Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

May 24, 2002

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

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of)
Tennessee Valley Authority)

Docket No. 50-260

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 2 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM - SECOND TEN-YEAR INSPECTION INTERVAL, REQUESTS FOR RELIEF 2-ISI-6, REVISON 2, 2-ISI-13, 2-ISI-14, AND 2-ISI-15

Reference: TVA letter to NRC dated July 26, 2001, American Society of Mechanical Engineers (ASME) Section XI, Inservice Inspection and Repair and Replacement Programs, Summary Reports for Cycle 11 Operation

In accordance with 10 CFR 50.55a(g)(5), TVA is requesting relief from certain inservice inspection requirements in Section XI of the ASME Boiler and Pressure Vessel Code. The need for these requests for relief was identified in TVA's letter referenced above. The enclosures to this letter contain BFN Unit 2 requests for relief 2-ISI-6, Revision 2, 2-ISI-13, 2-ISI-14, and 2-ISI-15 for NRC review and approval.

TVA has determined that certain BFN Unit 2 welds had nondestructive examination (NDE) coverage limitations (less than 90 percent coverage completed) which exceed that specified in ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds, Section XI, Division 1." The components are Reactor Pressure Vessel (RPV) nozzles (ASME Section XI Code Category B-D, Nozzle-To-Vessel Welds) which had calculated NDE examination coverage ranging between 56 and 72 percent completed. The limitations encountered during the

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performance of the ultrasonic (UT) examination were caused by component configuration. The nozzle contours limit the accessible UT examination volume. Hence, TVA is submitting relief request 2-ISI-6, Revision 2 in Enclosure 1.

Also, TVA has determined that the Standby Liquid Control nozzle, located in the bottom head of the reactor pressure vessel, is inaccessible for examination from the inside of the vessel. Therefore, the examinations must be performed from the outside surface of the vessel head. Because of the small diameter of the nozzle (approximately 2-inches) and the thickness of the head (approximately 6-inches), the ratio of the nozzle diameter to the head thickness make it impractical to perform an examination from the nozzle-to-head radius blend surface. Also, to perform the ultrasonic examination (UT) from the head surface the sound must travel through the full thickness of the head into a complex cladding/socket configuration. Geometric and material reflectors inherent in the design prevent a meaningful examination from being performed on the inside radius section of the nozzle. As a result, TVA is submitting request for relief 2-ISI-13 in Enclosure 2.

In addition, the reactor pressure vessel (RPV) shell-to-flange weld (C-5-FLG), and three RPV longitudinal shell welds (V-1-A, V-1-B, and V-1-C), had NDE coverage limitations. The coverage limitations (less than 90 percent) encountered during the performance of the ultrasonic (UT) examination were a result of interferences and weld geometry. The actual calculated NDE examination coverage ranged between 74 and 80 percent. Enclosure 3 provides request for relief 2-ISI-14 to address these welds.

There are also nine austenitic stainless steel piping welds where examination coverage was limited to one side of the weld. The welds are Category R-A (ASME Code Case N-577, "Risk-Informed Requirements for Class 1, 2, and 3 Piping, Method A," N-577-2500 Table 1). These welds received greater than 90 percent examination coverage per the requirements of ASME Section XI. However, 10 CFR 50.55a(b)(2)(xv)(A)(2) restricts taking credit for "one-side" examinations without completing a single-sided ASME Section XI, Appendix VIII Demonstration using flaws on the opposite side of the weld. At the time of the examinations,

no Performance Demonstration Initiative Program existed for single-side austenitic welds. Consequently, only 50 percent examination coverage was achieved. Enclosure 4 provides BFN request for relief 2-ISI-15 which addresses the nine welds examined during Cycle 11 plus two other welds that were examined during Cycle 10.

Pursuant to 10 CFR 50.55a(g)(5)(iv), these are the final requests for relief for the BFN Unit 2 Second Ten-year Inservice Inspection Interval that ended May 24, 2001.

There are no new commitments contained in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

T. E. Abney
Manager of Licensing
and Industry Affairs

cc: See Page 4

Enclosures
cc (Enclosures):
(Via NRC Electronic Distribution)

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Rockville, Maryland 20852-2739

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-6, REVISION 2

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
ASME SECTION XI, INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-6, Revision 2

Executive Summary: Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested for the following on the basis that conformance with the Code requirements is impractical.

TVA requests relief for nine reactor pressure vessel (RPV) nozzle-to-vessel full penetration welds. The design configuration of the RPV nozzle-to-vessel welds, precludes a 100 percent ultrasonic examination of the required volume for the full penetration welds of the components listed in Table 1. These examination limitations occur when the ASME Section XI, 1986 Edition, no Addenda, examination requirements are applied in areas of components constructed and fabricated to early plant designs. Based on a construction permit date prior to January 1, 1971, BFN is exempt from meeting certain provisions of the Code for examination access, to the extent practical, within the limitations of design, geometry, and materials of construction of the components in accordance with 10 CFR 50.55a(g)(4).

An ultrasonic examination was performed on accessible areas to the maximum extent practical given the physical limitations of the nozzle-to-vessel welds. The design configuration limits ultrasonic examination of the RPV nozzle-to-vessel welds to the percentages shown in Table 1.

TVA concludes that performance of an ultrasonic examination of essentially 100 percent of the RPV nozzle-to-vessel full penetration welds would be impractical. The performance of the ultrasonic examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety because the information and data obtained from the volume examined provides sufficient information to evaluate the overall integrity of the nozzle-to-vessel welds. Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 2, Second Ten-year ISI interval.

Unit:	Two (2)
ISI Interval:	ASME Section XI, Second Ten-Year ISI Interval (May 24, 1992 to May 24, 2001)
System(s):	Reactor Pressure Vessel (RPV)
Components:	Nine (9) RPV Nozzles, Full Penetration Welds
ASME Code Class:	ASME Code Class 1 (Equivalent)
ASME Section XI Code Edition:	1986 Edition, No Addenda
Code Table:	IWB-2500-1
Examination Category:	B-D, "Full Penetration Welds Of Nozzles In Vessels"
Examination Item Number:	B3.90, "Nozzle-to-Vessel welds"
Code Requirement:	ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.90, requires volumetric Examination of 100 percent of the Weld and Adjacent Base Material as depicted in Figure IWB-2500-7(a).
Code Requirements From Which Relief Is Requested:	Relief is requested from the ASME Section XI Code requirement (Table IWB-2500-1, Examination Category B-D, Item No. B3.90) to perform essentially 100 percent volumetric examination of the weld and adjacent base material.
List Of Items Associated With The Relief Request:	N-2D - RPV Nozzle-to-Vessel Weld N-2E - RPV Nozzle-to-Vessel Weld N-2K - RPV Nozzle-to-Vessel Weld N-3A - RPV Nozzle-to-Vessel Weld N-3C - RPV Nozzle-to-Vessel Weld N-4D - RPV Nozzle-to-Vessel Weld

N-4E - RPV Nozzle-to-Vessel Weld

N-8B - RPV Nozzle-to-Vessel Weld

N-10 - RPV Nozzle-to-Vessel Weld

Basis for Relief Request:

The design configuration of the RPV nozzle-to-vessel welds precludes an ultrasonic examination of essentially 100 percent of the required volume. The component design configuration limits ultrasonic examination coverage of the welds to the percentages listed in Table 1.

Alternative Examination:

None. In lieu of the Code required essentially 100 percent volume ultrasonic examination, TVA proposes an ultrasonic examination of accessible areas to the maximum extent practical given the component design, configuration of the RPV nozzle-to-vessel weld, and nozzle size.

Justification For The Granting Of Relief:

(1) The design configuration of the subject nozzle-to-vessel welds precludes ultrasonic examination of essentially 100 percent of the required examination volume. Access to the nozzle-to-vessel welds is by a series of doorways in the concrete biological shield wall. Insulation behind these doorways is designed for removal around the nozzle circumference. In order to examine the welds in accordance with the Code requirement the RPV would require extensive design modifications.

The physical arrangement of the nozzle-to-vessel weld precludes ultrasonic examination from the nozzle side. The limitations are inherent to the barrel-type nozzle-to-vessel weld design and is compounded by the close proximity of the biological shield wall.

Scanning from the nozzle surface is ineffective due to the weld location and the asymmetrical inside surface where the nozzle and vessel converge. Increased coverage by scanning from the outside blend radius of the weld, where practical, was achieved. Experience from the automated ultrasonic examination performed from the inside surface for BFN Unit 3, which is of similar design, has shown that the nozzle-to-vessel weld

coverage will not be greatly improved even if performed from the inside surface utilizing the current state-of-the-art techniques.

The configuration of the nozzle-to-vessel welds precludes ultrasonic examination from the nozzle side due to the weld location and the asymmetrical inside surface where the nozzle and vessel converge. The extent of examination coverage from the vessel side provides reasonable assurance that no flaws oriented parallel to the weld are present. In addition, approximately 100 percent of the required ultrasonic examination volume for flaws oriented transverse to the weld was performed from the vessel side.

(2) Radiographic examination as an alternate volumetric examination method was determined to be impractical due the radiological concerns. Gaining access to the inside surface of the RPV to place radiographic film would require extensive personnel protection due to high radiation and contamination levels. Also, due to the varying thickness at the outside blend radius of the weld several radiographs may be required of one area to obtain the required coverage and/or film density. The additional Code coverage gained by radiography is impractical when weighed against the radiological concerns.

Hence, TVA concludes that performing an ultrasonic volumetric examination of essentially 100 percent of the nozzle-to-vessel full penetration welds in the RPV would be impractical. Further, it would also be impractical to perform other volumetric examinations (i.e., radiography) which may slightly increase examination coverage. A maximum extent practical ultrasonic examination of the subject areas will provide an acceptable level of quality and safety. TVA concludes that significant degradation, if present, would have been detected during an ultrasonic examination performed to the maximum extent practical of the subject welds.

(3) Reference previously submitted request for relief 2-ISI-6, Revision 1 submitted by TVA letter dated April 3, 1998, and approved by NRC letter dated February 23, 1999. The list of items associated with Revision 1 of this request for relief are as follows:

N1A - RPV Nozzle-to-Vessel Weld
N1B - RPV Nozzle-to-Vessel Weld
N2A - RPV Nozzle-to-Vessel Weld
N2B - RPV Nozzle-to-Vessel Weld
N2C - RPV Nozzle-to-Vessel Weld
N2F - RPV Nozzle-to-Vessel Weld
N2G - RPV Nozzle-to-Vessel Weld
N2H - RPV Nozzle-to-Vessel Weld
N2J - RPV Nozzle-to-Vessel Weld
N3B - RPV Nozzle-to-Vessel Weld
N3D - RPV Nozzle-to-Vessel Weld
N4A - RPV Nozzle-to-Vessel Weld
N4B - RPV Nozzle-to-Vessel Weld
N4C - RPV Nozzle-to-Vessel Weld
N4F - RPV Nozzle-to-Vessel Weld
N5A - RPV Nozzle-to-Vessel Weld
N5B - RPV Nozzle-to-Vessel Weld
N8A - RPV Nozzle-to-Vessel Weld
N9 - RPV Nozzle-to-Vessel Weld
N8A - RPV Nozzle Inside Radius Section

Implementation Schedule:

This request for relief is applicable to the BFN Unit 2, ASME Section XI Second Ten-Year Inservice Inspection Interval (May 24, 1992 to May 24, 2001).

Reference:

ISWT (IHI Southwest Technologies, Inc.), "Examination Plan for Nondestructive Examination of the Reactor Pressure Vessel and Piping Welds at Browns Ferry Nuclear Plant, Unit 2, Appendix K."

Attachments:

Attachment A

2-ISI-0222-C/S 1 Revision 2
2-ISI-0222-C/S 2 Revision 2
2-ISI-0269-C/S 1 Revision 2
2-ISI-0270-C/S 1 Revision 1
2-ISI-0270-C/S 2 Revision 2
2-ISI-0380-C/S 1 Revision 0
2-CHM-2046-C/S 1 Revision 2

Attachment B

NDE Reports

N-2D - R-126
N-2E - R-127
N-2K - R-128
N-3A - R-129
N-3C - R-130
N-4D - R-131
N-4E - R-132
N-8B - R-133
N-10 - R-134

TABLE 1

WELD NUMBER	NPS	ISI DRAWING	PERCENT COVERAGE	REMARKS
N-2D (Recirc.)	12″	2-ISI-0270-C	67	Nozzle-to-Vessel Weld. 0, 45, and 60 degree auto scanning was restricted due to 1) nozzle configuration 2) Proximity of RPV insulation. Supplemental manual scans were performed to increase coverage. No exams were performed from the nozzle side due to nozzle configuration.
N-2E (Recirc.)	12″	2-ISI-0270-C	67	Nozzle-to-Vessel Weld. 0, 45, and 60 degree auto scanning was restricted due to 1) nozzle configuration 2) Proximity of RPV insulation. Supplemental manual scans were performed to increase coverage. No exams were performed from the nozzle side due to nozzle configuration.
N-2K (Recirc.)	12"	2-ISI-0270-C	67	Nozzle-to-Vessel Weld. 0, 45, and 60 degree auto scanning was restricted due to 1) nozzle configuration 2) Proximity of RPV insulation. Supplemental manual scans were performed to increase coverage. No exams were performed from the nozzle side due to nozzle configuration.
N-3A (Main Steam)	26″	2-ISI-0222-C	61	Nozzle-to-Vessel Weld. 0, 45, and 60 degree manual scanning was restricted due to nozzle configuration. No exams were performed from the nozzle side due to nozzle configuration.
N-3C (Main Steam)	26″	2-ISI-0222-C	61	Nozzle-to-Vessel Weld. 0, 45, and 60 degree manual scanning was restricted due to nozzle configuration. No exams were performed from the nozzle side due to nozzle configuration.
N-4D (Feedwater)	12"	2-ISI-0269-C	69	Nozzle-to-Vessel Weld. 0, 45, and 60 degree auto scanning was restricted due to 1) nozzle configuration 2) Proximity of RPV insulation. Supplemental manual scans were performed to increase coverage. No exams were performed from the nozzle side due to nozzle configuration.
N-4E (Feedwater)	12"	2-ISI-0269-C	69	Nozzle-to-Vessel Weld. 0, 45, and 60 degree auto scanning was restricted due to 1) nozzle configuration 2) Proximity of RPV insulation. Supplemental manual scans were performed to increase coverage. No exams were performed from the nozzle side due to nozzle configuration.

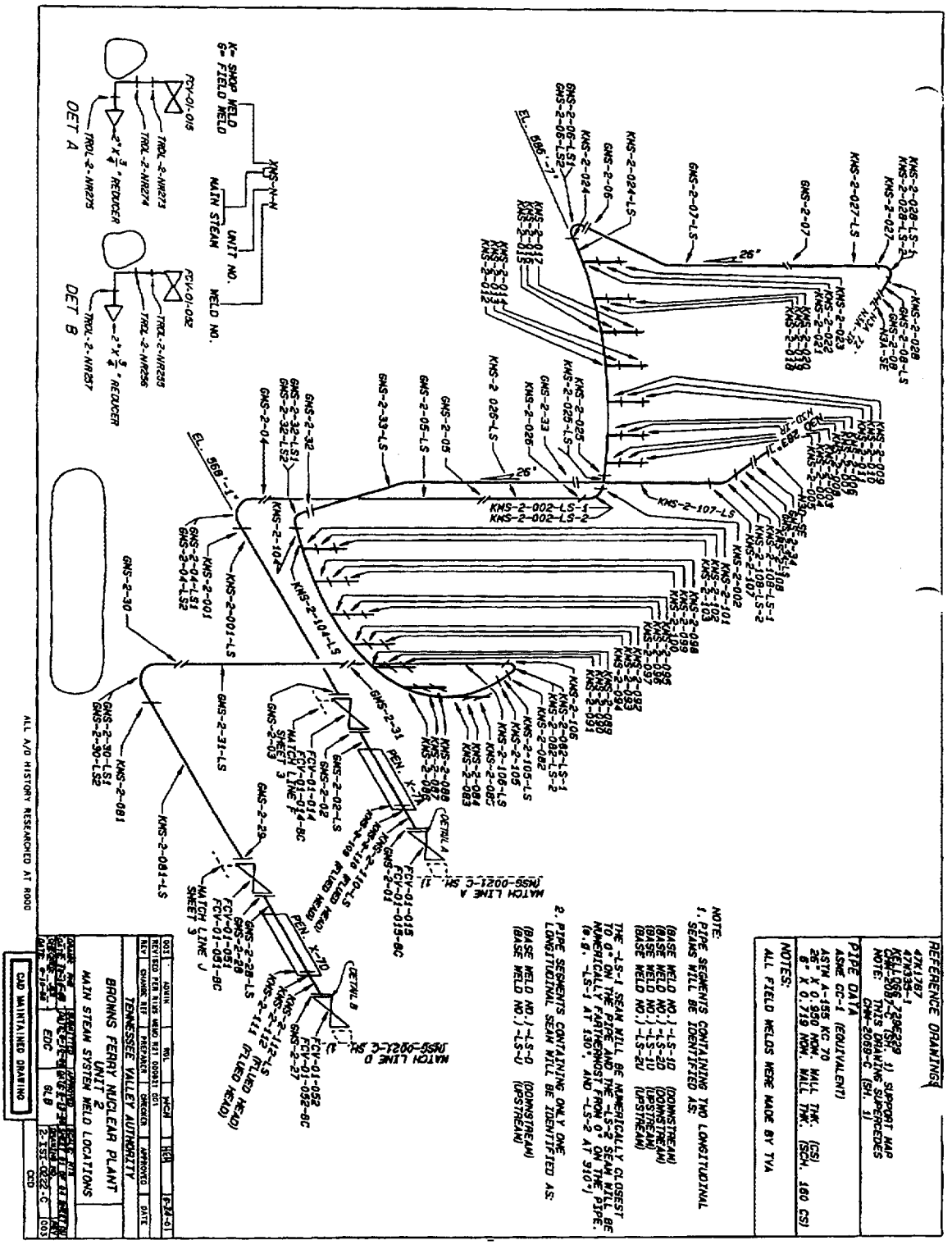
WELD NUMBER	NPS	ISI DRAWING	PERCENT COVERAGE	REMARKS
N-8B (Instr. Nozzle)	4″	2-CMH-2046-C	72	Nozzle-to-Vessel Weld. 0, 45, and 60 degree manual scanning was restricted due to nozzle configuration. No exams were performed from the nozzle side due to nozzle configuration.
N-10 (Instr. Nozzle)	2″	2-ISI-0270-C	56	Nozzle-to-Vessel Weld. 0, 45, and 60 degree manual scanning was restricted due to nozzle configuration. No exams were performed from the nozzle side due to nozzle configuration.

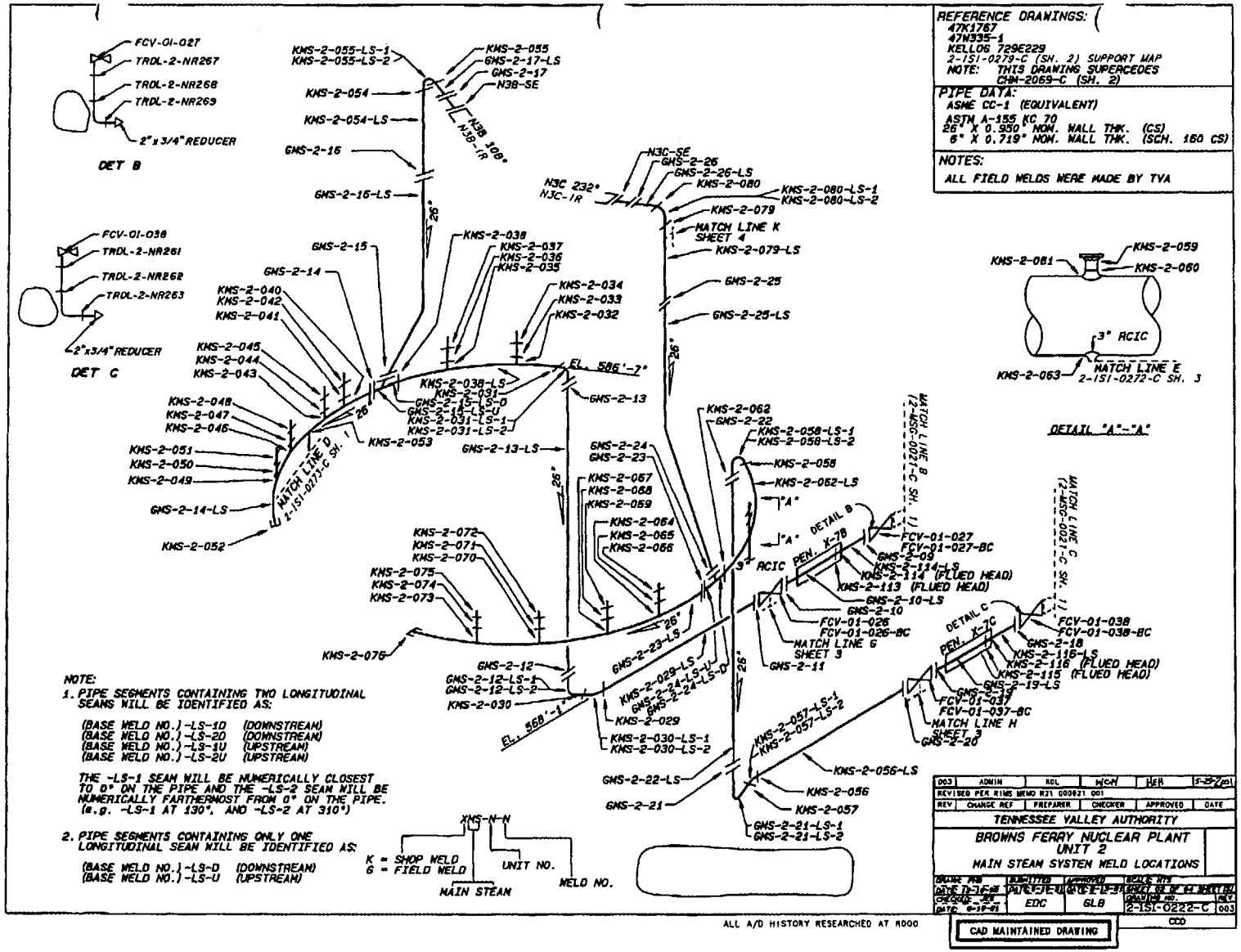
Attachment A

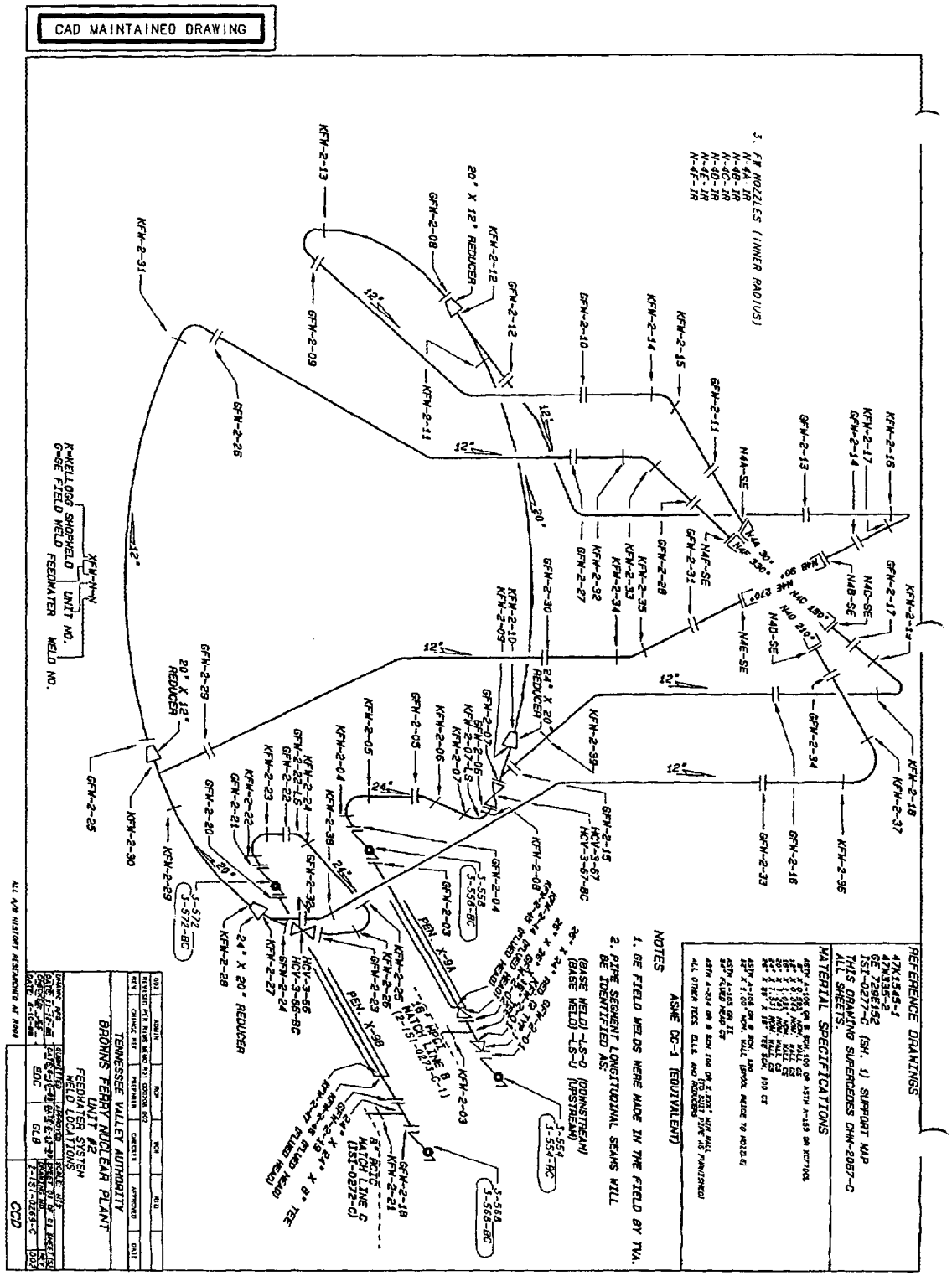
2-ISI-6, Revision 2

Seven (7) Sketches

2-ISI-0222-C, Sheet 1, Revision 2
2-ISI-0222-C, Sheet 2, Revision 2
2-ISI-0269-C, Sheet 1, Revision 2
2-ISI-0270-C, Sheet 1, Revision 1
2-ISI-0270-C, Sheet 2, Revision 2
2-ISI-0380-C, Sheet 1, Revision 0
2-CHM-2046-C, Sheet 1, Revision 2

