY
Browns Ferry Nuclear Plant, Unit 3
Request for Relief 3-ISI-29**

Attachment A

Inservice Inspection Drawings:

3-ISI-0330-C-1

3-ISI-0328-C-2

3-ISI-0332-C-1

3-ISI-0332-C-2

3-CHM-2407-C-2

NOTE:

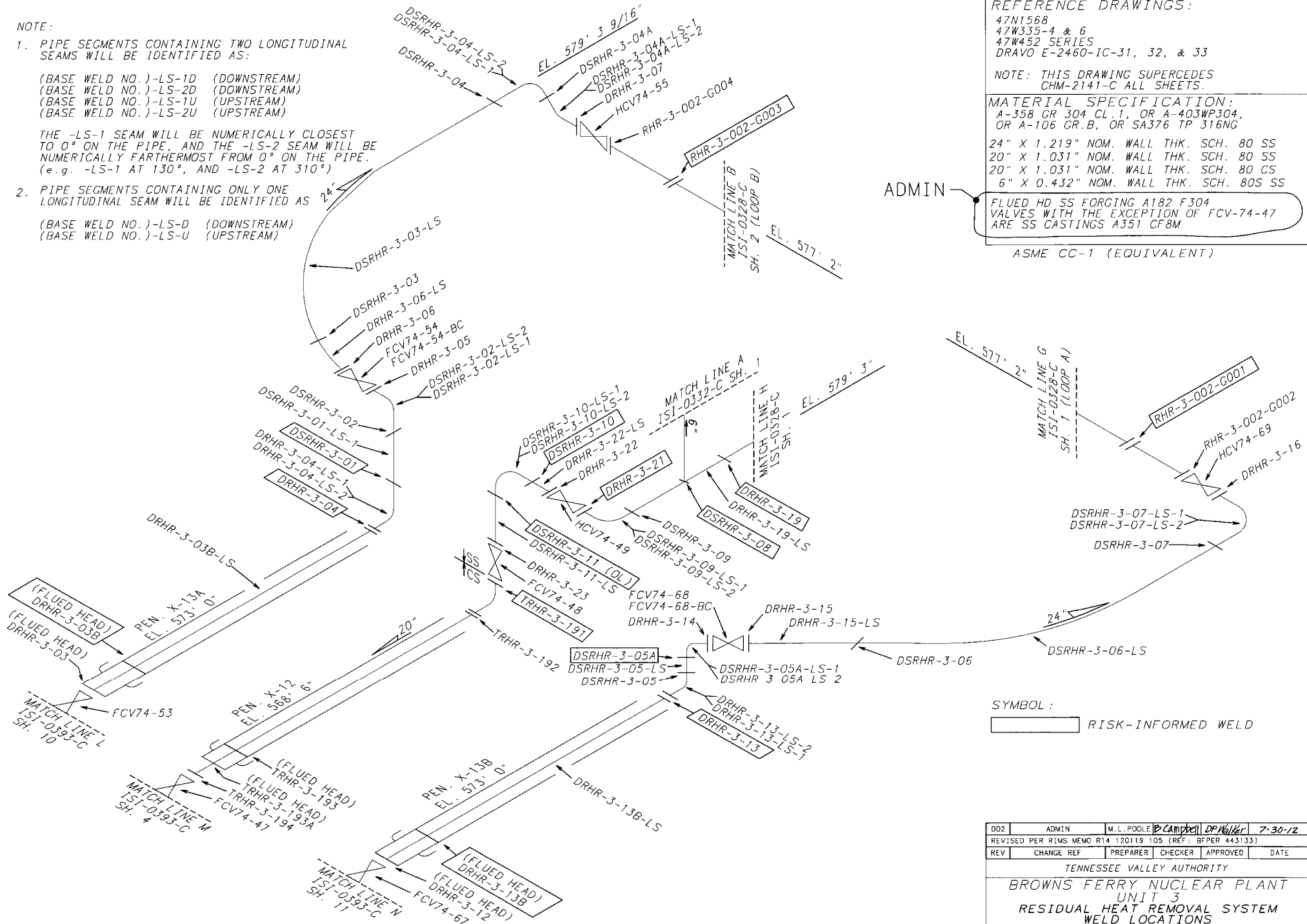
- PIPE SEGMENTS CONTAINING TWO LONGITUDINAL SEAMS WILL BE IDENTIFIED AS:

(BASE WELD NO.)-LS-1D (DOWNSTREAM)
(BASE WELD NO.)-LS-2D (DOWNSTREAM)
(BASE WELD NO.)-LS-1U (UPSTREAM)
(BASE WELD NO.)-LS-2U (UPSTREAM)

THE -LS-1 SEAM WILL BE NUMERICALLY CLOSEST TO 0° ON THE PIPE, AND THE -LS-2 SEAM WILL BE NUMERICALLY FARTHERMOST FROM 0° ON THE PIPE. (e.g. -LS-1 AT 130°, AND -LS-2 AT 310°)

- PIPE SEGMENTS CONTAINING ONLY ONE LONGITUDINAL SEAM WILL BE IDENTIFIED AS

(BASE WELD NO.)-LS-D (DOWNSTREAM)
(BASE WELD NO.)-LS-U (UPSTREAM)



REFERENCE DRAWINGS:

47N1568
47W335-4 & 6
47W452 SERIES
DRAVO E-2460-IC-31, 32, & 33

NOTE: THIS DRAWING SUPERCEDES CHM-2141-C ALL SHEETS.

MATERIAL SPECIFICATION:
A-358 GR 304 CL. 1, OR A-403WP304,
OR A-106 GR.B, OR SA376 TP 316NG

24" X 1.219" NOM. WALL THK. SCH. 80 SS
20" X 1.031" NOM. WALL THK. SCH. 80 SS
20" X 1.031" NOM. WALL THK. SCH. 80 CS
6" X 0.432" NOM. WALL THK. SCH. 80S SS

FLUED HD SS FORGING A182 F304
VALVES WITH THE EXCEPTION OF FCV-74-47
ARE SS CASTINGS A351 CF8M

ASME CC-1 (EQUIVALENT)

SYMBOL:

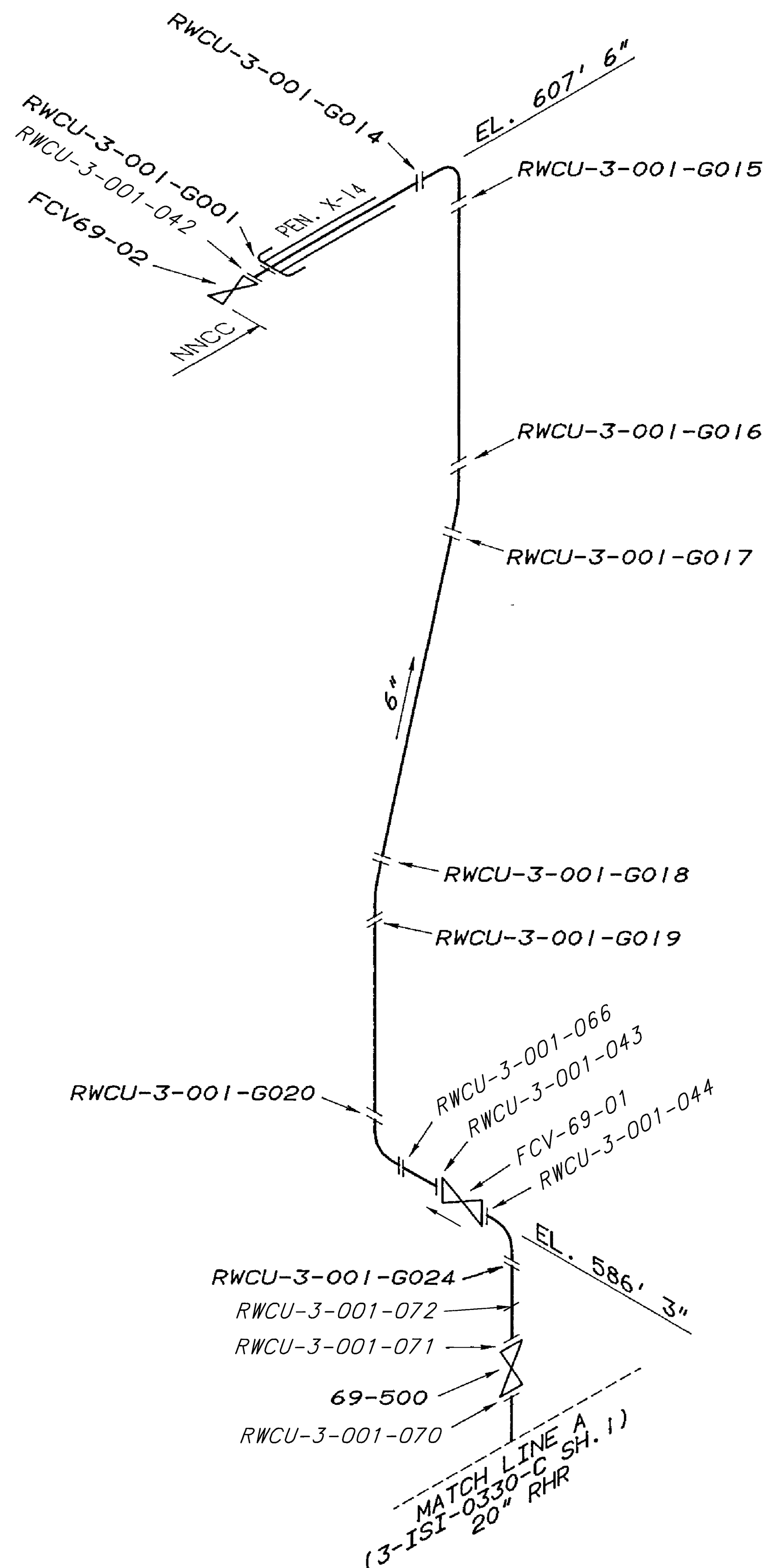
RISK-INFORMED WELD

002	ADMIN	M.L. POOLE	B. Campbell	DP/WR	7-30-72
REVISED PER RIMS MEMO R14 120119 105 (REF: BPER 443133)					
REV	CHANGE REF	PREPARED	CHECKER	APPROVED	DATE
TENNESSEE VALLEY AUTHORITY					
BROWNS FERRY NUCLEAR PLANT					
UNIT 3					
RESIDUAL HEAT REMOVAL SYSTEM					
WELD LOCATIONS					
DRAWN:	PHB	DATE:	5-17-89	SCALE:	NTS
CHECKED:	JES	APPROVED:	GLB	SHEET	01 OF 01
SUBMITTED:	EDC			REV	3-ISI-0330-C 002

ALL A/D HISTORY RESEARCHED AT R000

CAD MAINTAINED DRAWING

CCD



REFERENCE DRAWINGS

RWCU-3-001 (TVA WELD MAP)

NOTE:
THIS DRAWING SUPERSEDES A PORTION
OF CHM-2144-C

MATERIAL SPECIFICATIONS

FITTINGS

6" SA403 WP316NG SCH. 80

PIPING

6" SA376 TP316NG SCH. 80

VALVES SS CASTINGS A351 CF8M

ASME CC-1 (EQUIVALENT)

ADMIN

002	ADMIN	M.L. POOLE	B. Campbell	DP Walker	7-30-12
REVISED PER RIMS MEMO R14 120119 105 (REF: BFFER 443133)					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
TENNESSEE VALLEY AUTHORITY					
BROWNS FERRY NUCLEAR PLANT					
UNIT 3					
REACTOR WATER CLEAN UP, RCIC, AND CRD					
WELD IDENTIFICATION					
DRAWN:	PHB	DATE:	5-17-89	SCALE:	NTS
CHECKED:	JES	APPROVED:	GLB	SHEET	01 OF 02
SUBMITTED:	EDC			3-ISI-0332-C	002

CCD

CAD MAINTAINED DRAWING

ALL A/D HISTORY RESEARCHED AT R000

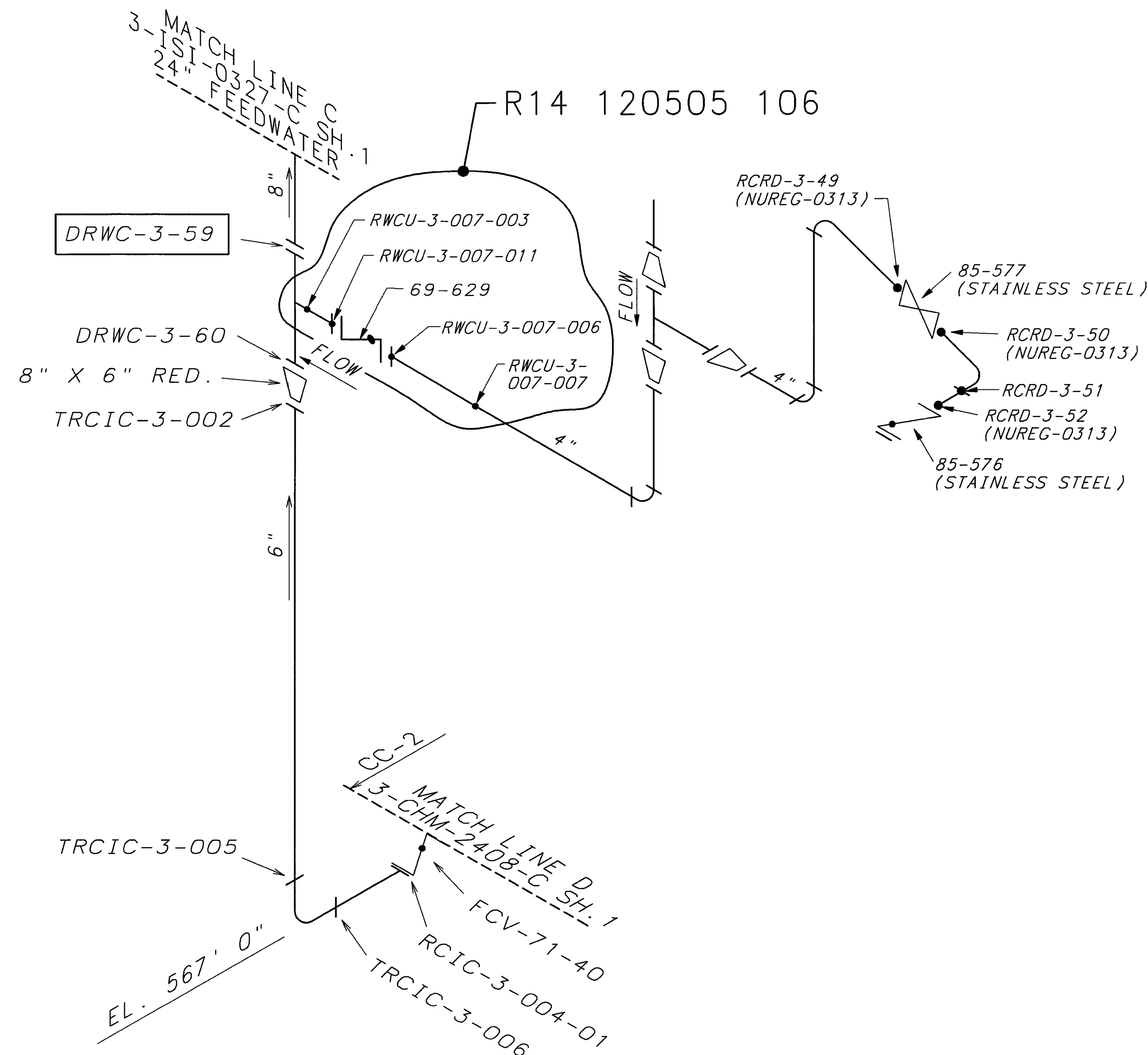
REGION OF THERMAL
FATIGUE EXAMINATION
PER NUREG-0619

THERMAL TEE
UPSTREAM OF VALVE
3-FCV-69-629

RCRDS-3-03-TEE

8"x8"x6"
THERMAL TEE

DET A



REFERENCE DRAWINGS

TVA 47W335-14
TVA 47W335-17
RWC-3-004 (TVA WELD MAP)
DRAVO E-2460-IC-49

NOTE:

THIS DRAWING SUPERSEDES CHM-2143-C
AND CHM-2144-C (ALL SHEETS)

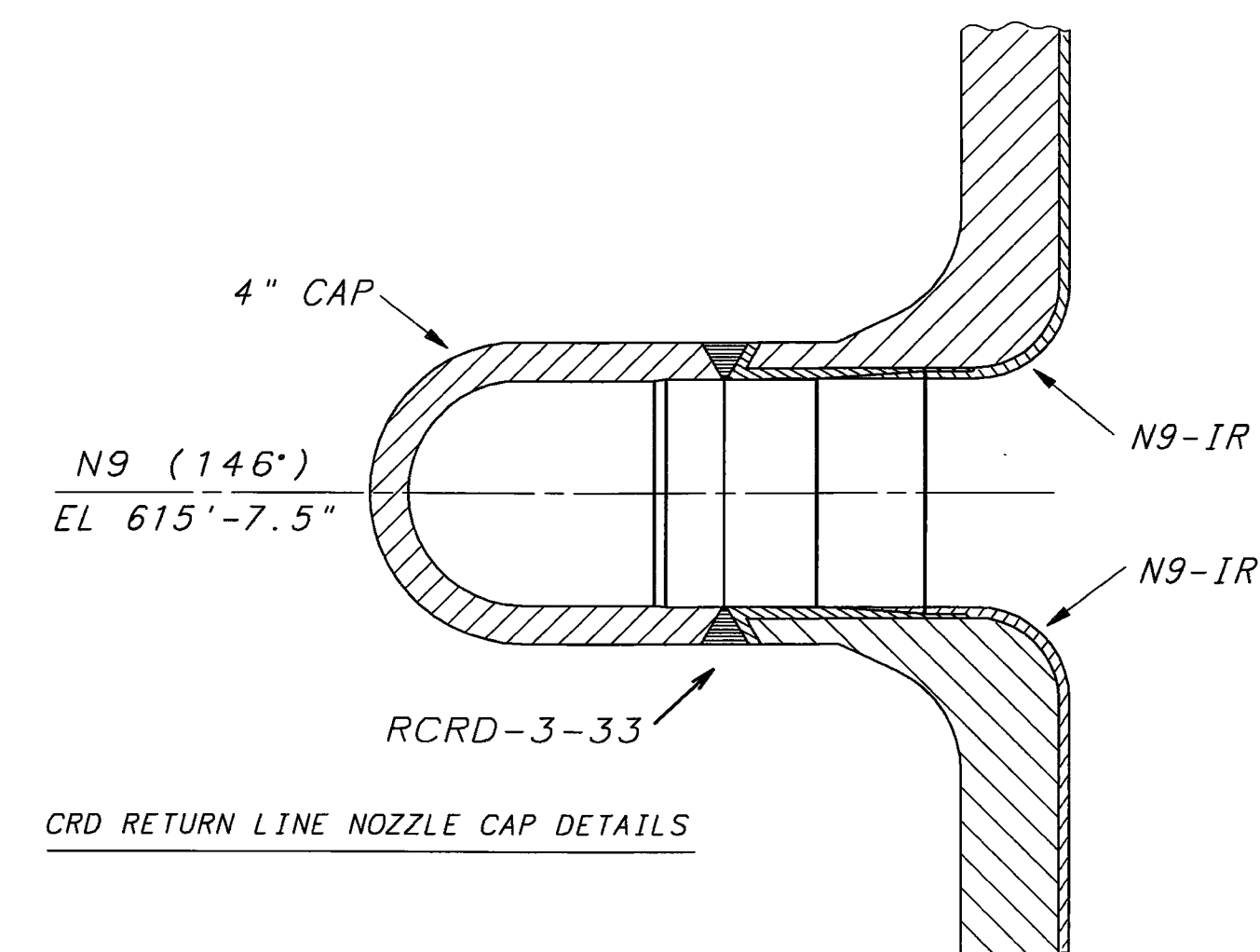
MATERIAL SPECIFICATIONS

4" X 0.337" NOM. WALL - CS
SCH. 80 A-333, GR1 (SEAMLESS)
6" X 0.562 NOM. WALL - CS, SCH. 120
8" X 0.593 NOM. WALL - CS, SCH. 100
CRD CAP 4" X 0.674" NOM. WALL SS
VALVE 69-629 SA105, CS FORGING
VALVES SS FORGINGS A182 F316
85-576, 85-577

NOTE: ALL FIELD WELDS WERE MADE BY TVA
ASME CC-1 (EQUIVALENT)

R14 120505 106

R14 120119 105



SYMBOL :

RISK-INFORMED WELD

007	ADMIN	K KING	B Campbell	DPW/ker	7-30-12
REVISED PER RIMS MEMO R14 120119 105 (REF: BFER 443133) AND R14 120505 106					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE
TENNESSEE VALLEY AUTHORITY					
BROWNS FERRY NUCLEAR PLANT UNIT 3 REACTOR WATER CLEAN UP, RCIC, AND CRD WELD IDENTIFICATION					
DRAWN: PHB	DATE: 1-4-93	SCALE: NTS	CADAM/ISICMP		
CHECKED: RPG	APPROVED:	SHEET 02 OF 02		REV	
SUBMITTED: JES	GLB	3-ISI-0332-C		007	