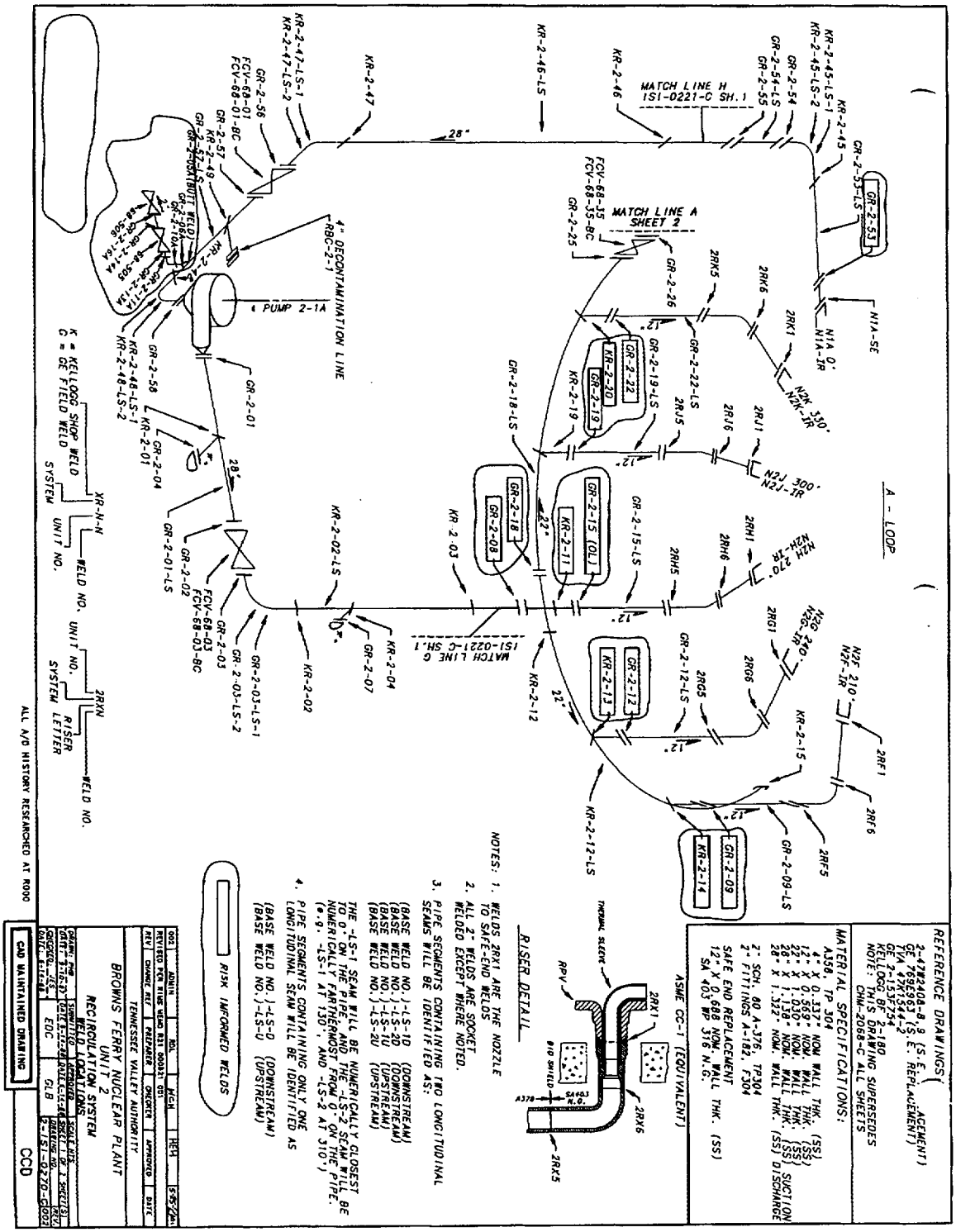

REFERENCE DRAWING
47K1787
47K335-1
KELL 2068-2-296239 (SH. 1) SUPPORT MAP
CDM-2068-C (SH. 1) THIS DRAWING SUPERCEDES
NOTE:
PIPE DATA
ASME CC-1 (EQUIVALENT)
ASTM A-155 KC 70
26" X 0.950 NOM. WALL THK. (CS)
8" X 0.719 NOM. WALL THK. (SCH. 160 CS)
NOTES:
ALL FIELD WELDS WERE MADE BY TVA
NOTE:
1. PIPE SEGMENTS 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 FARTHEMOST FROM 0° ON THE PIPE. (e.g. -LS-1 AT 130°, AND -LS-2 AT 310°)
2. PIPE SEGMENTS CONTAINING ONLY ONE LONGITUDINAL SEAM WILL BE IDENTIFIED AS:
(BASE WELD NO./-LS-D (DOWNSTREAM)
(BASE WELD NO./-LS-U (UPSTREAM)
DET A
DET B
MATCH LINE A
MATCH LINE D
MATCH LINE J
DETAIL A
DETAIL B
ALL A/D HISTORY RESEARCHED AT ROOD
CAD MAINTAINED DRAWING
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT
UNIT 2
MAIN STEAM SYSTEM WELD LOCATIONS
2-ISI-0222-C
003


REFERENCE DRAWINGS:
47K1767
47N335-1
KELLOG 729E229
2-ISI-0279-C (SH. 2) SUPPORT MAP
NOTE: THIS DRAWING SUPERCEDES CHM-2069-C (SH. 2)
PIPE DATA:
ASME CC-1 (EQUIVALENT)
ASTM A-155 KC 70
26" X 0.950" NOM. WALL THK. (CS)
6" X 0.719" NOM. WALL THK. (SCH. 160 CS)
NOTES:
ALL FIELD WELDS WERE MADE BY TVA
DET B
DET C
DETAIL "A"-"A"
MATCH LINE K SHEET 4
MATCH LINE E 2-ISI-0272-C SH. 3
MATCH LINE D 2-ISI-0273-C SH. 1
MATCH LINE G SHEET 3
MATCH LINE H SHEET 3
MATCH LINE B (2-MSC-0021-C SH. 1)
MATCH LINE C (2-MSC-0021-C SH. 1)
DETAIL B
DETAIL C
PEN. X-7B
PEN. X-7C
3" RCIC
N38 108°
N38-1R
N3C 232°
N3C-1R
EL. 586'-2"
EL. 568'-1"
NOTE:
1. 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°)
2. PIPE SEGMENTS CONTAINING ONLY ONE LONGITUDINAL SEAM WILL BE IDENTIFIED AS:
(BASE WELD NO.)-LS-D (DOWNSTREAM)
(BASE WELD NO.)-LS-U (UPSTREAM)
XMS-N-N
K = SHOP WELD
G = FIELD WELD
UNIT NO.
WELD NO.
MAIN STEAM
ALL A/D HISTORY RESEARCHED AT NDOO
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT UNIT 2
MAIN STEAM SYSTEN WELD LOCATIONS
2-ISI-0222-C
003
CAD MAINTAINED DRAWING


CAD MAINTAINED DRAWING
REFERENCE DRAWINGS
47K1545-1
47K935-2
GE 729E152
ISI-0277-C (SH. 1) SUPPORT MAP
THIS DRAWING SUPERCEDES CHK-2067-C
ALL SHEETS.
MATERIAL SPECIFICATIONS
NOTES
1. GE FIELD WELDS WERE MADE IN THE FIELD BY TVA.
2. PIPE SEGMENT LONGITUDINAL SEAMS WILL BE IDENTIFIED AS:
(BASE WELD) -LS-D (DOWNSTREAM)
(BASE WELD) -LS-U (UPSTREAM)
ASME CC-1 (EQUIVALENT)
K=KELLOGG SHOPWELD
G=GE FIELD WELD
FEEDWATER UNIT NO.
WELD NO.
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT
UNIT #2
FEEDWATER SYSTEM
WELD LOCATIONS
CCD

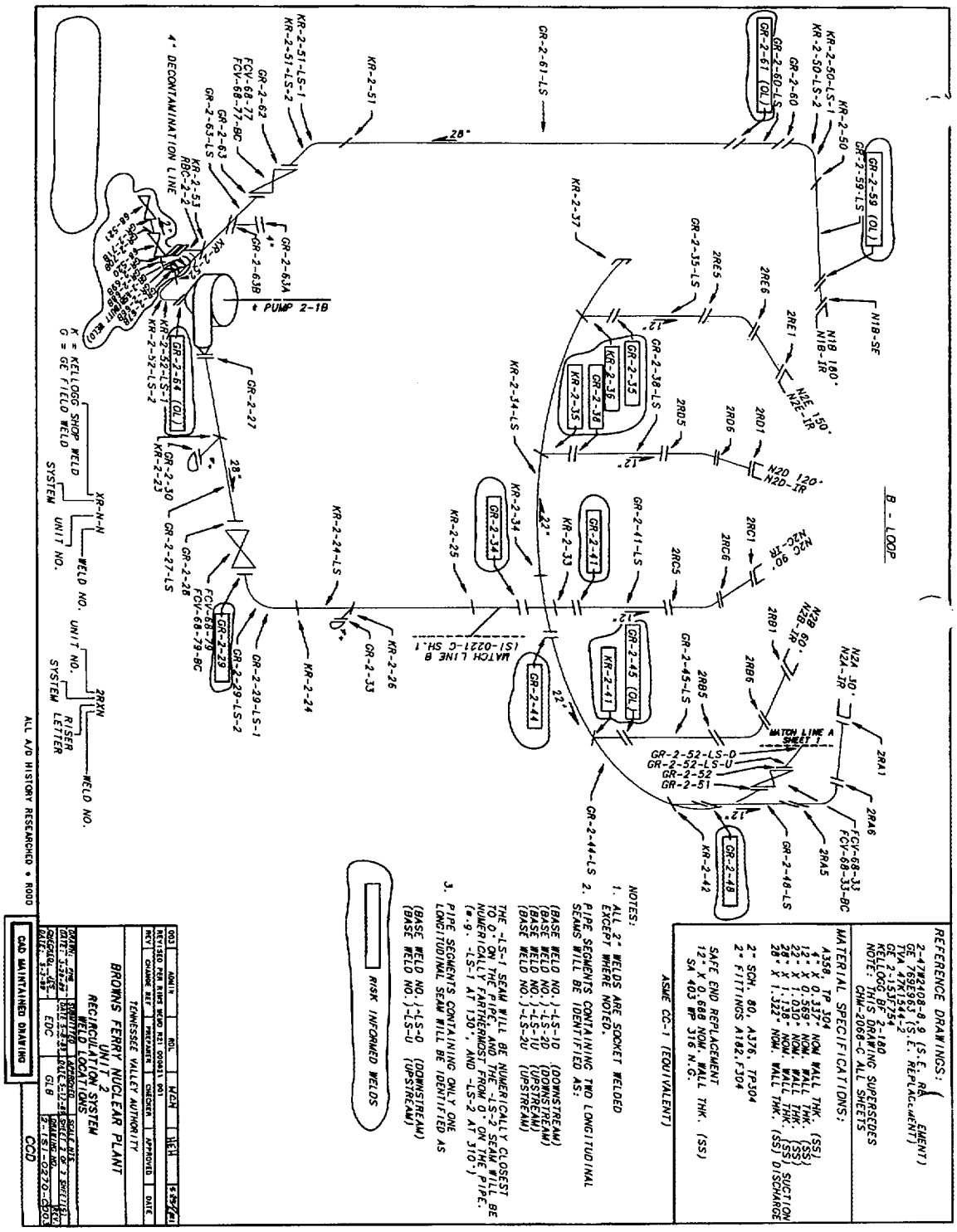
ATTACHMENT A

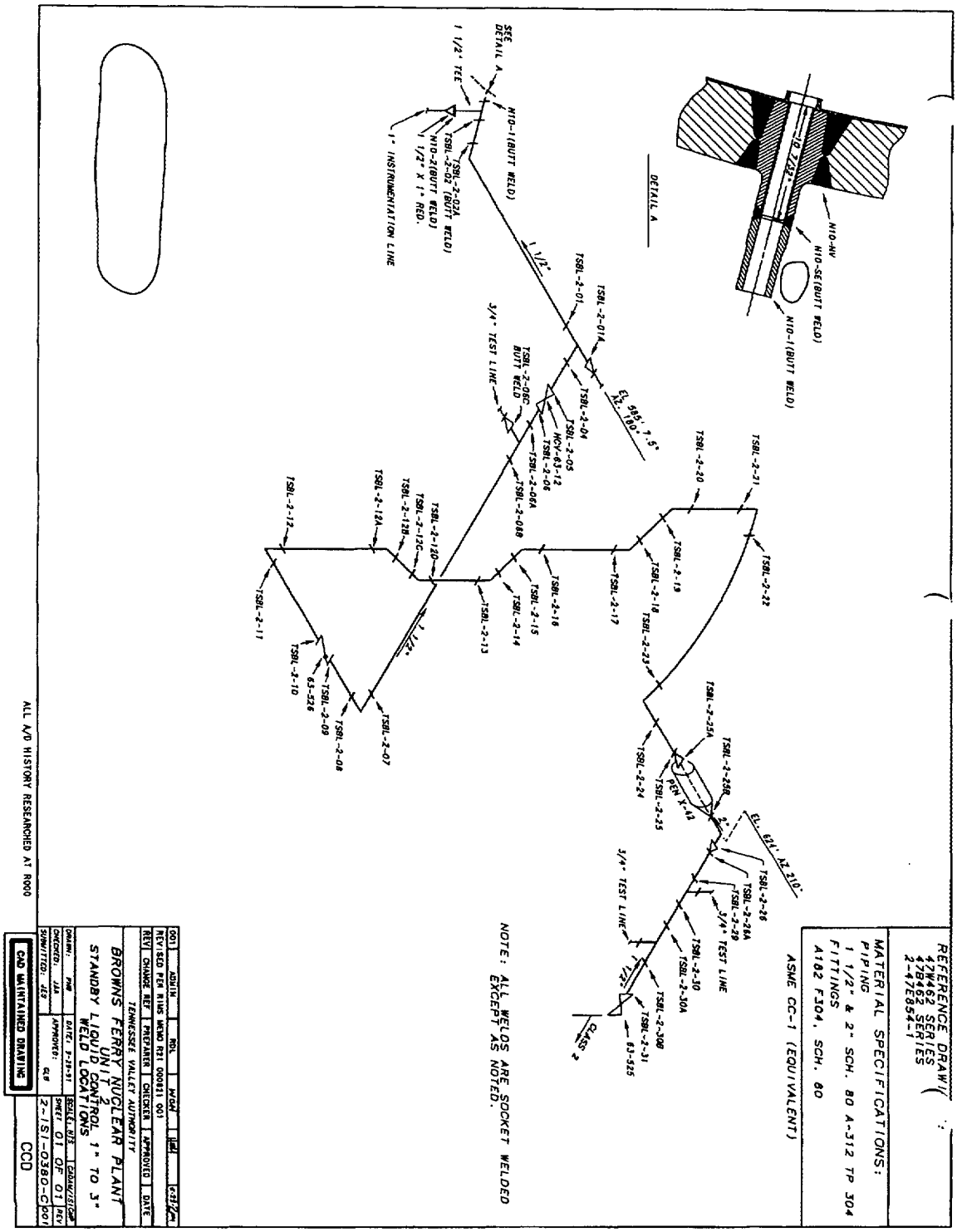
2-ISI-0270-C/S1



ATTACHMENT A

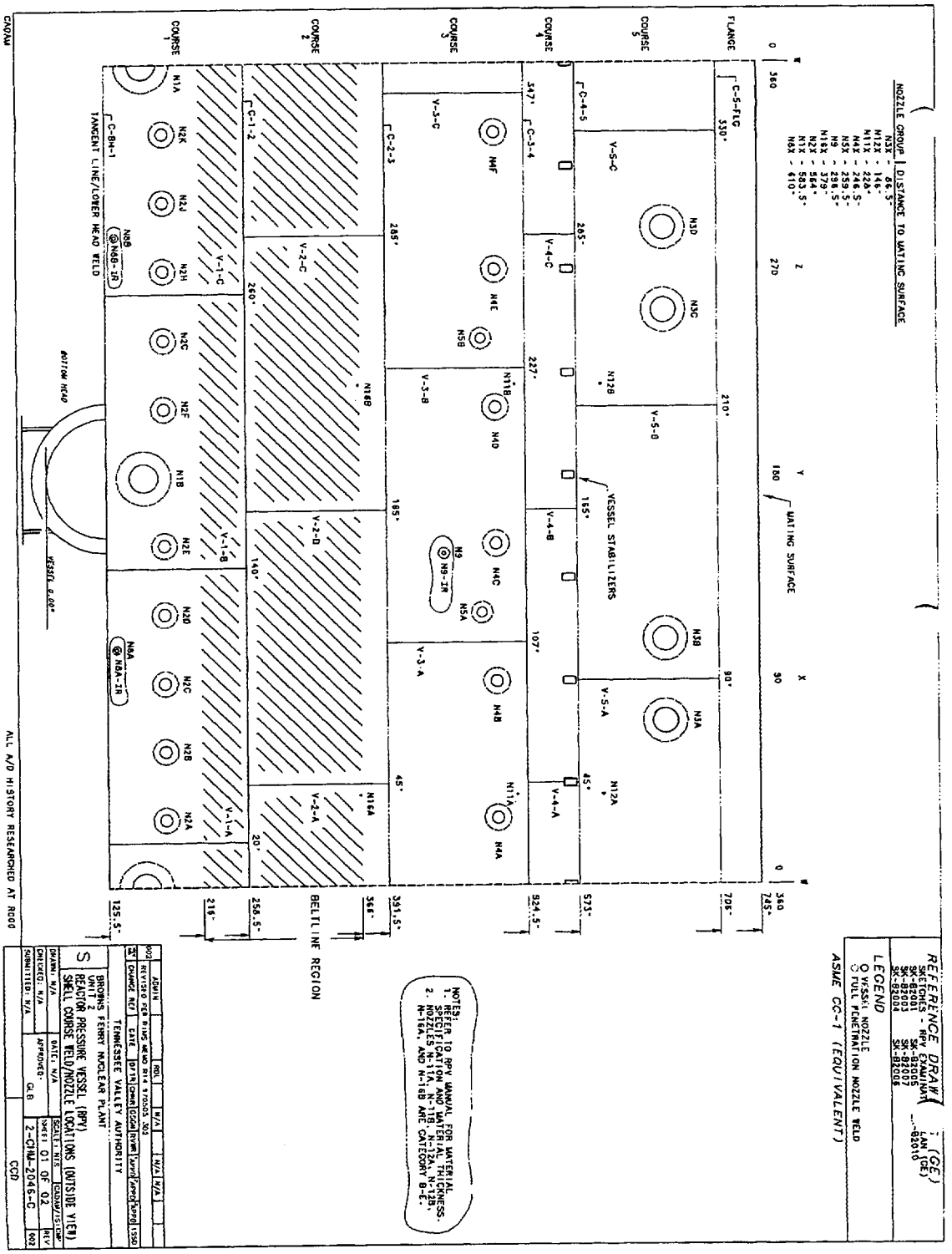
2-ISI-0270-C/S2




REFERENCE DRAWING
17W462 SERIES
17B462 SERIES
2-47E854-1
MATERIAL SPECIFICATIONS:
PIPING
1 1/2" & 2" SCH. 80 A-312 TP 304
FITTINGS
A182 F304, SCH. 80
ASME CC-1 (EQUIVALENT)
NOTE: ALL WELDS ARE SOCKET WELDED EXCEPT AS NOTED.
DETAIL A
N10-4W
N10-5E(BUTT WELD)
N10-1(BUTT WELD)
SEE DETAIL A
1 1/2" TEE
N10-1(BUTT WELD)
TSBL-2-02A
TSBL-2-02 (BUTT WELD)
N10-2(BUTT WELD)
1 1/2" X 1" RED.
1" INSTRUMENTATION LINE
TSBL-2-01
TSBL-2-01A
TSBL-2-04
TSBL-2-05
MCV-63-12
TSBL-2-06
TSBL-2-06A
TSBL-2-06B
TSBL-2-06C
BUTT WELD
3/4" TEST LINE
TSBL-2-07
TSBL-2-08
TSBL-2-09
TSBL-2-10
63-526
TSBL-2-11
TSBL-2-12
TSBL-2-12A
TSBL-2-12B
TSBL-2-12C
TSBL-2-12D
TSBL-2-13
TSBL-2-14
TSBL-2-15
TSBL-2-16
TSBL-2-17
TSBL-2-18
TSBL-2-19
TSBL-2-20
TSBL-2-21
TSBL-2-22
TSBL-2-23
TSBL-2-24
TSBL-2-25
TSBL-2-25A
TSBL-2-25B
FCV X-48
TSBL-2-26
TSBL-2-26A
TSBL-2-29
TSBL-2-30
TSBL-2-30A
TSBL-2-30B
TSBL-2-31
63-525
CLASS 2
CAD MAINTAINED DRAWING
ALL A/D HISTORY RESEARCHED AT ROOD
BROWNS FERRY NUCLEAR PLANT
UNIT 2
STANDBY LIQUID CONTROL 1" TO 3"
WELD LOCATIONS
TENNESSEE VALLEY AUTHORITY
2-ISI-0380-C
CCD

ATTACHMENT A

2-CHM-2046-C/S1



Attachment B

2-ISI-6, Revision 2

NDE Reports

Nozzle	Report No.
N-2D	R-126
N-2E	R-127
N-2K	R-128
N-3A	R-130
N-3C	R-131
N-4D	R-131
N-4E	R-132
N-8B	R-133
N-10	R-134

R-126

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051 | BROWNS FERRY NUCLEAR PLANT, UNIT 2 | Summary Sheet No.: 001700

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: RECIRCULATION INLET NOZZLE TO SHELL WELD AT 120 DEGREES
IDENTIFICATION: N2D

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Exam/Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
AUT	BFN/AUT11/0/1/0	0	OD-1a	X	-	-			Automated examination limited due to nozzle configuration and
AUT	BFN/AUT11/0/1/0	AUT45	OD-1a	X	-	-			insulation.
AUT	BFN/AUT11/0/1/0	AUT60	OD-1a	X	-	-			
UT	BFNUT35/1/0/1	0	210007	X	-	-			Manual examination performed in areas of automated limitations
UT	BFNUT35/1/0/1	45	230013	X	-	-			to increase coverage.
UT	BFNUT35/1/0/1	45T	230013	X	-	-			
UT	BFNUT35/1/0/1	60	230013	X	-	-			
UT	BFNUT35/1/0/1	60T	230013	X	-	-			

Coverage - 67%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Brady Cogleder 12-Apr-01

Page 1 of 1

Page 1 of 6

R-126

00135

R-126

00136

SwRI EDAS EXAM AND REVIEW RECORD

Exam No. OD-1A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01 18APR01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N2-D	Module Config.:	111
Weld Description:	Recir. Inlet NTS @120°	Scan Path Dwg:	SPN2NTS

Calibration Records:

Channel 1	90011	Channel 5	N/A	Cal. Set No.
Channel 2	90012	Channel 6	N/A	NTS-TWD
Channel 3	90013	Channel 7	N/A	
Channel 4	90014	Channel 8	N/A	

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	500	22500	Lower Limit	1328	1775
Upper Limit	36584	31180	Upper Limit	3232	3003

Examination Data:

Exam Date:	6-Apr-01		Temperature Start:	72
Start/End Time:	1620	1650	Temperature End:	72

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X 3.5	Channel 3	X 3.5	Channel 5	N/A	Channel 7	N/A
Channel 2	X 3.5	Channel 4	X 3.5	Channel 6	N/A	Channel 8	N/A
0 Deg. TCG On/Off	N/A						

Examination Remarks:

Signature: Pat Stan **SNT Level:** II

Archive CD No: _____ **Analysis Tape No:** N/A

Scan No.	Increment Position Start	Increment Position Stop	Scan Position Start	Scan Position Stop
236-328	22500	31200	1775	3003
N/A	N/A		N/A	
N/A	N/A		N/A	
N/A	N/A		N/A	

Recordable Indications:

	Yes	No		Yes	No
Channel 1		X	Channel 5	N/A	N/A
Channel 2		X	Channel 6	N/A	N/A
Channel 3		X	Channel 7	N/A	N/A
Channel 4		X	Channel 8	N/A	N/A

Analyst(s): Eric M. Bauer **SNT Level:** III

R-126

00137

ISwT OD EXAMINATION PARAMETERS RECORD

Exam No. OD-1A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N2D-NTS	Module Config.:	111
Weld Description:	Recirc Inlet NTS @120	Scan Path Dwg:	SPN2NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Automatic Scan
Scan Axis	Y Axis	Scan Motion	Bi-Directional
Increment Axis	X Axis	Correction	Default

Examination Parameters:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Lower Limit	500	Lower Limit	1328
Upper Limit	36548	Upper Limit	3232
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units Deg	1.00	Conversion Units In.	1.00
EDAS Radius			
Reference Offset Deg		Reference Offset In.	

Module Parameters: 111 NTS-TWD

	Status	Angle	Direction	Scan Offset	Step Offset
Channel 1	On	45	(-)	(-) 0.66	(-) 2.0Deg.
Channel 2	On	60	(-)	(-) 0.66	(+) 2.0 Deg
Channel 3	On	0L	(-)	(-) 0.66	0
Channel 4	On	0W	(+)	(-) 0.66	0
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	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	TWD	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Device Conversion Counts:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Inches Per Degree	0.38	Counts Per Inch	100
Degrees Per Inch	2.60	Inches Per Count	0.01

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	7-Apr-01	EXAM STARTED 845 EXAM ENDED 935	210007

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @ 120°	N2D	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	SHELL	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030003	N/A	N/A	6.5"	Flush			Nozzle to Shell →
EXAMINER: Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 83.25"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE: Examination performed on outer blend radius, from 0° to 360°, starting at 17.75" from nozzle centerline to end of boss. Also picked up area not covered with automated examination, area 300° cw to 230°.

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Victor Ung	III	8 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 4 of 6

K-126 00138

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 7-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 0845 / EXAM ENDED 0935	SHEET No: 230013
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY Nozzle @ 120-Deg	IDENTIFICATION N2D	Lo LOCATION TDC	Wo LOCATION Centerline of Weld

EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040013 040014	ANGLE USED	0°	45°	60°	45T°	60T°	WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II			SCANNING dB	67.2	84.2	88.8	84.2	88.8	WELD LENGTH 83.25"

INDICATION NO. N/A	MAX % OF DAC N/A	SEARCH UNIT ANGLE N/A	SEARCH UNIT LOCATION N/A	EXAMINATION SURFACE ☐ INSIDE ☑ OUTSIDE	EXAMINATION SURFACE TEMPERATURE ° F BEFORE 88° AFTER: 88°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	MA
50% L1															EXAMINATION PEFORMED FROM OUTER BLEND RADIUS					MA
100%L1															FROM 0-DEG TO 360-DEG, STARTING AT 17.75" FROM NOZZLE C/L					MA
L MAX															TO END OF BOSS.					MA
100%L2															ALSO PICKED UP AREA NOT COVERED WITH AUTOMATED					MA
50% L2															EXAMINATION, AREA 300-DEG CW TO 230-DEG					MA
20% L2																				
L POS																				
L POS																				
L POS																				
L POS																				
L POS																				

REVIEWED BY Neeta Ray	SNT LEVEL III	DATE: 8APR 01	PAGE 1 OF 1

ISwT FORM UT-23 (REV. 07/99)

Page 5 of 6

00139

Required Volume = 70.24" sq

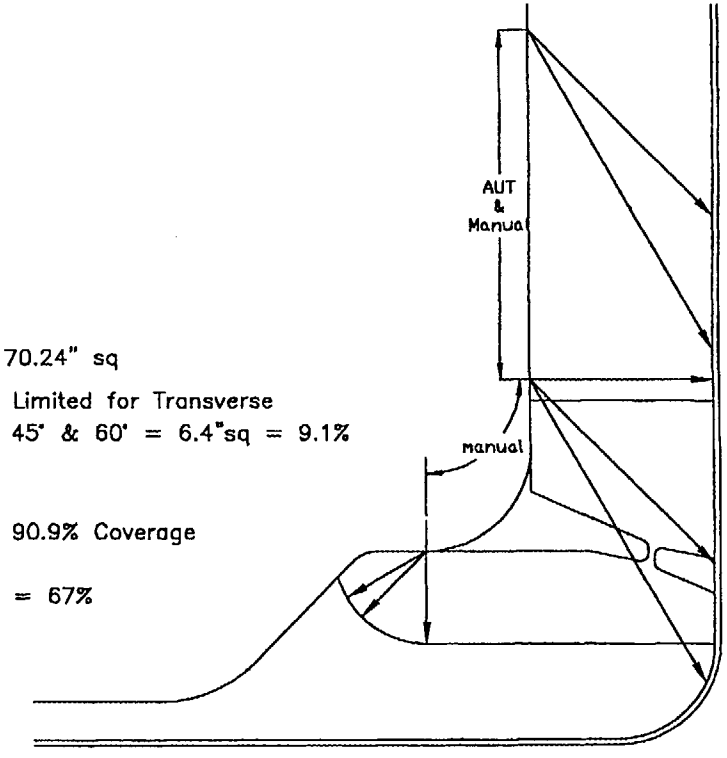
Limited for Parallel
45° = 3.0"sq = 4.3%
60° = 1.9"sq = 2.7%

Single Sided
48.5% Coverage

Limited for Transverse
45° & 60° = 6.4"sq = 9.1%

90.9% Coverage

Effective Coverage = 67%



Page 6 of 6

R-126

Browns Ferry Unit 2
N2 Nozzle-to-Shell
April 2001
N-2-D, N-2-E & N-2-K

0040

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051 | BROWNS FERRY NUCLEAR PLANT, UNIT 2 | Summary Sheet No.: 001800

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: RECIRCULATION INLET NOZZLE TO SHELL WELD AT 150 DEGREES
IDENTIFICATION: N2E

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Exam/Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
AUT	BFN/AUT11/0/1/0	0	OD-5a	X	-	-			Automated examination limited due to nozzle configuration and
AUT	BFN/AUT11/0/1/0	AUT45	OD-5a	X	-	-			insulation.
AUT	BFN/AUT11/0/1/0	AUT60	OD-5a	X	-	-			
UT	BFNUT35/1/0/1	0	210008	X	-	-			Manual examination performed in areas of automated limitations
UT	BFNUT35/1/0/1	45	230014,-15	X	-	-			to increase coverage.
UT	BFNUT35/1/0/1	45T	230014,-15	X	-	-			
UT	BFNUT35/1/0/1	60	230014,-15	X	-	-			
UT	BFNUT35/1/0/1	60T	230014,-15	X	-	-			

Coverage - 67%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Brady Cagledu 12-Apr-01

Page 1 of 1

Page 1 of 7

R-127

00142 R-127

ISWT O.D. EXAM AND REVIEW RECORD

Exam No. OD-5A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01 1 IDAPR01
Project No.:	N/A	Device Config.:	D-BFN2-003
Weld Identification:	N2E-NTS	Module Config.:	111
Weld Description:	Recirc.Inlet NTS @150	Scan Path Dwg:	SPN2NTS

Calibration Records:

Channel 1	90011	Channel 5	N/A	Cal. Set No.
Channel 2	90012	Channel 6	N/A	NTS-TWD ~~N-2-NTS~~
Channel 3	90013	Channel 7	N/A	
Channel 4	90014	Channel 8	N/A	4/26/01

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	500	4000	Lower Limit	1419	1775
Upper Limit	36548	13500	Upper Limit	3003	3003

Examination Data:

Exam Date:	4/7/01		Temperature Start:	89
Start/End Time:	0455	0522	Temperature End:	89

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X /3.5	Channel 3	X /3.5	Channel 5	N/A	Channel 7	N/A
Channel 2	X /3.5	Channel 4	X /3.5	Channel 6	N/A	Channel 8	N/A
0 Deg. TCG On/Off	N/A						

Examination Remarks:

Signature: _____ SNT Level: III

Archive CD No: _____ Analysis Tape No: N/A

Increment Position: **Scan Position:**

Scan No.	Start	Stop	Start	Stop
42-142	4000	13500	1775	3003
N/A	N/A		N/A	
N/A	N/A		N/A	
	N/A		N/A	

Recordable Indications:

	Yes	No		Yes	No
Channel 1		X	Channel 5	N/A	N/A
Channel 2		X	Channel 6	N/A	N/A
Channel 3		X	Channel 7	N/A	N/A
Channel 4		X	Channel 8	N/A	N/A

Analyst(s): _____ SNT Level: III

00143 R-127

ISWT O. D. EXAMINATION PARAMETERS RECORD

Exam No. OD-5A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/ϕ 1 10APR01 (4)
Project No.:	N/A	Device Config.:	D-BFN2-003
Weld Identification:	N2E-NTS	Module Config.:	111
Weld Description:	Recirc.Inlet NTS @150	Scan Path Dwg:	SPN2NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Manual Scan
Scan Axis	Y Axis	Scan Motion	Bi-Directional
Increment Axis	X Axis	Correction	Default

Examination Parameters:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Lower Limit	500	Lower Limit	1419
Upper Limit	36548	Upper Limit	3003
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units Deg	1.00	Conversion Units Inches	1.00
EDAS Radius			
Reference Offset Deg		Reference Offset In.	

Module Parameters: 111 Cal-601

	Status	Angle	Direction	Scan Offset	Step Offset
Channel 1	On	45	(-)	(-) 0.66	(-) 2.0 Deg.
Channel 2	On	60	(-)	(-) 0.66	(+) 2.0 Deg.
Channel 3	On	0L	(-)	(-) 0.66	0.00
Channel 4	On	0W	(+)	(-) 0.66	0.00
Channel 5	On	N/A	N/A	N/A	N/A
Channel 6	Off	N/A	N/A	N/A	N/A
Channel 7	Off	N/A	N/A	N/A	N/A
Channel 8	Off	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	Twd	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Check for limitations due to insulation panels, brackets, and/or thermocouples.

Device Conversion Counts:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Inches Per Degree	0.38	Counts Per Inch	100.00
Degrees Per Inch	2.60	Inches Per Count	0.01

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	07-Apr-01	EXAM STARTED 0835 EXAM ENDED 1020	210008

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @ 150°	N2E	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	SHELL	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030003	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 83.25"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE: Examination performed on outer blend radius, from 0° to 360°, starting at 17.75" from nozzle centerline to end of boss. Also picked up area not covered with automated examination, area 125° cw to 45°.

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Wesley Dig	III	8 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 4 of 7

K-1 & 1

00144

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 7-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 0935 / EXAM ENDED 1020	SHEET No: 230014
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY Nozzle @ 150-Deg	IDENTIFICATION N2E	Lo LOCATION TDC	Wo LOCATION Centerline of Weld
EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040013 040014	WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II			WELD LENGTH 83.25"

ANGLE USED	0°	45°	60°	45T°	60T°
SCANNING dB	67.2	84.2	88.8	84.2	88.8

INDICATION NO.	MAX % OF DAC	SEARCH UNIT ANGLE	SEARCH UNIT LOCATION	EXAMINATION SURFACE	EXAMINATION SURFACE TEMPERATURE ° F
N/A	N/A	N/A	N/A	☐ INSIDE ☑ OUTSIDE	BEFORE 88° AFTER: 88°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50% DAC W1	50% DAC MP	100% DAC W1	100% DAC MP	> 100% 1/2 MAX W1	> 100% 1/2 MAX MP	W MAX W	W MAX MP	> 100% 1/2 MAX W2	> 100% 1/2 MAX MP	100% DAC W2	100% DAC MP	50% DAC W2	50% DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	WA
50% L1															EXAMINATION PEFORMED FROM OUTER BLEND RADIUS					WA
100%L1															FROM 0-DEG TO 360-DEG, STARTING AT 17.75" FROM NOZZLE C/L					WA
L MAX															TO END OF BOSS.					WA
100%L2															ALSO PICKED UP AREA NOT COVERED WITH AUTOMATED					WA
50% L2															EXAMINATION, AREA 300-DEG TO 45-DEG AND 125-DEG					WA
20% L2															TO 230-DEG.					WA
L POS																				
L POS																				
L POS																				
L POS																				
L POS																				

REVIEWED BY	SNT LEVEL	DATE:	PAGE
[signature]	III	8APR01	1 OF 2

ISwT FORM UT-23 (REV. 07/99)

Page 5 of 7

00145

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-0147	Browns Ferry Unit 2	7-Apr-01	EXAM STARTED 1420 EXAM ENDED 1550	230015

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @ 150-Deg	N2E	TDC	Centerline of Weld

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	ANGLE USED	0°	45°	60°	45T°	60T°	WELD TYPE
William Angell	II	NO. BFN-UT35 REV 1								Nozzle to Shell
EXAMINER:	SNT LEVEL	CHG 0 ICN 1 ☐ N/A	040013 040014	SCANNING dB	67.2	84.2	88.8	84.2	88.8	WELD LENGTH
Charles Littlefield	II									83.25"

INDICATION NO.	MAX % OF DAC	SEARCH UNIT ANGLE	SEARCH UNIT LOCATION	EXAMINATION SURFACE	EXAMINATION SURFACE TEMPERATURE ° F
N/A	N/A	N/A	N/A	☐ INSIDE ☑ OUTSIDE	BEFORE 88° AFTER: 88°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	
50% L1														EXAMINATION PEFORMED FROM OUTER BLEND RADIUS						
100%L1														FROM 0-DEG TO 360-DEG, STARTING AT 17.75" FROM NOZZLE C/L						
L MAX														TO END OF BOSS.						
100%L2														ALSO PICKED UPAREA NOT COVERED WITH AUTOMATED						
50% L2														EXAMINATION, AREA 230-DEG TO 300- DEG						
20% L2																				
L POS																				
L POS																				
L POS																				
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REVIEWED BY	SNT LEVEL	DATE:	PAGE
Nestor Diz	III	8 APR 01	2 OF 2

ISwT FORM UT-23 (REV. 07/99)

Page 6 of 7

00149

Required Volume = 70.24" sq

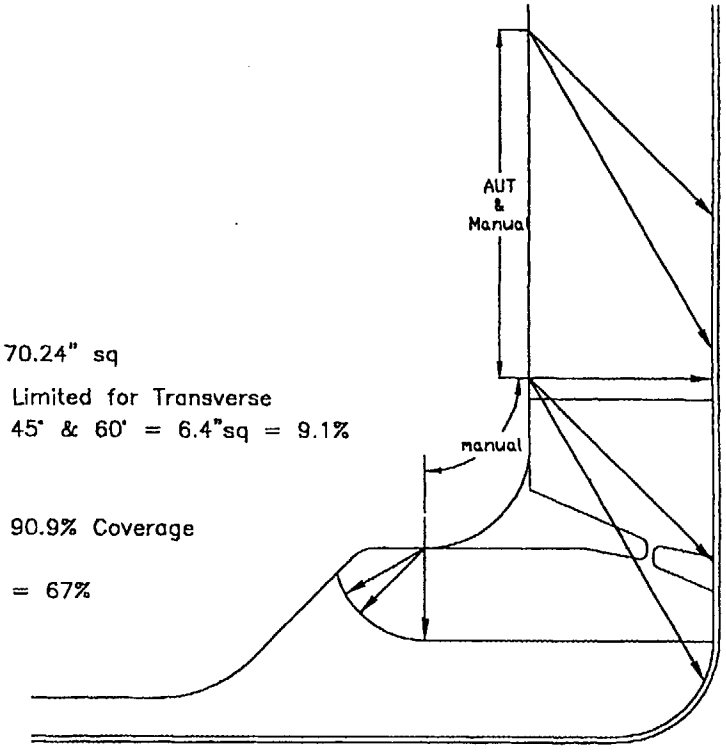
Limited for Parallel
45° = 3.0"sq = 4.3%
60° = 1.9"sq = 2.7%

Single Sided
48.5% Coverage

Limited for Transverse
45° & 60° = 6.4"sq = 9.1%

90.9% Coverage

Effective Coverage = 67%



Page 19 of 17

R-127

Browns Ferry Unit 2
N2 Nozzle-to-Shell
April 2001
N-2-D, N-2-E & N-2-K

U0147

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051

BROWNS FERRY NUCLEAR PLANT, UNIT 2

Summary Sheet No.: 001900

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: RECIRCULATION INLET NOZZLE TO SHELL WELD AT 330 DEGREES
IDENTIFICATION: N2K

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Exam/Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
AUT	BFN/AUT11/0/1/0	0	OD-9a	X	.	.			Automated examination limited due to nozzle configuration and insulation.
AUT	BFN/AUT11/0/1/0	AUT45	OD-9a	X	.	.			
AUT	BFN/AUT11/0/1/0	AUT60	OD-9a	X	.	.			
UT	BFNUT35/1/0/1	0	210009	X	.	.			Manual examination performed in areas of automated limitations to increase coverage.
UT	BFNUT35/1/0/1	45	230016	X	.	.			
UT	BFNUT35/1/0/1	45T	230016	X	.	.			
UT	BFNUT35/1/0/1	60	230016	X	.	.			
UT	BFNUT35/1/0/1	60T	230016	X	.	.			

Coverage - 67%

****UT CALIBRATION BLOCK(S)****
BF-18

00148

Prepared by: Grady Lagleder 12-Apr-01

Page 1 of 1 Exh 2

R-128

R-128 00149

ISwT OD EXAMINATION PARAMETER RECORDS

Exam No. OD-9A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/~~0~~1 10Apr01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N2K-NTS	Module Config.:	111
Weld Description:	Recirc Inlet NTS @330	Scan Path Dwg:	SPN2NTS

Calibration Records:

Channel 1	90011		Channel 5	N/A		Cal. Set No.
Channel 2	90012		Channel 6	N/A		NTS TWD
Channel 3	90013		Channel 7	N/A		
Channel 4	90014		Channel 8	N/A		

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	500	4500	Lower Limit	1328	1775
Upper Limit	36548	12900	Upper Limit	3232	3003

Examination Data:

Exam Date:	7-Apr-01		Temperature Start:	75
Start/End Time:	1355	1411	Temperature End:	75

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X / 3.5	Channel 4	X / 3.5	Channel 7	N/A	
Channel 2	X / 3.5	Channel 5	N/A	Channel 8	N/A	
Channel 3	X / 3.5	Channel 6	N/A	0 Deg. TCG On/Off	ON	

Examination Remarks:

Exam Limited Due to Nozzle Insulation.

Signature: [signature] N/A **SNT Level** II / N/A

Archive CD No: _____ **Analysis Tape No:** N/A

Increment Position: **Scan Position:**

Scan No.	Start	Stop			Start	Stop	
47-136	4500	12900			1775	3003	
N					N		
		A				A	

Recordable Indications:

	Yes	No				Yes	No
Channel 1		X			Channel 5	N	
Channel 2		X			Channel 6		
Channel 3		X			Channel 7		
Channel 4		X			Channel 8		A

Analyst(s): [signature] N/A **SNT Level** III / N/A

K-128

00150

ISwT OD EXAMINATION PARAMETERS RECORD

Exam No. OD-9A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01 10Apr01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N2K-NTS	Module Config.:	111
Weld Description:	Recirc Inlet NTS @330	Scan Path Dwg:	SPN2NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Automatic Scan
Scan Axis	Y Axis	Scan Motion	Bi-Directional
Increment Axis	X Axis	Correction	Default

Examination Parameters:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Lower Limit	500	Lower Limit	1328
Upper Limit	36548	Upper Limit	3232
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units Deg	1.00	Conversion Units In.	1.00
EDAS Radius			
Reference Offset Deg		Reference Offset In.	

Module Parameters: 111 NTS-TWD

	Status	Angle	Direction	Scan Offset	Step Offset
Channel 1	On	45	(-)	(-) 0.66	(-) 2.0Deg.
Channel 2	On	60	(-)	(-) 0.66	(+) 2.0 Deg
Channel 3	On	0L	(-)	(-) 0.66	0
Channel 4	On	0W	(+)	(-) 0.66	0
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	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	TWD	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Device Conversion Counts:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Inches Per Degree	0.38	Counts Per Inch	100
Degrees Per Inch	2.60	Inches Per Count	0.01

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	07-Apr-01	EXAM STARTED 1455 EXAM ENDED 1550	210009

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @ 330°	N2K	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	SHELL	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030003	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 83.25"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE: Examination performed on outer blend radius, from 0° to 360°, starting at 17.75" from nozzle centerline to end of boss. Also picked up area not covered with automated examination, area 125° cw to 45°.

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Hector Diaz	III	8 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 40 of 40 Rev 1 5/2/04

A-100 00151

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 7-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 1455 / EXAM ENDED 1550	SHEET No: 230016
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY Nozzle @ 330-Deg	IDENTIFICATION N2K	Lo LOCATION TDC	Wo LOCATION Centerline of Weld
EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040013 040014	WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II			WELD LENGTH 83.25"

ANGLE USED	0°	45°	60°	45T°	60T°
SCANNING dB	67.2	84.2	88.8	84.2	88.8

INDICATION NO.	MAX % OF DAC	SEARCH UNIT ANGLE	SEARCH UNIT LOCATION	EXAMINATION SURFACE	EXAMINATION SURFACE TEMPERATURE ° F
N/A	N/A	N/A	N/A	☐ INSIDE ☑ OUTSIDE	BEFORE 88° AFTER: 88°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	
50% L1															EXAMINATION PEFORMED FROM OUTER BLEND RADIUS					
100%L1															FROM 0-DEG TO 360-DEG, STARTING AT 17.75" FROM NOZZLE C/L					
L MAX															TO END OF BOSS.					
100%L2															ALSO PICKED UPAREA NOT COVERED WITH AUTOMATED					
50% L2															EXAMINATION, AREA 125-DEG CW TO 45-DEG					
20% L2																				
L POS																				
L POS																				
L POS																				
L POS																				
L POS																				

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Nicholas Clay	III	8 APR 01	1 OF 1

ISwT FORM UT-23 (REV. 07/99)

Page 5 of 46 Exh. 10 Stipul.

00152

Required Volume = 70.24" sq

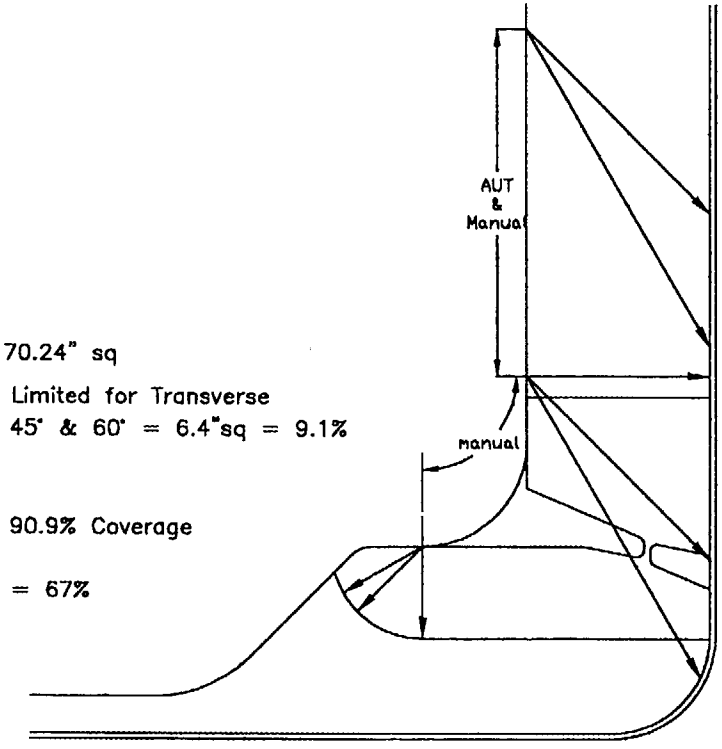
Limited for Parallel
45° = 3.0"sq = 4.3%
60° = 1.9"sq = 2.7%

Single Sided
48.5% Coverage

Limited for Transverse
45° & 60° = 6.4"sq = 9.1%

90.9% Coverage

Effective Coverage = 67%



Page 6 of 6

R-128

00153

Browns Ferry Unit 2
N2 Nozzle-to-Shell
April 2001
N-2-D, N-2-E & N-2-K

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051

BROWNS FERRY NUCLEAR PLANT, UNIT 2

Summary Sheet No.: 002000

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: MAIN STEAM NOZZLE TO SHELL WELD AT 72 DEGREES
IDENTIFICATION: N3A

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
UT	BFNUT35/1/0/1	0	210001	X	.	.			Examination limited due to nozzle configuration.
UT	BFNUT35/1/0/1	45	230001	X	.	.			
UT	BFNUT35/1/0/1	45T	230001	X	.	.			
UT	BFNUT35/1/0/1	60	230001	X	.	.			
UT	BFNUT35/1/0/1	60T	230001	X	.	.			

Coverage - 61%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Grady Lagleder 12-Apr-01

Page 1 of 4

00154

R-129

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	3/31/01	EXAM STARTED 1030 EXAM ENDED 1215	210001

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @72 deg	N3A	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	DOWN	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030003 1 UA 3/31/01	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 132.64"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		UA

REMARKS / LIMITATIONS, IF NONE SO STATE: Exmination limited due to outer blend radius. UA
Examination started at 5.5" from nozzle boss. UA

REVIEWED BY	SNT LEVEL	DATE:	PAGE
[signature]	III	31-Apr-01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 2 of 4

0015

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147					SITE: Browns Ferry Unit 2						DATE: (DAY - MONTH - YEAR) 31-Mar-01				TIME: (24 HR CLOCK) EXAM STARTED 1030 EXAM ENDED 1215						SHEET No: 230001		
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel					LINE / SUBASSEMBLY @ 72°						IDENTIFICATION N3A				Lo LOCATION TDC						Wo LOCATION Centerline of Weld		
EXAMINER: William Angell					SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A					CALIBRATION SHEET(s) 040001 040002				ANGLE USED	0°	45°	60°	45T°	60T°	WELD TYPE Nozzle to Shell		
EXAMINER: Charles Littlefield					SNT LEVEL II										SCANNING dB	69.4	68.6	74.4	68.6	74.4	WELD LENGTH 132.64"		
INDICATION NO. N/A			MAX % OF DAC N/A		SEARCH UNIT ANGLE N/A						SEARCH UNIT LOCATION N/A				EXAMINATION SURFACE ☐ INSIDE ☑ OUTSIDE						EXAMINATION SURFACE TEMPERATURE ° F BEFORE 86° AFTER: 86°		
L MEASUREMENTS	20% DAC		50 % DAC		100% DAC		> 100 % 1/2 MAX		W MAX		> 100 % 1/2 MAX		100% DAC		50 % DAC		20% DAC		REMARKS		INITIALS		
			W1	MP	W1	MP	W1	MP	W	MP	W2	MP	W2	MP	W2	MP	W2	MP					
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW		WA		
50% L1																			The near surface was		WA		
100%L1																			examined using the 60°		WA		
L MAX																			Examination limited due to		WA		
100%L2																			Outer Blend radius. Tangental		WA		
50% L2																			and Parallel examination		WA		
20% L2																			Started at 5.5" from Nozzle		WA		
L POS																			Boss.		WA		
L POS																							
L POS																							
L POS																							
L POS																							

REVIEWED BY [signature] SNT LEVEL III DATE: 2 APR 01 PAGE 1 OF 1

SwT FORM UT-23 (REV. 07/99)

Page 3 of 4

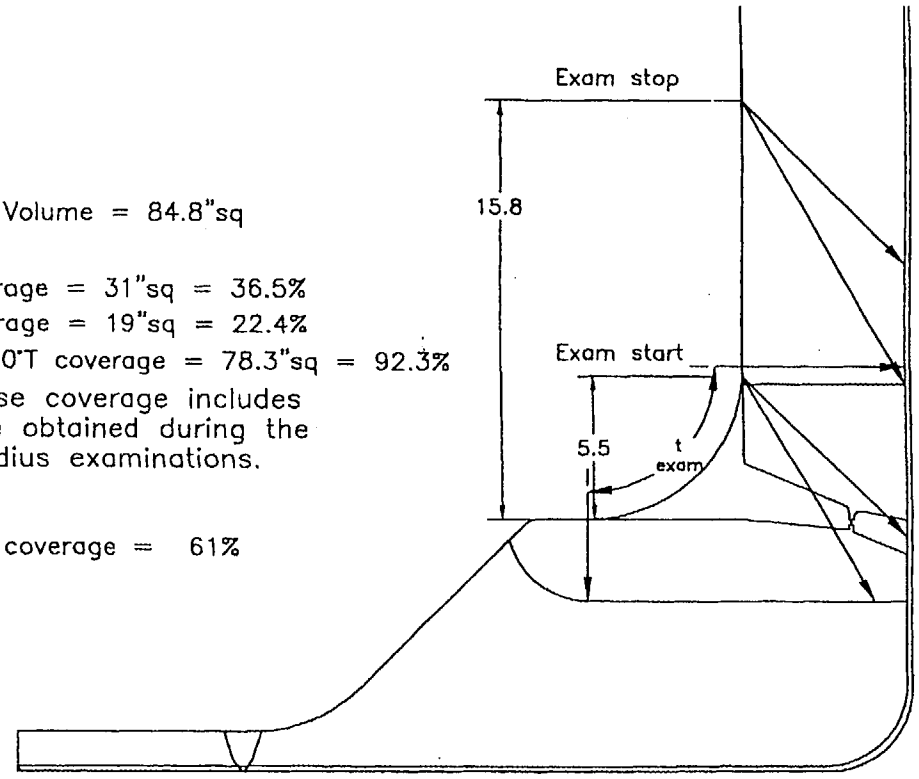
00156

R-129

Required Volume = 84.8"sq

60° coverage = 31"sq = 36.5%
45° coverage = 19"sq = 22.4%
45°t & 60°T coverage = 78.3"sq = 92.3%
Transverse coverage includes coverage obtained during the inner radius examinations.

Effective coverage = 61%



Page 4 of 4

R-129

Browns Ferry Unit 2
N-3-A & C Nozzle-to-Shell
April 2001
N3

00157

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051

BROWNS FERRY NUCLEAR PLANT, UNIT 2

Summary Sheet No.: 002100

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: MAIN STEAM NOZZLE TO SHELL WELD AT 252 DEGREES
IDENTIFICATION: N3C

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
UT	BFNUT35/1/0/1	0	210002	X	.	.			Examination limited due to nozzle configuration.
UT	BFNUT35/1/0/1	45	230002	X	.	.			
UT	BFNUT35/1/0/1	45T	230002	X	.	.			
UT	BFNUT35/1/0/1	60	230002	X	.	.			
UT	BFNUT35/1/0/1	60T	230002	X	.	.			

Coverage - 61%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Grady Cagleden 12-Apr-01

Page 1 of 4

R-130

00158

ISwT LAMINATION EXAMINATION RECORD

PROJECT No. :	SITE :	DATE : (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	3/31/01	EXAM STARTED 1030 EXAM ENDED 1215	210002

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @252 deg	N3C	TDC	Weld Centerline

EXAMINER :	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	DOWN	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐N/A	030003	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER : Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 132.64"

IND No	% LOSS OF B. W.	IND AMP % F. S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE : Exmination limited due to outer blend radius.
Examination started at 5.5" from nozzle boss.