ALL A/D HISTORY RESEARCHED AT R000

CAD MAINTAINED DRAWING

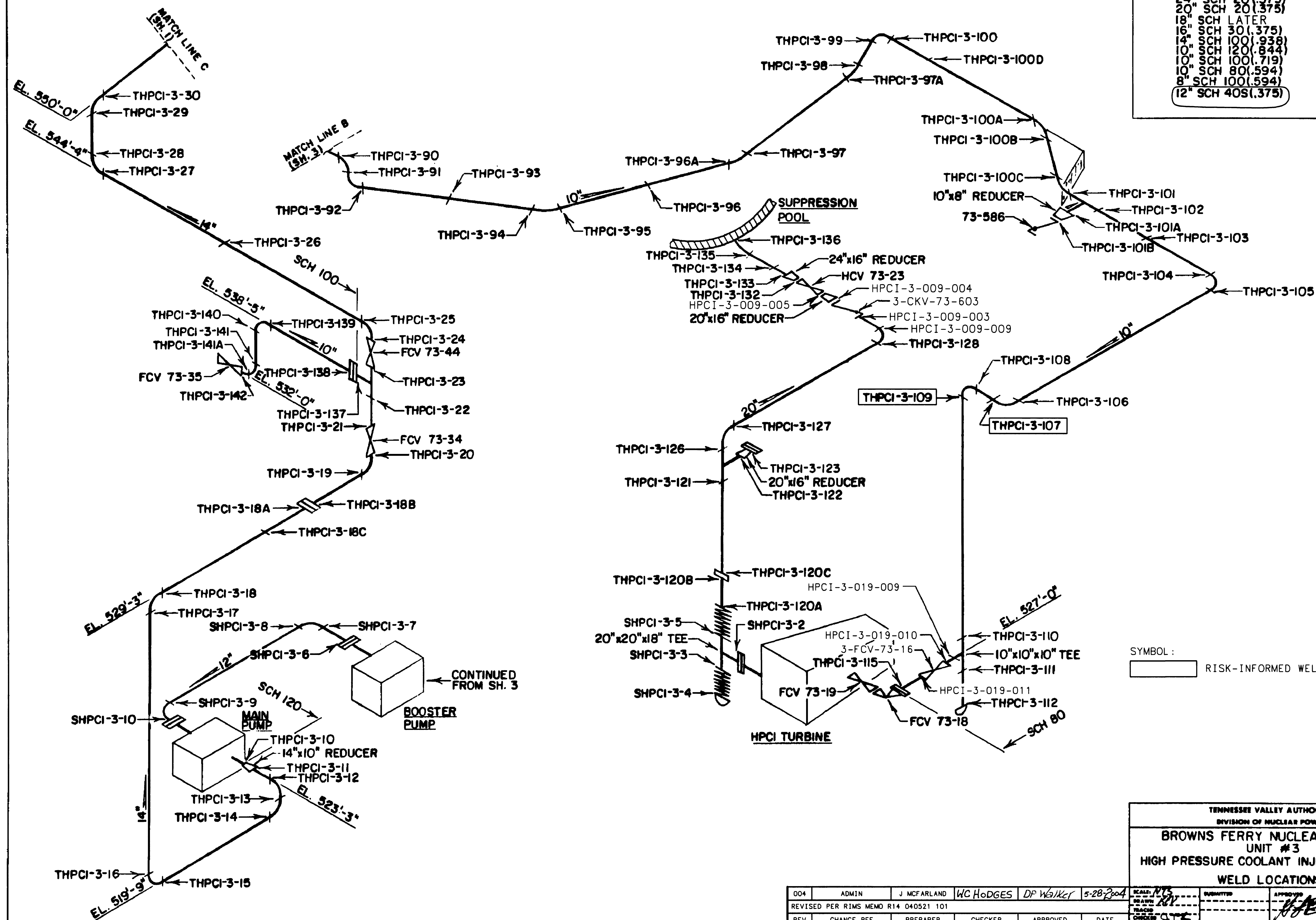
CCD

47W335-13
47W455 SERIES
E-4707
2F-1238

CLASS 2

CARBON STEEL

24"	SCH 20	(.375)
20"	SCH 20	(.375)
18"	SCH LATER	
16"	SCH 30	(.375)
14"	SCH 100	(.938)
10"	SCH 120	(.844)
10"	SCH 100	(.719)
10"	SCH 80	(.594)
8"	SCH 100	(.594)
12"	SCH 40S	(.375)



SYMBOL :  RISK-INFORMED WELD

TENNESSEE VALLEY AUTHORITY
DIVISION OF NUCLEAR POWER

**BROWNS FERRY NUCLEAR PLANT
UNIT #3
HIGH PRESSURE COOLANT INJECTION SYSTEM**

WELD LOCATIONS

004	ADMIN	J MCFARLAND	WC HODGES	DP Walker	5-28-2004	SCALE: <i>PTS</i> DRAWN: <i>8/1</i> TRACE: <i>CHM</i> CHECK: <i>CHM</i>	SUBMITTER	APPROVED <i>CHM</i>	DATE 7-20-83 SHEET 2 OF 3 SHEETS 3-CHM-2407-C
REVISED PER RIMS MEMO R14 040521 101									
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE				

ALL A/D HISTORY RESEARCHED AT ROOD

CAD MAINTAINED DRAWING

CCD R004

Enclosure 4

**TENNESSEE VALLEY AUTHORITY
Browns Ferry Nuclear Plant, Unit 3
Request for Relief 3-ISI-29**

Attachment B

Examination Data Reports:

UT 12-024

UT-12-031

UT-14-039

UT-14-027

UT-14-031

UT-14-036

UT-14-001

UT-14-002

UT-12-046

UT-12-047



UT Calibration Examination

Site/Unit: BFN / 3
 Summary No.: 05109-ISI-BFN3
 Workscope: ISI

Procedure: N-UT-65
 Procedure Rev.: 5
 Work Order No.: 3-SI-4.6.G

Outage No.: U3RF15
 Report No.: UT-12-024
 Page: 1 of 7

Code: Section XI 2001 Ed/2003 Add Cat./Item: R-A/R1.16E Location: REACTOR BUILDING-DRYWELL
 Drawing No.: 3-ISI-0328-C-02 Description: VLV - P
 System ID: 068 - Reactor Water Recirculating System
 Component ID: GR-3-63
 Limitations: NONE Size/Length: 28 / Thickness/Diameter: 1.138 / 28
 Start Time: 1130 Finish Time: 1150

Instrument Settings

Serial No.: E37688
 Manufacturer: KRAUTKRAMER
 Model: USN 60 Linearity: L-10-012
 Delay: 7.77 Range: 3.0
 M'd Cal/Vel: .1337 Energy: High
 Damping: 1000 Ohms Reject: 0
 PRF Mode: Auto High SU Freq.: 2.25 MHz
 Disp. Start: IP Rectify: Full Wave
 Inst. Freq.: 2.25 MHz

Search Unit

Serial No.: 00W3N2
 Manufacturer: KBA
 Size: 0.5" Model: Comp G
 Freq.: 2.25 MHz Center Freq.: N/A
 Exam Angle: 60 Squint Angle: N/A
 Measured Angle: 60 Mode: SHEAR
 Exit Point: N/A # of Elements: 1
 Config.: SINGLE Focus: N/A
 Shape: Round Contour: FLAT
 Wedge Style: Non-Integral

Cal. Checks	Time	Date
Initial Cal.	1030	4/12/2012
Inter. Cal.	N/A	
Inter. Cal.	N/A	
Inter. Cal.	N/A	
Final Cal.	1235	4/12/2012

Couplant

Cal. Batch: 06125
 Type: Ultrage II
 Mfg.: Sonotech
 Exam Batch:
 Type: N/A
 Mfg.: N/A

Search Unit Cable

Type: RG-174 Length: 6 No. Conn.: 0
 Scan Coverage

Upstream ☐ Downstream ☒ Scan dB: N/A
 CW ☐ CCW ☐ Scan dB: N/A
 Exam Surface: OD
 Surface Condition: As Found

Calibration Block

Cal. Block No.: WB-85
 Thickness: N/A Dia.: N/A
 Cal. Blk. Temp.: 73 Temp. Tool: 558274
 Comp. Temp.: 70 Temp. Tool: 558274

Recordable Indication(s): Yes ☒ No ☐ (If Yes, Ref. Attached Ultrasonic Indication Report.)
 Results: NRI ☐ RI ☒ Info ☐ **THROUGH WALL SIZING**

Percent Of Coverage Obtained > 90%: N/A Reviewed Previous Data: Yes

Axial Orientated Search Unit

Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
NTCH	N/A	3.1	.9
NTCH	N/A	6	1.8
NTCH	N/A	9	2.7
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Circumferential Orientated Search Unit

Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

Reference/Simulator Block

Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
40	NSDH	80	2.2	.6
N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A

Comments: 558274 DUE DATE 12-10-2012
E37688 DUE DATE 08-15-2012

Examiner	Level	III-PDI	Signature	Date	Reviewer	Signature	Date
Welch, Matthew C.			<i>Matthew Welch</i>	4/12/2012	Damon Priestley, LIII	<i>Damon Priestley</i>	4/16/12
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					N/A		
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					BRUCE EAMIGH	<i>B. Eamigh</i>	4/19/12



Supplemental Report

Report No.: UT-12-024

Page: 5 of 7

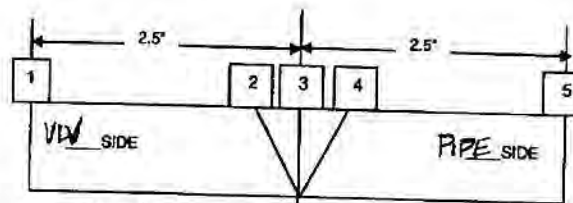
Summary No.: 05109-ISI-BFN3

Sketch or Photo: O:\Ideal_Server\Ideal_BFN\Documentation\U3R18 Scanned Data\GR-3-63 TC.jpg

THICKNESS AND CONTOUR

Position	0	90	180	270
1	N/A			
2*	1.26			
3	1.31			
4*	1.22			
5	1.20			

* Weld edge



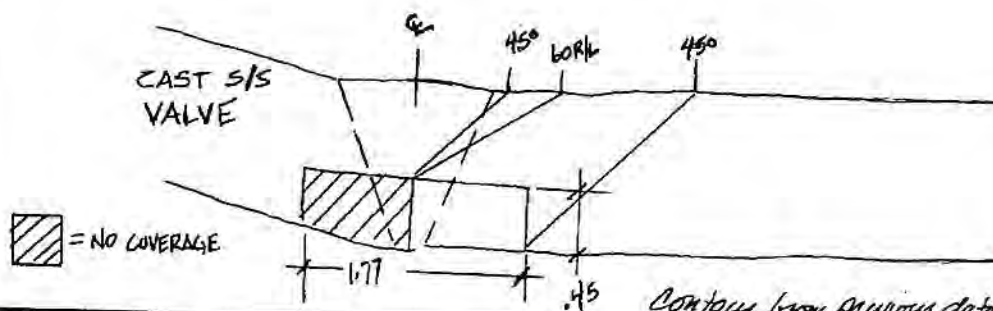
Examiner: <i>ED FISH</i>	Reviewer: <i>MATT WELCH</i>	ANII: <i>B. Eamigh</i>
Print name: <i>ED FISH</i>	Date: <i>4/19/12</i>	Print name: <i>BRUCE EAMIGH</i>
COMPONENT ID: <i>GR-3-63</i>	WELD LENGTH: <i>89.0"</i>	DIAMETER: <i>28"</i>
CROWN WIDTH: <i>1.25</i>		
CROWN HEIGHT: <i>FLUSH</i>		

Required exam volume:

$$.45 \times 1.77 \times 89 = 70.9 \text{ IN}^3$$

Obtained exam volume:

$$70.9 - (.45 \times .89 \times 89) = 35.6 \text{ IN}^3 / 70.9 = .502 \times 100 = 50.2\%$$



Contour from previous data U3C12.



Supplemental Report

Report No.: UT-12-024

Page: 6 of 7

Summary No.: 05109-ISI-BFN3

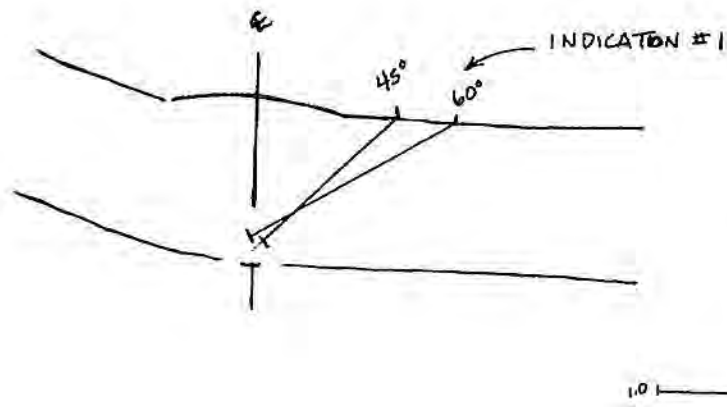
Sketch or Photo: O:\Ideas_Server\Ideas_BFN\Documentation\U3R18 Scanned Data\GR-3-63 PLOT.jpg

INDICATION PLOT

Component ID: GR-3-63

Examiner: <u>Matt Welch</u>	Reviewer: <u>RL</u>	ANII: <u>B. Eamigh</u>
Print name: MATT WELCH	Print name: <u>Damon Priestley</u>	Print name: <u>BRUCE EAMIGH</u>
Date: <u>4/12/12</u>	Date: <u>4/17/2012</u>	Date: <u>4/19/12</u>

RL - Remaining ligament = 1.0
TWE - Through wall extent = .2



SEE UT INDICATION SIZING REPORT FOR VALUES.

Ultrasonic Indication Sizing Report

Site/Unit:	BFN / 3
Summary No.:	05109-ISI-BFN3
Workscope:	ISI

Procedure:	N-UT-65
Procedure Rev.:	5
Work Order No.:	3-SI-4.6.G

Outage No.: U3RF15
Report No.: UT-12-024
Page: 7 of 7

[illegible]

Additional Remarks:

THROUGH WALL SIZING OF EXISTING IGSCC REFLECTOR. THIS EXAM SATISFIES THE REQUIREMENT OF IWB-2420(c) FOR COMPONENTS PLACED IN THE ORIGINAL SCHEDULE AFTER SUCCESSIVE INSPECTION PERIODS. NO CHANGE DETECTED

Examiner	Level	III-PDI	Signature	Date	Reviewer	Signature	Date
Welch, Matthew C.			<i>Matthew Welch</i>	4/12/2012	Damon Priestly, LIII	<i>Damon Priestly</i>	4/17/12
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					N/A		
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					BRUCE Eamigh	B. Eamigh	4/19/12

Ultrasonic Indication Sizing Report

Ultrasonic Indication Sizing Report

000228



UT Calibration Examination

Site/Unit: BFN / 3
 Summary No.: 05100-ISI-BFN3
 Workscope: AUG-ISI 4/12

Procedure: N-UT-64
 Procedure Rev.: 11
 Work Order No.: 3-SI-4.6.G

Outage No.: U3RF15
 Report No.: UT-12-031
 Page: 1 of 6

Code: Section XI 2001 Ed/2003 Add Cat./Item: R-A/R1.16D Location: REACTOR BUILDING-ACCESS ROOM
 Drawing No.: 3-ISI-0330-C-01 Description: VLV - FH
 System ID: 074 - Residual Heat Removal System
 Component ID: DRHR-3-12
 Limitations: YES - JOINT CONFIG AND CAST SS COMPONENT Size/Length: 24 / Thickness/Diameter: 1.219 / 24
 Start Time: 1155 Finish Time: 1225

Instrument Settings

Serial No.: E36302
 Manufacturer: KRAUTKRAMER
 Model: USN 60 Linearity: L-12-003
 Delay: 8.4278 Range: 6.0
 M'tl Cal/Vel: .1262 Energy: High
 Damping: 1000 Ohms Reject: 0
 PRF Mode: Auto High SU Freq.: 1.5 MHz
 Disp. Start: IP Rectify: Full Wave
 Inst. Freq.: 2.0 MHz

Search Unit

Serial No.: 01FH9X
 Manufacturer: KBA
 Size: 0.375" Model: Comp G
 Freq.: 1.5 MHz Center Freq.: N/A
 Exam Angle: 70 Squint Angle: N/A
 Measured Angle: 68 Mode: Shear
 Exit Point: N/A # of Elements: 1
 Config.: SINGLE Focus: N/A
 Shape: Round Contour: N/A
 Wedge Style: Non-Integral

Cal. Checks	Time	Date
Initial Cal.	0930	4/14/2012
Inter. Cal.	N/A	
Inter. Cal.	1215	4/14/2012
Inter. Cal.	N/A	
Final Cal.	1244	4/14/2012

Couplant

Cal. Batch: 06125
 Type: Ultragel II
 Mfg.: Sonotech
 Exam Batch: 06125
 Type: Ultragel II
 Mfg.: Sonotech

Search Unit Cable

Type: RG-174 Length: 6 No. Conn.: 0

Scan Coverage

Upstream ☐ Downstream ☒ Scan dB: 59.5
 CW ☐ CCW ☐ Scan dB: N/A
 Exam Surface: OD
 Surface Condition: ISI Prep

Reference Block

Serial No.: 789631
 Type: Rompas

Axial Orientated Search Unit

Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
1.5 NOTCH	80%	6.6	3.958
N/A			
N/A			
N/A			
N/A			

Circumferential Orientated Search Unit

Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
N/A			
N/A			
N/A			
N/A			

Reference/Simulator Block

Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
51.3	FSDH	39	2.9	1.63
N/A				
N/A				

Ax. Gain (dB): 51.3 Circ. Gain (dB): N/A
 1 Screen Div. = .6 in. of Sound Path

Calibration Block

Cal. Block No.: SQ-123
 Thickness: 1.5 Dia.: FLAT
 Cal. Blk. Temp.: 70.6 Temp. Tool: 558274
 Comp. Temp.: 78.6 Temp. Tool: 558274

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report.)

Results: NRI ☒ RI ☐ Info ☐

Percent Of Coverage Obtained > 90%: No Reviewed Previous Data: Yes

Comments: E36302 DUE DATE IS 08-15-2012
 558274 DUE DATE IS 12-10-2012

Examiner	Level	II(N)	Signature	Date	Reviewer	Signature	Date
Fish, Edward W				4/14/2012	Matt Welch, LIII		4/17/12
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					N/A		
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					BRUCE EAMIGH	B. Eamigh	4/17/12

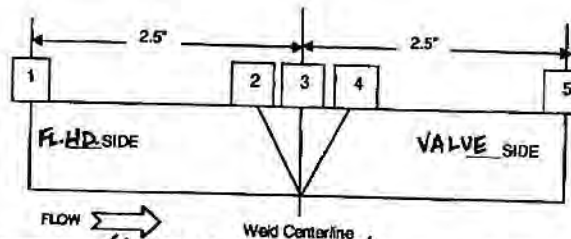
Summary No.: 05100-JSI-BFN3

Sketch or Photo: O:\Ideal_Server\Ideal_BFN\Documentation\U3R18 Scanned Data\DRHR-3-12.jpg

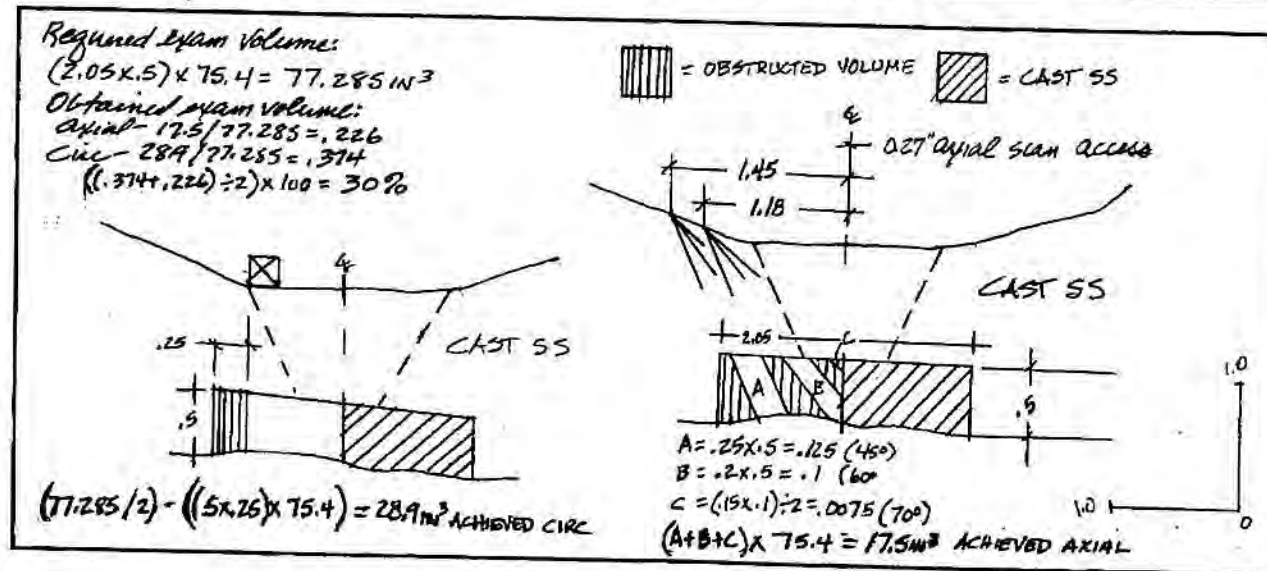
THICKNESS AND CONTOUR

Position	0	90	180	270
1	1/4			
2	1/4			
3	1/4			
4	1/4			
5	1/4			

* Weld edge



Examiner: <u>ED FISH</u>	Date: <u>4/14/12</u>	Reviewer: <u>MATT WELCH</u>	Date: <u>4/19/12</u>	ANII: <u>B. Eamigh</u>	Date: <u>4/19/12</u>
Print name: <u>ED FISH</u>	Date: <u>4/14/12</u>	Print name: <u>MATT WELCH</u>	Date: <u>4/19/12</u>	Print name: <u>BRUCE EAMIGH</u>	Date: <u>4/19/12</u>
COMPONENT ID: <u>DRHR-3-12</u>					
CROWN WIDTH: <u>1.5"</u>			WELD LENGTH: <u>77.285 75.4"</u>		
CROWN HEIGHT: <u>FLUSH</u>			DIAMETER: <u>2.6" OD</u>		





Supplemental Report

Report No.: UT-12-031

Page: 6 of 6

Summary No.: 05100-ISI-BFN3

Sketch or Photo: O:\ddeal_Server\ddeal_BFN\Documentation\U3R18 Scanned Data\DRHR-3-12 limitation.jpg

DRHR-3-12

Discussion: Limitations due to joint configuration and Cast SS Component:

- Joint configuration consists of a cast stainless steel valve to a penetration flued head.
- PDI Supplement 2 is not qualified for detection in Cast SS material.
- Joint geometry limits shear wave axial scan motion to 0.27"
- Joint geometry limits refracted longitudinal axial scan motion to 0.0".
 - Wave focusing requirements defined in PDI-UT-2, Rev. E, para. 6.8.2.(b) required the probe footprint to be too large for the available scanning surface.
- Nonparallel surfaces (OD vs. ID of base material) limited the circumferential scan direction to the weld crown.
 - PDI-UT-2, Rev. E, para. 8.3.3 requires scan form the weld crown to be parallel to weld center line.

Unsuitable LIII 4/17/12



UT Calibration/Examination

Site/Unit: BFN / 3
Summary No.: 05054-ISI-BFN3
Workscope: ISI

Procedure: N-UT-64/PDI-UT-2
Procedure Rev.: 13/F
Work Order No.: 114699848

Outage No.: U3RF16
Report No.: UT-14-039
Page 1 of 25

Code: Section XI 2001 Ed/2003 Add Cat./Item: R-A/R1.11 Location: REACTOR BUILDING-DRYWELL
Drawing No.: 3-ISI-0330-C-01 Description: TEE - P
System ID: 074 - Residual Heat Removal System
Component ID: DRHR-3-19
Limitations: See Coverage Plot - Single side access Size/Length: 20 / Thickness/Diameter: 1.031 / 20
Start Time: 0851 Finish Time: 1050

Instrument Settings
Serial No.: E36302
Manufacturer: KRAUTKRAMER
Model: USN 60 Linearity: L-14-003
Delay: 7.6041 Range: 3.700
M/I Cal/Vel: 0.1249 Energy: High
Damping: 1000 Ohms Reject: 0
PRF Mode: Auto High SU Freq.: 1.5 MHz
Disp. Start: IP Rectify: Full Wave
Inst. Freq.: 2.25 MHz

Search Unit
Serial No.: 01YPH2
Manufacturer: GE
Size: 0.5" Model: Comp G
Freq.: 1.5 MHz Center Freq.: N/A
Exam Angle: 45 Squint Angle: N/A
Measured Angle: 43 Mode: Shear
Exit Point: .5" # of Elements: 1
Config.: Single Focus: N/A
Shape: Round Contour: Flat
Wedge Style: Non-Integral

Ax. Gain (dB): 23.4 Circ. Gain (dB): 23.4
1 Screen Div. = .37 in. of Sound Path

Calibration Block
Cal. Block No.: WB-84
Thickness: 1.5 Dia.: Flat
Cal. Blk. Temp.: 67.6 Temp. Tool: 531993
Comp. Temp.: 76 Temp. Tool: 531993

Scan Coverage
Upstream ☒ Downstream ☒ Scan dB: 37.0
CW ☒ CCW ☒ Scan dB: 37.0
Exam Surface: ID
Surface Condition: Ground

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report.)
Results: NRI ☒ RI ☐ Info ☐

Percent Of Coverage Obtained > 90%: 59.24 Reviewed Previous Data: Yes

Cal. Checks	Time	Date
Initial Cal.	0830	3/5/2014
Inter. Cal.		
Inter. Cal.		
Inter. Cal.		
Final Cal.	1137	3/5/2014

Couplant
Cal. Batch: 12H130
Type: Ultragel II
Mfg.: Sonotech
Exam Batch: 12H130
Type: Ultragel II
Mfg.: Sonotech

Reference Block
Serial No.: 790398
Type: SS Rompas

Axial Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
1.5 Notch	80	5.6	2.030	
Circumferential Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
1.5 Notch	80	5.6	2.030	
Reference/Simulator Block				
Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
43.3	FSDH	80	2.8	1.008

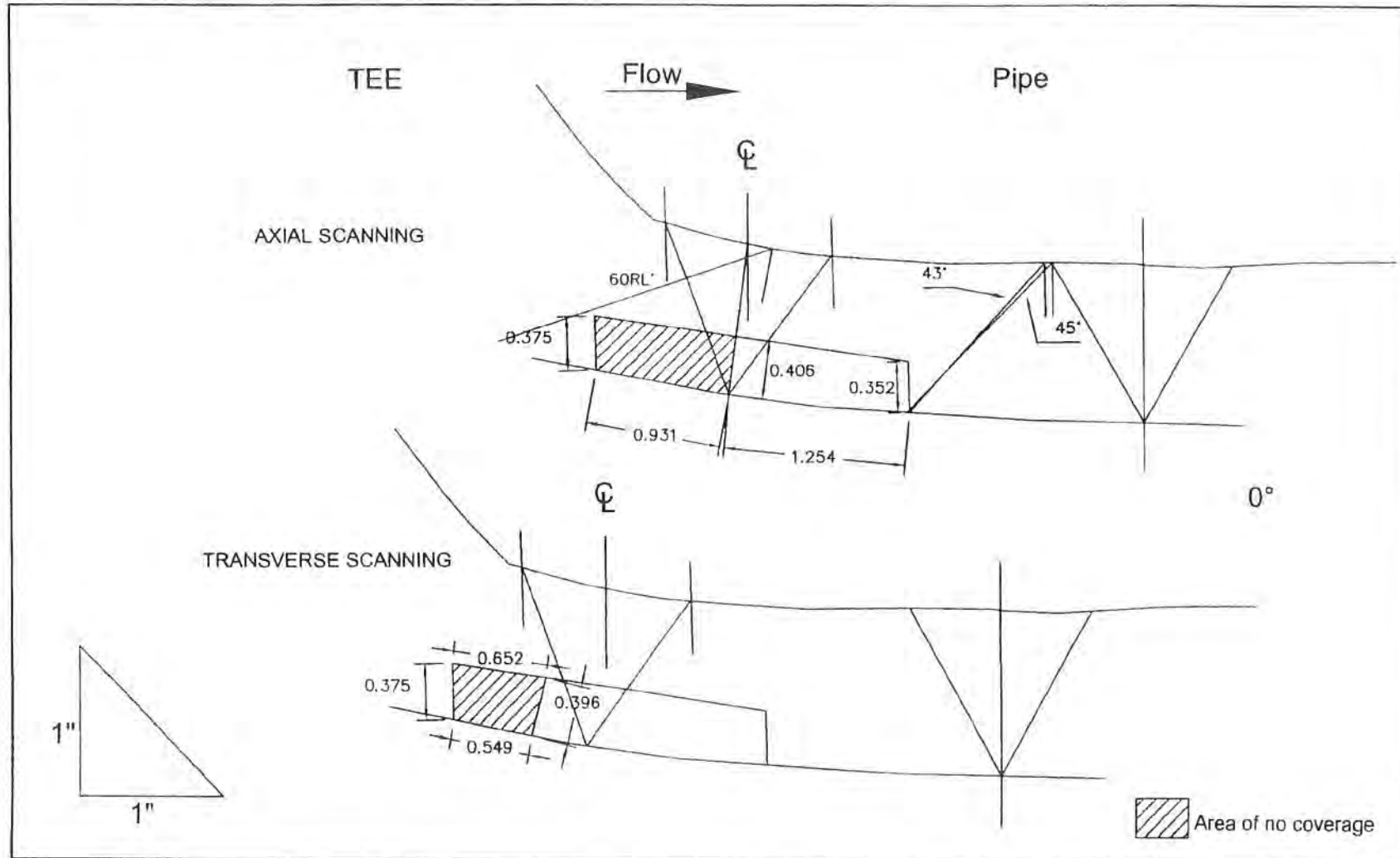
Comments: E36302 Cal Due 10/26/2014
531993 Cal Due 10/26/2014

Examiner	Level	III*	Signature	Date	Reviewer	Signature	Date
KLEINJAN, DAVID R				3/5/2014	Matt Welch, LIII		3/10/14
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					N/A		
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A							3/14/14

COVERAGE PLOT

Component ID: DRHR-3-19 UT-14-039

Examiner: <i>S.R. Blane 05 MAR 2014</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>S. Flood</i>
Print name: DAVID KLEINJAN	Print name: MATT WELCH	Print name: Samuel Flood
Date: 05 MAR 2014	Date: 3/10/14	Date: 3/14/14



pg 3/5

SUMMARY NO: 05054-ISI-BFN3		SITE: BROWNS FERRY		Unit #3
DESCRIPTION: TEE TO PIPE		IDENTIFICATION: DRHR-3-19		
SYSTEM ID: RESIDUAL HEAT REMOVAL SYSTEM		LT-14-039		
Prepared By: DAVID KLEINJAN		Reviewer By: MATT WELCH		
Signature: <i>[Signature]</i>		Signature: <i>[Signature]</i>		
Date: 05 MAR 2014		Date: 3/10/14		
Items #				
1	Axial Required Exam volume for scan 3 $((0.375+0.406)/2)*0.931*58.5=$			21.2680
2	Axial Required Exam volume for scan 4 $((0.406+0.352)/2)*1.254*58.5=$			27.8031
3	Clockwise and CounterClockwise Required exam volume on the upstream side (scan 5 & 6) $((0.375+0.406)/2)*0.931*58.5=$			21.2680
4	Clockwise and CounterClockwise Required exam volume on the downstream side (scan 5 & 6) $((0.406+0.352)/2)*1.254*58.5=$			27.8031
5	Axial Obstructed Volume Exam for scan 3 $((0.375+0.406)/2)*0.931*58.5=$			21.2680
6	Axial Obstructed Volume Exam for scan 4 0=			0.0000
7	Clockwise and Counterclockwise Obstructed Volume Exam on the upstream side (scan 5 & 6) $0.2292*58.5=$			13.4082
8	Clockwise and Counterclockwise Obstructed Volume Exam on the downstream side (scan 5 & 6) 0=			0.0000
9	Axial Obtained Exam Volume for scan 3 Item 1 - Item 5 =			0.0000
10	Axial Obtained Exam Volume for scan 4 Item 2 - Item 6 =			27.8031
11	Clockwise and Counter Clockwise Obtained Volume Exam on the upstream side (scan 5 & 6) Item 3 - Item 7 =			7.8598
12	Clockwise and Counter Clockwise Obtained Volume Exam on the downstream side (scan 5 & 6) Item 4 - Item 8 =			27.8031
13	Axial Exam Volume Percentage for scan 3 $(\text{Item 9}/(\text{Item 1}))*100 =\%$			0.00%
14	Axial Exam Volume Percentage for scan 4 $(\text{Item 10}/(\text{Item 2}))*100 =\%$			100.00%
15	Clockwise and CounterClockwise Exam Volume Percentage on the upstream side (scan 5 & 6) $(\text{Item 11}/(\text{Item 3}))*100 =\%$			36.96%
16	Clockwise and CounterClockwise Exam Volume Percentage on the downstream side (scan 5 & 6) $(\text{Item 12}/(\text{Item 4}))*100 =\%$			100.00%
17	Full Exam Volume Percentage combining in the Axial, Clockwise, and CounterClockwise Dircetions $(\text{Item 13} + \text{Item 14} + \text{Item 15} + \text{Item 16})/4 =\%$			59.24%

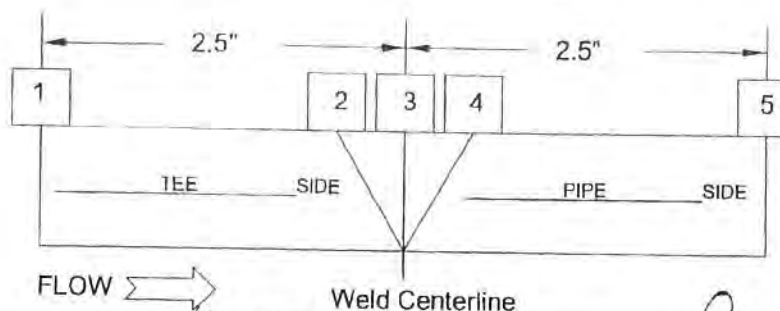
MATT
 Sanford
 3/14/14

pg 4/5

THICKNESS AND CONTOUR

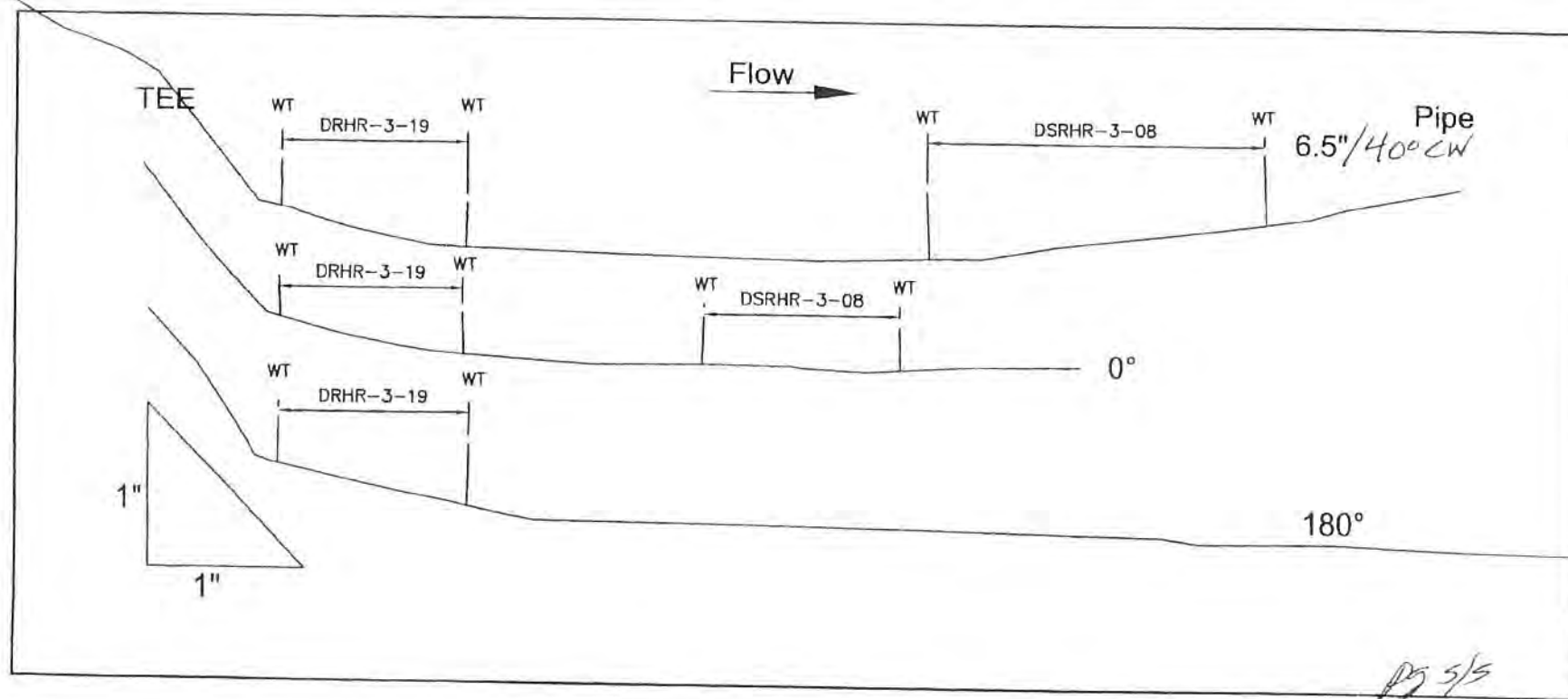
Position	0	90	180	270
1	N/A	N/A	N/A	N/A
2*	1.105	N/A	1.104	N/A
3	1.062	N/A	1.073	N/A
4*	1.052	N/A	1.022	N/A
5	1.092	N/A	1.087	N/A

*Weld Edge



LT-14-039

Examiner: <i>S.R. Klein</i> 05 MAR 2014	Reviewer: <i>Matt Welch</i> 3/10/14	ANII: <i>Samuel F. Ford</i> 3/14/14
Print name: DAVID KLEINMAN Date:	Print name: MATT WELCH Date:	Print name: Samuel Ford Date:
COMPONENT ID: DRHR-3-19		
CROWN WIDTH: 1.2		WELD LENGTH: 58.5"
CROWN HEIGHT: FLUSH		DIAMETER: 20"





UT Calibration/Examination

Site/Unit: **BFN / 3**
 Summary No.: **05094-ISI-BFN3**
 Worksopce: **ISI**

Procedure: **N-UT-64/PDI-UT-2**
 Procedure Rev.: **13/F**
 Work Order No.: **114699848**

Outage No.: **U3RF16**
 Report No.: **UT-14-027**
 Page: **1** of **24**

Code: **Section XI 2001 Ed/2003 Add** Cat./Item: **R-A/R1.16C** Location: **REACTOR BUILDING-DRYWELL**
 Drawing No.: **3-ISI-0330-C-01** Description: **P - EL**
 System ID: **074 - Residual Heat Removal System**
 Component ID: **DSRHR-3-05A**
 Limitations: **Access limited on upstream side**
 Size/Length: **24 /** Thickness/Diameter: **1.219 / 24**
 Start Time: **1657** Finish Time: **1740**

Instrument Settings
 Serial No.: **E37688**
 Manufacturer: **KRAUTKRAMER**
 Model: **USN 60** Linearity: **L-14-002**
 Delay: **6.4972** Range: **3.411**
 M'll Cal/Vel: **0.1230** Energy: **High**
 Damping: **1000 Ohms** Reject: **0**
 PRF Mode: **Auto High** SU Freq.: **1.5 MHz**
 Disp. Start: **IP** Rectify: **Full Wave**
 Inst. Freq.: **2.0 MHz**

Ax. Gain (dB): **24.2** Circ. Gain (dB): **24.2**
1 Screen Div. = **.34** in. of **Sound Path**

Calibration Block
 Cal. Block No.: **WB-85**
 Thickness: **1.5** Dia.: **N/A**
 Cal. Blk. Temp.: **67** Temp. Tool: **531993**
 Comp. Temp.: **88** Temp. Tool: **531993**

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report.)

Results: NRI ☒ RI ☐ Info ☐

Percent Of Coverage Obtained > 90%: **88%** Reviewed Previous Data: **Yes**

Search Unit
 Serial No.: **00FCYR**
 Manufacturer: **KBA**
 Size: **0.5"** Model: **Comp G**
 Freq.: **1.5 MHz** Center Freq.: **N/A**
 Exam Angle: **45** Squint Angle: **N/A**
 Measured Angle: **43** Mode: **Shear**
 Exit Point: **0.4in** # of Elements: **1**
 Config.: **Single** Focus: **N/A**
 Shape: **Round** Contour: **Flat**
 Wedge Style: **NON-INTEGRAL**

Search Unit Cable
 Type: **RG-174** Length: **6** No. Conn.: **0**

Scan Coverage
 Upstream ☒ Downstream ☒ Scan dB: **41.3**
 CW ☒ CCW ☒ Scan dB: **41.3**
 Exam Surface: **OD**
 Surface Condition: **As Found**

Cal. Checks	Time	Date
Initial Cal.	1417	3/3/2014
Inter. Cal.	1657	3/3/2014
Inter. Cal.		
Inter. Cal.		
Final Cal.	1741	3/3/2014

Couplant
 Cal. Batch: **13C002**
 Type: **Ultrage II**
 Mfg.: **Sonotech**
 Exam Batch: **13C002**
 Type: **Ultrage II**
 Mfg.: **Sonotech**

Reference Block
 Serial No.: **93-5728**
 Type: **SS Rompas**

Axial Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
1.5" Notch	80	6	2.057	
Circumferential Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
1.5" Notch	80	6	2.057	
Reference/Simulator Block				
Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
22.0	2" R	80	6	1.488

Comments: **E37688 Cal Due 10/26-2014**
531993 Cal Due 10/26/2014

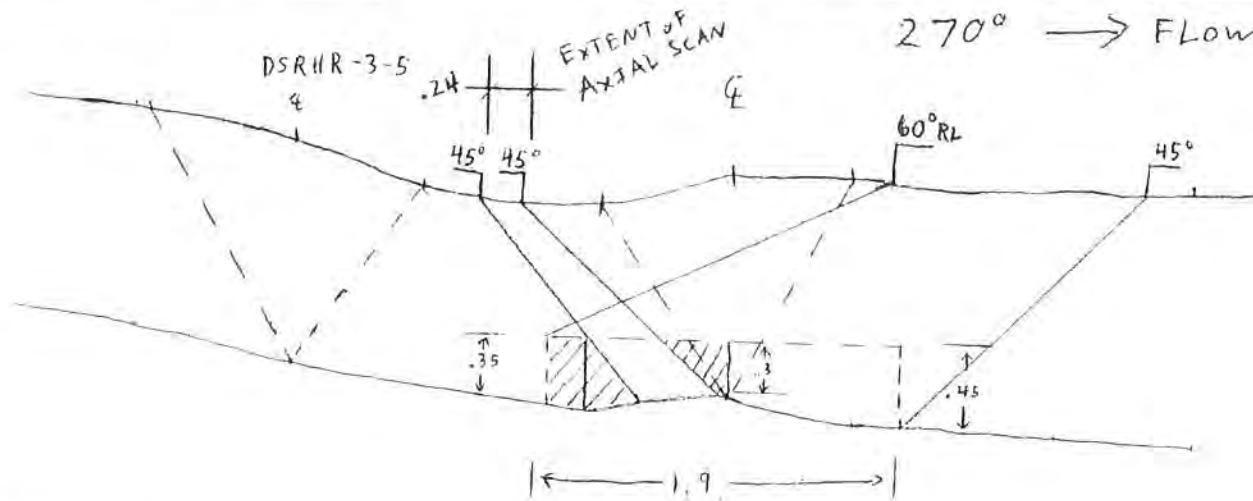
Examiner	Level	III*	Signature	Date	Reviewer	Signature	Date
Maclean, Duncan J.			<i>DJ Maclean</i>	3/4/2014	Matt Welch, LIII	<i>Matt Welch</i>	3/6/14
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					N/A		
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					<i>Samuel Ford</i>	<i>Samuel Ford</i>	3/10/14

COVERAGE PLOT

Component ID: DSRHR-3-05A

LIT-14-027

Examiner: <i>DSM</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>Samuel Ford</i>
Print name: <i>DSMACLEAN</i>	Print name: <i>MATT WELCH</i>	Print name: <i>Samuel Ford</i>
Date: <i>3-4-14</i>	Date: <i>3/6/14</i>	Date: <i>3/10/14</i>



REV:

$$(.35 + .45) \div 2 = .40$$

$$.40 \times 1.9 \times 75.75 = 57.57 \text{ in}^3$$

Obtained Volume:

$$.35 \times .2 = 0.07$$

$$.35 \times .3 \div 2 = 0.0525$$

$$.3 \times .4 \div 2 = 0.06$$

$$0.1825 \times 75.75 = 13.82 \text{ in}^3 \text{ Obscured}$$

76% Axial Coverage

100% Circ. Coverage

$$176 \div 2$$

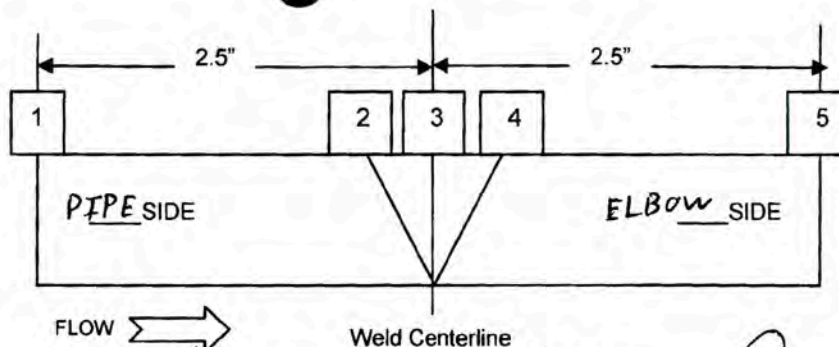
88% Exam Volume Achieved

pg 34

THICKNESS AND CONTOUR

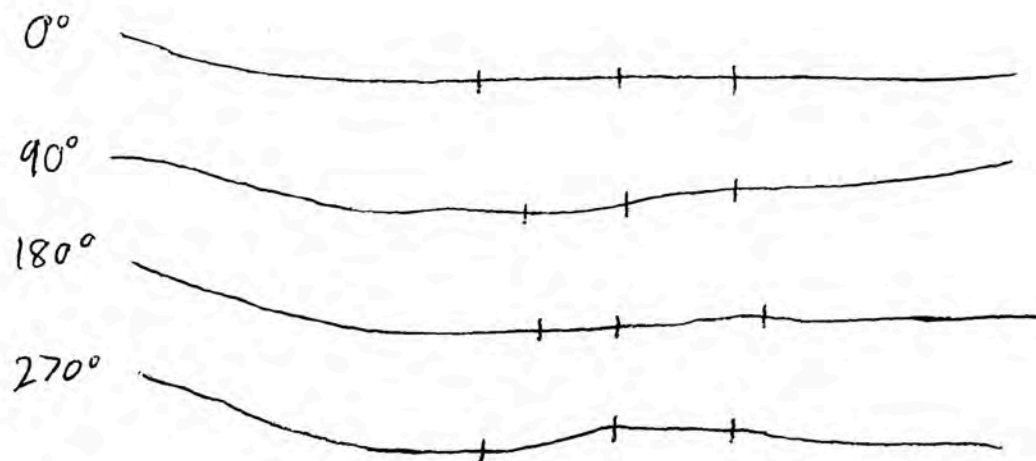
Position	0	90	180	270
1	1.31	1.23	1.25	1.21
2*	1.24	1.23	1.21	1.13
3	1.26	1.33	1.35	1.22
4*	1.45	1.40	1.44	1.37
5	1.41	1.47	1.45	1.39

* Weld edge



UT-14-027

Examiner: <u>DJMACLEAN</u>	Reviewer: <u>Matt Welch 3/6/14</u>	ANII: <u>Samuel Flood</u>
Print name: <u>DJMACLEAN</u> 3/4/14 Date:	Print name: <u>MATT WELCH</u> Date:	Print name: <u>Samuel Flood</u> Date:
COMPONENT ID: <u>DSR HR -3-05A</u>		<u>3/10/14</u>
CROWN WIDTH: <u>1.20"</u>		WELD LENGTH: <u>75.75"</u>
CROWN HEIGHT: <u>Flush</u>		DIAMETER: <u>24"</u>



000201

pg 4/4



Ultrasonic Examination

Site/Unit:	BFN / 3	Procedure:	N-UT-87/EPRI-DMW-PA-1	Outage No.:	U3RF16
Summary No.:	05099-ISI-BFN3	Procedure Rev.:	3/4	Report No.:	UT-14-031
Workscope:	ISI	Work Order No.:	114699848	Page:	1 of 33
Code:	Section XI 2001 Ed/2003 Add	Cat./Item:	R-A/R1.16C	Location:	REACTOR BUILDING-DRYWELL
Drawing No.:	3-ISI-0330-C-01	Description:	VLV - EL		
System ID:	074 - Residual Heat Removal System				
Component ID:	TRHR-3-191	Size/Length:	20 /	Thickness/Diameter:	1.031 / 20
Limitations:					
Comments:	This report contains the Manual Phased Array examination data.				