REVIEWED BY	SNT LEVEL	DATE :	PAGE
	III	31-Apr-01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 2 of 4

0015

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 31-Mar-01	TIME: (24 HR CLOCK) EXAM STARTED 1400 / EXAM ENDED 1555		SHEET No: 230002
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY @ 252°	IDENTIFICATION N3C	Lo LOCATION TDC		Wo LOCATION Centerline of Weld
EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040001 040002		WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II				WELD LENGTH 132.64"

ANGLE USED	0°	45°	60°	45T°	60T°
SCANNING dB	69.4	68.6	74.4	68.6	74.4

INDICATION NO.	MAX % OF DAC	SEARCH UNIT ANGLE	SEARCH UNIT LOCATION	EXAMINATION SURFACE	EXAMINATION SURFACE TEMPERATURE ° F
N/A	N/A	N/A	N/A	☐ INSIDE ☑ OUTSIDE	BEFORE 86° AFTER: 86°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	WA
50% L1																			The near surface was	WA
100% L1																			examined using the 60°	WA
L MAX																			Examination limited due to	WA
100% L2																			Outer Blend radius. Tangential	WA
50% L2																			and Parallel examination	WA
20% L2																			started at 5.5" from Nozzle	WA
L POS																			Boss.	WA
L POS																				
L POS																				
L POS																				
L POS																				

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Heath Dix	III	2 APR 01	1 OF 1

ISwT FORM UT-23 (REV. 07/99)

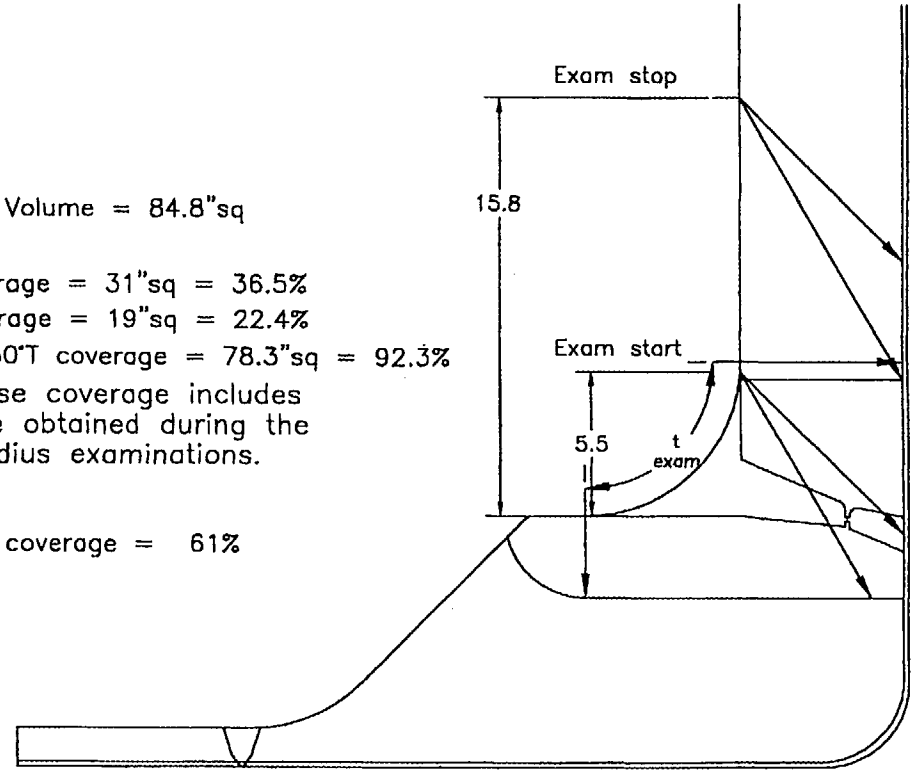
Page 3 of 4

00160 K-150

Required Volume = 84.8"sq

60° coverage = 31"sq = 36.5%
45° coverage = 19"sq = 22.4%
45°t & 60°T coverage = 78.3"sq = 92.3%
Transverse coverage includes coverage obtained during the inner radius examinations.

Effective coverage = 61%



Page 4 of 4

R-130

Browns Ferry Unit 2
N-3-A & C Nozzle-to-Shell
April 2001
N3

TOTAL

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051

BROWNS FERRY NUCLEAR PLANT, UNIT 2

Summary Sheet No.: 002200

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: FEEDWATER NOZZLE TO SHELL WELD AT 210 DEGREES
IDENTIFICATION: N4D

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Exam/Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
AUT	BFN/AUT11/0/1/0	0	OD-13a,b	X	-	-			Automated examination limited due to nozzle configuration and
AUT	BFN/AUT11/0/1/0	AUT45	OD-13a,b	X	-	-			insulation.
AUT	BFN/AUT11/0/1/0	AUT60	OD-13a,b	X	-	-			
UT	BFNUT35/1/0/1	0	210010	X	-	-			Manual examination performed in areas of automated limitations
UT	BFNUT35/1/0/1	45	230011	X	-	-			to increase coverage.
UT	BFNUT35/1/0/1	45T	230011	X	-	-			
UT	BFNUT35/1/0/1	60	230011	X	-	-			
UT	BFNUT35/1/0/1	60T	230011	X	-	-			

Coverage - 69%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Gladys Cagleden 12-Apr-01

Page 1 of 8

R-131

00162

R-131

00163

SwRI EDAS EXAM AND REVIEW RECORD

Exam No. OD-13A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01 10APR01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N-4-D	Module Config.:	111
Weld Description:	Feedwater NTS @ 210	Scan Path Dwg:	SPN4NTS

Calibration Records:

Channel 1	90011	Channel 5	N/A	Cal. Set No.
Channel 2	90012	Channel 6	N/A	NTS-TWD
Channel 3	90013	Channel 7	N/A	
Channel 4	90014	Channel 8	N/A	

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	4500	4500	Lower Limit	1775	1775
Upper Limit	12500	12500	Upper Limit	3003	3003

Examination Data:

Exam Date:	5-Apr-01		Temperature Start:	88
Start/End Time:	0350	0450	Temperature End:	88

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X 3.5	Channel 3	X 3.5	Channel 5	N/A	Channel 7	N/A
Channel 2	X 3.5	Channel 4	X 3.5	Channel 6	N/A	Channel 8	N/A
0 Deg. TCG On/Off		N/A					

Examination Remarks:

Limited Exam Due to Nozzle Insulation

Signature: [signature] **SNT Level:** III

Archive CD No: _____ **Analysis Tape No:** N/A

Increment Position: **Scan Position:**

Scan No.	Start	Stop	Start	Stop
47-132	4500	12500	1775	3003
N/A	N/A		N/A	
N/A	N/A		N/A	
N/A	N/A		N/A	

Recordable Indications:

	Yes	No		Yes	No
Channel 1		X	Channel 5	N/A	N/A
Channel 2		X	Channel 6	N/A	N/A
Channel 3		X	Channel 7	N/A	N/A
Channel 4		X	Channel 8	N/A	N/A

Analyst(s): [signature] **SNT Level:** III

R-131

SwRI EDAS EXAMINATION PARAMETERS RECORD

Exam No. OD-13A 00164

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/0 1 10Apr2018
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N-4-D	Module Config.:	111
Weld Description:	Feedwater NTS @ 210	Scan Path Dwg:	SPN4NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Automatic Scan
Scan Axis	X Axis	Scan Motion	Bi-Directional
Increment Axis	Y Axis	Correction	Default

Examination Parameters:

Increment Axis/Linear Arm		Scan Axis/Drive Car	
Lower Limit	4500	Lower Limit	1775
Upper Limit	12500	Upper Limit	3003
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units In.	1.00	Conversion Units Deg	1.00
EDAS Radius In.			
Reference Offset In.		Reference Offset Deg	

Module Parameters: 111 NTS-TWD

	Status	Angle	Direction	Scan Offset		Step Offset
Channel 1	On	45	(-)	(-) 0.66		(-) 2.0 Deg.
Channel 2	On	60	(-)	(-) 0.66		(+) 2.0 Deg.
Channel 3	On	0L	(-)	(-) 0.66		0.00
Channel 4	On	0W	(+)	(-) 0.66		0.00
Channel 5	OFF	N/A	N/A	N/A	N/A	N/A
Channel 6	OFF	N/A	N/A	N/A	N/A	N/A
Channel 7	OFF	N/A	N/A	N/A	N/A	N/A
Channel 8	OFF	N/A	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	TWD	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Check for limitations due to insulation panels, brackets, and/or thermocouples.

Device Conversion Counts:

Increment Axis/Linear Arm		Scan Axis/Drive Car	
Counts Per Inch	100.00	Inches Per Degree	0.39
Inches Per Count	0.01	Degrees Per Inch	2.54

R-131

ISwT OD EXAMINATION PARAMETER RECORDS **Exam No. OD-13B** 00165

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01 1 DAPR01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N4D-NTS	Module Config.:	111
Weld Description:	Feedwater NTS @210	Scan Path Dwg:	~~SPN2NTS~~ SPN4NTS LK 4/26/01

Calibration Records:

Channel 1	90011		Channel 5	N/A		Cal. Set No.
Channel 2	90012		Channel 6	N/A		NTS TWD
Channel 3	90013		Channel 7	N/A		
Channel 4	90014		Channel 8	N/A		

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	500	22800	Lower Limit	1775	1775
Upper Limit	36548	30000	Upper Limit	3003	3003

Examination Data:

Exam Date:	5-Apr-01		Temperature Start:	89
Start/End Time:	0545	0605	Temperature End:	89

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X / 3.5	Channel 4	X / 3.5	Channel 7	N/A	
Channel 2	X / 3.5	Channel 5	N/A	Channel 8	N/A	
Channel 3	X / 3.5	Channel 6	N/A	0 Deg. TCG On/Off	ON	

Examination Remarks:

Signature: [signature] / N/A **SNT Level** III / N/A

Archive CD No: _____ **Analysis Tape No:** N/A

Increment Position: **Scan Position:**

Scan No.	Start	Stop			Start	Stop	
240-315	22800	30000			1775	3003	
N					N		
		A				A	

Recordable Indications:

	Yes	No				Yes	No
Channel 1		X			Channel 5	N	
Channel 2		X			Channel 6		
Channel 3		X			Channel 7		
Channel 4		X			Channel 8		A

Analyst(s): [signature] N/A **SNT Level** III / N/A

Page 4 of 8

R-131

ISwT OD EXAMINATION PARAMETERS RECORD

Exam No. OD-13B 00166

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/0 1 10APR01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N4D-NTS	Module Config.:	111
Weld Description:	Feedwater NTS @210 a	Scan Path Dwg:	SPN2NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Automatic Scan
Scan Axis	Y Axis	Scan Motion	Bi-Directional
Increment Axis	X Axis	Correction	Default

Examination Parameters:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Lower Limit	500	Lower Limit	1775
Upper Limit	36548	Upper Limit	3003
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units Deg	1.00	Conversion Units In.	1.00
EDAS Radius			
Reference Offset Deg		Reference Offset In.	

Module Parameters: 111 NTS-TWD

	Status	Angle	Direction	Scan Offset	Step Offset
Channel 1	On	45	(-)	(-) 0.66	(-) 2.0Deg.
Channel 2	On	60	(-)	(-) 0.66	(+) 2.0 Deg
Channel 3	On	0L	(-)	(-) 0.66	0
Channel 4	On	0W	(+)	(-) 0.66	0
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	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	TWD	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Exam Limited Due to Nozzle Insulation.

Device Conversion Counts:

Increment Axis/Drive Car		Scan Axis/Linear Arm	
Inches Per Degree	0.38	Counts Per Inch	100
Degrees Per Inch	2.60	Inches Per Count	0.01

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	06-Apr-01	EXAM STARTED 940 EXAM ENDED 1030	210010

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY		Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @ 210°	N4D	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNES UP	CL	SHELL	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030004	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER:	**SNT LEVEL**						**CROWN WIDTH**			**WELD LENGTH**
Charles Littlefield	II						N/A	N/A	N/A	83.25"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE: Examination performed on outer blend radius, from 0° to 360°, starting at 17.75" from nozzle centerline to end of boss. Also picked up area not covered with automated examination, area 300° cw to 45° to 125° to 230°.
Limited examination at 180°, 27.75" from centerline of weld due to insulation support bracket.

REVIEWED BY	SNT LEVEL	DATE:	PAGE
[signature]	III	8 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 6 of 8

R-131

0016

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 6-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 0940 / EXAM ENDED 1030		SHEET No: 230011
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY Nozzle @ 210-Deg	IDENTIFICATION N4D	Lo LOCATION TDC		Wo LOCATION Centerline of Weld
EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040011 040012		WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II				WELD LENGTH 49"

ANGLE USED	0°	45°	60°	45T°	60T°
SCANNING dB	67.2	84.2	90.0	84.2	90.0

INDICATION NO.	MAX % OF DAC	SEARCH UNIT ANGLE	SEARCH UNIT LOCATION	EXAMINATION SURFACE	EXAMINATION SURFACE TEMPERATURE ° F
N/A	N/A	N/A	N/A	☐ INSIDE ☑ OUTSIDE	BEFORE 88° AFTER: 88°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	
50% L1														EXAMINATION PEFORMED FROM OUTER BLEND RADIUS						
100%L1														FROM 0-DEG TO 360-DEG, STARTING AT 17.75" FROM NOZZLE C/L						
L MAX														TO END OF BOSS.						
100%L2														ALSO PICKED UPAREA NOT COVERED WITH AUTOMATED						
50% L2														EXAMINATION, AREA 300-DEG TO 45-DEG AND 125-DEG						
20% L2														TO 230-DEG.						
L POS														LIMITED EXAMINATION AT 180-DEG, 27.75" FROM C/L, DUE TO						
L POS														INSULATION SUPPORT BRACKET						
L POS																				
L POS																				
L POS																				

REVIEWED BY	SNT LEVEL	DATE:	PAGE
[signature]	II	7 APR 01	1 OF 1

ISwT FORM UT-23 (REV. 07/99)

Page 7 of 8

00168

R-131

Required Volume = 66.78" sq

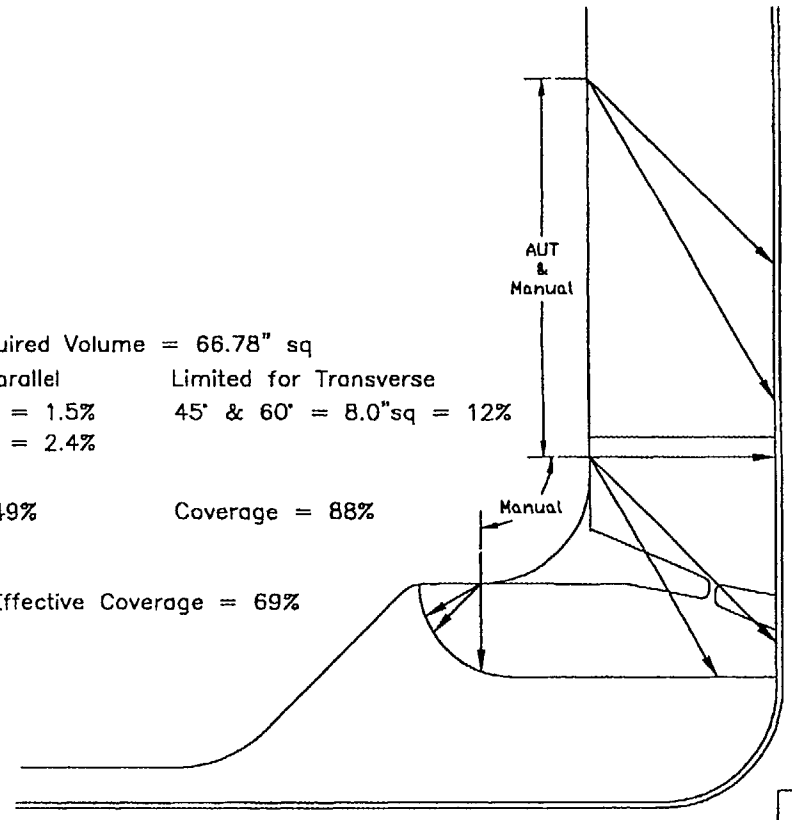
Limited for Parallel
60° = 1.0"sq = 1.5%
45° = 1.6"sq = 2.4%

Limited for Transverse
45° & 60° = 8.0"sq = 12%

Single Sided
Coverage = 49%

Coverage = 88%

Effective Coverage = 69%



Page 8 of 8

R-131

Browns Ferry Unit 2
N4 Nozzle-to-Shell
April 2001
N-4-D & N-4-E

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051

BROWNS FERRY NUCLEAR PLANT, UNIT 2

Summary Sheet No.: 002300

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: FEEDWATER NOZZLE TO SHELL WELD AT 270 DEGREES
IDENTIFICATION: N4E

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Exam/Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
AUT	BFN/AUT11/0/1/0	0	OD-17a,b	X	.	.			Automated examination limited due to nozzle configuration and insulation.
AUT	BFN/AUT11/0/1/0	AUT45	OD-17a,b	X	.	.			
AUT	BFN/AUT11/0/1/0	AUT60	OD-17a,b	X	.	.			
UT	BFNUT35/1/0/1	0	210011	X	.	.			Manual examination performed in areas of automated limitations to increase coverage.
UT	BFNUT35/1/0/1	45	230012	X	.	.			
UT	BFNUT35/1/0/1	45T	230012	X	.	.			
UT	BFNUT35/1/0/1	60	230012	X	.	.			
UT	BFNUT35/1/0/1	60T	230012	X	.	.			

Coverage - 69%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Grady Lagleder 12-Apr-01

Page 1 of 8

R-132
00170

R-132

00171

SwRI EDAS EXAM AND REVIEW RECORD

Exam No. OD-17A

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/0 1 APR 10, '01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N-4-E	Module Config.:	111
Weld Description:	Feedwater NTS @ 270	Scan Path Dwg:	SPN4NTS

Calibration Records:

Channel 1	90011	Channel 5	N/A	Cal. Set No.
Channel 2	90012	Channel 6	N/A	NTS-TWD
Channel 3	90013	Channel 7	N/A	
Channel 4	90014	Channel 8	N/A	

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	4400	4400	Lower Limit	1775	1775
Upper Limit	12700	12700	Upper Limit	3003	3003

Examination Data:

Exam Date:	5-Apr-01		Temperature Start:	88
Start/End Time:	0010	0048	Temperature End:	88

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X 3.5	Channel 3	X 3.5	Channel 5	N/A	Channel 7	N/A
Channel 2	X 3.5	Channel 4	X 3.5	Channel 6	N/A	Channel 8	N/A
0 Deg. TCG On/Off		N/A					

Examination Remarks:

Limited Exam Due to Nozzle Insulation

Signature: _____ **SNT Level:** III

Archive CD No: _____ **Analysis Tape No:** N/A

Increment Position: **Scan Position:**

Scan No.	Start	Stop	Start	Stop
46-134	4400	12700	1775	3003
N/A	N/A		N/A	
N/A	N/A		N/A	
N/A	N/A		N/A	

Recordable Indications:

	Yes	No		Yes	No
Channel 1		X	Channel 5	N/A	N/A
Channel 2		X	Channel 6	N/A	N/A
Channel 3		X	Channel 7	N/A	N/A
Channel 4		X	Channel 8	N/A	N/A

Analyst(s): _____ **SNT Level:** III

R-132

SwRI EDAS EXAMINATION PARAMETERS RECORD

Exam No. OD-17A 0017

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/~~0~~1 10APR01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N-4-E	Module Config.:	111
Weld Description:	Feedwater NTS @ 270	Scan Path Dwg:	SPN4NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Automatic Scan
Scan Axis	X Axis	Scan Motion	Bi-Directional
Increment Axis	Y Axis	Correction	Default

Examination Parameters:

Increment Axis/Linear Arm		Scan Axis/Drive Car	
Lower Limit	4400	Lower Limit	1775
Upper Limit	12700	Upper Limit	3003
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units In.	1.00	Conversion Units Deg	1.00
EDAS Radius In.			
Reference Offset In.		Reference Offset Deg	

Module Parameters: 111 NTS-TWD

	Status	Angle	Direction	Scan Offset		Step Offset
Channel 1	On	45	(-)	(-) 0.66		(-) 2.0 Deg.
Channel 2	On	60	(-)	(-) 0.66		(+) 2.0 Deg.
Channel 3	On	0L	(-)	(-) 0.66		0.00
Channel 4	On	0W	(+)	(-) 0.66		0.00
Channel 5	OFF	N/A	N/A	N/A	N/A	N/A
Channel 6	OFF	N/A	N/A	N/A	N/A	N/A
Channel 7	OFF	N/A	N/A	N/A	N/A	N/A
Channel 8	OFF	N/A	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	TWD	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Check for limitations due to insulation panels, brackets, and/or thermocouples.

Device Conversion Counts:

Increment Axis/Linear Arm		Scan Axis/Drive Car	
Counts Per Inch	100.00	Inches Per Degree	0.39
Inches Per Count	0.01	Degrees Per Inch	2.54

R-132

SwRI EDAS EXAM AND REVIEW RECORD **Exam No. OD-17B** 00173

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/01 IDNR01
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N-4-E	Module Config.:	111
Weld Description:	Feedwater NTS @ 270	Scan Path Dwg:	SPN4NTS

Calibration Records:

Channel 1	90011	Channel 5	N/A	Cal. Set No.
Channel 2	90012	Channel 6	N/A	NTS-TWD
Channel 3	90013	Channel 7	N/A	
Channel 4	90014	Channel 8	N/A	

Examination Parameters:

Increment Axis	Planned	Actual	Scan Axis	Planned	Actual
Lower Limit	500	22400	Lower Limit	1419	1775
Upper Limit	36548	31600	Upper Limit	3003	3003

Examination Data:

Exam Date:	5-Apr-01		Temperature Start:	88
Start/End Time:	0100	0120	Temperature End:	88

Three-View Images Reviewed/Pulser Gain/0 Degree TCG:

Channel 1	X 3.5	Channel 3	X 3.5	Channel 5	N/A	Channel 7	N/A
Channel 2	X 3.5	Channel 4	X 3.5	Channel 6	N/A	Channel 8	N/A
0 Deg. TCG On/Off		N/A					

Examination Remarks:

Limited Exam Due to Nozzle Insulation

Signature: _____ **SNT Level:** III

Archive CD No: _____ **Analysis Tape No:** N/A

Increment Position: Scan No.	Start	Stop	Scan Position: Start	Stop
235-333	22400	31600	1775	3003
N/A	N/A		N/A	
N/A	N/A		N/A	
N/A	N/A		N/A	

Recordable Indications:

	Yes	No		Yes	No
Channel 1		X	Channel 5	N/A	N/A
Channel 2		X	Channel 6	N/A	N/A
Channel 3		X	Channel 7	N/A	N/A
Channel 4		X	Channel 8	N/A	N/A

Analyst(s): _____ **SNT Level:** III

Page 4 of 8

R-132

SwRI EDAS EXAMINATION PARAMETERS RECORD

Exam No. OD-17B 00174

Site/Plant I.D.:	Browns Ferry Unit 2	Pro/Rev/Chg/ICN:	BFN-AUT-11/0/0 1 IDAPRO1
Project No.:	01-0147	Device Config.:	D-BFN2-003
Weld Identification:	N-4-E	Module Config.:	111
Weld Description:	Feedwater NTS @ 270	Scan Path Dwg:	SPN4NTS

Scan Controller Parameters:

Controller	O.D. Dev.	Mode	Automatic Scan
Scan Axis	X Axis	Scan Motion	Bi-Directional
Increment Axis	Y Axis	Correction	Default

Examination Parameters:

Increment Axis/Linear Arm		Scan Axis/Drive Car	
Lower Limit	500	Lower Limit	1419
Upper Limit	36548	Upper Limit	3003
Increment Interval	95	DCI	4
Conversion Counts	100	Conversion Counts	100
Conversion Units In.	1.00	Conversion Units Deg	1.00
EDAS Radius In.			
Reference Offset In.		Reference Offset Deg	

Module Parameters: 111 NTS-TWD

	Status	Angle	Direction	Scan Offset		Step Offset
Channel 1	On	45	(-)	(-) 0.66		(-) 2.0 Deg.
Channel 2	On	60	(-)	(-) 0.66		(+) 2.0 Deg.
Channel 3	On	0L	(-)	(-) 0.66		0.00
Channel 4	On	0W	(+)	(-) 0.66		0.00
Channel 5	OFF	N/A	N/A	N/A	N/A	N/A
Channel 6	OFF	N/A	N/A	N/A	N/A	N/A
Channel 7	OFF	N/A	N/A	N/A	N/A	N/A
Channel 8	OFF	N/A	N/A	N/A	N/A	N/A

Positional Parameters:

Beam Direction:	TWD	X -0- Reference TDC	0.00
Transducer Size	0.75	Y -0- Reference Nozzle C/L	0.00
Code % of Overlap	50		
Number of Scans	380		

Examination Remarks:

Check for limitations due to insulation panels, brackets, and/or thermocouples.

Device Conversion Counts:

Increment Axis/Linear Arm		Scan Axis/Drive Car	
Counts Per Inch	100.00	Inches Per Degree	0.39
Inches Per Count	0.01	Degrees Per Inch	2.54

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	06-Apr-01	EXAM STARTED 1030 EXAM ENDED 1125	210011

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @ 270°	N4E	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNES UP	CL	SHELL	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030004	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 83.25"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE: Examination performed on outer blend radius, from 0° to 360°, starting at 17.75" from nozzle centerline to end of boss. Also picked up area not covered with automated examination, area 300° cw to 45° to 125° to 230°.
Limited examination at 180°, 27.75" from centerline of weld due to insulation support bracket.