Results: Accept Reject Info

Percent Of Coverage Obtained > 90%:

Reviewed Previous Data:

Examiner	Level	Signature	Date	Reviewer	Signature	Date
N/A		See report for examiner signatures		MATT WELCH	<i>Matt Welch</i>	3/9/14
Examiner	Level	Signature	Date	Site Review	Signature	Date
N/A	N/A			N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			Samuel Flood	<i>Samuel Flood</i>	3/11/14

TENNESSEE VALLEY AUTHORITY		EXAMINATION SUMMARY AND RESOLUTION DATA SHEET		REPORT NUMBER: <i>UT-14-031</i>	
PROJECT: BFN UNIT: 3		CYCLE: 16	COMPONENT ID: TRHR-3-191		
EXAMINATION METHOD			SYSTEM: RHR- ISI DWG. NO. 3-ISI-0330-C-01		
MT <input type="checkbox"/>	PT <input type="checkbox"/>	UT <input checked="" type="checkbox"/>	VT <input type="checkbox"/>	CODE CLASS: 1 CATEGORY:	
PROCEDURE		REV:	TC:	COFIG.:	EL TO VLV
EXAMINER: <i>ED ASH</i> <i>Ed Ash</i>		EXAMINER:		EXAMINER:	
LEVEL: <i>II</i>		LEVEL:		LEVEL:	

TRHR-3-191 is a dissimilar metal weld consisting of a cast stainless steel valve to a carbon steel elbow.

This examination claims dual credit:

-Category R-A, item R1.16 C

-Category C/NUREG-0313 for IGSCC

The examination utilized Phased Array Ultrasonics for Dissimilar Metal

Weld in accordance with EPRI Generic Procedure EPRI-DMW-PA-1, rev.4

as implemented through TVA/ISO Procedure N-UT-87, rev.3.

Coverage limitations were associated with surface conditions and the cast stainless steel valve.

Scans were limited to the downstream side of the joint

Code coverage is reported in two applications, ASME Section XI, 2001 Edition through the 2003 Addenda and Procedure Qualified coverage.

Results are below:

ASME Section XI: 54.3%

Procedure coverage: 43.3%

There were no recordable indications.

RESOLUTION BY: *MATT WELCH*

Matt Welch

LEVEL: *III* DATE: *3/7/14*

REVIEWED BY: *MATT WELCH*

Matt Welch

LEVEL: *III* DATE: *3/7/14*

ANII:

Ed Ash

DATE: *3/11/14*

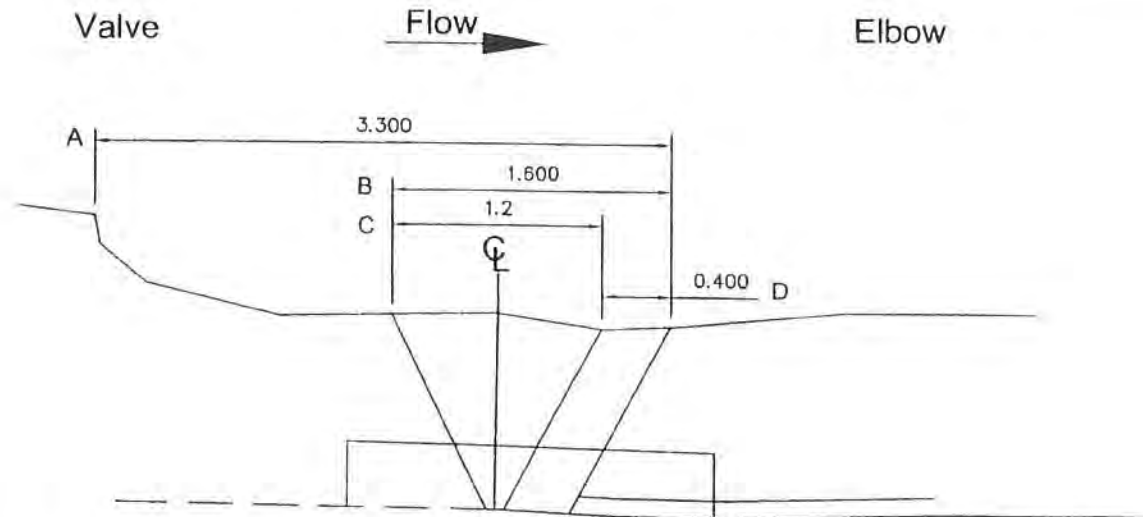
PG. *2* OF *33*

COVERAGE PLOT

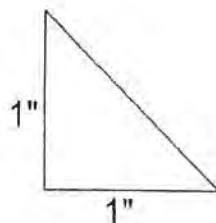
Component ID: TRHR-3-191

UT-14-031

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>Samuel Flannery</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flannery
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14



A = (Machined) boss to interface
 B = U/S Weld toe to interface
 C = Weld crown width
 D = Buttering width

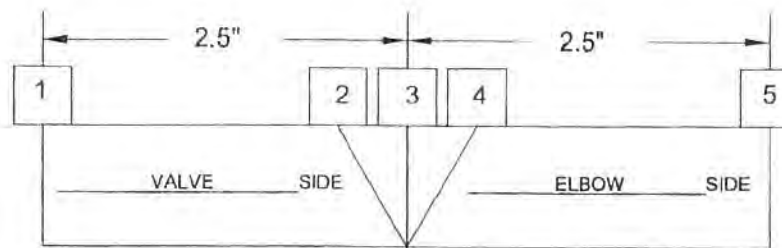


pg 16/33

THICKNESS AND CONTOUR

Position	0	90	180	270
1	N/A	N/A	N/A	N/A
2*	N/A	N/A	N/A	N/A
3	1.160	1.090	1.167	1.100
4*	1.135	1.123	1.000	1.040
5	1.195	1.196	1.239	1.130

*Weld Edge

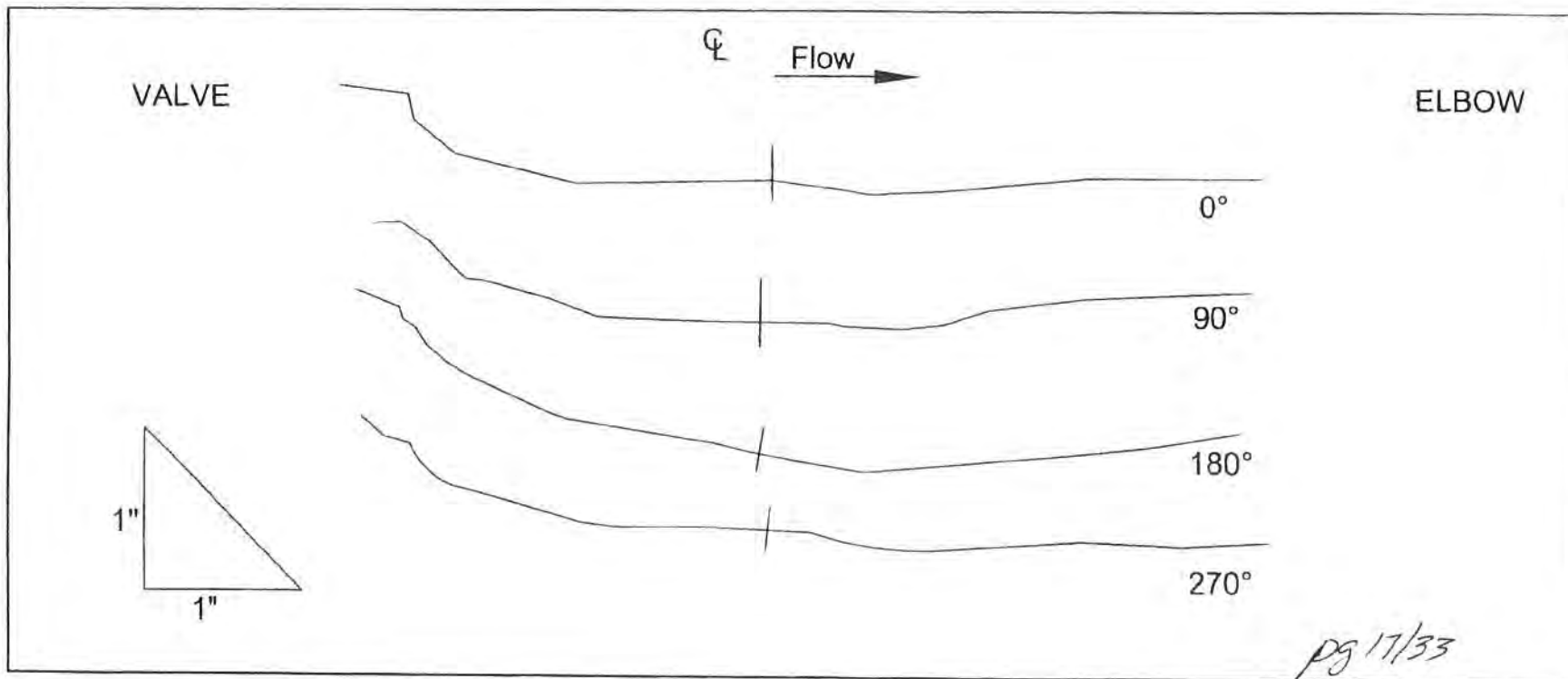


LT-14-031

FLOW →

Weld Centerline

Examiner: <u>Ed Fish</u>	Reviewer: <u>Matt Welch</u> 3/7/14	ANII: <u>Samuel Flood</u> 3/11/14
Print name: ED FISH Date:	Print name: MATT WELCH Date:	Print name: Samuel Flood Date:
COMPONENT ID: TRHR-3-191		
CROWN WIDTH: 1.2"		WELD LENGTH: 62.8"
CROWN HEIGHT: FLUSH		DIAMETER: 20"



COVERAGE PLOT SUMMARY

Component ID:TRHR-3-191

LT-14-031

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>Samuel F. Fish</i>
Print name: ED FISH	Print name: MATT WELCH	Print name: Samuel F. Fish
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

ASME Section XI coverage achieved- 54.3%

Lower 1/3 of weld thickness, 1/2" beyond weld toe on each side of joint.

Refracted Longitudinal wave mode, axial scan direction- 73.3%

Refracted Longitudinal wave mode, circumferential scan direction-44.3%

Combined Refracted Longitudinal Wave mode coverage-60.8%

Shear Wave mode coverage, axial scan direction-47.8%

Shear Wave mode coverage, circumferential scan direction-47.8%

Combined Shear Wave mode coverage- 47.8%

Procedure required examination volume achieved-43.3%

Full volume thickness, 1/2" beyond weld toe on each side of joint

Refracted Longitudinal wave mode, axial scan direction- 14.7%

Refracted Longitudinal wave mode, circumferential scan direction-20.9%

Combined Refracted Longitudinal Wave mode coverage-17.8%

Shear Wave mode coverage, axial scan direction-36.7%

Shear Wave mode coverage, circumferential scan direction-49.9%

Combined Shear Wave mode coverage- 43.3%

Coverage Key:

REV= Required examination Volume

OEV= Obtained Examination volume

R/L= Refracted Longitudinal

Axial Scan direction= upstream and downstream

Circ Scan direction= Clock wise and Counter clock wise

pg 18/33

COVERAGE PLOT

Component ID: TRHR-3-191

LT-14-031

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	AN# <i>Samuel Flood</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flood
Date: 21 FEB 2014	Date: 3/4/14	Date: 3/11/14

$AME REV = 43.96 m^3$
 $R/L REV = [(5.85) - 2] \times 3.5 \times 12.8 = 14.8$
 $SHEAR REV = 43.96 - 14.8 = 29.16$

Valve

Flow

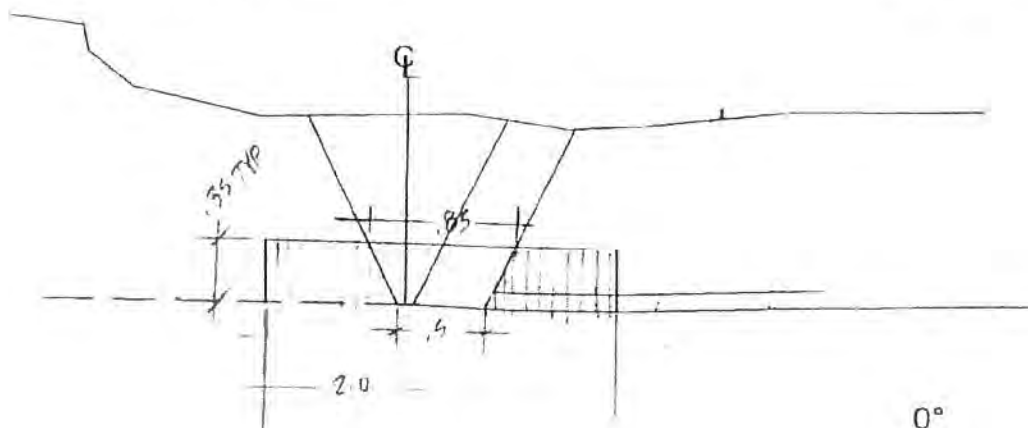
Elbow



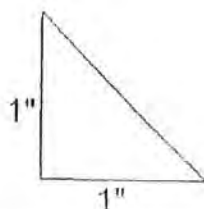
R/L VOLUME



SHEAR VOLUME



0°



PS 19/33

COVERAGE PLOT

Component ID: TRHR-3-191

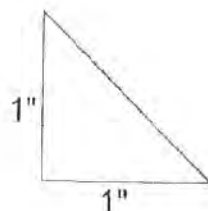
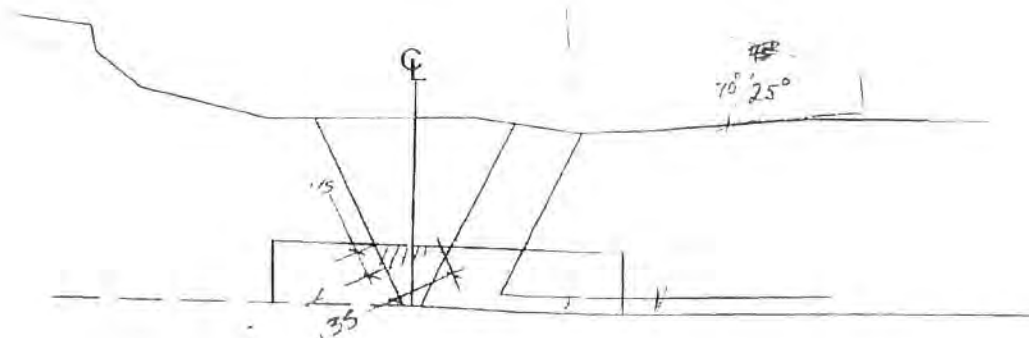
Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>LT-14-031</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flory
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

$$1. \quad R/L \text{ OBST} = ((.15 \times .35) \div 2) \times 62.8 = 1.65 \quad \text{DEV R/L} = 14.8 - 1.65 = 13.15 / 14.8 = .888 = 88.8\%$$

Axial scan direction Valve

Flow

Elbow



COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: *Ed Fish*
 Print name: Ed Fish
 Date: 21 FEB 2014

Reviewer: *Matt Welch*
 Print name: MATT WELCH
 Date: 3/7/14

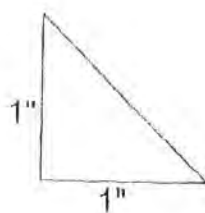
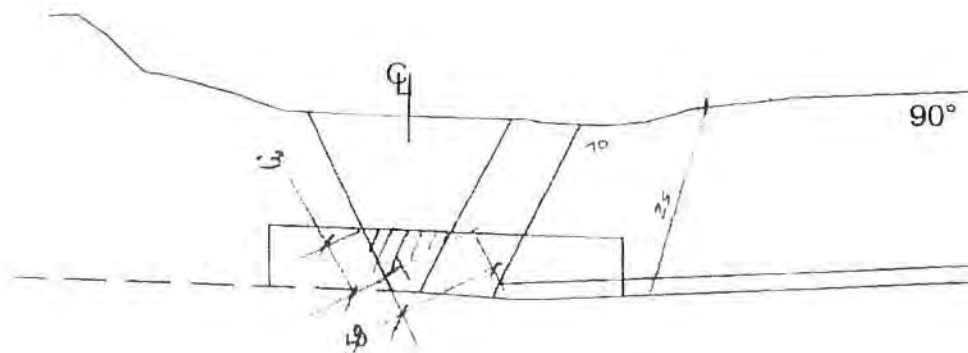
AMH: *R. Flood*
 Print name: Samuel Flood
 Date: 3/14/14

$$R/L\ DWSF = ((.3 \times .58) \div 2) \times 62.8 = 5.46$$

$$R/L\ OEV = 14.8 - 5.46 = 9.34 / 14.8 = .631 = 63.1\%$$

Valve Flow Elbow

Axial scan direction



COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANIT: <i>Samuel F. Welch</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel F. Welch
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

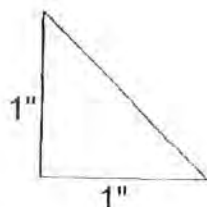
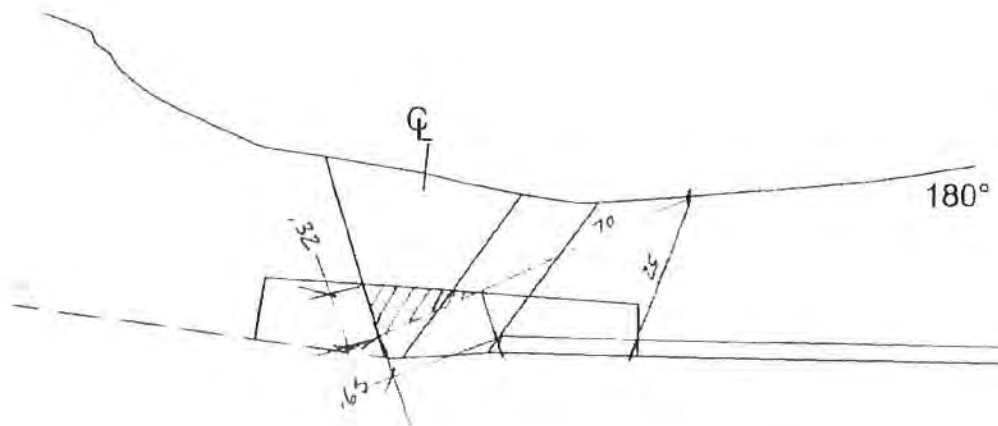
$$R/L\ OBST = ((.32 \times .65) \div 2) \times 62.8 = 6.53$$

$$R/L\ DEV = 14.8 - 6.53 = 8.27 / 14.8 = .559 = 55.9\%$$

axial scan direction Valve

Flow →

Elbow



pg 22/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>Samuel Flood</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flood
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