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Nestor Alva	III	8 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 6 of 8

00175

R-132

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 6-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 1030 / EXAM ENDED 1125	SHEET No: 230012
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY Nozzle @ 270-Deg	IDENTIFICATION N4E	Lo LOCATION TDC	Wo LOCATION Centerline of Weld
EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040011 040012	WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II			WELD LENGTH 49"
INDICATION NO. N/A	MAX % OF DAC N/A	SEARCH UNIT ANGLE N/A	SEARCH UNIT LOCATION N/A	EXAMINATION SURFACE ☐ INSIDE ☑ OUTSIDE
EXAMINATION SURFACE TEMPERATURE ° F BEFORE 88° AFTER: 88°				

ANGLE USED	0°	45°	60°	45T°	60T°
SCANNING dB	67.2	84.2	90.0	84.2	90.0

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	WA
50% L1														EXAMINATION PEFORMED FROM OUTER BLEND RADIUS						WA
100%L1														FROM 0-DEG TO 360-DEG, STARTING AT 17.75" FROM NOZZLE C/L						WA
L MAX														TO END OF BOSS.						WA
100%L2														ALSO PICKED UPAREA NOT COVERED WITH AUTOMATED						WA
50% L2														EXAMINATION, AREA 300-DEG TO 45-DEG AND 125-DEG						WA
20% L2														TO 230-DEG.						WA
L POS														LIMITED EXAMINATION AT 180-DEG, 27.75" FROM C/L, DUE TO						WA
L POS														INSULATION SUPPORT BRACKET						WA
L POS																				
L POS																				
L POS																				

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Nestor Diaz	II	7 APR 01	1 OF 1

ISwT FORM UT-23 (REV. 07/99)

Page 1 of 8

00175

Required Volume = 66.78" sq

Limited for Parallel

60° = 1.0"sq = 1.5%

45° = 1.6"sq = 2.4%

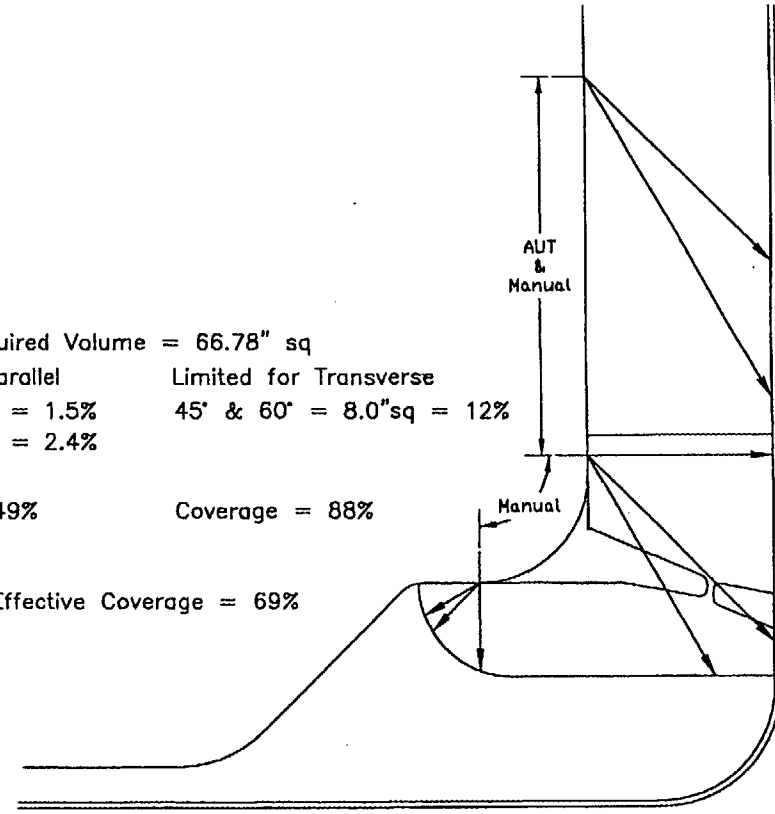
Single Sided Coverage = 49%

Limited for Transverse

45° & 60° = 8.0"sq = 12%

Coverage = 88%

Effective Coverage = 69%



Page 8 of 8

R-132

00177

Browns Ferry Unit 2
N4 Nozzle-to-Shell
April 2001
N-4-D & N-4-E

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051 | BROWNS FERRY NUCLEAR PLANT, UNIT 2 | Summary Sheet No.: 002400

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: JET PUMP INSTRUMENTATION NOZZLE TO SHELL WELD AT 285 DEGREES
IDENTIFICATION: N8B

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
UT	BFNUT35/1/0/1	0	210004	X	·	·			Examination limited due to nozzle configuration.
UT	BFNUT35/1/0/1	45	230007	X	·	·			
UT	BFNUT35/1/0/1	45T	230007	X	·	·			
UT	BFNUT35/1/0/1	60	230007	X	·	·			
UT	BFNUT35/1/0/1	60T	230007	X	·	·			

Coverage - 72%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Grady Cogleden 12-Apr-01

Page 1 of 1

Page 1 of 4

00178

R-133

ISwT LAMINATION EXAMINATION RECORD

PROJECT No.:	SITE:	DATE: (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	3-Apr-01	EXAM STARTED 1340 EXAM ENDED 1515	210004

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	Nozzle @285 deg	N8B	TDC	Weld Centerline

EXAMINER:	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	DOWN	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	030002	N/A	N/A	6.5"	Flush			Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II						CROWN WIDTH N/A	N/A	N/A	WELD LENGTH 25"

IND No	% LOSS OF B.W.	IND AMP % F.S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		

REMARKS / LIMITATIONS, IF NONE SO STATE: Exmination limited due to outer blend radius.
Examination started at 1.5" from nozzle boss.

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Neeta Ling	III	5 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 2 of 4

00179

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 3-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 1025 / EXAM ENDED 1120	SHEET No: 230007
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY Nozzle @ 285 deg	IDENTIFICATION N8B	Lo LOCATION TDC	Wo LOCATION Centerline of Weld
EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040006 040007	WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II			WELD LENGTH 25

ANGLE USED	0°	45°	60°	45T°	60T°
SCANNING dB	67.2	68.6	73.0	68.6	73.0

INDICATION NO.	MAX % OF DAC	SEARCH UNIT ANGLE	SEARCH UNIT LOCATION	EXAMINATION SURFACE	EXAMINATION SURFACE TEMPERATURE ° F
N/A	N/A	N/A	N/A	☐ INSIDE ☑ OUTSIDE	BEFORE: 86° AFTER: 86°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	UA
50% L1																	Exmination limited due to outer blend radius.			UA
100%L1																	Examination started at 1.5" from nozzle boss.			UA
L MAX																				
100%L2																				
50% L2																				
20% L2																				
L POS																				
L POS																				
L POS																				
L POS																				
L POS																				

REVIEWED BY	SNT LEVEL	DATE:	PAGE
Neal Ley	III	5APR01	1 OF 1

ISwT FORM UT-23 (REV. 07/99)

Page 3 of 4

00180

R-133

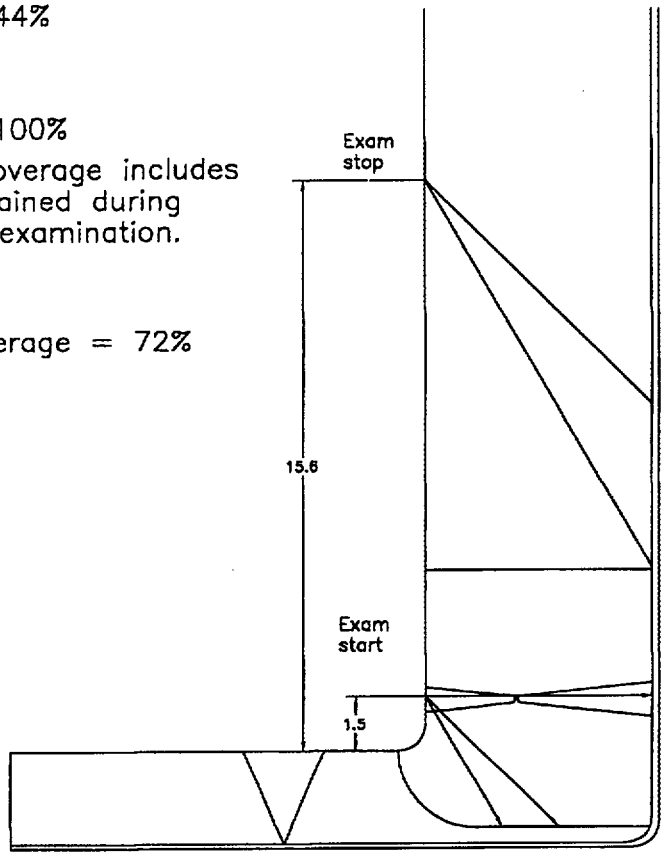
Required Volume = 43.5"sq

45° coverage = 36.5"sq = 84%
60° coverage = 40"sq = 92%

45° & 60° single sided
coverage = 44%

45°T & 60°T
coverage = 100%
Transverse coverage includes coverage obtained during inner radius examination.

Effective coverage = 72%



Browns Ferry Unit 2
N-8 Nozzle-to-Shell
April 2001
N8

ISwT EXAMINATION SUMMARY RECORD

Project No.: 00-051

BROWNS FERRY NUCLEAR PLANT, UNIT 2

Summary Sheet No.: 002500

SITE: BROWNS FERRY NUCLEAR PLANT, UNIT 2
SYSTEM: REACTOR PRESSURE VESSEL
LINE/SUBASSEMBLY: CORE DIFF. PRESS. AND LIQUID CONTROL NOZZLE TO SHELL WELD
IDENTIFICATION: N10

NDE Method	Proc/Rev/Chg/ICN	Exam Angle	Sheet Nos.	NRI	GEOM	OTHER	Resolution Record	CNF Number	Remarks
UT	BFNUT35/1/0/1	0	210003	X	.	.			Examination limited due to nozzle configuration.
UT	BFNUT35/1/0/1	45	230006	X	.	.			
UT	BFNUT35/1/0/1	45T	230006	X	.	.			
UT	BFNUT35/1/0/1	60	230006	X	.	.			
UT	BFNUT35/1/0/1	60T	230006	X	.	.			

Coverage - 56%

****UT CALIBRATION BLOCK(S)****
BF-18

Prepared by: Grady Lagleder 12-Apr-01

Page 64

R-134

00182

ISwT LAMINATION EXAMINATION RECORD

PROJECT No. :	SITE :	DATE : (DAY - MONTH - YEAR)	TIME: (24 HR CLOCK)	SHEET No:
01-147	Browns Ferry Unit 2	3-Apr-01	EXAM STARTED 1015 EXAM ENDED 1120	210003

EXAMINATION AREA (SYST / COMP)	LINE / SUBASSEMBLY	IDENTIFICATION	Lo LOCATION	Wo LOCATION
Reactor Pressure Vessel	N/A	N10	TDC	Weld Centerline

EXAMINER :	SNT LEVEL	PROCEDURE	CALIBRATION SHEET(s)	MEASURED THICKNESS UP	CL	DOWN	CROWN HEIGHT	ATTENUATION UP	DOWN	WELD TYPE (FLOW)
William Angell	II	NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐N/A	030002	N/A	N/A	6.5"	Flush	N/A	N/A	Nozzle to Shell
EXAMINER :	**SNT LEVEL**						**CROWN WIDTH**			**WELD LENGTH**
Charles Littlefield	II						N/A			18.75"

IND No	% LOSS OF B. W.	IND AMP % F. S.	POSITION 1 L1	W1	W2	MP	POSITION L	W1	W2	MP	POSITION L	W1	W2	MP	POSITION 2 L2	W1	W2	MP	SEARCH UNIT LOC	REMARKS	INITIALS
			No Recordable Indications																On Shell		WA

REMARKS / LIMITATIONS, IF NONE SO STATE : Exmination limited due to outer blend radius. WA
Examination started at 1.5" from nozzle boss. WA

REVIEWED BY	SNT LEVEL	DATE :	PAGE
Heath Diz	III	5 APR 01	1 OF 1

ISwT FORM UT-21 (REV. 07/99)

Page 2 of 4

ISwT PRESSURE VESSEL EXAMINATION RECORD

PROJECT No.: 01-0147	SITE: Browns Ferry Unit 2	DATE: (DAY - MONTH - YEAR) 3-Apr-01	TIME: (24 HR CLOCK) EXAM STARTED 1025 / EXAM ENDED 1120	SHEET No: 230006
EXAMINATION AREA (SYST / COMP) Reactor Pressure Vessel	LINE / SUBASSEMBLY N/A	IDENTIFICATION N10	Lo LOCATION TDC	Wo LOCATION Centerline of Weld

EXAMINER: William Angell	SNT LEVEL II	PROCEDURE NO. BFN-UT35 REV 1 CHG 0 ICN 1 ☐ N/A	CALIBRATION SHEET(s) 040006 040007	ANGLE USED	0°	45°	60°	45T°	60T°	WELD TYPE Nozzle to Shell
EXAMINER: Charles Littlefield	SNT LEVEL II			SCANNING dB	67.2	68.6	73.0	68.6	73.0	WELD LENGTH 18.75"

INDICATION NO. N/A	MAX % OF DAC N/A	SEARCH UNIT ANGLE N/A	SEARCH UNIT LOCATION N/A	EXAMINATION SURFACE ☐ INSIDE ☑ OUTSIDE	EXAMINATION SURFACE TEMPERATURE ° F BEFORE 86° AFTER: 86°

L MEASUREMENTS	20% DAC W1	20% DAC MP	50 % DAC W1	50 % DAC MP	100% DAC W1	100% DAC MP	> 100 % 1/2 MAX W1	> 100 % 1/2 MAX MP	W MAX W	W MAX MP	> 100 % 1/2 MAX W2	> 100 % 1/2 MAX MP	100% DAC W2	100% DAC MP	50 % DAC W2	50 % DAC MP	20% DAC W2	20% DAC MP	REMARKS	INITIALS
20% L1					No Recordable Indications														Shell Side, On Weld, CW, CCW	LMA
50% L1																	Exmination limited due to outer blend radius.			LMA
100%L1																	Examination started at 1.5" from nozzle boss.			LMA
L MAX																				
100%L2																				
50% L2																				
20% L2																				
L POS																				
L POS																				
L POS																				
L POS																				
L POS																				

REVIEWED BY Neeta Clay	SNT LEVEL III	DATE: 5 APR 01	PAGE 1 OF 1

ISWT FORM UT-23 (REV. 07/99)

Page 3 of 4

00184

Required Volume = 33"sq

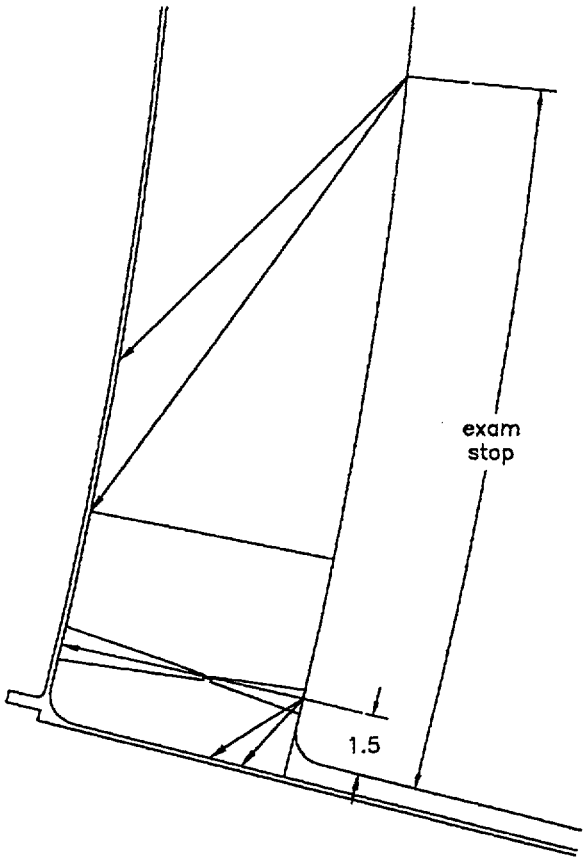
45° coverage = 31"sq = 94%

60° coverage = 31.9"sq = 97%

45° & 60° single sided coverage = 47%

45° & 60° coverage = 21.4"sq = 65%

Effective coverage = 56%



Browns Ferry Unit 2
N-10 Nozzle-to-Shell
April 2001
N10

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-13

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
ASME SECTION XI, INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-13

Executive Summary: Pursuant to 10 CFR 50.55a(g)(5)(iii), relief is requested for the following on the basis that conformance with the Code requirements is impractical.

TVA is requesting relief from inservice inspection requirements of the 1986 Edition, no addenda, of Section XI of the ASME Boiler and Pressure Vessel Code for the volumetric examination of the reactor pressure vessel (RPV) Standby Liquid Control nozzle inside radius section.

The Standby Liquid Control nozzle is designed with an integral socket to which the boron injection piping is welded. The nozzle is located in the bottom head of the reactor pressure vessel in an area that is inaccessible for examination from the inside of the vessel. Therefore, the examinations must be performed from the outside surface of the vessel head. Because of the small diameter of the nozzle (i.e., ~2-inch) and the thickness of the head (i.e., ~6-inches), the ratio of the nozzle diameter to the head thickness make it impractical to perform an examination from the nozzle-to-head radius blend surface. Also, to perform the ultrasonic examination (UT) from the head surface the sound must travel through the full thickness of the head into a complex cladding/socket configuration. Geometric and material reflectors inherent in the design prevent a meaningful examination from being performed on the inside radius section of the nozzle.

A UT examination would result in a hardship and unusual difficulty without a compensating increase in the level of

quality and safety. TVA proposes to perform a visual (VT-2) examination the nozzle area each refueling outage in conjunction with the Class 1 System Leakage Test.

This request for relief is consistent with one submitted by PECO Energy Company for Peach Bottom Atomic Power Station (RR-24) by letter dated August 13, 1998. The request was approved by NRC letter dated July 31, 2000.

Unit: Two (2)

ISI Interval: ASME Section XI, Second Ten-Year ISI Interval (May 24, 1992 to May 24, 2001)

System(s): Standby Liquid Control (SLC)

Components: RPV Nozzle Inside Radius Section

ASME Code Class: ASME Code Class 1

ASME Section XI Code Edition: 1986 Edition, No Addenda

Code Table: IWB-2500-1

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

Examination Item Number: B3.100, Nozzle Inside Radius Section

Code Requirement: The 1986 Edition, no Addenda, ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item B3.100, requires a volumetric examination of the inside radius sections of nozzles in vessels.

Code Requirements From Which Relief Is Requested: Relief is requested from the requirement to perform the volumetric examination of the inside radius section of the ~2-inch diameter Standby Liquid Control nozzle.

List Of Items Associated With The Relief Request:

N10-NV (Standby Liquid Control nozzle inside radius section)

Basis For Relief Request:

The Standby Liquid Control nozzle is designed with an integral socket to which the boron injection piping is welded. The Standby Liquid Control nozzle is located in the bottom head of the reactor pressure vessel in an area that is inaccessible for examination from inside of the vessel. Therefore, the examinations must be performed from the outside surface of the vessel head. Because of the small diameter of the nozzle (i.e., ~2-inches)and the thickness of the head (i.e., ~6-inches), the ratio of the nozzle diameter to the head thickness make it impractical to perform an examination from the nozzle-to-head radius blend surface. Also, to perform the ultrasonic examination from the head surface the sound must travel through the full thickness of the head into a complex cladding/socket configuration. These geometric and material reflectors, inherent in the design, prevent a meaningful examination from being performed on the inside radius section of the nozzle. Additionally, the inside radius section socket is welded to piping which injects boron at locations far removed from the nozzle thus eliminating any thermal stratification possibility at the nozzle inside radius section.

This request for relief is consistent with one submitted by PECO Energy Company for Peach Bottom Atomic Power Station (RR-24) by letter dated August 13, 1998. The request was approved by NRC letter dated July 31, 2000.

Alternate Examination:

A visual (VT-2) examination of the nozzle area will be performed each refueling outage in conjunction with the Class 1 System Leakage Test.

Justification For The Granting Of Relief: The design configuration prevents a meaningful UT examination from being performed on the inside radius section of the Standby Liquid Control nozzle.

Implementation Schedule: This request for relief is applicable to the BFN Unit 2, ASME Section XI, Second Ten-Year Inservice Inspection Interval (May 24, 1992 to May 24, 2001).

Attachment: Sketch SK-B2202

Attachment

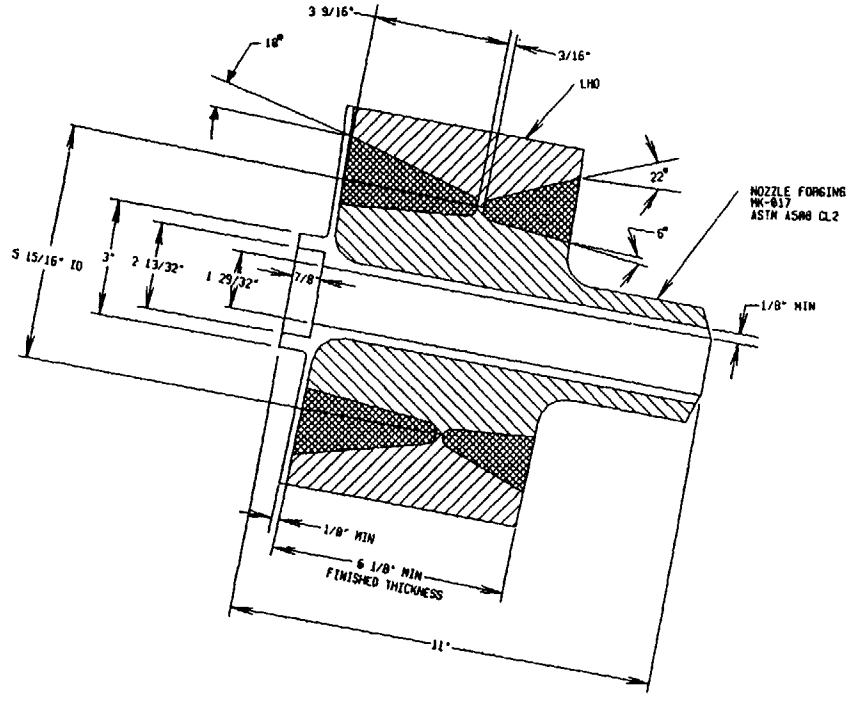
2-ISI-13

One (1) Sketch

SK-B2202

ATTACHMENT

SK-B2022



REFERENCE B&W DRAWING NO. 1220958E-0 (DETAIL 8)
AND NO. 1519863E-0

SKETCH RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	INIT	APPROVED	INIT	PURPOSE
0	9-15-92	N MCLAVERTY	K. TROTTER		R. HOOPER		

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

BE DWG NO.	PROJECT	TITLE	SKETCH NO
A00-5306	BROWNS FERRY 2	WELD DETAIL DIFFERENTIAL PRESSURE AND LIQUID CONTROL NOZZLE N10	SK-B2022

ENCLOSURE 3
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-14

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
AUGMENTED AND ASME SECTION XI, INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-14

Executive Summary: Pursuant to 10 CFR 50.55a(g)(5)(iii) relief is requested for the following on the basis that conformance with the Code requirements is impractical.

TVA is requesting relief from specified inservice inspection requirements in the 1986 Edition, no addenda, Section XI of the ASME Boiler and Pressure Vessel Code for Category B-A, Pressure Retaining Welds in Reactor Vessels (RPV), Item Numbers B1.12, Longitudinal Shell Welds and B1.30, Shell-to-Flange Weld. The requirement is for a volumetric examination of essentially 100 percent of the weld. The configuration of the BFN Unit 2 RPV and vessel internals prevents essentially 100 percent examination coverage of the shell-to-flange course weld (C-5-FLG) and three longitudinal shell welds (V-1-A, V-1-B, and V-1-C). BFN Unit 2 has fifteen longitudinal welds in the RPV shell courses. Three of the fifteen welds did not receive essentially 100 percent coverage because of obstructions from other components. The physical examination limitations occur when the 1986 ASME Section XI Code examination requirements are applied in areas of components constructed and fabricated to early plant designs, which were not required to be "designed for access." The BFN Unit 2 construction permit was issued prior to January 1, 1971, and is therefore exempt from complying with certain provisions of the Code requirements for examination access pursuant to 10 CFR 50.55a(g)(4).

Compliance with the 1986 Edition, no Addenda, of ASME Section XI, is impractical and will result in unusual difficulty and unnecessary radiation exposure to examination personnel

without any compensating increase in the level of quality or safety.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the four welds described above.

Unit: Two (2)

ISI Interval: ASME Section XI, Second Ten-Year ISI Interval (May 24, 1992 to May 24, 2001)

System(s): Reactor Pressure Vessel (RPV)

Components: 3 RPV Longitudinal Welds and One RPV Shell-to-Flange Weld

ASME Code Class: ASME Code Class 1

ASME Section XI Code Edition: 1986 Edition, no Addenda

Code Table: IWB-2500-1

Examination Category: B-A, Pressure Retaining Welds in Reactor Vessels.

Examination Item Number: B1.12 Longitudinal Shell Welds and, B1.30 Shell-to-Flange Weld

Code Requirement: The 1986 Edition, no Addenda, ASME Section XI, Table IWB-2500-1, Examination Category B-A, Item Numbers B1.12 and B1.30 require a volumetric examination of essentially 100 percent of the weld.

Code Requirements From Which Relief Is Requested: Relief is requested from the requirement to perform a volumetric examination of essentially 100 percent of the three RPV longitudinal shell welds and one RPV shell-to-flange weld.

List Of Items Associated With The Relief Request: RPV Longitudinal Shell Welds, V-1-A, V-1-B, V-1-C, and RPV Shell to Flange Weld, C-5-FLG

Basis For Relief Request:

Areas of the C-5-FLG, V-1-A, V-1-B, and V-1-C welds are inaccessible for UT examination due to the design configuration of the RPV and vessel internals. The examinations were performed with automated ultrasonic equipment from the vessel inside surface utilizing the Advanced Inservice Reactor Inspection System 21 device, (AIRIS 21) and Enhanced Data Acquisition System-II equipment (EDAS™-II). The C-5-FLG weld scan limitations were due to a taper at the weld, and obstructions by the guide rods and steam nozzle plugs. The V-1-A, V-1-B, and V-1-C RPV longitudinal shell weld scans were obstructed by the jet pump restrainer bracket and jet pump diffuser.

Alternative Examination:

None. In lieu of the Code required essentially 100 percent volume ultrasonic examination, TVA proposes an ultrasonic examination of accessible areas to the maximum extent practical given the component design, and configuration of the subject welds.

Justification for The Granting of Relief:

The configuration of BFN Unit 2 RPV and vessel internals prevents essentially 100 percent examination coverage of the shell-to-flange weld (C-5-FLG) and three RPV longitudinal shell welds (V-1-A, V-1-B, and V-1-C). The examinations were performed with automated ultrasonic equipment from the vessel inside surface utilizing the Advanced Inservice Reactor Inspection System 21 (AIRIS 21) device, and Enhanced Data Acquisition System-II (EDAS™-II) equipment. To increase the examination coverage of the shell-to-flange weld, manual UT examinations were performed on the outside surfaces of the RPV in areas of non-coverage from the inside surface examination. The manual examination also encountered scan limitations due to the flange configuration. The total coverage obtained for the C-5-FLG weld was 76.6 percent.

BFN Unit 2 has fifteen longitudinal welds in the RPV shell courses. Twelve of these welds received essentially 100 percent coverage.

Three of the fifteen welds did not receive essentially 100 percent coverage due to obstructions from the vessel internal components. The V-1-A, V-1-B, and V-1-C longitudinal shell weld scans were obstructed by the jet pump restrainer bracket and jet pump diffuser and received 76, 74, and 80 percent coverage respectively. The outside surfaces of these three welds were inaccessible due to the bio-shield concrete wall.

The UT examinations of the shell-to-flange course and longitudinal shell welds were performed to the maximum extent practical for maximum coverage. The UT examinations of both the shell-to-flange course and longitudinal shell welds were performed with equipment, personnel, and procedures qualified to the PDI Program.

Because BFN construction permit was issued prior to January 1, 1971, BFN is exempt from complying with certain provisions of the Code requirements for examination access as granted by 10 CFR 50.55a(g)(4).

Compliance with the 1986 Edition, no Addenda, ASME Section XI is not practical and will result in unusual difficulty and unnecessary radiation exposure to examination personnel without any compensating increase in the level of quality or safety. TVA considers that the obtained coverage to the maximum extent practical will provide an acceptable level of quality and safety.

Implementation Schedule:

This request for relief is applicable to the BFN Unit 2, ASME Section XI, Second Ten-Year Inservice Inspection Interval (May 24, 1992 to May 24, 2001).

Attachment:

Sketches

2-CHM-2046-C, Sheet 1
2-CHM-2046-C, Sheet 2

Attachment

2-ISI-14

Two (2) Sketches

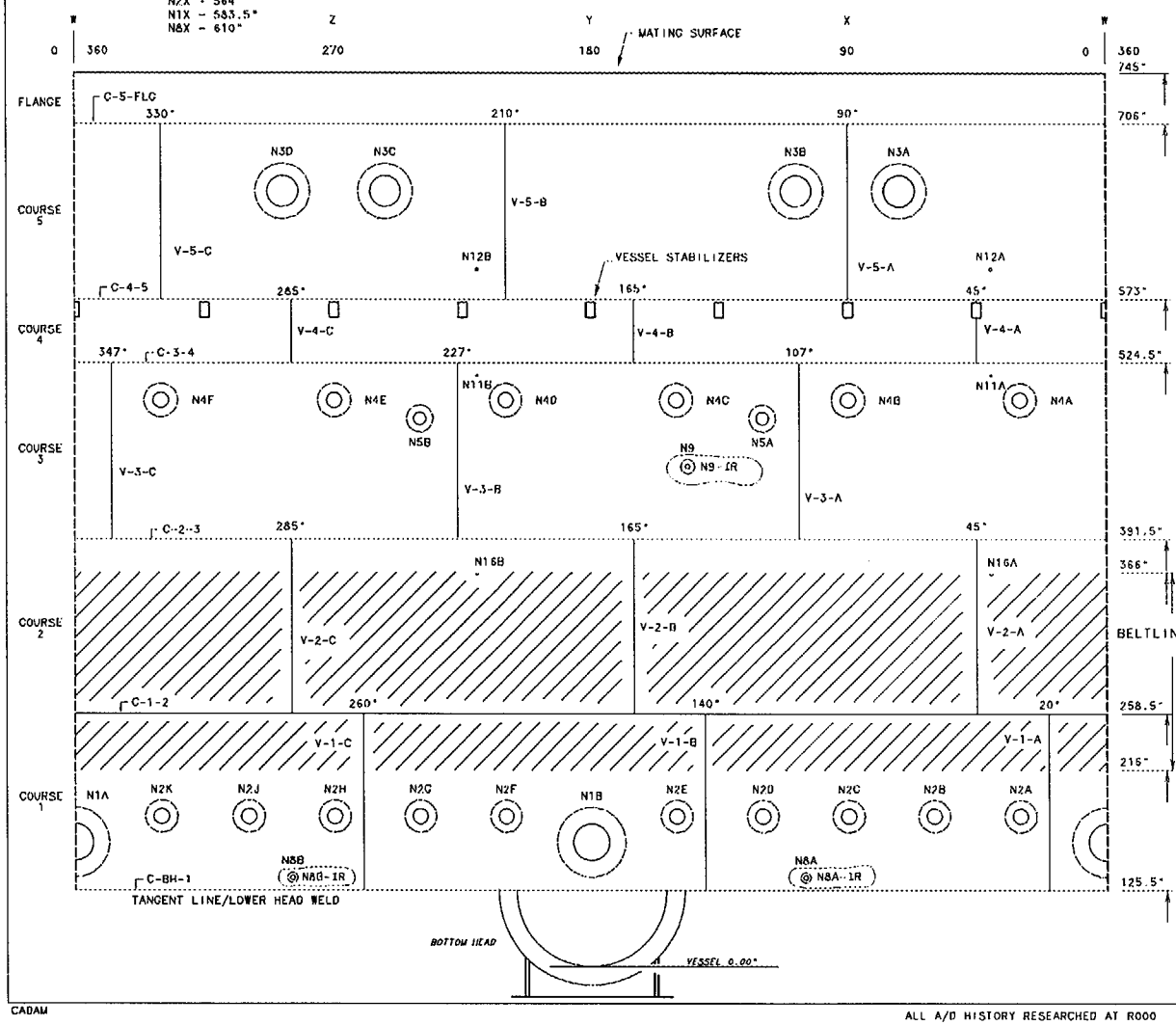
2-CHM-2046-C, Sheet 1
2-CHM-2046-C, Sheet 2

NOZZLE GROUP	DISTANCE TO MATING SURFACE
N3X	86.5"
N12X	146"
N11X	226"
N4X	246.5"
N5X	259.5"
N9	296.5"
N16X	379"
N2X	564"
N1X	583.5"
N8X	610"

REFERENCE DRAWINGS (GE)
SKETCHES - RPV EXAMINATION PLAN (GE)
SK-B2001 SK-B2005 SK-B2010
SK-B2003 SK-B2007
SK-B2004 SK-B2008

LEGEND
O VESSEL NOZZLE
◎ FULL PENETRATION NOZZLE WELD

ASME CC-1 (EQUIVALENT)



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

BELTLINE REGION

002	ADMIN		RDL		N/A		N/A	N/A	
	REVISED PER RIMS MEMO R14 970205 302								
REV	CHANGE REF	DATE	DFTR	CHKR	DSGN	RVWR	APPD	APPD	APPD	ISSR

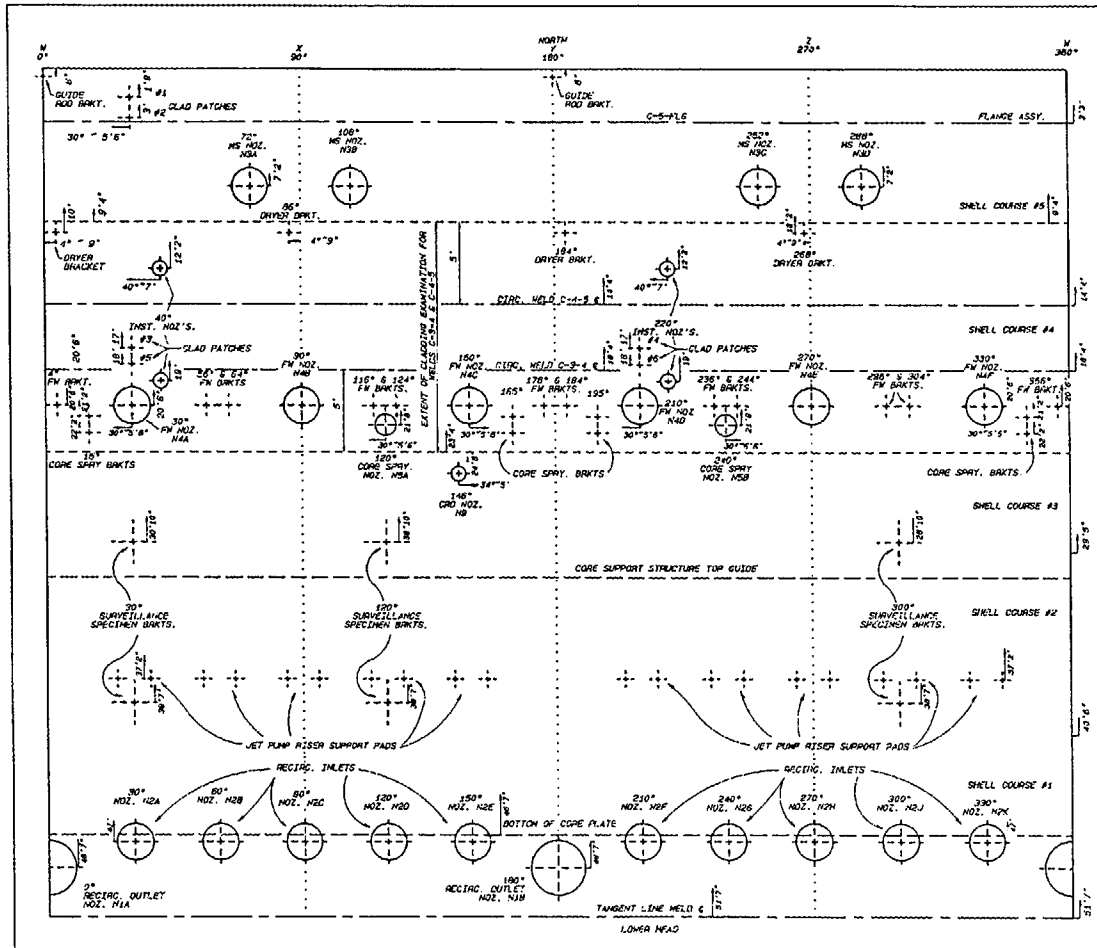
TENNESSEE VALLEY AUTHORITY

S BROWNS FERRY NUCLEAR PLANT
UNIT 2
REACTOR PRESSURE VESSEL (RPV)
SHELL COURSE WELD/NOZZLE LOCATIONS (OUTSIDE VIEW)

DRAWN: N/A	DATE: N/A	SCALE: NTS	CADAM/15:CMP
CHECKED: N/A	APPROVED: GLB	SHEET 01 OF 02	REV
SUBMITTED: N/A		2-CHM-2046-C	002
		CCD	

CADAM

ALL A/D HISTORY RESEARCHED AT R000



REFERENCE DRAWINGS
500733-001C (MIRROR INSULATION)
24187-F (B&W)
122856E

NOTES:
1. FOUR (4) STEAM DRYER HOLDDOWN BRACKETS (NOT SHOWN) ARE LOCATED IN THE VESSEL CLOSURE HEAD 10" UP FROM THE FLANGE. THESE ARE AT AZIMUTH LOCATIONS 41°, 139°, 221°, AND 319°.
2. CODE CATEGORY B-N-1
RPV INTERIOR
CODE CATEGORY B-N-2
RPV-INT ATT BLR①
RPV-INT ATT NBLR②
RPV-CORE SUPPORT
① INTEGRAL ATTACHMENT BELTLINE REGION
② INTEGRAL ATTACHMENT NON BELTLINE REGION

REV	CHANGE NO.	DATE	DRN	DSGN	CHKD	APPD	APPD	APPD	PCAD
000	33 ADMIN		RJ		N/A		N/A	N/A	

S TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT
UNIT 2
REACTOR VESSEL WELD AND NOZZLE LOCATIONS (INTERIOR WALL)

DRAWN: PMB	SUBMITTED:	APPROVED:	SCALE: NTS
DATE: 7-25-88	DATE: 9-23-88	DATE: 9-23-88	SHEET 02 OF 02 SHEET (s)
CHECKED: VSS	EDC	GLB	DRAWING NO. 2-CHM-2046-C REV 000
DATE: 9-23-88			

CCD

PCADAM

ALL A/D HISTORY RESEARCHED AT R000

2-CHM-2046-C, Sheet 2

ENCLOSURE 4

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI
INSERVICE INSPECTION (ISI) PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-15

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
ASME SECTION XI, INSERVICE INSPECTION PROGRAM
(SECOND TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-15

Executive Summary: Pursuant to 10 CFR 50.55a(g)(5)(iii) relief is requested for the following on the basis that conformance with the Code requirements is impractical.

This request for relief addresses seven Reactor Recirculation System and two Residual Heat Removal (RHR) System full penetration piping welds examined in Cycle 11. The subject welds were examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program.

An ultrasonic examination was performed on these piping welds of the accessible areas to the maximum extent practical due to the configuration. The one sided only ultrasonic examination provided 50 percent coverage because of a requirement mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2), which states, "where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaws on the opposite side of the weld." At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI Code requirements, UT coverage obtained was essentially 100 percent.

The performance of the ultrasonic examination of the subject areas, to the maximum extent practical, provides an acceptable level of quality and safety because the information and data obtained from the volume examined provides sufficient information to evaluate the overall integrity of the piping welds.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the Second Ten-Year Inspection Interval for the nine welds described above.

This request for relief also addresses one Reactor Recirculation System and one Residual Heat Removal System Full Penetration Piping Weld examined during Cycle 10. These welds were examined in April 1999, utilizing NDE methods and techniques to the requirements of ASME Section XI Code, 1989 Edition, no Addenda, prior to the Performance Demonstration Initiative (PDI) Program requirements being mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2).

The performance of the ultrasonic examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety because the information and data obtained from the volume examined provides sufficient information to evaluate the overall integrity of the piping welds.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the BFN Unit 2, ASME Section XI, Second Ten-Year Inspection Interval.

Unit: Two (2)

ISI Interval: ASME Section XI, Second Ten-Year ISI Interval (May 24, 1992 to May 24, 2001)

System(s): Reactor Recirculation System (RECIRC) and, Residual Heat Removal System (RHR)

Components: 11 Full Penetration Piping Welds (nine welds examined in Cycle 11 and 2 welds examined in Cycle 10)

ASME Code Class: ASME Code Class 1 and 2 (Equivalent)

ASME Section XI Code Edition: 1986 Edition, no Addenda

Code Table: Code Case N-577, N-577-2500, Table I

Examination Category: R-A, Risk-Informed Piping Examinations

Examination Item Number: R1.16, "Elements Subject to Intergranular Stress Corrosion Cracking (IGSCC)"

Code Requirement: Code Case N-577, N-577-2500, Table I, Examination Category R1.16, requires volumetric examination of 100 percent of the weld and adjacent base material as shown in Figure IWB-2500-8(c).

Code Requirement From Which Relief Is Requested: Relief is requested from the Risk-Informed Inservice Inspection Program, Code Case N-577 requirement (Table I N-577-2500) Examination Category R-A, Item No. R1.16) to perform essentially 100 percent volumetric examination of weld and adjacent base material.

List Of Items Associated With The Relief Request:

GR-2-09 - Sweep-O-Let to Pipe
GR-2-12 - Sweep-O-Let to Pipe
GR-2-15(OL) - Reducer to Pipe
GR-2-18 - Pipe to Cross Tee
GR-2-19 - Sweep-O-Let to Pipe
GR-2-22 - Sweep-O-Let to Pipe
GR-2-35 - Sweep-O-Let to Pipe
GR-2-48 - Sweep-O-Let to Pipe
DRHR-2-03 - Flued Head to Valve
DRHR-2-09 - Pipe to Tee
DRHR-2-22 - Valve to Pipe

Basis for Relief: For nine of the welds above (excluding GR-2-15(OL) and DRHR-2-03) it is not possible to perform the volumetric ultrasonic examination from both sides of the weld due to the configuration of these components. And, because of the requirement mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2), which states, "where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaws on the opposite side of the weld." At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent examination coverage can be claimed.

However, under the ASME Section XI Code requirements, UT coverage obtained was essentially 100 percent.

Attached is a detailed description of the limitations for each weld in Table 1. Welds GR-2-15(OL) and DRHR-2-03 were examined in April 1999, prior to the Performance Demonstration Initiative (PDI) Program requirements being mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2), utilizing NDE methods and techniques to the requirements of ASME Section XI Code, 1989 Edition, no Addenda,

Weld GR-2-15(OL) examination limitations were due to the component configuration, reducer to pipe, and the fact that the weld was overlayed and the overlay weld extended on to the reducer. One hundred percent Code coverage could not be achieved

Weld DRHR-2-03 examination limitations were due the configuration of the components, valve to flued head. Due to the limited scan surfaces on both sides of the weld, only 85 percent Code coverage was obtained.

The performance of the ultrasonic examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety because the information and data obtained from the volume examined provides sufficient information to evaluate the overall integrity of the piping welds. Attached is a detailed description of the limitations for each weld in Table 1.

Alternative Examination:

None. In lieu of the Code required essentially 100 percent volume ultrasonic examination, TVA proposes an ultrasonic examination of accessible areas to the maximum extent practical given the component design and configuration of the aforementioned piping welds.

Justification For The Granting of Relief:

The nine welds scheduled for examination in Cycle 11 were examined with the latest ultrasonic techniques, procedures, equipment,

and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program.

An ultrasonic examination was performed on these piping welds of the accessible areas to the maximum extent practical due to the configuration. Credit for the one side only ultrasonic examination provides 50 percent coverage because of a requirement mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2), which states, "where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single sided Appendix VIII demonstration using flaws on the opposite side of the weld." At the time of the examination there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI Code requirements, UT coverage obtained was essentially 100 percent.

The two welds scheduled for Cycle 10 were examined in April 1999, utilizing NDE methods and techniques to the requirements of ASME Section XI Code, 1989 Edition, no Addenda, prior to the Performance Demonstration Initiative (PDI) Program requirements required by 10 CFR 50.55a(b)(2)(xv)(A)(2).

Weld GR-2-15(OL) limitations were due to the component configuration, reducer to pipe and the fact that the weld was overlayed and the overlay weld extended on to the reducer. One hundred percent Code coverage could not be achieved

Weld DRHR-2-03 limitations were due the configuration of the components, valve to flued head. Due to the limited scan surfaces on both sides of the weld, only 85 percent coverage was obtained.

The performance of the ultrasonic examination of the subject areas to the maximum extent practical provides an acceptable level of quality and safety because the information and data obtained from the volume examined provides sufficient information to evaluate the overall integrity of the piping welds.

Therefore pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the nine welds described above.

Implementation Schedule:

This request for relief is applicable to the BFN Unit 2, ASME Section XI, Second Ten-Year Inservice Inspection Interval (May 24, 1992 to May 24, 2001).

Attachments:

Attachment A

(Sketches)

2-ISI-0221-C, Sheet 2
2-ISI-0270-C, Sheet 1
2-ISI-0270-C, Sheet 2

Attachment B

(NDE Reports)

TABLE 1

WELD NUMBER	NPS	ISI DRAWING	PERCENT Coverage	REMARKS
GR-2-09	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
GR-2-12	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
GR-2-15(OL)	12"	2-ISI-0270-C	80	Limitations due to component configuration, reducer-to-pipe, also, the overlay weld is welded onto the reducer. Cannot obtain 100 percent UT Code coverage. This weld was examined in Cycle 10 (April 1999) to the requirements of the ASME Section XI Code, 1989 Edition, No Addenda, prior to the Performance Demonstration Initiative (PDI) Program requirements and the mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2).
GR-2-18	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.

WELD NUMBER	NPS	ISI DRAWING	PERCENT COVERAGE	REMARKS
GR-2-19	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
GR-2-22	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
GR-2-35	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
GR-2-48	12"	2-ISI-0270-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
DRHR-2-03	24"	2-ISI-0221-C	85	Limitations due to component configuration, flued head to valve 2-FCV-074-53 cannot obtain 100 percent UT Code coverage. This weld was examined in Cycle 10 (April 1999) to the requirements of ASME Section XI Code, 1989 Edition, No Addenda, prior to the Performance Demonstration Initiative (PDI) Program requirements mandated by 10 CFR 50.55a(b)(2)(xv)(A)(2).

WELD NUMBER	NPS	ISI DRAWING	PERCENT COVERAGE	REMARKS
DRHR-2-09	24″	2-ISI-0221-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed. However, under the ASME Section XI requirements, essentially 100 percent coverage was obtained.
DRHR-2-22	20"	2-ISI-0221-C	50	Limitations due to component configuration and the requirements in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to the Appendix VIII Program to claim full Code coverage. At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Therefore, only 50 percent coverage can be claimed.

Attachment A

2-ISI-15

Three (3) Sketches

2-ISI-0221-C, Sheet 1
2-ISI-0270-C, Sheet 1
2-ISI-0270-C, Sheet 2

ATTACHMENT A

2-ISI-0221-C, Sheet 1

NOTE:

1. 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°)

2. PIPE SEGMENTS CONTAINING ONLY ONE LONGITUDINAL SEAM WILL BE IDENTIFIED AS:

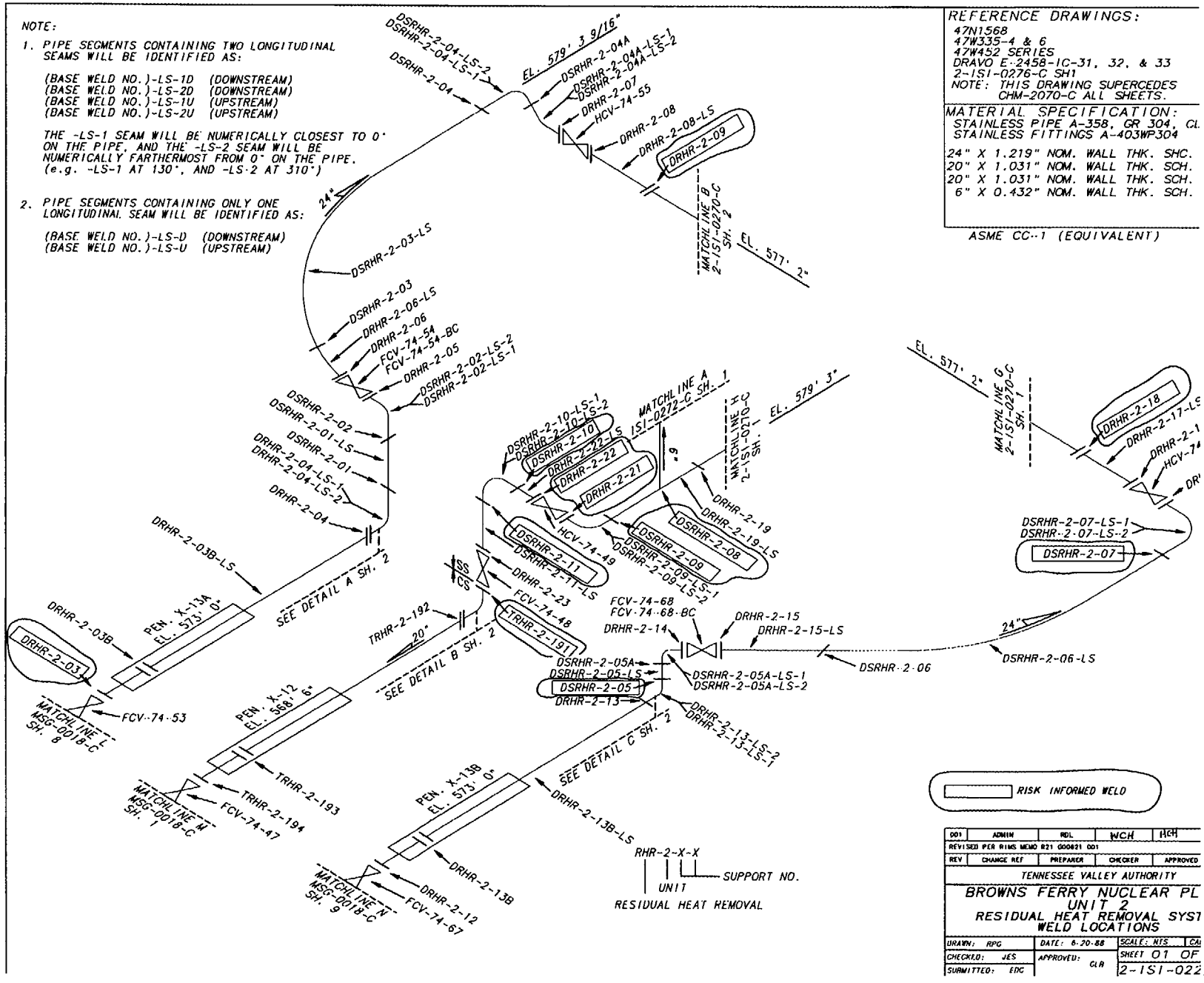
   (BASE WELD NO.)-LS-D (DOWNSTREAM)
   (BASE WELD NO.)-LS-U (UPSTREAM)

REFERENCE DRAWINGS:
47N1568
47W335-4 & 6
47W452 SERIES
DRAVO E-2458-IC-31, 32, & 33
2-ISI-0276-C SH1
NOTE: THIS DRAWING SUPERCEDES CHM-2070-C ALL SHEETS.

MATERIAL SPECIFICATION:
STAINLESS PIPE A-358, GR 304, CL.
STAINLESS FITTINGS A-403WP304

24" X 1.219" NOM. WALL THK. SHC.
20" X 1.031" NOM. WALL THK. SCH.
20" X 1.031" NOM. WALL THK. SCH.
6" X 0.432" NOM. WALL THK. SCH.