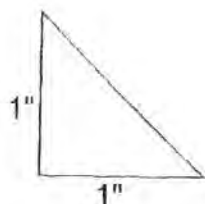
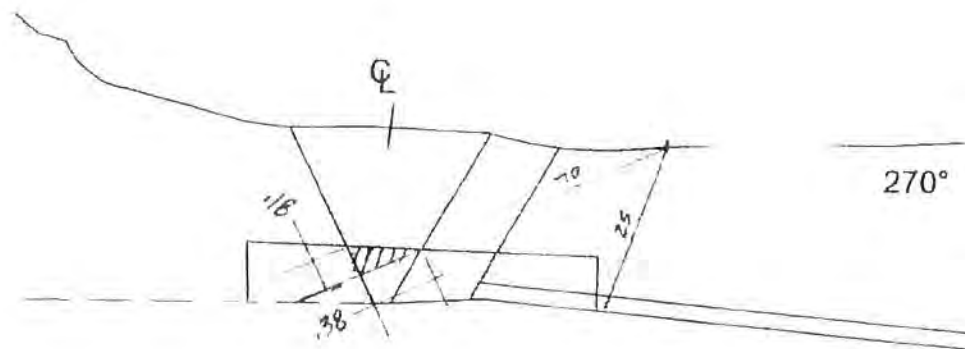
$$R/L\ OBST = ((.18 \times .38) \div 2) \times 62.8 = 2.15$$

$$R/L\ OEY = 14.8 - 2.15 = 12.65 / 14.8 = .855 = 85.5\%$$

Valve
axial scan direction

Flow

Elbow



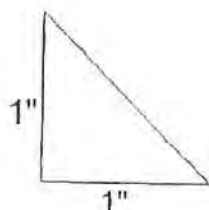
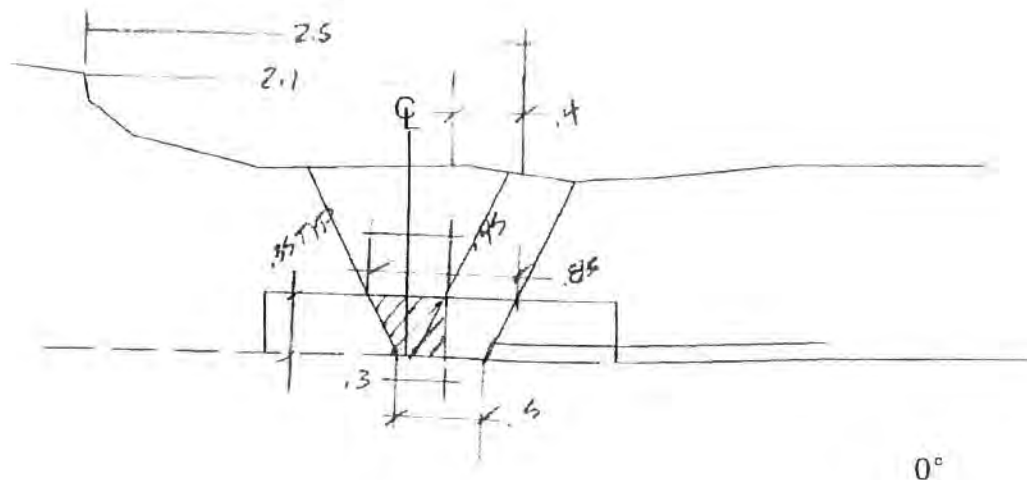
pg 23/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>NT-14-051</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flood
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

RL REV = 14.8 R/L OBST CUR SCAN DIRECTION = 14.8 $\left[\left((.3 + .45) \div 2 \right) \times .35 \right] \times 62.8 = 6.56 / 14.8$
 Valve Flow Elbow OEV = 44.3%



PS 24/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner:

Print name: Ed Fish

Date: 21 FEB 2014

Reviewer:

Print name: MATT WELCH

Date: 3/7/14

ANIL

Print name: Samuel F. Lopez

Date: 3/11/14

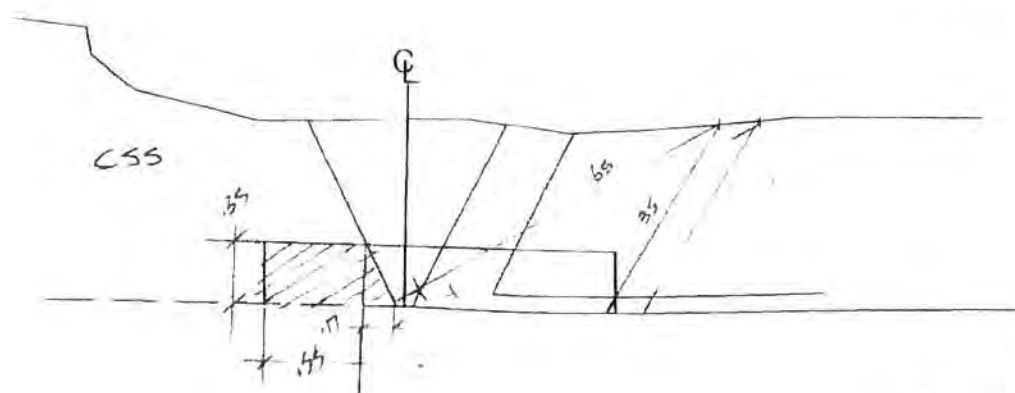
ASME REV SHEAR = 29.16 OBST = $((.35 \times .55) + ((.17 \times .35) - 2) \times 62.8 = 13.95$ REV = $13.95 / 29.16 = .478$

Valve

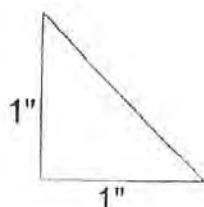
Flow

Elbow 47.8% @ all sectors

- axial = Cric scan directions



0°



pg 25/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANH: <i>OT-14-031</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: <i>Samuel Flood</i>
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

Procedure REV = 131.8 IN³

$$RL REV = 131.8 - \left[\left(\frac{(1.9 + .5)}{2} \right) \times 1.05 \right] \times 62.8 = 65.94$$

Valve

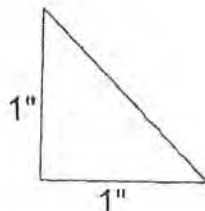
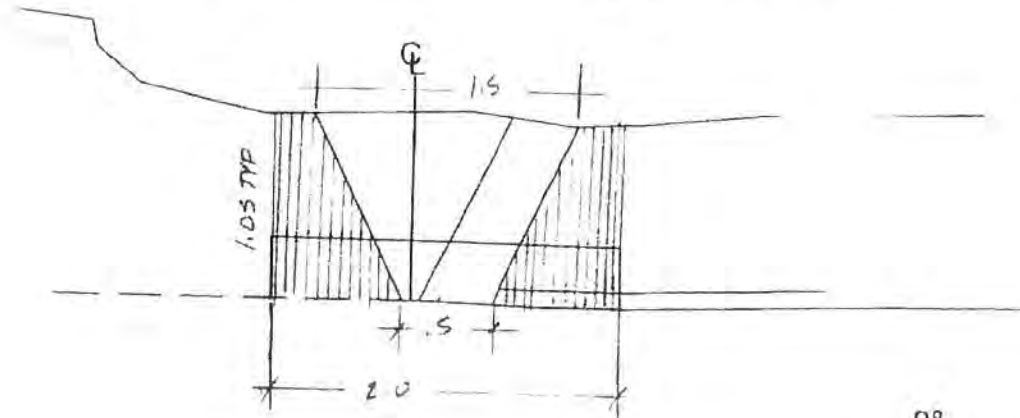
Flow

Elbow

$$SHEAR REV = 131.8 - 65.94 = 65.86$$

□ RL VOLUME

▨ SHEAR VOLUME



pg 26/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>Samuel Flood</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flood
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/16/14

R/L REV = 65.94 in³ Axial scan direction

R/L OBST = 51.18 in³

Valve

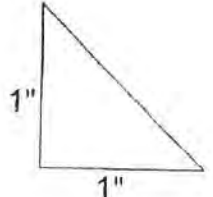
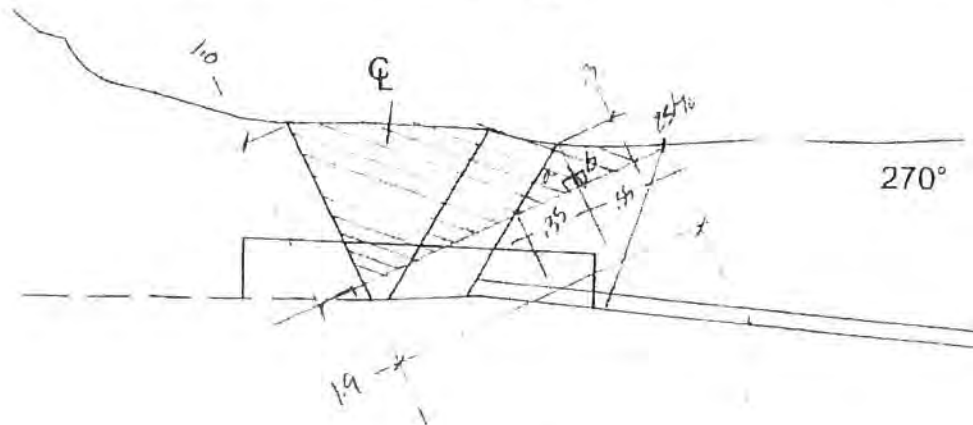
Flow

Elbow

$$((10 \times 1.9) \div 2) - (a + b) \times 62.8 = 51.18$$

OBSTRUCTED VOLUME

$$R/L OEV = 65.94 - 51.18 = 14.76 / 65.94 = .224 = 22.4\%$$



$$a = (.3 \times .35) \div 2 = .0525$$

$$b = (.3 \times .35) \div 2 = .0525$$

$$a + b = 0.135$$

COVERAGE PLOT

Component ID: TRHR-3-191


Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANII: <i>UTP4-031</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: <i>Samuel Flax</i>
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

R/L REV = 65.94 in² Axial scan direction

R/L OBST = 57.9 in² Valve

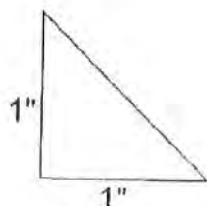
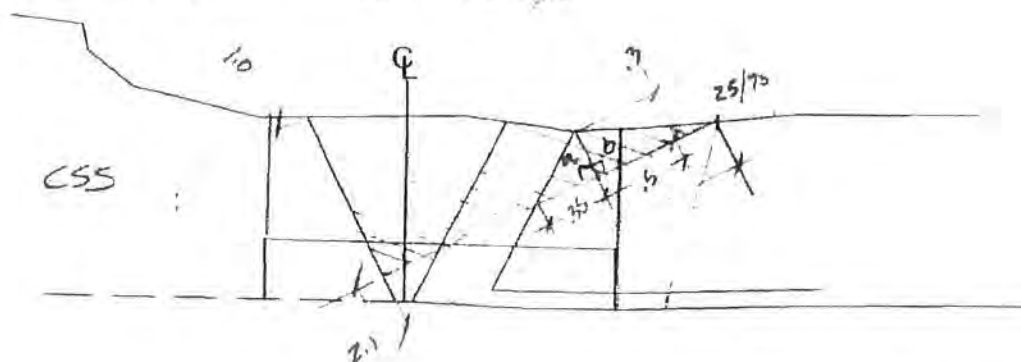
Flow →

Elbow

 OBSTRUCTED VOLUME

$$((1.0 \times 2.1) - 2) = (a+b) \times 62.8 = 57.9$$

$$R/L OEV = 65.94 - 57.9 = 8.04 / 65.94 = .122 = 12.2\%$$



$$a = (.3 \times .35) - 2 = .0525$$

$$b = (.3 \times .5) - 2 = .075$$

$$a+b = .1275$$

0°

pg 28/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANR: <i>Samuel Flood</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flood
Date: 21 FEB 2014	Date: 3/4/14	Date: 3/11/14

R/L REV = 65.94 in³ Axial scan direction

R/L OBST = 57.7

Valve

Flow →

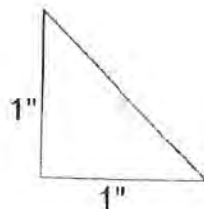
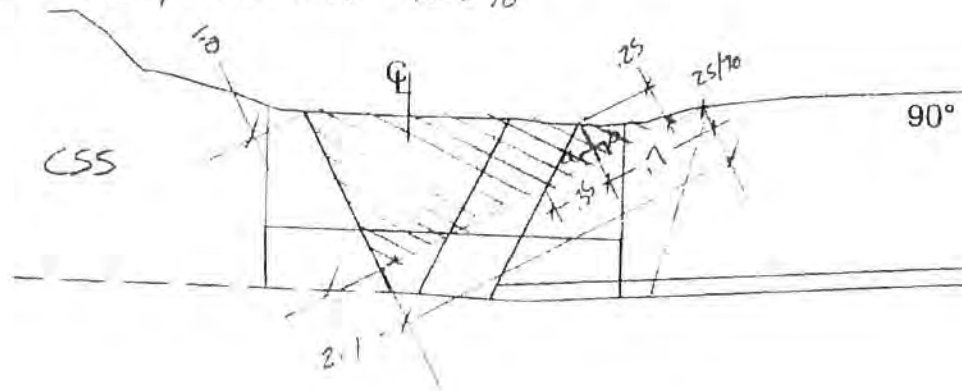
Elbow



OBSTRUCTED VOLUME

$$((1.0 \times 2.1) \div 2) - (a+b) \times 62.8 = 57.7$$

$$R/L OEV = 65.94 - 57.7 = 8.24 / 65.94 = .125 = 12.5\%$$



$$a = (.35 \times .25) \div 2 = .044$$

$$b = (.25 \times .7) \div 2 = .0875$$

$$a+b = 0.1315$$

pg 29/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: *Ed Fish*
 Print name: Ed Fish
 Date: 21 FEB 2014

Reviewer: *Matt Welch*
 Print name: MATT WELCH
 Date: 3/7/14

AMH: *Samuel Flood*
 Print name: Samuel Flood
 Date: 3/11/14

R/L REV = 65.94 Axial scan direction

R/L OBST = 58.25

Valve

Flow

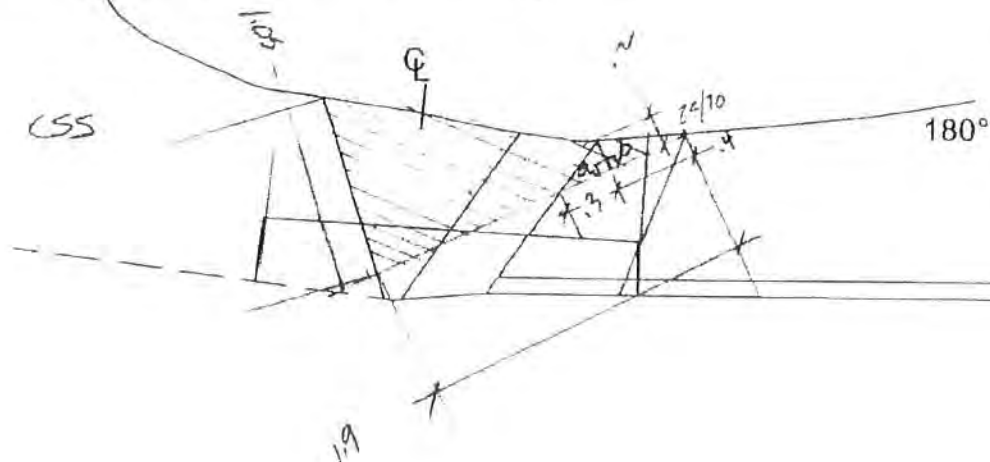
Elbow



OBSTRUCTED VOLUME

$$((1.03 \times 1.9) \div 2) - (a+b) \times 62.8 = 58.25$$

$$R/L DEV = 65.94 - 58.25 = 7.69 / 65.94 = .117 = 11.7\%$$



$$a = (.3 \times 2) \div 2 = .03$$

$$b = (.2 \times 4) \div 2 = .04$$

$$a+b = .07$$

pg 30/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANIL: <i>Samuel Flores</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flores
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14


R/L REV = 65.94 in³ Circ Scan direction

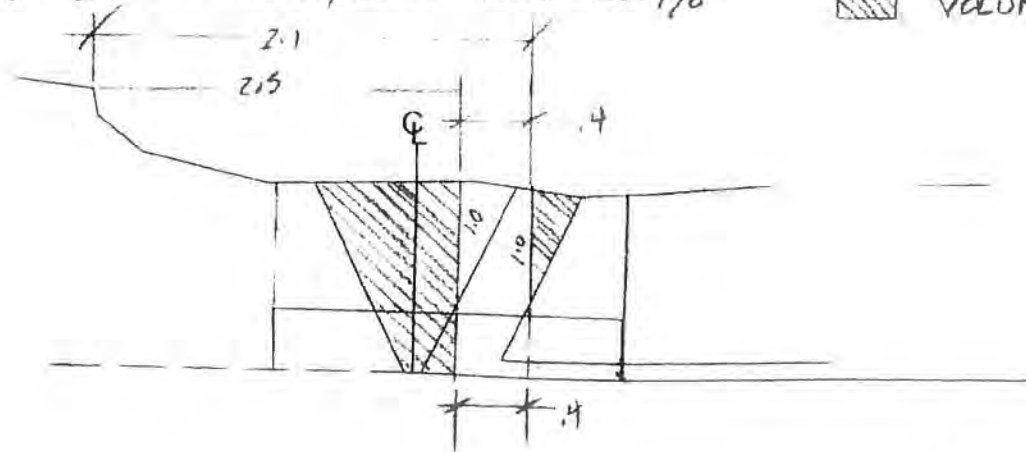
R/L OBST = 52.1 in³ Valve

Flow 

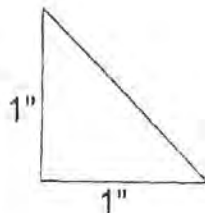
Elbow

$$65.94 - \left[\left(\frac{1.1 \times 1.0}{2} \right) \times .4 \right] \times 62.8 = 13.82 / 65.94 = .209 = 20.9\%$$

 OBSTRUCTED VOLUME



0°



pg 31/33

COVERAGE PLOT

Component ID: TRHR-3-191

Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANH: <i>Samuel Flood</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: Samuel Flood
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

Shear REV = 65.86 in³ axial scan direction


Shear OBST = 41.68 in³ Valve

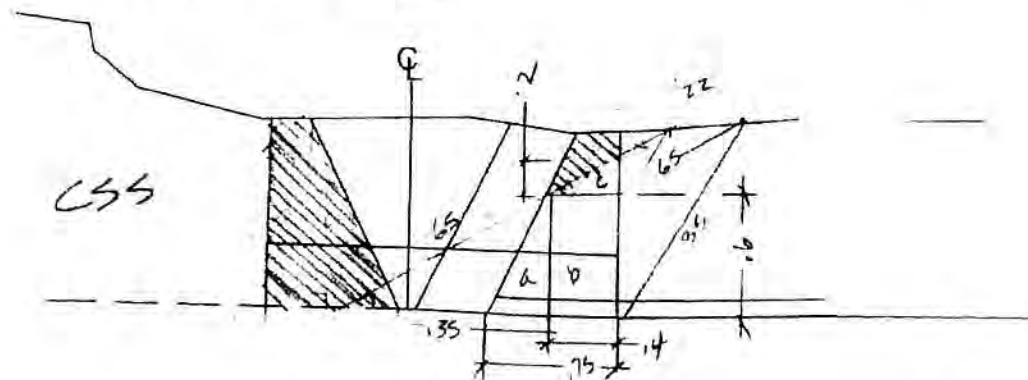
$$65.86 - (a+b+c) = 41.68$$

$$\text{Shear OEV} = 24.18 / 65.86 = .367 = 36.7\%$$

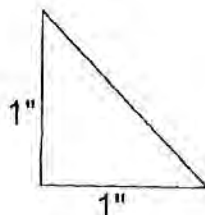
Flow →

Elbow

 OBSTRUCTED VOLUME



0°



$$a = (.35 \times .6) \div 2 = .105$$

$$b = .6 \times .4 = .24$$

$$c = (.4 \times .2) \div 2 = .04$$

$$a + b + c = .385 \times 62.8 = 24.18$$

pg 32/33

COVERAGE PLOT

Component ID: TRHR-3-191


Examiner: <i>Ed Fish</i>	Reviewer: <i>Matt Welch</i>	ANIT: <i>OT-14-031</i>
Print name: Ed Fish	Print name: MATT WELCH	Print name: <i>Samuel Flood</i>
Date: 21 FEB 2014	Date: 3/7/14	Date: 3/11/14

Shear REV = 65.86 in³ CUL Scan direction


Shear OBST = 32.97 in³ Valve

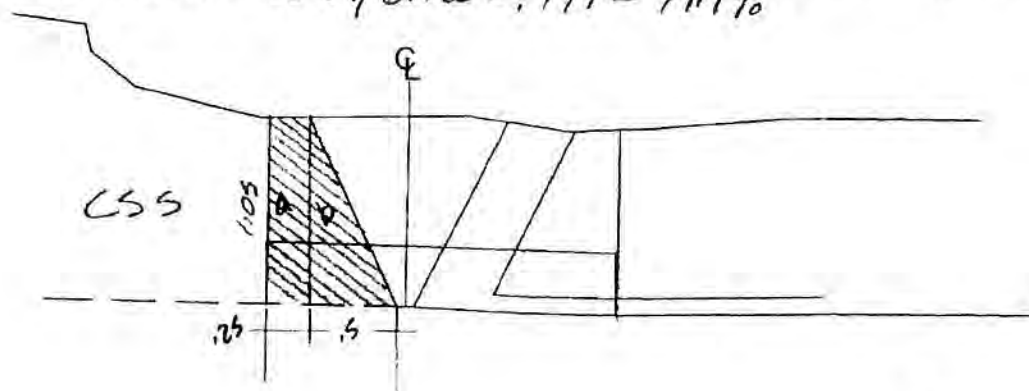
$$(a+b) \times 62.8 = 32.97 \text{ in}^3$$

$$\text{Shear OEV} = 65.86 - 32.97 = 32.89 / 65.86 = .499 \pm 49.9\%$$

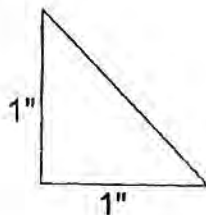
Flow 

Elbow

 OBSTRUCTED VOLUME



0°



$$a = 1.05 \times .25 = .262$$

$$b = (1.05 \times .5) \div 2 = .262$$

$$a+b = .525$$

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UT Calibration/Examination

Site/Unit: **BFN / 3**
 Summary No.: **01819-ISI-BFN3**
 Workscope: **ISI**

Procedure: **N-UT-64/PDI-UT-2**
 Procedure Rev.: **13/F**
 Work Order No.: **114699848**

Outage No.: **U3RF16**
 Report No.: **UT-14-036**
 Page: **1** of **2**

Code: **Sec XI 2001 Ed/2003 Add** Cat/Item: **B-J/B9.11** Location: **REACTOR BUILDING-DRYWELL**
 Drawing No.: **3-ISI-0332-C-01** Description: **TEE - VLV**
 System ID: **069 - Reactor Water Cleanup System**
 Component ID: **RWCU-3-001-070** Size/Length: **6 /** Thickness/Diameter: **0.432 / 6**
 Limitations: **Single sided exam, see coverage plot page for details** Start Time: **0843** Finish Time: **0850**

Instrument Settings
 Serial No.: **E37688**
 Manufacturer: **KRAUTKRAMER**
 Model: **USN 60** Linearity: **L-14-002**
 Delay: **5.8291** Range: **1.5**
 MII Cal/Vel: **0.1219** Energy: **High**
 Damping: **1000 Ohms** Reject: **0**
 PRF Mode: **Auto High** SU Freq.: **1.5 MHz**
 Disp. Start: **IP** Rectify: **Full Wave**
 Inst. Freq.: **2.0 MHz**

Ax. Gain (dB): **26.2** Circ. Gain (dB): **26.2**
 1 Screen Div. = **.15** in. of **Sound Path**

Calibration Block
 Cal. Block No.: **WB-84**
 Thickness: **1"** Dia.: **N/A**
 Cal. Blk. Temp.: **68** Temp. Tool: **558272**
 Comp. Temp.: **76** Temp. Tool: **558272**

Search Unit
 Serial No.: **SH0104**
 Manufacturer: **GE**
 Size: **0.375"** Model: **Comp G**
 Freq.: **1.5 MHz** Center Freq.: **N/A**
 Exam Angle: **45** Squint Angle: **N/A**
 Measured Angle: **45** Mode: **Shear**
 Exit Point: **.4** # of Elements: **1**
 Config.: **Single** Focus: **N/A**
 Shape: **Round** Contour: **Flat**
 Wedge Style: **Non-Integral**

Search Unit Cable
 Type: **RG-174** Length: **6** No. Conn.: **0**

Scan Coverage
 Upstream ☒ Downstream ☒ Scan dB: **46.2**
 CW ☒ CCW ☒ Scan dB: **46.2**
 Exam Surface: **OD**
 Surface Condition: **As Found**

Cal. Checks	Time	Date
Initial Cal.	0746	3/5/2014
Inter. Cal.	0843	3/5/2014
Inter. Cal.		
Inter. Cal.		
Final Cal.	0850	3/5/2014

Couplant
 Cal. Batch: **13C002**
 Type: **Ultrigel II**
 Mfg.: **Sonotech**
 Exam Batch: **13C002**
 Type: **Ultrigel II**
 Mfg.: **Sonotech**

Reference Block
 Serial No.: **790398**
 Type: **SS Rompas**

Axial Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
1" Notch	80	9	1.343	
Circumferential Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
1" Notch	80	9	1.343	
Reference/Simulator Block				
Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
23.0	1" R	85	6.5	.999

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report)
 Results: NRI ☒ RI ☐ Info ☐
 Percent Of Coverage Obtained > 90%: **48.8%** Reviewed Previous Data: **Yes**

Comments: **558272 Cal Due 1/25/2015**
3/14/14 **537500 Cal Due 10/26/2014**
E37688

Examiner	Level	III*	Signature	Date	Reviewer	Signature	Date
Macleon, Duncan J.			<i>DJ Macleon</i>	3/4/2014	Matt Welch, LIII	<i>Matt Welch</i>	3/6/14
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A					N/A		
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					<i>Shirley Flood</i>	<i>Ja Hanc</i>	3/13/14

COVERAGE PLOT

Component ID: RWCU-3-001-070

WT-14-036

Examiner: <u>DJ Maclean</u>	Reviewer: <u>Matthew</u>	ANII: <u>John</u>
Print name: <u>DJ Maclean</u>	Print name: <u>MATTHEW</u>	Print name: <u>John of Ford</u>
Date: <u>3-4-14</u>	Date: <u>3/6/14</u>	Date: <u>3/13/14</u>

REQUIRED AXIAL EXAM

$$\begin{array}{rcl} H & W & \\ .2 & \times 1.15 & = .23 \\ .2 & \times .9 & = .18 \\ \hline & & .41 \text{ in}^2 \end{array}$$

AXIAL
Scan 3

$$\begin{array}{rcl} \text{Area} & L & \\ .41 & \times 21.25 & = 8.71 \text{ in}^3 \end{array}$$

$$.2 \times .4 = 0.08$$

$$.2 \times .6 = 0.12$$

$$\begin{array}{rcl} (.2 \times .2) \div 2 & = & 0.02 \\ \hline & & 0.22 \text{ in}^2 \end{array}$$

CIRC

$$\begin{array}{rcl} \text{Area} & L & \\ 0.22 & \times 21.25 & = 4.68 \text{ in}^3 \end{array}$$

$$4.68 \div 8.71 = 0.537 \times 100 = 53.7\%$$

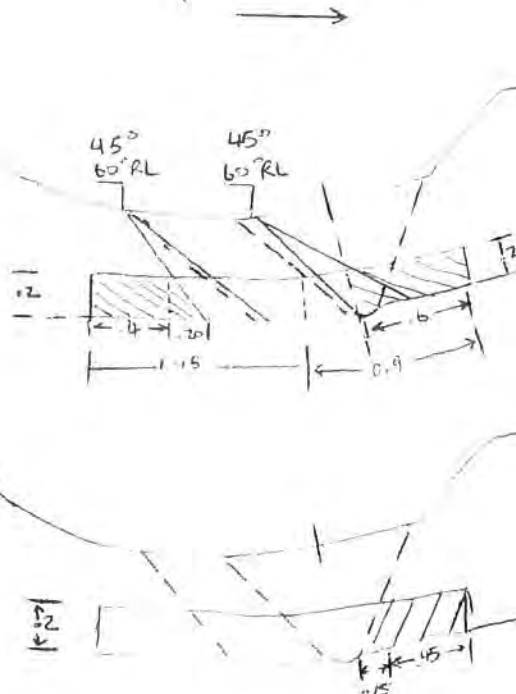
Scan 3 Coverage

$$100 - 53.7 = 46.3\%$$

Scan 4 Coverage

0%

90° FLOW



REQUIRED CIRC EXAM

$$\begin{array}{rcl} H & W & \\ (.2 \times .15) \div 2 & = & 0.015 \\ .2 \times .45 & = & 0.09 \\ \hline & & 0.105 \text{ in}^2 \end{array}$$

$$\begin{array}{rcl} \text{Area} & L & \\ 0.105 & \times 21.25 & = 2.23 \text{ in}^3 \end{array}$$

$$2.23 \div 8.71 = 0.256 = 25.6\%$$

Circ Scan 5 Coverage

$$100 - 25.6 = 74.4\%$$

Circ Scan 6 Coverage

74.4%

TOTAL ACHIEVED COVERAGE:

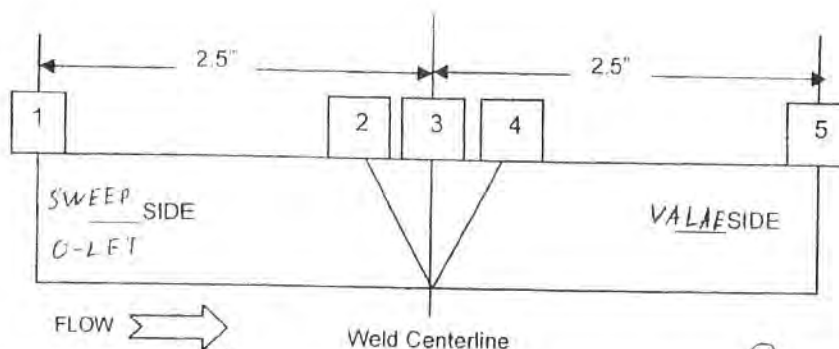
$$\begin{array}{rcl} 46.3 & & \\ 0 & & \\ 74.4 & & \\ + 74.4 & & \\ \hline 195.1 & \div 4 & = 48.8\% \end{array}$$

pg 3/4

THICKNESS AND CONTOUR

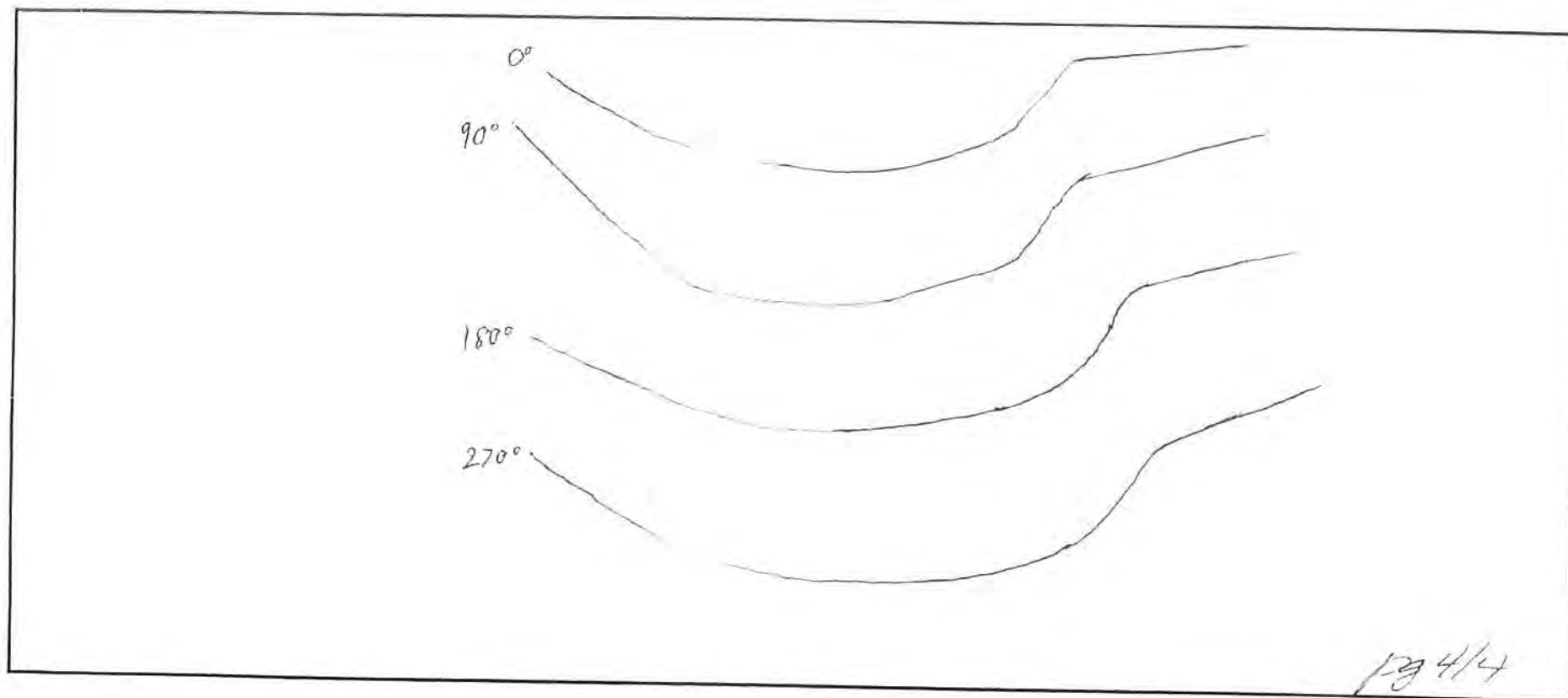
Position	0	90	180	270
1		.57	.77	
2*	N	.58	.58	N
3	A	.65	.59	A
4*		.58	.51	
5		1.02	.96	

* Weld edge



L17-14-036

Examiner: <u>DJ Maclean</u>	Reviewer: <u>Matt Welch 3/6/14</u>	ANII: <u>Samuel F. Ford</u>
Print name: <u>DJ Maclean</u> 3-4-14 Date:	Print name: <u>MATT WELCH</u> Date:	Print name: <u>Samuel F. Ford</u> Date: <u>3/13/14</u>
COMPONENT ID: <u>RWCU-3-001-070</u>		
CROWN WIDTH: <u>1.0"</u>	WELD LENGTH: <u>21.25"</u>	
CROWN HEIGHT: <u>Flush</u>	DIAMETER: <u>6.625"</u>	



UT Calibration/Examination

Site/Unit.	BFN / 3
Summary No.:	06000-ISI-BFN3
Workscope.	PSI

Procedure:	N-UT-76/PDI-UT-1
Procedure Rev.:	9/E
Work Order No.:	113331815

Outage No.: U3RF16
Report No.: UT-14-001

Page: 1 of 25 ²⁵ 2/11/14

Code: Sec XI 2001 Ed/2003 Add Cat./Item: G-F-2/C5.51 Location: REACTOR BUILDING

Drawing No.: 3-CHM-2407-C-02 Description: P - FLG Location: REACTOR BUILDING

System ID: 073 - High Pressure Coolant Injection System

Component ID: **HPCI-3-019-018**

Limitations:	No exam on the flange side due to configuration	Size/Length:	10	Thickness/Diameter:	.594/10"
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Instrument Settings	Search Unit	Start Time	Finish Time	09:35
---------------------	-------------	------------	-------------	-------

Serial No.:	E37690	Serial No.:	SE1640	Cal. Checks	Time	Date	Axial Orientated Search Unit
-------------	--------	-------------	--------	-------------	------	------	------------------------------

Manufacturer:	KRAUTKRAMER	Manufacturer:	KRAUTKRAMER	Initial Cal.	08-30	214/2014	Calibration	Signal	Sweep	Sound Bath
---------------	-------------	---------------	-------------	--------------	-------	----------	-------------	--------	-------	------------

Model:	USN 60	Linearity:	L-14-001	Size:	.5	Model:	Comp G	Inter. Cal.	08:30	2/4/2014	Reflector	Amplitude %	Division	Sound Path
--------	--------	------------	----------	-------	----	--------	--------	-------------	-------	----------	-----------	-------------	----------	------------

Delay:	8.8697	Range:	2.000	Freq:	2.25 MHz	Center Freq:	N/A	Inter. Cal:		1.0" NOTCH	80	7.2	1.44
--------	--------	--------	-------	-------	----------	--------------	-----	-------------	--	------------	----	-----	------

Mtl Cal/Vel:	0.1276	Energy:	High	Freq:	2.25 MHz	Center Freq:	N/A	Inter. Cal:	
				Exam Angle:	45	Scout Angle:	N/A		

Damping:	1000 Ohms	Reject:	0	Chart Angle:	-45	Squint Angle:	N/A	Final Cal.	09:43	2/4/2014
----------	-----------	---------	---	--------------	-----	---------------	-----	------------	-------	----------

[illegible]

Disp. Start:	IP	Rectify:	Full Wave	Ext. Freq:	.5	# of Elements:	1	Cal. Batch:	12H130	Circumferential Orientation
--------------	-----------	----------	------------------	------------	-----------	----------------	----------	-------------	---------------	-----------------------------

Inst. Freq.:	2.25 MHz	Config.:	Single	Focus:	N/A	Car. Gen.:	TAH130	Circumferential Orientated Search Unit			
						Type:	Ultracel II				

Shape:	Round	Contour:	N/A	Mfg.:	Sonotek	Calibration	Signal	Sweep	Sound Path
						Reflector	Amplitude %	Division	

Ax. Gain (dB):	24.6	Circ. Gain (dB):	N/A	Wedge Style:	Non-Integral	Edge:	Smooth	Frequency:	1.0 Natch	Amplitude %	Division	
									80	7.2		1.11

1	Screen Div. = .2	in. of	Sound Path	Search Unit Cable	Exam Batch: 12H130	7.5 INCHES	80	7.2	1.44
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Calibration Block	Type: RG-174	Length: 6	No. Conn: 0	Type: Ultratel II
-------------------	---------------------	------------------	--------------------	--------------------------

Cal. Block No.:	SO-115	Scan Coverage	Mfg.:	Sonotech				
-----------------	--------	---------------	-------	----------	--	--	--	--

Part Block No.:	SQ-115		Upstream <input checked="" type="checkbox"/>	Downstream <input type="checkbox"/>	Scan dB: 48	Reference Block
Thickness:	1.003	Dia. FLAT				
Reference/Simulator Block						

Cal. Blk Temp:	51.8	Temp Test:	520055	CW <input checked="" type="checkbox"/>	CCW <input checked="" type="checkbox"/>	Scan dB:	48	Serial No.:	92-7615
----------------	------	------------	--------	--	---	----------	----	-------------	---------

Car. Bk. Temp.: 51.8	Temp. Foot: E39055	Exam Surface: OD	Type: CS Rompas	dB	Reflector	Amplitude %	Division	Sound Path
Comp. Temp.: 51.8	Temp. Test: E39055			24.6	ESDP	20	5	

Comp. Temp.: 51.8	Temp. Tool: E39055	Surface Condition: Ground	24.6	FSDH	20	5.2	1.08
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[illegible]


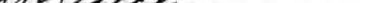
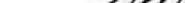
Results:	NRI <input checked="" type="checkbox"/>	RI <input type="checkbox"/>	Info <input type="checkbox"/>	Comments: E37690 DUE 8/11/2014
----------	---	-----------------------------	-------------------------------	--------------------------------

	Percent Of Coverage Obtained > 98%	100%	100%	100%	Contingent	E37690 DUE 8/14/2014
		100%	100%	100%		E39055 DUE 6/24/2014

Percent Of Coverage Obtained > 90%: **No** Reviewed Previous Data: **None**

Examiner	Level	III*	Signature	Date	Reviewer	Signature

KLEINJAN, DAVID R	<i>D.K. Kleinjan</i>	2/4/2014	Matt Welch, LIII	<i>Matt Welch</i>	Signature	<i>2/4/14</i>	Date
-------------------	----------------------	----------	------------------	-------------------	-----------	---------------	------

Examiner	Level	N/A	Signature	Date	Site Review	Signature
						

[illegible]

Other	Level	N/A	Signature	Date	ANII Review	Signature
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[illegible]

UT Calibration/Examination

Figure 1. The effect of the concentration of the inhibitor on the rate of polymerization of α -methylstyrene in the presence of SnCl_4 at 25°C .

SUMMARY NO:	06001-ISI-BFN3	SITE:	BROWNS FERRY	Unit #3
DESCRIPTION	PIPE TO FLANGE	IDENTIFICATION:	HPCI-3-019-018	
SYSTEM ID: HIGH PRESSURE COOLANT INJECTION SYSTEM				
Prepared By:	David Kleinjan	Reviewer By:	MATT WELCH	
Signature:	<i>[Signature]</i>	Signature:	<i>[Signature]</i>	
Date:	04 FEB 2014	Date:	2/19/14	

Items #

1	Axial Required Exam volume $34 * 1.670 * ((.214 + .230) / 2) =$	12.6052
2	Clockwise and CounterClockwise Required exam volume $34 * 1.670 * ((.214 + .230) / 2) =$	12.6052
3	Axial Obstructed Volume Exam (Coverage was achieved by scanning across the weld) 0 =	0.0000
4	Clockwise and Counterclockwise Obstructed Volume Exam $34 * .434 * ((.214 + .230) / 2) =$	3.2758
5	Axial Obtained Exam Volume Item 1 - Item 3 =	12.6052
6	Clockwise and Counter Clockwise Obtained Volume Exam Item 2 - Item 4 =	9.3293
7	Axial Exam Volume Percentage (Item 5 / (Item 1)) * 100 = %	100.00%
8	Clockwise and CounterClockwise Exam Volume Percentage (Item 6 / (Item 2)) * 100 = %	74.01%
9	Full Exam Volume Percentage combining in the Axial, Clockwise, and CounterClockwise Dircetions (Item 7 + Item 8) / 2 = %	87.01%

*NOT
Sealed 2/20/14
pg 3/5*

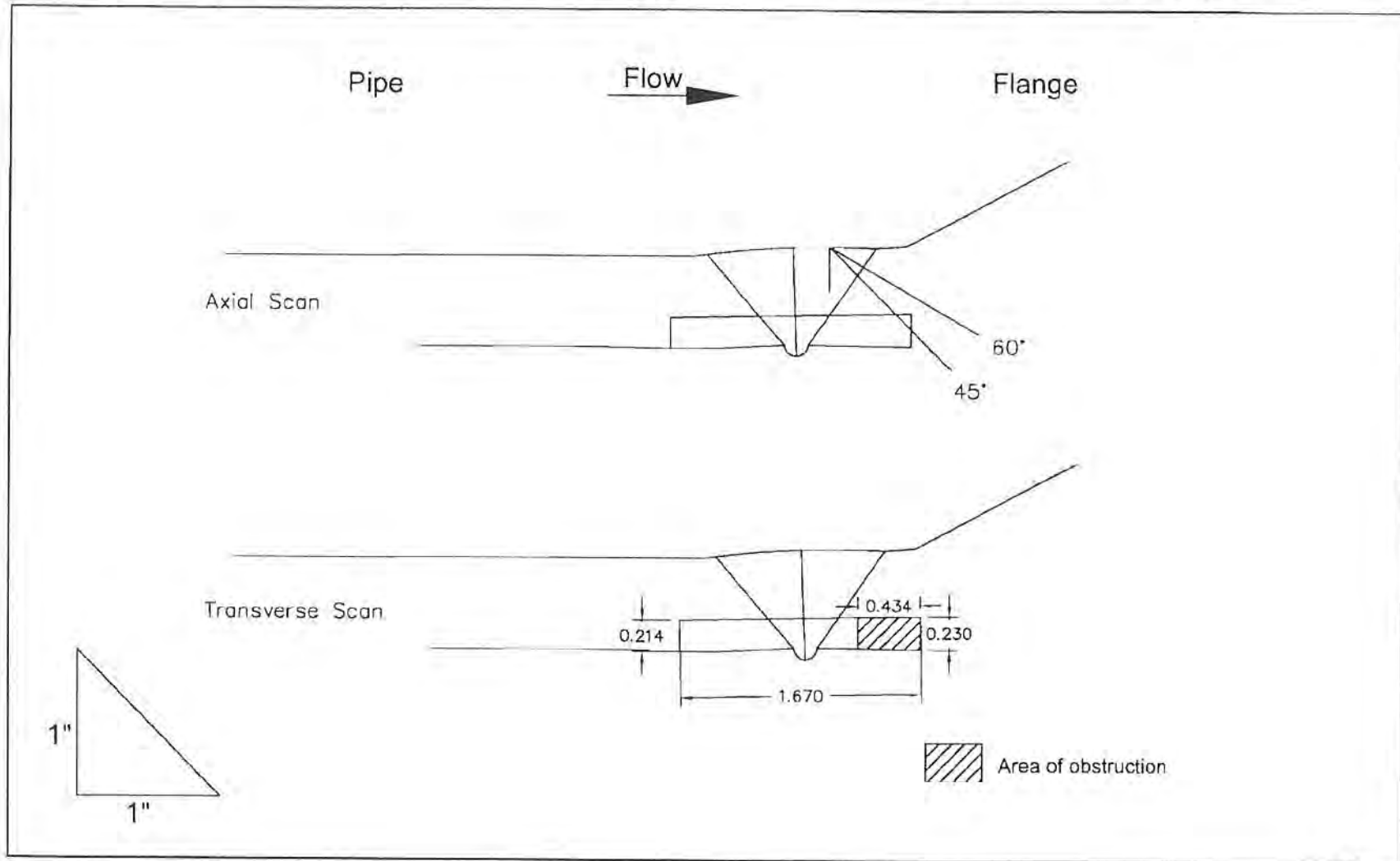
LF-14-001

COVERAGE PLOT

Component ID: HPCI-3-019-018-CORO

LT-14-001

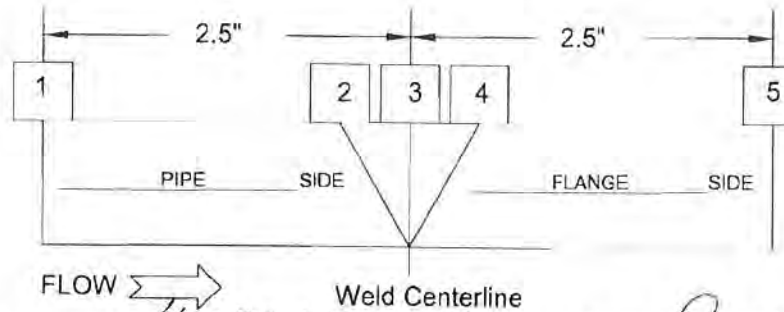
Examiner: <i>D.K. [Signature]</i>	Reviewer: <i>W. [Signature]</i>	ANII: <i>[Signature]</i>
Print name: David Kleinjan	Print name: MATT WELCH	Print name: Samuel Floss
Date: 04 FEB 2014	Date: 2/19/14	Date: 2/23/14