ASME CC-1 (EQUIVALENT)

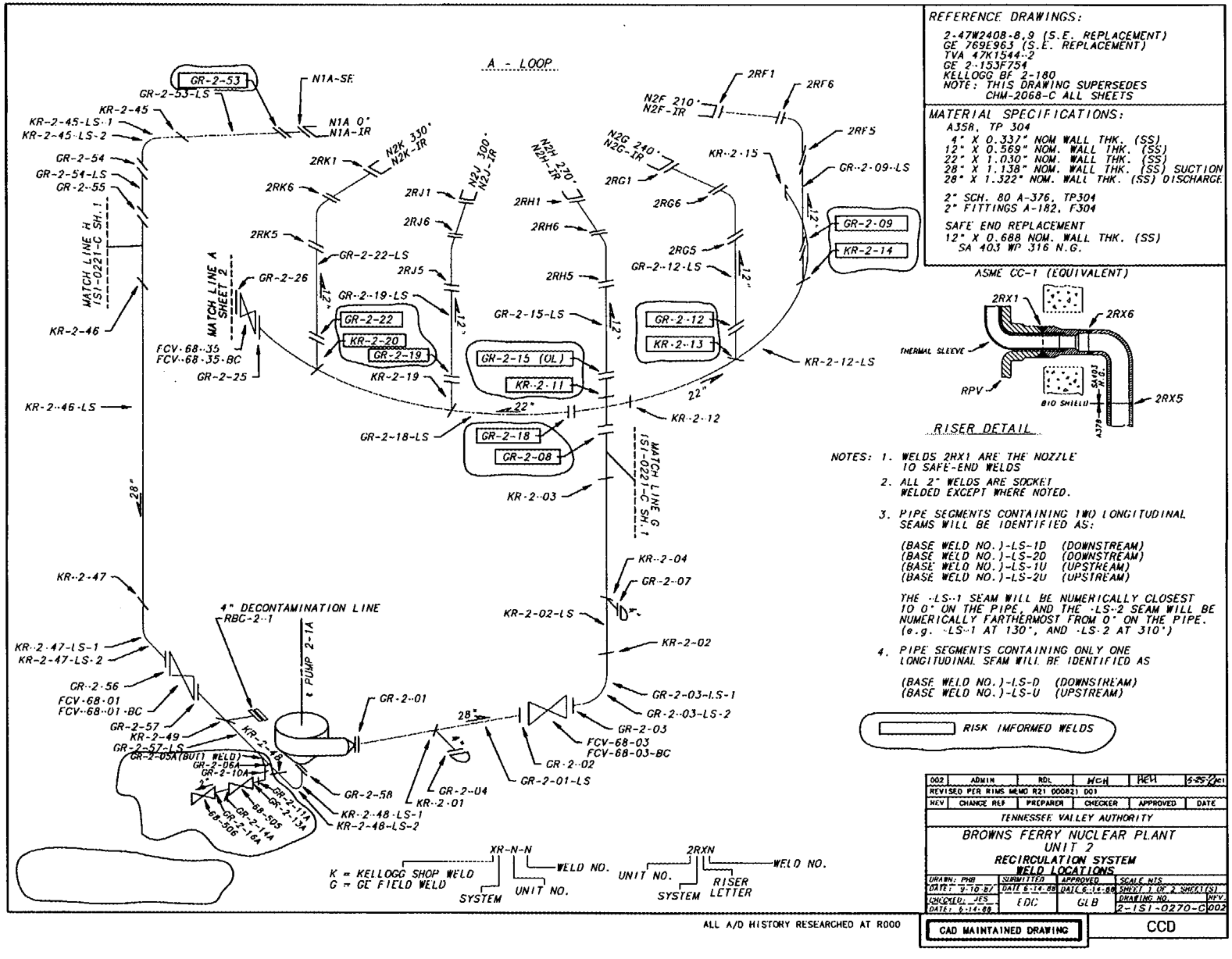


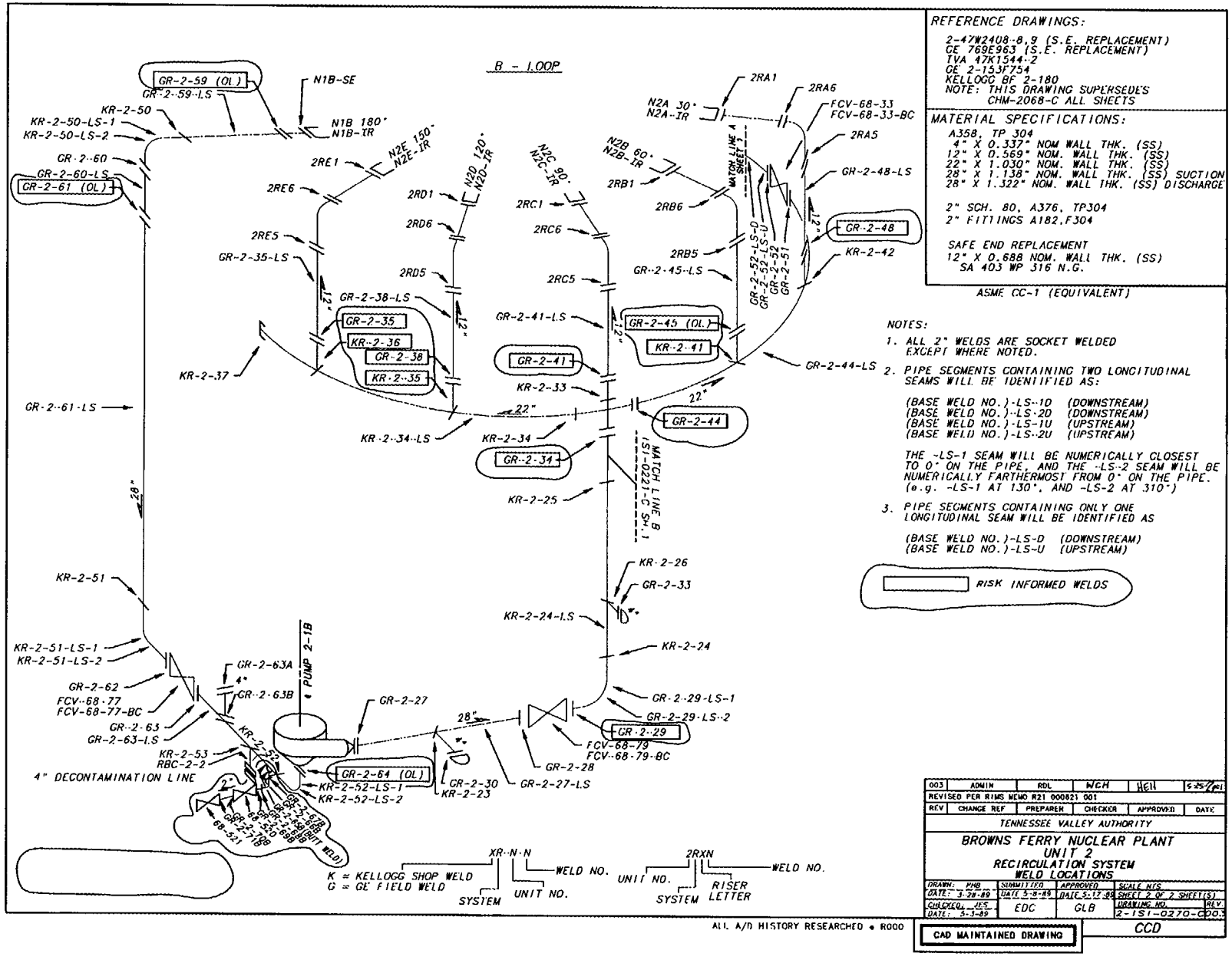
001	ADMIN	RDL	WCH	HCH
REVISED PER RIMS MEMO R21 000821 001				
REV	CHANGE REF	PREPARER	CHECKER	APPROVED

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PL
UNIT 2
RESIDUAL HEAT REMOVAL SYST
WELD LOCATIONS

DRAWN: RPG	DATE: 6-20-88	SCALE: NTS	CA
CHECKED: JES	APPROVED: CLR	SHEET 01 OF	
SUBMITTED: EDC		2-ISI-022	1


A - LOOP
REFERENCE DRAWINGS:
2-47W2408-8,9 (S.E. REPLACEMENT)
GE 769E963 (S.E. REPLACEMENT)
TVA 47K1544-2
GE 2-153F754
KELLOGG BF 2-180
NOTE: THIS DRAWING SUPERSEDES CHM-2068-C ALL SHEETS
MATERIAL SPECIFICATIONS:
A358, TP 304
4" X 0.337" NOM WALL THK. (SS)
12" X 0.569" NOM. WALL THK. (SS)
22" X 1.030" NOM. WALL THK. (SS)
28" X 1.138" NOM. WALL THK. (SS) SUCTION
28" X 1.322" NOM. WALL THK. (SS) DISCHARGE
2" SCH. 80 A-376, TP304
2" FITTINGS A-182, F304
SAFE END REPLACEMENT
12" X 0.688 NOM. WALL THK. (SS)
SA 403 WP 316 N.G.
ASME CC-1 (EQUIVALENT)
RISER DETAIL
NOTES: 1. WELDS 2RX1 ARE THE NOZZLE TO SAFE-END WELDS
2. ALL 2" WELDS ARE SOCKET WELDED EXCEPT WHERE NOTED.
3. 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°)
4. PIPE SEGMENTS CONTAINING ONLY ONE LONGITUDINAL SEAM WILL BE IDENTIFIED AS
(BASE WELD NO.)-LS-D (DOWNSTREAM)
(BASE WELD NO.)-LS-U (UPSTREAM)
RISK INFORMED WELDS
K = KELLOGG SHOP WELD
G = GE FIELD WELD
XR-N-N
SYSTEM
UNIT NO.
WELD NO.
2RXN
UNIT NO.
SYSTEM
RISER LETTER
WELD NO.
ALL A/D HISTORY RESEARCHED AT R000
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT
UNIT 2
RECIRCULATION SYSTEM
WELD LOCATIONS
CAD MAINTAINED DRAWING
CCD
2-1S1-0270-C
002


B - LOOP
REFERENCE DRAWINGS:
2-47W2408-8,9 (S.E. REPLACEMENT)
GE 769E963 (S.E. REPLACEMENT)
TVA 47K1544-2
GE 2-153F754
KELLOGG BF 2-180
NOTE: THIS DRAWING SUPERSEDES CHM-2068-C ALL SHEETS
MATERIAL SPECIFICATIONS:
A358, TP 304
4" X 0.337" NOM WALL THK. (SS)
12" X 0.569" NOM. WALL THK. (SS)
22" X 1.030" NOM. WALL THK. (SS)
28" X 1.138" NOM. WALL THK. (SS) SUCTION
28" X 1.322" NOM. WALL THK. (SS) DISCHARGE
2" SCH. 80, A376, TP304
2" FITTINGS A182,F304
SAFE END REPLACEMENT
12" X 0.688 NOM. WALL THK. (SS)
SA 403 WP 316 N.G.
ASME CC-1 (EQUIVALENT)
NOTES:
1. ALL 2" WELDS ARE SOCKET WELDED EXCEPT WHERE NOTED.
2. 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°)
3. PIPE SEGMENTS CONTAINING ONLY ONE LONGITUDINAL SEAM WILL BE IDENTIFIED AS
(BASE WELD NO.)-LS-D (DOWNSTREAM)
(BASE WELD NO.)-LS-U (UPSTREAM)
RISK INFORMED WELDS
GR-2-59 (OL)
GR-2-59-LS
N1B-SE
N1B 180°
N1B-IR
KR-2-50
KR-2-50-LS-1
KR-2-50-LS-2
GR-2-60
GR-2-60-LS
GR-2-61 (OL)
2RE1
N2E 150°
N2E-IR
2RE6
2RE5
GR-2-35-LS
2RD1
N2D 120°
N2D-IR
2RD6
2RD5
GR-2-38-LS
GR-2-35
KR-2-36
GR-2-38
KR-2-35
KR-2-37
GR-2-61-LS
KR-2-34-LS
2RC1
N2C 90°
N2C-IR
2RC6
2RC5
GR-2-41-LS
GR-2-41
KR-2-33
KR-2-34
GR-2-34
KR-2-25
MATCH LINE B ISI-0221-C SH. 1
N2B 60°
N2B-IR
2RB1
2RB6
2RB5
GR-2-45-LS
GR-2-45 (OL)
KR-2-41
GR-2-44
GR-2-44-LS
2RA1
N2A 30°
N2A-IR
2RA6
FCV-68-33
FCV-68-33-BC
2RA5
GR-2-48-LS
GR-2-48
KR-2-42
MATCH LINE A SHEET 3
GR-2-52-LS-D
GR-2-52-LS-U
GR-2-52
GR-2-51
KR-2-26
GR-2-33
KR-2-24-LS
KR-2-24
GR-2-29-LS-1
GR-2-29-LS-2
GR-2-29
FCV-68-79
FCV-68-79-BC
GR-2-28
GR-2-27-LS
GR-2-30
KR-2-23
GR-2-27
28"
22"
12"
4"
2"
KR-2-51
KR-2-51-LS-1
KR-2-51-LS-2
GR-2-62
FCV-68-77
FCV-68-77-BC
GR-2-63
GR-2-63-LS
GR-2-63A
GR-2-63B
PUMP 2-1B
KR-2-53
RBC-2-2
4" DECONTAMINATION LINE
GR-2-64 (OL)
KR-2-52-LS-1
KR-2-52-LS-2
GR-2-63B
GR-2-63A
GR-2-64
GR-2-64B
GR-2-64A
GR-2-64C
GR-2-64D
GR-2-64E
GR-2-64F
GR-2-64G
GR-2-64H
GR-2-64I
GR-2-64J
GR-2-64K
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GR-2-64AI
GR-2-64AJ
GR-2-64AK
GR-2-64AL
GR-2-64AM
GR-2-64AN
GR-2-64AO
GR-2-64AP
GR-2-64AQ
GR-2-64AR
GR-2-64AS
GR-2-64AT
GR-2-64AU
GR-2-64AV
GR-2-64AW
GR-2-64AX
GR-2-64AY
GR-2-64AZ
GR-2-64BA
GR-2-64BB
GR-2-64BC
GR-2-64BD
GR-2-64BE
GR-2-64BF
GR-2-64BG
GR-2-64BH
GR-2-64BI
GR-2-64BJ
GR-2-64BK
GR-2-64BL
GR-2-64BM
GR-2-64BN
GR-2-64BO
GR-2-64BP
GR-2-64BQ
GR-2-64BR
GR-2-64BS
GR-2-64BT
GR-2-64BU
GR-2-64BV
GR-2-64BW
GR-2-64BX
GR-2-64BY
GR-2-64BZ
GR-2-64CA
GR-2-64CB
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GR-2-64CD
GR-2-64CE
GR-2-64CF
GR-2-64CG
GR-2-64CH
GR-2-64CI
GR-2-64CJ
GR-2-64CK
GR-2-64CL
GR-2-64CM
GR-2-64CN
GR-2-64CO
GR-2-64CP
GR-2-64CQ
GR-2-64CR
GR-2-64CS
GR-2-64CT
GR-2-64CU
GR-2-64CV
GR-2-64CW
GR-2-64CX
GR-2-64CY
GR-2-64CZ
GR-2-64DA
GR-2-64DB
GR-2-64DC
GR-2-64DD
GR-2-64DE
GR-2-64DF
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GR-2-64DJ
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GR-2-64PX
GR-2-64PY
GR-2-64PZ
GR-2-64QA
GR-2-64QB
GR-2-64QC
GR-2-64QD
GR-2-64QE
GR-2-64QF
GR-2-64QG
GR-2-64QH
GR-2-64QI
GR-2-64QJ
GR-2-64QK
GR-2-64QL
GR-2-64QM
GR-2-64QN
GR-2-64QO
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GR-2-64TL
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GR-2-64TO
GR-2-64TP
GR-2-64TQ
GR-2-64TR
GR-2-64TS
GR-2-64TT
GR-2-64TU
GR-2-64TV
GR-2-64TW
GR-2-64TX
GR-2-64TY
GR-2-64TZ
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GR-2-64UB
GR-2-64UC
GR-2-64UD
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GR-2-64UF
GR-2-64UG
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GR-2-64GM
GR-2-64GN
GR-2-64GO
GR-2-64GP
GR-2-64GQ
GR-2-64GR
GR-2-64

Attachment B

2-ISI-15

NDE Reports

Weld No.	Report No.
GR-2-09	R-078
GR-2-12	R-079
GR-2-15(OL)	R-213
GR-2-18	R-074
GR-2-19	R-077
GR-2-22	R-076
GR-2-35	R-080
GR-2-48	R-073
DRHR-2-03	R-105
DRHR-2-09	R-085
DRHR-2-22	R-104

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-018

PROJECT: BFNP UNIT: 2 CYCLE: 11		COMPONENT ID: GR-2-09	
EXAMINATION METHOD		SYSTEM: RECIRC	ISI DWG. NO. 2-151-0270-C-01
MT ☐ PT ☐ UT ■ VT ☐		CONFIGURATION:	
PROCEDURE: N-UT-64	REV: 2 TC: 00-14	BRANCH	TO PIPE
EXAMINER: C. LaSoya	~~EXAMINER:~~ L. Thompson CL 4-4-01	EXAMINER:	EXAMINER:
LEVEL: II	LEVEL: TRN	LEVEL:	LEVEL:

This REPORT CONTAINS THE DATA ASSOCIATED WITH THE MANUAL UT EXAMINATION OF WELD GR-2-09. THE EXAMINATION SATISFIES THE REQUIREMENTS OF SECTION XI OF THE ASME CODE AND THE NUREG 0313.

A 45° SHEAR WAVE FULL V WAS PERFORMED IN (1) DIRECTION AXIALLY (DOWN STREAM SIDE) DUE TO THE CONFIGURATION BRANCH TO PIPE. CIRCUMFERENTIAL SCANS WERE PERFORMED WITH THE 45° DEGREE SHEAR SKEWING TOWARDS ℄ OF WELD FOR MAXIMUM COVERAGE. A 60° REFRACTED LONGITUDINAL WAVE WAS PERFORMED IN (1) DIRECTION AXIALLY (DOWN STREAM SIDE) SCANNING ACROSS THE WELD.

ROOT GEOMETRY WAS OBSERVED BELOW RECORDABLE LEVELS.

(*) 50% CODE COVERAGE OBTAINED IN THE AXIAL DIRECTION
100% CODE COVERAGE OBTAINED IN THE CIRC. DIRECTION.

THIS EXAM WAS PERFORMED WITH PROCEDURES, PERSONNEL AND EQUIPMENT QUALIFIED IN ACCORDANCE WITH ASME SECTION XI APPENDIX VIII AS AMENDED BY THE RULE.

(*) 90% COVERAGE OBTAINED USING 10CFR50.55a CRITERIA
100% COVERAGE OBTAINED USING SECTION XI CRITERIA 4/1/01

RESOLUTION BY:	REVIEWED BY:	ANII:
Casey L. LaSoya		Frank L. Dellois Jr
LEVEL: II DATE: 4-4-01	LEVEL: III DATE: 4-9-01	DATE: 4-19-01
		PG. 1 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-018

PROJECT: BFNP UNIT: 2 CYCLE: 11 | CALIBRATION DATE: 4-04-01

PROC.: N-UT-64 REV: 2 TC: 00-14 | CALIBRATION BLOCK NO.: BF79 TEMP: 69°F

INSTR. MFG: KBA DUE DATE: 6-20-01 | SIMULATOR BLOCK NO: 93-5724

MODEL/TYPE: USN 52 M & TE NO.: E25392 | THERMOMTER S/N: 562779 DUE DATE: 6-6-01

TRANSDUCER MFG: KBA ComP-G | COUPLANT ULTRAGEL BATCH: 99125D

S/N 00FCYK SIZE: .375" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ■ LONG ☐ RL ☐

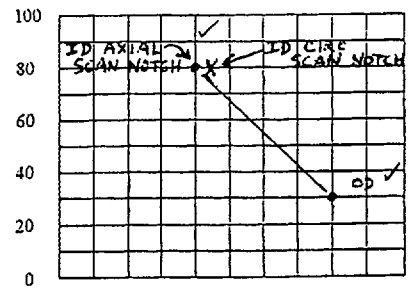
CABLE TYPE: RG-174/u LENGTH: 72" inches

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 93-5724

NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°

DAC



DISPLAY WIDTH: 2.463 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	31.0 dB	15
CIRC	■	☐	35.0 dB	15

FREQ: 2-8 MHz		REJECT: 0 %	
ANGLE: 44 deg		DAMPING: 1000 ohms	
DELAY: 0 msec		PULSER: SINGLE	
ZERO: 6413 msec		FILTER: FIXED *	
VELOCITY: .1251 msec		REP RATE: HIGH	
RANGE: 2.463 inches		TOF: ■ PEAK ☐ FLANK	
DISPLAY MODE: Full		POWER: BATTERY	
DUAL: ☐ ON ■ OFF		TCG: ☐ ON ■ OFF	

REF. REFLECTOR: N GAIN: ~~dB~~

AMPLITUDE: % METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 1250 FINAL TIME: 1440

~~VERIFICATION~~ TIMES 1) 2) A 3) 4) 5) 6) 7) 8) 9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**

VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	36	30	26	20	14	10	
ATTENUATOR	GAIN	SET	-6 dB	-12 dB		SET	+12		SET	+6	
	AMP	80%	32 TO 48	16 TO 24		20 %	64 TO 96		40%	64 TO 96	
			40	20			80			80	

COMMENTS:

PRIMARY EXAMINATION TECHNIQUE

WELDS/ITEMS EXAMINED:

GR-2-09

EXAMINER:	~~EXAMINER~~: L. Thompson 02 44-01	REVIEWER:	ANII:
Carey L. Lafoya			DATE: 4-19-01
LEVEL: II	LEVEL: TRN	LEVEL: II DATE: 4-7-01	PG.: 2 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-078

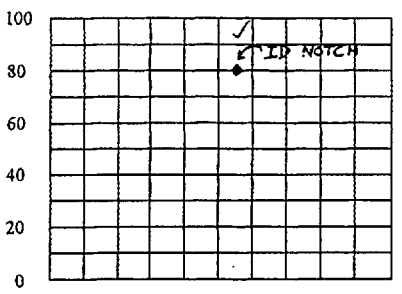
PROJECT: BFNP UNIT: 2 CYCLE: 11
PROC.: N-UT- 64 REV: 2 TC: 00-14
INSTR. MFG: KBA DUE DATE: 6-20-01
MODEL/TYPE: USN 52 M & TE NO.: E25392
TRANSDUCER MFG: RTD TRLA
S/N 99-1219 SIZE: 2(8x14) FREQ: 2.0 MHz
CABLE TYPE: BNC/LEMO DUAL RG-174 LENGTH: 72 inches

CALIBRATION DATE: 4-04-01
CALIBRATION BLOCK NO.: BF79 TEMP: 69°F
SIMULATOR BLOCK NO: 93-5724
THERMOMTER S/N: 562779 DUE DATE: 6-06-01
COUPLANT ULTRAGEL BATCH: 99125 ✓
EXAM TYPE: SHEAR ☐ LONG ☐ RL ■ ✓

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 93-5724
NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°

DAC



DISPLAY WIDTH: 2.500 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	62.0 dB	16
CIRC	☐	☐	N/A dB	N/A

FREQ:	2-8 MHz ✓	REJECT:	0 % ✓
ANGLE:	58 deg ✓	DAMPING:	1000 ohms ✓
DELAY:	0 msec	PULSER:	DUAL * ✓
ZERO:	8.867 msec	FILTER:	FIXED * ✓
VELOCITY:	.2324 msec	REP RATE:	HIGH ✓
RANGE:	2.500 inches ✓	TOF:	■ PEAK ☐ FLANK
DISPLAY MODE:	FULL	POWER:	BATTERY
DUAL:	■ ON ☐ OFF ✓	TCG:	☐ ON ■ OFF ✓

REF. REFLECTOR: N GAIN: ~~dB~~
AMPLITUDE: % METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 1245 FINAL TIME: 1435

~~VERIFICATION~~ TIMES	1)	2) A	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	14	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:
SUPPLEMENTAL EXAMINATION

WELDS/ITEMS EXAMINED:
GR-2-09

EXAMINER: Casey L. LaSage	~~EXAMINER:~~ L. Thompson CL 4-4-01	REVIEWER:	ANII: Grant L. Bellair Jr
LEVEL: II	LEVEL: TRA	LEVEL: II DATE: 4-1-01	DATE: 4-19-01 PG.: 3 OF 5

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-078

PROJECT: BFNP UNIT: 2 CYCLE: 11 EXAMINATION DATE: 4-04-01

PROCEDURE: N-UT-64 REV: 2 TC: 00-14 START TIME: 13:45 END TIME: 14:15

SYSTEM: RECIRC EXAM SURFACE ☐ ID ■ OD ✓

COMPONENT ID: GR-2-09 MATL. TYPE: ☐ CS ■ SS ✓ ☐ CSCL ☐ CCSS

Branch CONFIGURATION ~~REDUCER~~ TO PIPE ed 4-4-01 FLOW →

SURFACE TEMP.: 81 °F ✓ PYRO. NO.: 562779

CAL DUE DATE: 6-06-01

Wo REFERENCE: ℄ OF WELD

Lo REFERENCE: OUTER EXTRADOS OF ELBOW ABOVE

EXAM ANGLE	45 DEG	60RL DEG	
CIRC. SCAN SENSITIVITY	49 dB	N/A dB	
AXIAL SCAN SENSITIVITY	45 dB	76 dB	

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	3	45°		NO SCAN DUE TO CONFIGURATION
							%	4	45°	X	
							%	5	45°	X	
							%	6	45°	X	
							%	3*	60°RL		NO SCAN DUE TO CONFIGURATION
							%	4	60°RL	X	
			N				%				
							%				
					A		%				
							%		N		
							%				
							%				A
							%				
							%				

REMARKS / LIMITATIONS: EXAMINATION LIMITED TO SCAN #4 ~~dr~~ ed 4-4-01 due to Branch to Pipe Config. Code Coverage obtained to ℄ of Weld, axial direction. Scans 5 & 6 performed skewing toward ℄ of Weld for maximum coverage.
* Best effort examination performed.

EXAMINER: Casey L. La Forge	LEVEL: II	ANII: Frank J. Bellairs
~~EXAMINER~~: L. Thompson	LEVEL: TRN	DATE: 4-19-01
REVIEWER:	LEVEL: III DATE: 4-1-01	PAGE 4 OF 5

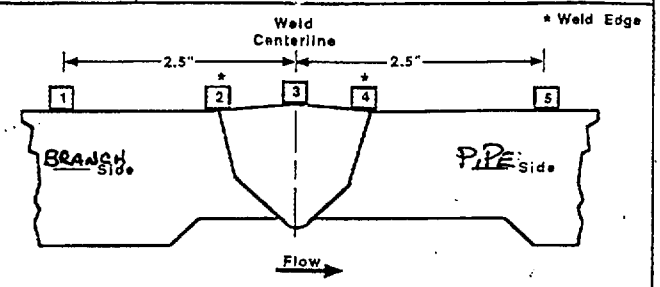
00080

TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-07B

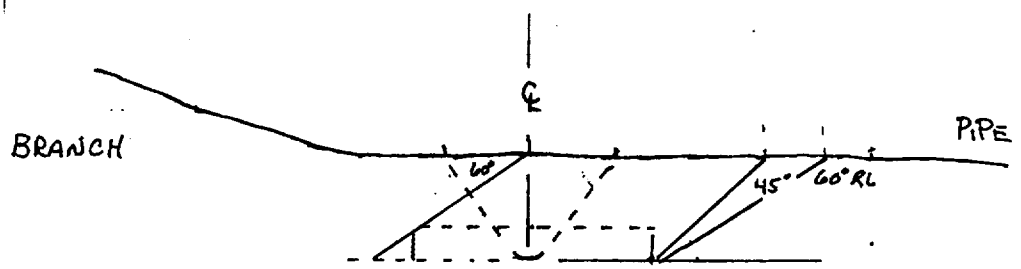
PROJECT: BFNP
UNIT: 2
WELD NO: GR-2-09
SYSTEM: RECIRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A	N		/
2	.74"			/
3	.75"			
4	.74"	/		
5	.59"	/		A



CROWN HEIGHT: Flush
DIAMETER: 12"
CROWN WIDTH: 1.2"
WELD LENGTH: 37.7"



45° SHEAR WAVE COVERAGE DRAWING
60° RL COVERAGE DRAWING

EXAMINER: Carey L. La Haye
LEVEL: II
DATE: 4-4-01

REVIEWED BY: [illegible]
LEVEL: III
DATE: 4-7-01

ANII: Frank D. Bellaio Jr
DATE: 4-19-01

PAGE 5 OF 5

TVA 19668 (NP-5-89)

1-103 999-44

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-019

PROJECT: BFNP	UNIT: 2	CYCLE: 11		COMPONENT ID: GR-2-12	
EXAMINATION METHOD				SYSTEM: RECIRC	ISI DWG. NO. 2-151-0270-C-01
MT ☐	PT ☐	UT ■	VT ☐	CONFIGURATION:	
PROCEDURE: N-UT-64	REV: 2	TC: 00-14		BRANCH	TO PIPE
EXAMINER: Casey L. LaSoya	~~EXAMINER:~~ LEE Thornton			EXAMINER:	EXAMINER:
LEVEL: II	LEVEL: TRN			LEVEL:	LEVEL:

This REPORT CONTAINS THE DATA ASSOCIATED WITH THE MANUAL UT EXAMINATION OF WELD GR-2-12. THE EXAMINATION SATISFIES THE RT.16c REQUIREMENTS OF ASME SECTION XI AND THE NUREG 0313.

A 45° SHEAR WAVE FULL V AND A 60° REFRACTED LONGITUDINAL WAVE ½ V EXAMINATION WAS PERFORMED IN (2) DIRECTIONS AXIALLY TO THE WELD, AND IN (2) DIRECTIONS CIRCUMFERENTIALLY UTILIZING THE 45° SHEAR WAVE. AXIAL SCANS WITH THE 60°RL TECHNIQUE WERE PERFORMED COMPLETELY ACROSS THE WELD IN BOTH DIRECTIONS.

RECORDABLE GEOMETRY WAS OBSERVED WITH THE 60°RL TECHNIQUE.

100% PERCENT COVERAGE WAS ACHIEVED.

THIS EXAMINATION WAS PERFORMED WITH EQUIPMENT PROCEDURES AND PERSONNEL QUALIFIED IN ACCORDANCE WITH ASME SECTION XI APPENDIX ~~VIII~~ AS AMENDED BY THE RULE.