THICKNESS AND CONTOUR

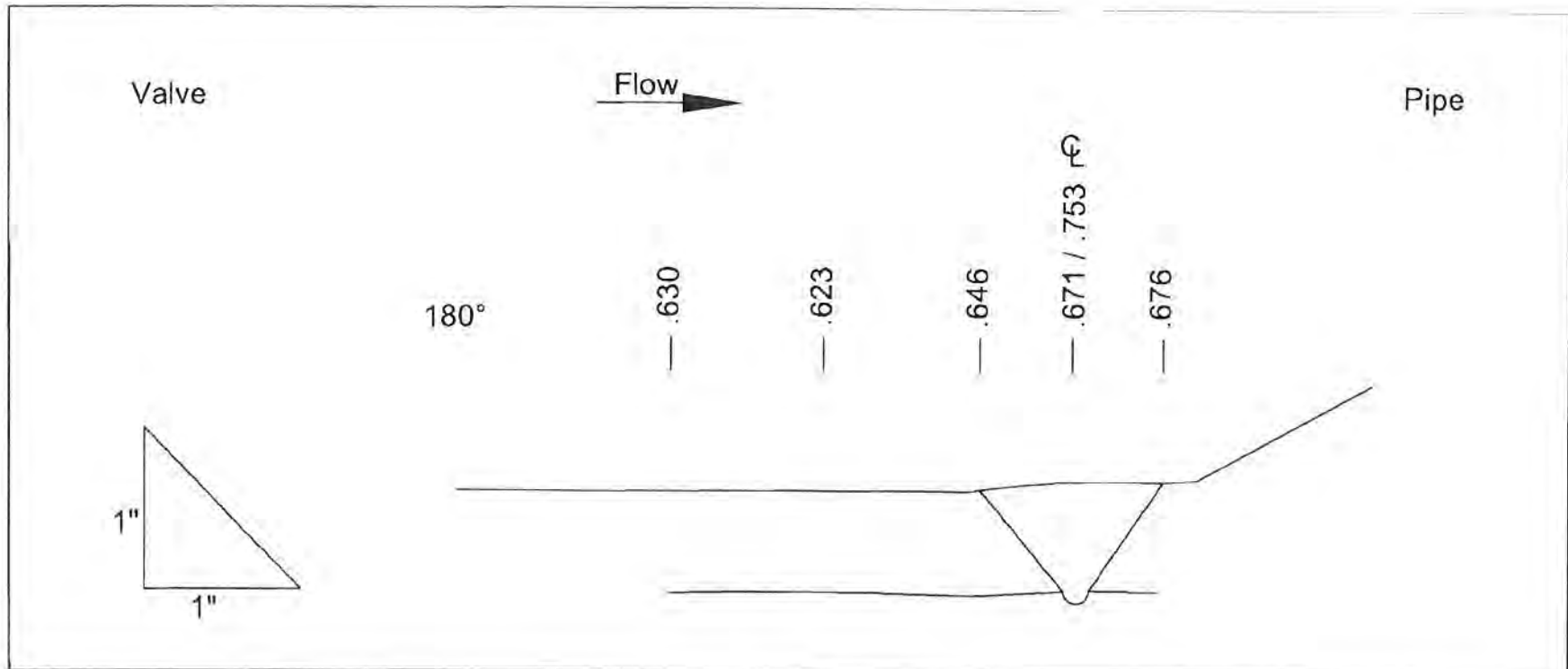
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2*	NR	NR	.646	NR
3	NR	NR	.671	NR
4*	NR	NR	.676	NR
5	NR	NR	NR	NR

*Weld Edge



LT-14-001

Examiner: <i>[Signature]</i>	Reviewer: <i>[Signature]</i> 2/19/14	ANII: <i>[Signature]</i>
Print name: DAVID KLEINJAN	Date: 2/19/14	Print name: Sanel Flood
COMPONENT ID: HPCI-019-018-CORO		Date: 2/28/14
CROWN WIDTH: 1.15"		WELD LENGTH: 34.0"
CROWN HEIGHT: FLUSH		DIAMETER: 10"



pg 5/5

UT Calibration/Examination

Site/Unit:	BFN / 3
Summary No.:	06001-ISI-BFN3
Workscope:	PSI

Procedure:	N-UT-76/PDI-UT-1
Procedure Rev.:	9/E
Work Order No.:	113331815

Outage No.: U3RF16
Report No.: UT-14-002
Page: 2 of 254

Code:		Cat./Item:	C-F-2/C5.51	Location:	REACTOR BUILDING
Drawing No.:	3-CHM-2407-C-02	Description:	VLV - PIPE		
System ID:	073 - High Pressure Coolant Injection System				
Component ID:	HPCI-3-019-019	Size/Length:	10"	Thickness/Diameter:	.594/10"
Limitations:	NO EXAM ON THE VALVE SIDE DUE TO CONFIGURATION		Start Time:	08:35	Finish Time: 09:35

Instrument Settings

Serial No.:	E37690		
Manufacturer:	KRAUTKRAMER		
Model:	USN 60	Linearity:	L-14-001
Delay:	8.6731	Range:	2.5
M'tl Cal/Vel:	0.1275	Energy:	High
Damping:	1000 Ohms	Reject:	0
PRF Mode:	Auto High	SU Freq.:	2.25 MHz
Disp. Start:	IP	Rectify:	Full Wave
Inst. Freq.:	2.25 MHz		

Ax. Gain (dB): **38.0** Circ. Gain (dB): **N/A**

1 Screen Div. = .25 in. of Sound Path

Calibration Block

Cal. Block No.:	SQ-115		
Thickness:	1.003	Dia.:	FLAT
Cal. Blk. Temp.:	51.8	Temp. Tool:	E39055
Comp. Temp.:	51.8	Temp. Tool:	E39055

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report.)Results: NRI ☒ RI ☐ Info ☐

Percent Of Coverage Obtained > 90%: **No** Reviewed Previous Data: **None**

Search Unit

Serial No.:	SE1640	
Manufacturer:	KRAUTKRAMER	
Size:	.5	Model: Comp G
Freq.:	2.25 MHz	Center Freq.: N/A
Exam Angle:	61	Squint Angle: N/A
Measured Angle:	61	Mode: Shear
Exit Point:	.5	# of Elements: 1
Config.:	SINGLE	Focus: N/A
Shape:	Round	Contour: N/A
Wedge Style:	Non-Integral	

Search Unit Cable

Type: **RG-174** Length: **6** No. Conn.: **0**

Scan Coverage

Upstream ☐ Downstream ☒ Scan dB: 59.0
CW ☐ CCW ☐ Scan dB: _____
Exam Surface: OD
Surface Condition: Ground

Cal. Checks	Time	Date
Initial Cal.	0824	2/4/2014
Inter. Cal.		
Inter. Cal.		
Inter. Cal.		
Final Cal.	0950	2/4/2014

Couplant

Cal. Batch:	12H130
Type:	Ultragel II
Mfg.:	Sonotech
Exam Batch:	12H130
Type:	Ultragel II
Mfg.:	Sonotech

Reference Block

Serial No.: 92-7615
Type: CS Rompas

Axial Orientated Search Unit

Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
1.0" NOTCH	80	7.4	1.854

Circumferential Orientated Search Unit

Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
N/A			

Reference/Simulator Block

Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
38.0	FSDH	60	5.8	1.4

Comments: E37690 DUE 8/14/2014
E39055 DUE 6/24/2014

Examiner KLEINJAN, DAVID R	Level III*	Signature 	Date 2/4/2014	Reviewer Matt Welch, LIII	Signature 	Date 2/19/14
Examiner N/A	Level N/A	Signature	Date	Site Review N/A	Signature	Date
Other N/A	Level N/A	Signature	Date	ANII Review 	Signature 	Date 2/28/14

SUMMARY NO:	06001-ISI-BFN3	SITE:	BROWNS FERRY	Unit #3
DESCRIPTION	VALVE TO PIPE		IDENTIFICATION:	HPCI-3-019-019
SYSTEM ID:	HIGH PRESSURE COOLANT INJECTION SYSTEM			
Prepared By:	David Kleinjan	Reviewer By:	MATT WELCH	
Signature:	<i>D.R. Kleinjan</i>	Signature:	<i>Matt Welch</i>	
Date:	04 FEB 2014	Date:	2/19/14	

Items #

1	Axial Required Exam volume $34 * 1.648 * ((.297 + .208) / 2) =$	14.1481
2	Clockwise and CounterClockwise Required exam volume $34 * 1.648 * ((.297 + .208) / 2) =$	14.1481
3	Axial Obstructed Volume Exam (Coverage was achieved by scanning across the weld) 0 =	0.0000
4	Clockwise and Counterclockwise Obstructed Volume Exam $34 * .729 * ((.297 + .208) / 2) =$	6.2585
5	Axial Obtained Exam Volume Item 1 - Item 3 =	14.1481
6	Clockwise and Counter Clockwise Obtained Volume Exam Item 2 - Item 4 =	7.8896
7	Axial Exam Volume Percentage $(\text{Item 5} / (\text{Item 1})) * 100 = \%$	100.00%
8	Clockwise and CounterClockwise Exam Volume Percentage $(\text{Item 5} / (\text{Item 2})) * 100 = \%$	55.76%
9	Full Exam Volume Percentage combining in the Axial, Clockwise, and CounterClockwise Dircetions $(\text{Item 7} + \text{Item 8}) / 2 = \%$	77.88%

pg 3/5

ANTI Saw Fwd 2/28/14

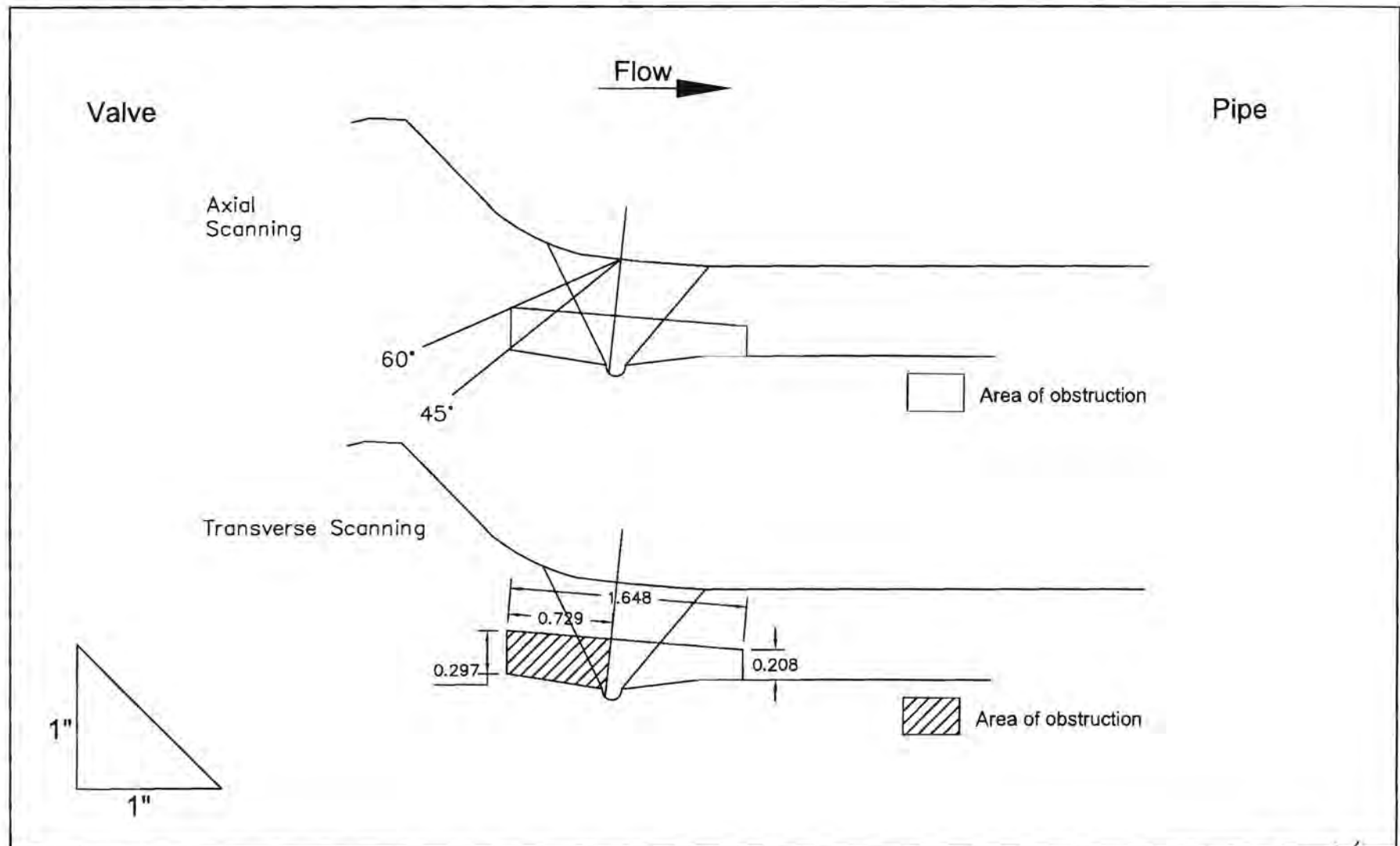
UT-14-002

COVERAGE PLOT

Component ID: HPCI-3-019-019-CORO

UT-14-002

Examiner: <i>[Signature]</i>	Reviewer: <i>[Signature]</i>	ANII: <i>[Signature]</i>
Print name: David Kleinjan	Print name: MATT WELCH	Print name: Samuel F. Wood
Date: 04 FEB 2014	Date: 2/19/14	Date: 2/28/14



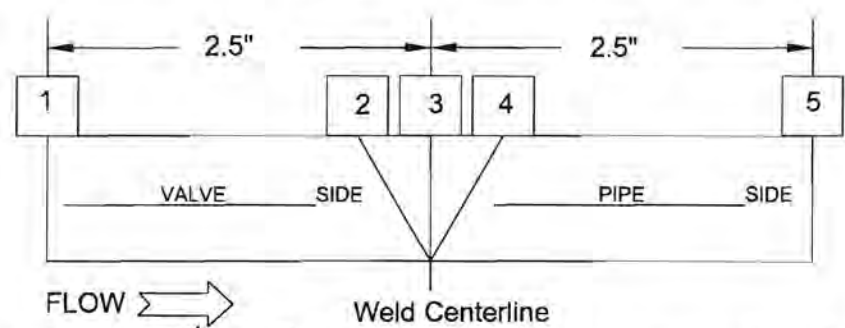
pg 4/5

UT-1002

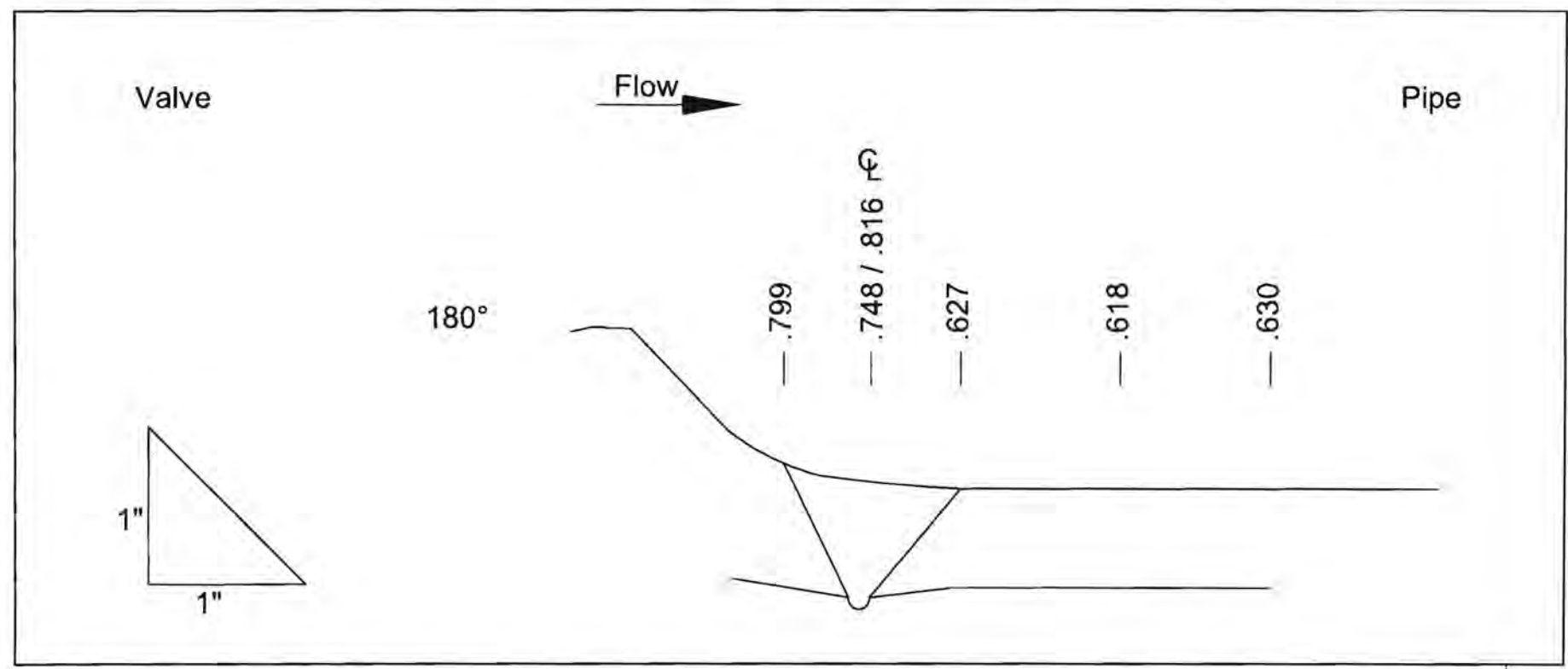
THICKNESS AND CONTOUR

Position	0	90	180	270
1	NR	NR	NR	NR
2*	NR	NR	.799	NR
3	NR	NR	.748	NR
4*	NR	NR	.627	NR
5	NR	NR	.630	NR

*Weld Edge



Examiner: <i>S.R. [Signature]</i>	Date: <i>2/4/14</i>	Reviewer: <i>[Signature]</i>	Date: <i>2/19/14</i>	ANII: <i>Samuel Flavel</i>
Print name: DAVID KLEINJAN	Date:	Print name: MATT WELCH	Date:	Print name: Samuel Flavel Date: 2/28/14
COMPONENT ID: HPCI-019-019-CORO				
CROWN WIDTH: 1.15"		WELD LENGTH: 34.0"		
CROWN HEIGHT: FLUSH		DIAMETER: 10"		



pg 5/5



UT Calibration Examination

Site/Unit: BFN / 3
 Summary No.: 05389-ISI-BFN
 Workscope: PSI

Procedure: N-UT-76
 Procedure Rev.: 7
 Work Order No.: 113331595

Outage No.: U3RF15
 Report No.: UT-12-046
 Page: 1 of 2

Code: Sec XI 2001 Ed/2003 Add Cal/Item: B-J/B9.11 Location: REACTOR BUILDING-DRYWELL
 Drawing No.: 3-ISI-0332-C-02 Description: PIPE - RED TEE
 System ID: 069 - Reactor Water Cleanup System
 Component ID: RWCU-3-007-003
 Limitations: YES- PARTIAL SINGLE SIDE ACCESS ON TEE- SEE COVERAGE PLOT Size/Length: 4 / 14.25 Thickness/Diameter: 0.337 / 4
 Start Time: 0930 Finish Time: 0945

Instrument Settings

Serial No.: E33669
 Manufacturer: KRAUTKRAMER
 Model: USN 60 Linearity: L-11-007
 Delay: 3.5247 Range: 1.783
 M'll Cal/Vel: .1275 Energy: High
 Damping: 1000 Ohms Reject: 0
 PRF Mode: Auto High SU Freq.: 5.0 MHz
 Disp. Start: IP Rectify: Full Wave
 Inst. Freq.: 5.0 MHz

Search Unit

Serial No.: 00F62P
 Manufacturer: KBA
 Size: 0.25" Model: Comp G
 Freq.: 5.0 MHz Center Freq.: NA
 Exam Angle: 45 Squint Angle: NA
 Measured Angle: 45 Mode: SHEAR
 Exit Point: .35" # of Elements: 1
 Config.: Single Focus: NA
 Shape: Round Contour: FLAT
 Wedge Style: NON-INTEGRAL

Cal. Checks	Time	Date
Initial Cal.	0910	4/29/2012
Inter. Cal.	0930	4/29/2012
Inter. Cal.	NA	
Inter. Cal.	NA	
Final Cal.	1021	4/29/2012

Couplant

Cal. Batch: 11425
 Type: Ultragel II
 Mfg.: Sonotech
 Exam Batch: 11425
 Type: Ultragel II
 Mfg.: Sonotech

Search Unit Cable

Type: RG-174 Length: 6' No. Conn.: 0

Scan Coverage

Upstream ☒ Downstream ☒ Scan dB: 46
 CW ☒ CCW ☒ Scan dB: 49.4
 Exam Surface: OD
 Surface Condition: Flush

Calibration Block

Cal. Block No.: SQ-119
 Thickness: 0.5" Dia.: FLAT
 Cal. Blk. Temp.: 71.5 Temp. Tool: 558275
 Comp. Temp.: 70.9 Temp. Tool: 558275

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report.)
 Results: NRI ☒ RI ☐ Info ☐

Percent Of Coverage Obtained > 90%: No Reviewed Previous Data: None

Axial Orientated Search Unit			
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
0.5" NOTCH	80	4.0	.705
NA			
NA			
NA			
NA			

Circumferential Orientated Search Unit			
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path
0.5" NOTCH	80	4	.705
NA			
NA			
NA			

Reference/Simulator Block				
Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
36.8	FSDH	50	5.6	1.003
NA				
NA				

Comments: E33669 DUE DATE 8/15/12, 558275 DUE DATE 12-10-12

Examiner	Level	III-PDI	Signature	Date	Reviewer	Signature	Date
Welch, Matthew C.			<i>Matthew Welch</i>	4/30/12	S. ALEX ZIPPERER	II-PDI	4/30/12
Examiner	Level	N/A	Signature	Date	Site Review	Signature	Date
N/A							
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					BRUCE EAMIGH	B. Eamigh	5/1/12

COVERAGE PLOT

Component ID: RWCU-X-007-003

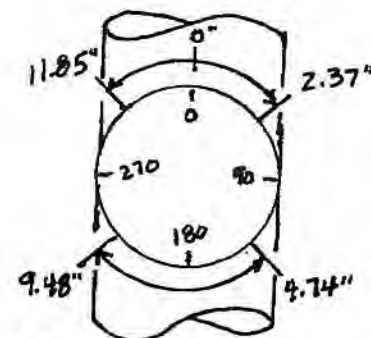
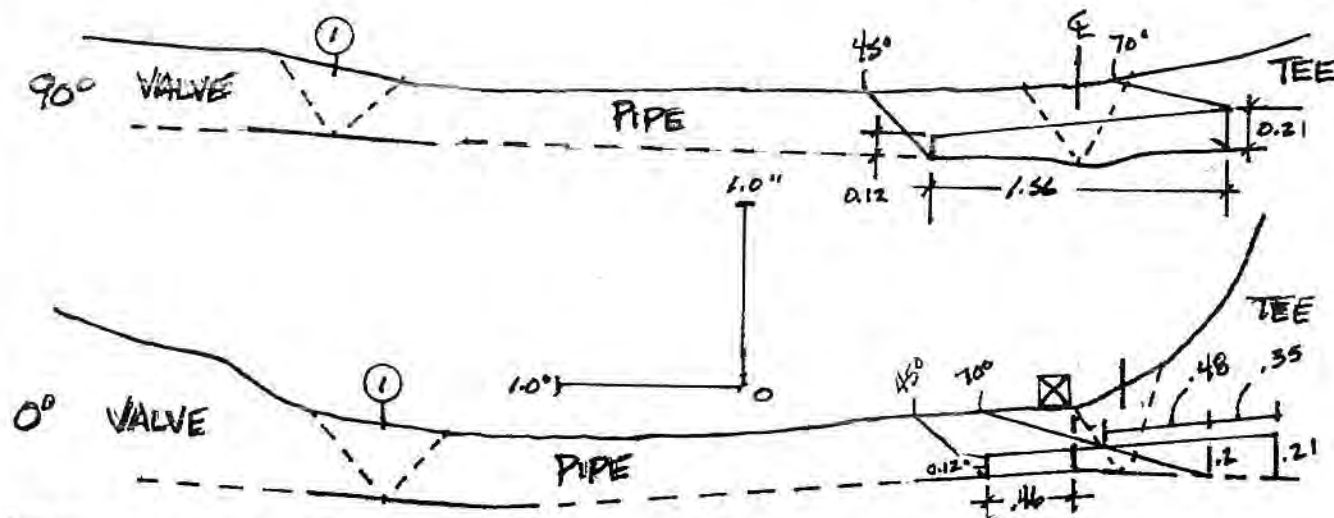
Examiner: <i>Matt Welch</i> 4/30/12	Reviewer: <i>[Signature]</i>	ANII: <i>B. Emigh</i> 4/30/12
Print name: MATT WELCH	Print name: S. ALEX ZIPPERER	Print name: BRUCE EMIGH
Date: 4/30/12	Date: 4/30/12	Date: 5/1/12

REQUIRED EXAM VOLUME: 3.67 IN³

$$[(0.12 + 0.21) \div 2] \times 1.56 \times 14.25$$

OBTAINED EXAM VOLUME: 2.12 IN³ / 57.85%

- OBSTRUCTED PERCENTAGE = 67%
 $(14.25 - 4.75) \div 14.25 = .67$
- AXIAL % = 100 - 31.1 = 68.3
- CIRC % = 100 - 52.6 = 47.4
 $(68.3 + 47.4) \div 2 = 57.85$



AXIAL SCAN OBSTRUCTION = 31.1%

$$[(0.48 \times 2) \div 2] - [(0.21 + 0.2) \div 2] \times 0.35 = .12$$

$$3.67 - ((0.12 \times 14.25) \times 0.67) = 1.14 \div 3.67 = .311$$

① WELD RWCU-1-007-011 SHOWN FOR REFERENCE

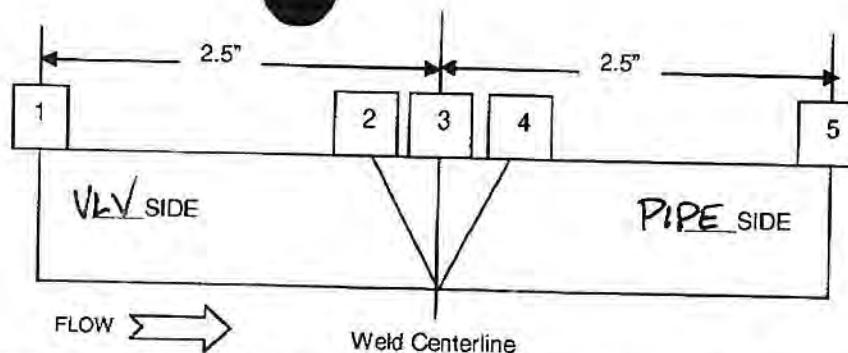
CIRC SCAN OBSTRUCTION = 52.6%

$$3.67 - ((0.46 \times 1.2) \times 14.25) = 2.88 \times 0.67 = 1.93 \div 3.67$$

THICKNESS AND CONTOUR

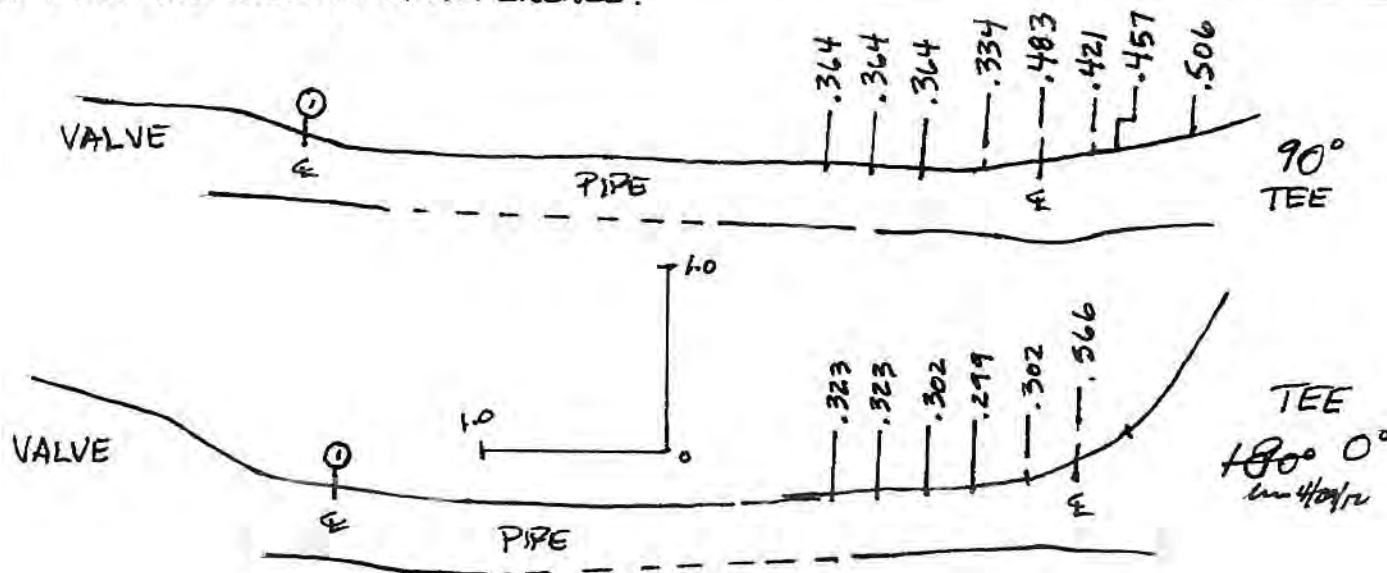
Position	0	90	180	270
1				
2*				
3				
4*				
5				

* Weld edge



Examiner: <i>Matt Welch</i> 4/30/12	Reviewer: <i>[Signature]</i> 4/30/12	ANII: <i>B. Earnigh</i> 5/1/12
Print name: <i>MATT WELCH</i> Date: 4/30/12	Print name: <i>S. Alex ZIMMER</i> Date: 4/30/12	Print name: <i>BRUCE EARNIGH</i> Date: 5/1/12
COMPONENT ID: <i>RWCU 2X-007-003</i>		
CROWN WIDTH: <i>.6</i> 4/30/12		WELD LENGTH: <i>14.25</i>
CROWN HEIGHT: <i>FLUSH</i>		DIAMETER: <i>4.53</i>

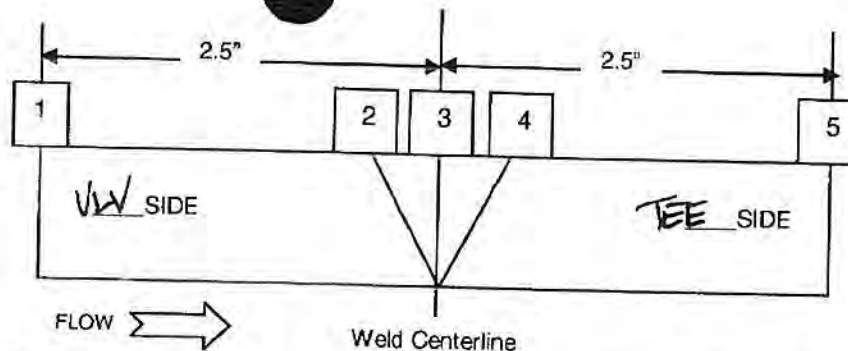
① WELD RWCU-1-007-011 SHOWN FOR REFERENCE.



THICKNESS AND CONTOUR

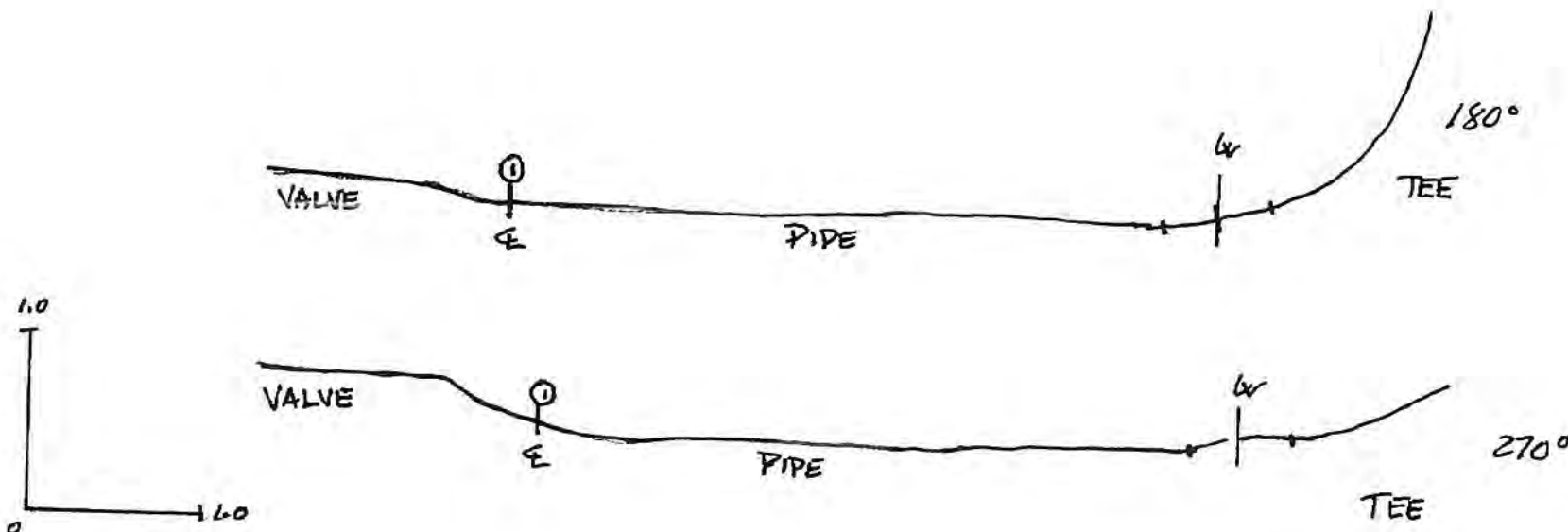
Position	0	90	180	270
1				
2*		N		
3			A	
4*				
5				

* Weld edge



Examiner: <i>Matt Welch</i> 4/30/12	Reviewer: <i>[Signature]</i> 4/30/12	ANII: <i>B. Eamigh</i> 5/1/12
Print name: <i>MATT WELCH</i> Date: <i>4/30/12</i>	Print name: <i>S. PETER ZIPPALLO</i> Date: <i>4/30/12</i>	Print name: <i>BAUCE Eamigh</i> Date: <i>5/1/12</i>
COMPONENT ID: <i>RWCU-X-007-003</i>		
CROWN WIDTH: <i>.6</i> 4/30/12	WELD LENGTH: <i>14.25</i>	
CROWN HEIGHT: <i>FLUSH</i>	DIAMETER: <i>4.53</i>	

① WELD RWCU-1-007-011 SHOWN FOR REFERENCE



000300



UT Calibration/Examination

Site/Unit: BFN / 3
 Summary No.: 03534000-ISI-BFN
 Workspace: PSI

Procedure: N-UT-76
 Procedure Rev.: 7
 Work Order No.: 113331595

Outage No.: U3RF15
 Report No.: UT-12-047
 Page: 1 of 2

Code: Section XI 2001 Ed/2003 Add Cat./Item: B-JBS.11 Location: REACTOR BUILDING-DRYWELL
 Drawing No.: 3-ISI-0332-C-02 Description: VLV - RED TEE
 System ID: 069 - Reactor Water Cleanup System
 Component ID: RWCU-3-007-011
 Limitations: YES - CIRC SCAN ON VALVE SIDE-SEE COVERAGE PLOT Size/Length: 4 / 14.25 Thickness/Diameter: 0.337 / 4
 Start Time: 0930 Finish Time: 0945

Instrument Settings
 Serial No.: E33669
 Manufacturer: KRAUTKRAMER
 Model: USN 60 Linearity: L-12-008
 Delay: 3.5247 Range: 1.783
 M'd Cal/Vel: .1275 Energy: High
 Damping: 1000 Ohms Reject: 0
 PRF Mode: Auto High SU Freq.: 5.0 MHz
 Disp. Start: IP Rectify: Full Wave
 Inst. Freq.: 5.0 MHz

Search Unit
 Serial No.: 00F62P
 Manufacturer: KBA
 Size: 0.25" Model: Comp G
 Freq.: 5.0 MHz Center Freq.: NA
 Exam Angle: 45 Squint Angle: NA
 Measured Angle: 45 Mode: SHEAR
 Exit Point: .35 # of Elements: 1
 Config.: Single Focus: NA
 Shape: Round Contour: FLAT
 Wedge Style: NON-INTEGRAL

Ax. Gain (dB): 28.6 Circ. Gain (dB): 28.6
 i Screen Div. = .178 in. of Sound Path

Calibration Block
 Cal. Block No.: SQ-119
 Thickness: 0.5 Dia.: FLAT
 Cal. Blk. Temp.: 71.5 Temp. Tool: 558275
 Comp. Temp.: 70.9 Temp. Tool: 558275

Recordable Indication(s): Yes ☐ No ☒ (If Yes, Ref. Attached Ultrasonic Indication Report.)
 Results: NRI ☒ RI ☐ Info ☐

Percent Of Coverage Obtained > 90%: No Reviewed Previous Data: None

Cal. Checks	Time	Date
Initial Cal.	0710	4/29/2012
Inter. Cal.	0930	4/29/2012
Inter. Cal.	NA	
Inter. Cal.	NA	
Final Cal.	1021	4/29/2012

Couplant
 Cal. Batch: 11425
 Type: Ultragel II
 Mfg.: Sonotech
 Exam Batch: 11425
 Type: Ultragel II
 Mfg.: Sonotech

Reference Block
 Serial No.: 5100
 Type: Rompas

Axial Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
0.5" NOTCH	80	4.0	.705"	
NA				
NA				
NA				
NA				
Circumferential Orientated Search Unit				
Calibration Reflector	Signal Amplitude %	Sweep Division	Sound Path	
0.5" NOTCH	80	4.0	.705	
NA				
NA				
NA				
Reference/Simulator Block				
Gain dB	Reflector	Signal Amplitude %	Sweep Division	Sound Path
36.8	FSDH	50	5.6	1.003
NA				
NA				

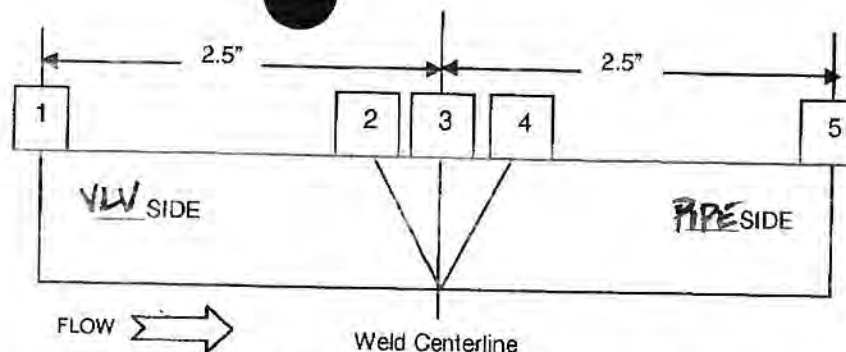
Comments: E33669 DUE DATE 8/15/12, 558275 DUE DATE 12/10/12.

Examiner	Level	III-PDI	Signature	Date	Reviewer	Signature	Date
Welch, Matthew C.			<i>Matthew Welch</i>	4/30/12	S. Alex Z. Iapace	11-PDI	4/30/12
Examiner	Level	NA	Signature	Date	Site Review	Signature	Date
N/A							
Other	Level	NA	Signature	Date	ANII Review	Signature	Date
N/A					Bruce Eamigh	B. Eamigh	5/2/12

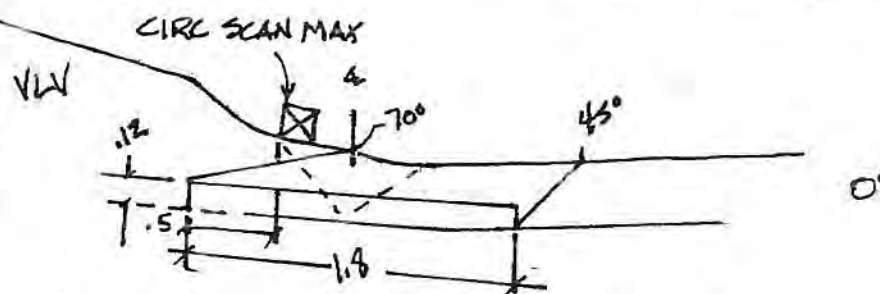
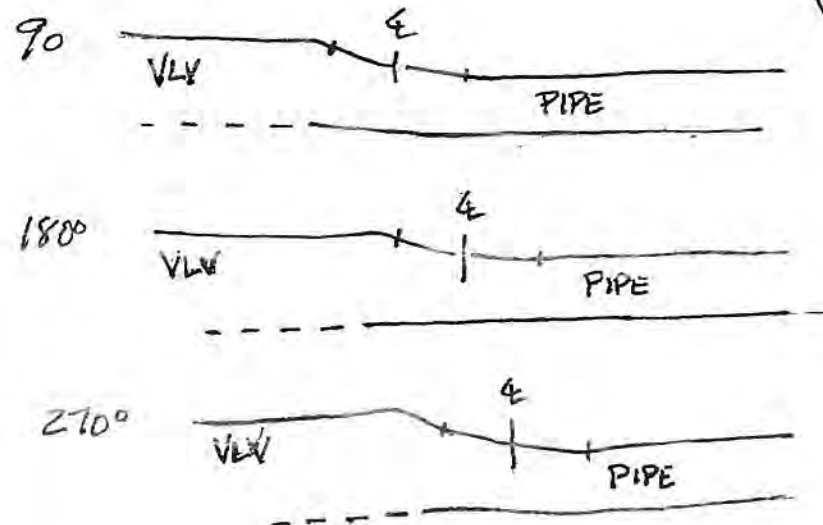
THICKNESS AND CONTOUR

Position	0	90	180	270
1	N/A	N/A	N/A	N/A
2*	.455	.440	.503	.451
3	.391	.384	.399	.385
4*	.357	.335	.341	.343
5	.357	.335	.341	.343

* Weld edge



Examiner: <i>Matt Welch</i> 4/30/12	Reviewer: <i>[Signature]</i> 4/30/12	ANII: <i>B. Earnigh</i> 5/2/12
Print name: <i>MATT WELCH</i> Date:	Print name: <i>S. R. ZAPPA</i> Date:	Print name: <i>BRUCE EARNIGH</i> Date:
COMPONENT ID: <i>RWC-3-007-011</i>		
CROWN WIDTH: <i>.75</i>	WELD LENGTH: <i>14.25</i>	
CROWN HEIGHT: <i>FLUSH</i>	DIAMETER: <i>4.53</i>	



$$\text{REQUIRED EXAM VOLUME} = 3.08 \text{ IN}^3$$

$$(.12 \times 1.8) \times 14.25 = 3.08$$

$$\text{OBTAINED EXAM VOLUME: } 88.6\%$$

$$\text{AXIAL: NO LIMITATIONS} = 100\%$$

$$\text{CIRC: LIMITATION} = 72.2\%$$

$$3.08 - (.12 \times .5) \times 14.25 = 2.25 \div 3.08 = .722$$

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