*50% COVERAGE OBTAINED USING 10 CFR50.55a CRITERIA
100% COVERAGE OBTAINED USING SECTION XI CRITERIA

4.9.01

RESOLUTION BY:	REVIEWED BY:	ANII:
Casey L. LaSoya		Grant L. Bellairs
LEVEL: II DATE: 4-4-01	LEVEL: II DATE: 4.9.01	DATE: 4-19-01
		PG. 1 OF 8

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-079

PROJECT: BFNP UNIT: 2 CYCLE: 11 | CALIBRATION DATE: 4-03-01

PROC.: N-UT-64 REV: 2 TC: 00-14 | CALIBRATION BLOCK NO.: BF79 ✓ TEMP: 65 °F

INSTR. MFG: KBA DUE DATE: 6-20-01 | SIMULATOR BLOCK NO: 93-5724 ✓

MODEL/TYPE: USN 52 M & TE NO.: E25392 ✓ | THERMOMTER S/N: 562779 DUE DATE: 6-6-01

TRANSDUCER MFG: KBA COMP-G | COUPLANT ULTRAGEL BATCH: 99125D ✓

S/N 00FCYK ✓ SIZE: .375" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ■ ✓ LONG ☐ RL ☐

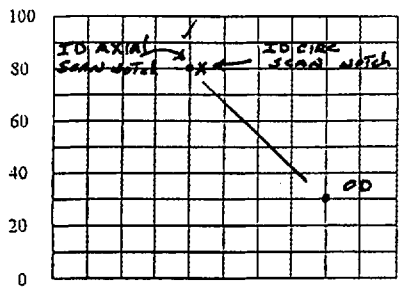
CABLE TYPE: RG-174/U LENGTH: 72" inches

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 93-5724 ✓

NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°

DAC



DISPLAY WIDTH 2.463 inches

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	■	☐	31.0 dB	15
CIRC	■	☐	35.0 dB	15

FREQ: 2-8 MHz ✓		REJECT: 0 % ✓	
ANGLE: 44 deg		DAMPING: 1000 ohms ✓	
DELAY: 0 msec		PULSER: SINGLE* ✓	
ZERO: 6.413 msec		FILTER: FIXED * ✓	
VELOCITY: .1251 msec ✓		REP RATE: HIGH ✓	
RANGE: 2.463 inches ✓		TOF: ■ PEAK ☐ FLANK ✓	
DISPLAY MODE: FULL		POWER: BATTERY ✓	
DUAL: ☐ ON ■ OFF ✓		TCG: ☐ ON ■ OFF ✓	

REF. REFLECTOR: N GAIN: ~~dB~~

AMPLITUDE: % METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 1010 FINAL TIME: 1530

~~VERIFICATION~~ TIMES 1) 2) A 3) 4) 5) 6) 7) 8) 9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL										
SIGNAL 1	100	90	80	70	60	50	40	30	20	
SIGNAL 2	50	45	40	36	30	26	20	14	10	

ATTENUATOR								
GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6
AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
		40	20		80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
PRIMARY EXAMINATION TECHNIQUE	GR-2-12

EXAMINER:	~~EXAMINER~~: L. Thompson	REVIEWER:	ANII:
Corey L. LaBorge	cj 4-4-01		Frank J. Bellaire Jr
LEVEL: II	~~LEVEL~~: TRN	LEVEL: III DATE: 4-4-01	DATE: 4-19-01
			PG.: 2 OF 8

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-079

PROJECT: BFNP UNIT: 2 CYCLE: 11 | CALIBRATION DATE: 4-03-01

PROC.: N-UT- 64 REV: 2 TC: 00-14 | CALIBRATION BLOCK NO.: BF79 ✓ TEMP: 71 °F

INSTR. MFG: KBA DUE DATE: 6-20-01 ✓ | SIMULATOR BLOCK NO: 93-5724 ✓

MODEL/TYPE: USN 52 M & TE NO.: E25392 ✓ | THERMOMTER S/N: 562779 DUE DATE: 6-6-01

TRANSDUCER MFG: KBA COMP-G ✓ | COUPLANT ULTRAGEL BATCH: 99125D

S/N 00FCYN SIZE: .375" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ■ LONG ☐ RL ☐

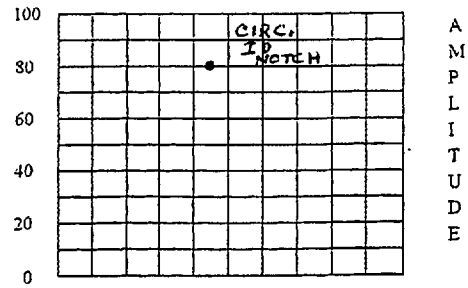
CABLE TYPE: RG-174/u LENGTH: 72" inches

ANGLE VERIFICATION

BLOCK TYPE: II W | S/N: 791539

NOMINAL ANGLE: 70° | ACTUAL ANGLE: 67°

DAC



DISPLAY WIDTH: 3.500 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	42.5 dB	17
CIRC	☐	☐	N/A dB	N/A

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: 67	deg	DAMPING: 1000	ohms
DELAY: 0	msec	PULSER: SINGLE *	
ZERO: 9.426	msec	FILTER: FIXED *	
VELOCITY: .1320	msec	REP RATE: HIGH	
RANGE: 3.500	inches	TOF: ■ PEAK ☐ FLANK	
DISPLAY MODE: Full		POWER: BATTERY	
DUAL: ☐ ON ■ OFF		TCG: ☐ ON ■ OFF	

REF. REFLECTOR: N GAIN: ~~dB~~

AMPLITUDE: ~~%~~ METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 13:20 FINAL TIME: 14:30

~~VERIFICATION~~ TIMES 1) 2) A 3) 4) 5) 6) 7) 8) 9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	14	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:

SUPPLEMENTAL EXAMINATION, SCANNED @ 40. dB TO MAINTAIN 5% TO 15% ID NOISE LEVEL.

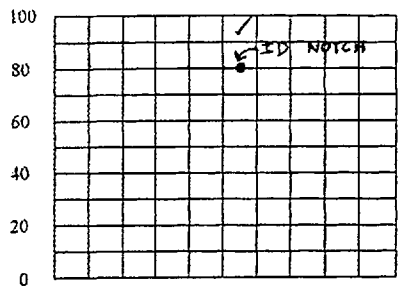
WELDS/ITEMS EXAMINED:

GR-2-12

EXAMINER: Carey L. LaHoya	~~EXAMINER~~: L. Thompson CL 4-5-01	REVIEWER:	ANII: Jack C. Bellamy Jr
LEVEL: II	LEVEL: ~~I~~ II TRN CL 4-5-01	LEVEL: III DATE: 4-9-01	DATE: 4-19-01
			PG.: 3 OF 8

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-079

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-03-01
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF79 ✓ TEMP: 65°F
INSTR. MFG: KBA DUE DATE: 6-20-01	SIMULATOR BLOCK NO: 93-5724
MODEL/TYPE: USN 52 M & TE NO.: E25392 ✓	THERMOMTER S/N: 562779 DUE DATE: 6-06-01
TRANSDUCER MFG: RTD TRLA	COUPLANT ULTRAGEL BATCH: 99125
S/N 99-1219 ✓ SIZE: 2(8x14) FREQ: 2.00 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL■ ✓
CABLE TYPE: RG-174/U LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: ROMPAS S/N: 93-5724
DAC	NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°



DISPLAY WIDTH: 2.500 inches

1.3

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	62.0 dB	16
CIRC	☐	☐	N/A dB	N/A

FREQ: 2-8 MHz ✓	REJECT: 0 % ✓
ANGLE: 58 deg ✓	DAMPING: 1000 ohms ✓
DELAY: 0 msec	PULSER: DUAL * ✓
ZERO: 8.867 msec	FILTER: FIXED * ✓
VELOCITY: .2324 msec ✓	REP RATE: HIGH ✓
RANGE: 2.500 inches ✓	TOF: ■ PEAK ☐ FLANK
DISPLAY MODE: FULL	POWER: BATTERY ✓
DUAL: ■ ON ✓ ☐ OFF	TCG: ☐ ON ■ OFF ✓

REF. REFLECTOR: N GAIN: ~~dB~~	CALIBRATION TIMES
AMPLITUDE: % METAL PATH: "	INITIAL TIME: 1020 FINAL TIME: 1540

~~VERIFICATION~~ TIMES	1)	2) A	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	14	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
SUPPLEMENTAL EXAMINATION	GR-2-12

EXAMINER: Carey L. La Haye	~~EXAMINER~~: L. Thompson 4-4-01	REVIEWER: WMB	ANII: [signature] DATE: 4-19-01
LEVEL: II	~~LEVEL~~: TRN	LEVEL: III DATE: 4-1-01	PG.: 4 OF 8

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-019

PROJECT: BFNP UNIT: 2 CYCLE: 11 | EXAMINATION DATE: 4-3-01

PROCEDURE: N-UT-64 REV: 2 TC: 00-14 | START TIME: 12:30 END TIME: 14:45

SYSTEM: RECIRC | EXAM SURFACE ☐ ID ■ OD

COMPONENT ID: GR-2-12 | MATL. TYPE: ☐ CS ■ SS ☐ CSCL ☐ CCSS

CONFIGURATION: BRANCH TO PIPE (FLOW →) | SURFACE TEMP.: 81 °F PYRO. NO.: 562779

CAL DUE DATE: 6-06-01

Wo REFERENCE: ℄ OF WELD | EXAM ANGLE: 45° DEG, 60RL DEG

Lo REFERENCE: EXTRADOS OF ELBOW ABOVE | CIRC. SCAN SENSITIVITY: 49 dB, N/A dB

AXIAL SCAN SENSITIVITY: 45 dB, 76 dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	3	45°	X	
		N					%	4	45°	X	N
							%	5	45°	X	
							%	6	45°	X	
			A				%	3	60RL	X	A
1	*	12"	*	1.1	1.512	.8"	100 %	4	60RL		ROOT GEOMETRY
							%				
							%				
		N					%		N		
							%				
							%				
							%				
					A		%				A
							%				

REMARKS / LIMITATIONS:

* ROOT GEOMETRY OBSERVED 360° AT VARYING AMPLITUDES, PREVIOUSLY RECORDED AND PLOTTED. NO APPARENT CHANGES OBSERVED. NO REFLECTORS INDICATIVE OF CRACKS OR IGSCC WERE NOTED. MAINTAINED 5 TO 20% ID NOISE LEVEL DURING EXAMINATION.

EXAMINER: Casey L. LaAnza	LEVEL: II	ANII: Israel L. Gabriel	
~~EXAMINER:~~ CL 4-4-01 L. THOMPSON	LEVEL: TRN	DATE: 4-19-01	
REVIEWER:	LEVEL: III	DATE: 4-7-01	PAGE 5 OF 8

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-079

PROJECT: BNFP UNIT: 2 CYCLE: 11 | EXAMINATION DATE: 4-5-01

PROCEDURE: N-UT-64 REV: 2 TC: 00-14 | START TIME: 13:45 END TIME: 13:55

SYSTEM: RECIRC | EXAM SURFACE ☐ ID ■ OD

COMPONENT ID: GR-2-12 | MATL. TYPE: ☐ CS ■ SS ☐ CSCL ☐ CCSS

C ONFIGURATION: BRANCH TO PIPE (FLOW →) | SURFACE TEMP.: 71 °F PYRO. NO.: 562779

CAL DUE DATE: 6-6-01

Wo REFERENCE: ℄ OF WELD | EXAM ANGLE: 70 DEG / N DEG

Lo REFERENCE: OUTER EXTRADOS OF ELBOW Above | CIRC. SCAN SENSITIVITY: N/A dB / N dB

AXIAL SCAN SENSITIVITY: 40 dB / A dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	4	70°S	X	
							%				
		N					%				
							%				
							%		N		
							%				
							%				
							%				
							%				
							%				
					A		%				A
							%				
							%				
							%				

REMARKS / LIMITATIONS:

ONE-SIDE EXAMINATION FROM DOWN-STREAM SIDE. SUPPLEMENTAL EXAM OF GEOMETRICAL REFLECTORS. MAINTAINED 5% TO 15% ID NOISE LEVEL. NO INDICATIONS INDICATIVE OF CRACKS OR IGSCC OBSERVED.

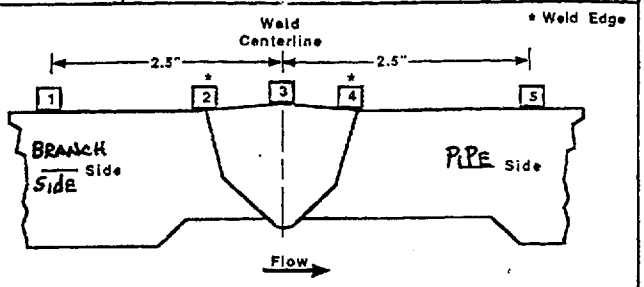
EXAMINER: Carey L. La Loya	LEVEL: II	ANII: Jack C. Hellar Jr	
~~EXAMINER:~~ CL 4-5-01 L. Thompson	LEVEL: TRN	DATE: 4-19-01	
REVIEWER:	LEVEL: III	DATE: 4-7-01	PAGE 6 OF 8

TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-079

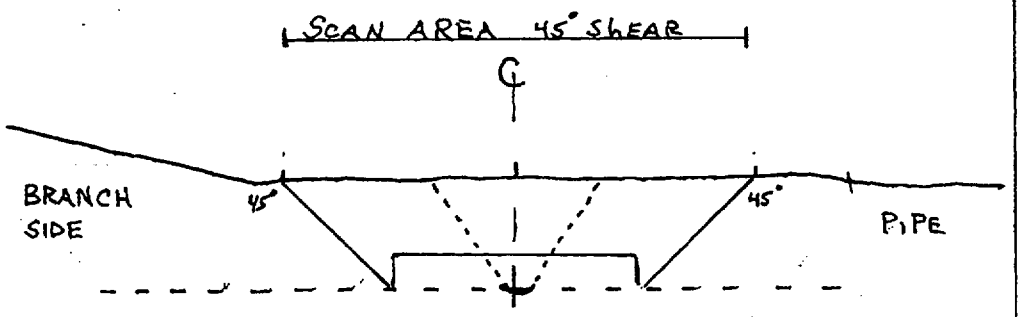
PROJECT: BFNP
UNIT: 2
WELD NO: GR- 2-12
SYSTEM: RECIRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	.8	N		
3	N/A			
4	.8		A	
5	N/A			



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.25"
DIAMETER: 12"
WELD LENGTH: 40.25"



LONG SEAM @ 25" TO 26" CONTOUR
+THICKNESS READINGS FROM PREVIOUS
EXAMINATION DATA.

EXAMINER: Corey L. LaVoya
LEVEL: II
DATE: 4-3-01

REVIEWED BY: [illegible]
LEVEL: III
DATE: 4-9-01

ANII: Frank J. Bellaire
DATE: 4-19-01

PAGE 1 OF 8

TVA 19668 (NP-5-89)

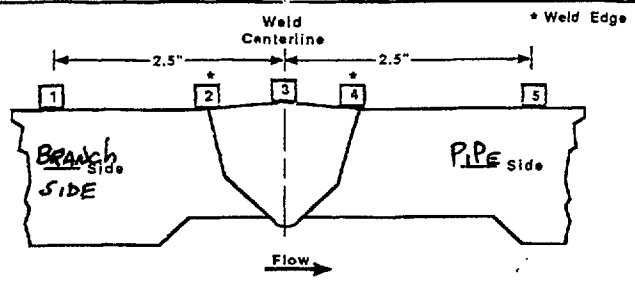
1-188-999-44

TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-079

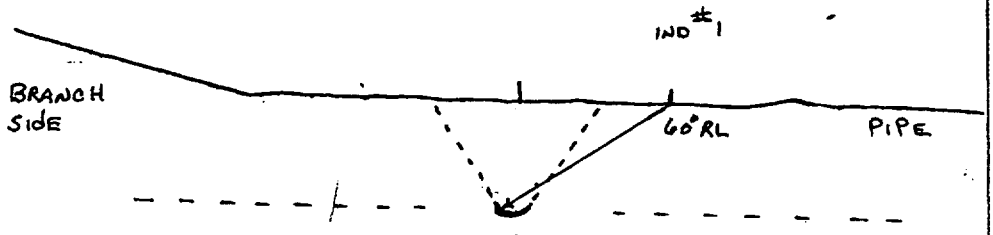
PROJECT: BFNP
UNIT: 2
WELD NO: GR-2-12
SYSTEM: RECIRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

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



CROWN HEIGHT: FLUSH
DIAMETER: 12"
CROWN WIDTH: 1.25"
WELD LENGTH: 40.25'



EXAMINER: Larry L. LaForge
LEVEL: II
DATE: 4-3-01

REVIEWED BY: [illegible]
LEVEL: III
DATE: 4.7.01

ANII: Frank J. Nelais Jr
DATE: 4-19-01
PAGE 8 OF 8

TVA 19668 (NP-5-89)
1-708 999-44

000438 E

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-213

PROJECT: BFN	UNIT: 2	CYCLE: 10	COMPONENT ID: ER-2-15 OL	
EXAMINATION METHOD			SYSTEM: RECIRC 068	
MT ☐	PT ☐	UT ☒	VT ☐	CONFIGURATION:
PROCEDURE: N-UT-66	REV: 0	TC: NA	REDUCER	TO PIPE
EXAMINER: Kenneth E Smith	EXAMINER: Thos. J. Ulm		EXAMINER: N/A	EXAMINER: N/A
LEVEL: II	LEVEL: II		LEVEL:	LEVEL:

THIS EXAMINATION WAS PERFORMED MANUALLY TO THE REQUIREMENTS OF NUREG-0313 FOR WELD OVERLAY. A 60RL DUAL TRANSDUCER WAS USED FOR THE EXAMINATION. THE .45" DEEP END DRILLED HOLE IN CAL. BLOCK BF-50 WAS USED FOR CALIBRATION SENSITIVITY.

AN INDICATION LESS THAN 1" LONG WAS DETECTED NEAR THE OVERLAY/PIPING BASE METAL INTERFACE. THE INDICATION IS VERY SIMILAR IN LENGTH AND LOCATION TO THAT RECORDED PREVIOUSLY AND CHARACTERIZED AS A NON-METALLIC INCLUSION.

AN AVERAGE BASELINE NOISE LEVEL OF 20% FSH WAS MAINTAINED AT SCANNING SENSITIVITY.

FULL SCAN COVERAGE OF THE REQUIRED VOLUME IS LIMITED DUE TO THE OVERLAY CONFIGURATION. ALSO, THE PROCEDURALLY REQUIRED VOLUME IS EXPANDED CONSIDERABLY FROM THAT REQUIRED PREVIOUSLY.

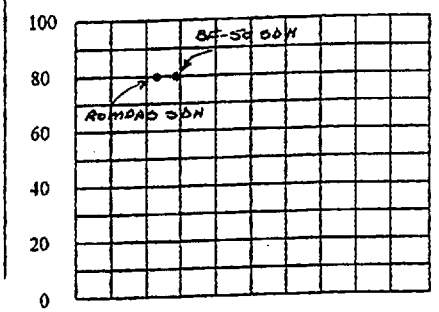
80% OF THE REQUIRED SCANS 3, 4, 5, 6 COVERAGE WAS ACHIEVED. SEE ATTACHED SCAN COVERAGE PLOT.

This examination satisfies the requirements of ASME Section XI (Risk Informed) RI.16E. Aug 20/01

RESOLUTION BY: Thos. J. Ulm	REVIEWED BY: W M Buckley	ANII: [illegible]
LEVEL: II DATE: 4-20-99	LEVEL: III DATE: 4/22/99	DATE: 5/14/99 Aug 20/01
		PG. 1 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-213

PROJECT: BFN UNIT: 2 CYCLE: 10	CALIBRATION DATE: 4-20-99
PROCEDURE: N-UT- 66 REV: 0 TC: N/A	CALIBRATION BLOCK NO.: BF-50 TEMP: 77 °F
INSTRUMENT: KB DUE DATE: 12-2-99	SIMULATOR BLOCK NO: 790390
MODEL/TYPE: USK 7D SERIAL NO.: E20105	THERMOMTER S/N: 562777 DUE DATE: 12-2-99
TRANSDUCER MANUF: RTD	COUPLANT ULTRAGEL II BATCH: 092111
S/N 92-815 SIZE: 2 (8x14) FREQ: 2 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CABLE TYPE: 2 (RG174) LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: ROMPAS S/N: 790390
DAC	NOMINAL ANGLE: 60RL ACTUAL ANGLE: 60RL



DISPLAY WIDTH: 3 inches MP

REF. REFLECTOR: ROMPAS SDH GAIN: 56 dB

AMPLITUDE: 80 % METAL PATH: 0.707"

VERIFICATION TIMES 1) 1329 2) 1409 3) 4) 5) 6) 7) 8) 9)

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☒	58 dB	3
CIRC	☐	☒	58 dB	3

FREQ:	1-5 MHz	REJECT:	0 %
ANGLE:	60 deg	DAMPING:	FIXED ohms
DELAY:	7.7 msec	PULSER:	DUAL *
ZERO:	8.21 msec	FILTER:	FIXED *
VELOCITY:	2247 msec	REP RATE:	HIGH
RANGE:	3.0 inches	TOF:	☒PEAK ☐ FLANK
RECTIFIER:	N/A	POWER:	DC
DUAL:	☒ ON ☐ OFF	TCG:	☐ ON ☒ OFF

CALIBRATION TIMES

INITIAL TIME: 1302 FINAL TIME: 1430

*** PDI QUALIFIED INSTRUMENT SETTINGS:**

VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6	
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96	
			38	17		92		86	

COMMENTS:	WELDS/ITEMS EXAMINED:
NONE	CR-2-15 OL

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
Kenneth R. Smith	Thos. J. Ulrich	[illegible]	[illegible] 5/14/01
LEVEL: II	LEVEL: II	LEVEL: III DATE: 4-22-99	DATE: 5/14/01
			PG.: 2 OF 5

000440

TVA TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NO. R- 213

PROJECT: BFN UNIT: 2 CYCLE: 10
PROCEDURE: N-UT- 66 REV.: 0 TC.: N/A
SYSTEM: RECIRC 068
COMPONENT I.D.: QR-2-15 OL
CONFIGURATION (FLOW): REDUCER TO: PIPE
Wo REF: D.S. EDGE OF OL Lo REF: EXTRADOS D.S. ELB.
MATERIAL TYPE: CS ☐ SS ☒ CCSS ☐ CSCL ☐
EXAMINATION SURFACE ID ☐ OD ☐

EXAMI DATE: 4-20-99 COMPONENT TEMP: 79°F
THERMOMETER NO.: 562777 DUE: 12-2-99
60RL DEG. START TIME: 1330 STOP TIME: 1408
N/A DEG. START TIME: N/A STOP TIME: N/A
CALIBRATION SHEET C- C-
EXAMINATION ANGLE: 60RL DEG. N / DEG
CIRC. SCAN SENSITIVITY: 64 dB / dB
AXIAL SCAN SENSITIVITY: 64 dB / A dB

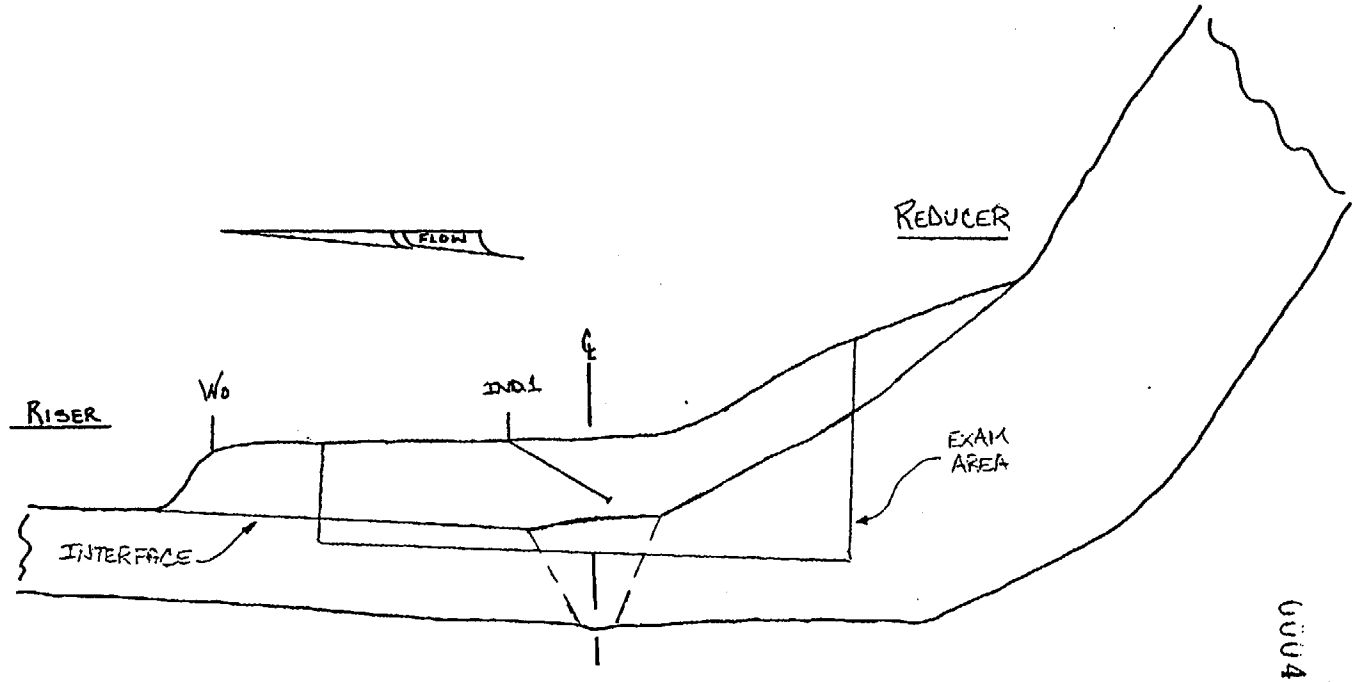
IND NO.	L(in)FROM REF. L1	L Max	L2	AT MAX AMPLITUDE W Max	Mp Max	D Max	MAX AMP % DAC	EXAM NO. 3-14	NOM. ANG.	NRI	INDICATION INFORMATION: (TYPE, DAMPING, ETC.)
								3		X	
1	40.2	40.5	41.0	2.2	0.861	0.430	40	4	60RL		SEE REMARKS
								5		X	
								6		X	

REMARKS \ LIMITATIONS: IND. #1 PREVIOUSLY RECORDED AS NON METALIC INCLUSION.

CIRCUMFERENCE OF OVERLAY AT D.S. EDGE IS 43.0"
CIRCUMFERENCE OF RISER PIPE IS 40.2"

EXAMINER: Kenneth R. Smith LEVEL: II
EXAMINER: James J. Ulm LEVEL: II
ANII REVIEW BY: Albert Tadd 7/1/01 DATE: 5/14/01
REVIEWED BY: [illegible] LEVEL III DATE: 4-22-99

TVA Office of Nuclear Power	PROJECT: BFNP SYSTEM: 068 RECIRC. Unit: 2 WELD NO.: GR-2-15-OL	REPORT NO.: R-213



ID/OD PROFILE TAKEN
FROM PREVIOUS DATA

GUU441
HSB
5/14/01

BY: Kenneth R. Smith LEVEL: II DATE: 4-20-99 PAGE 4 OF 5

'A ice of Nuclear Power	PROJECT: BFNP Unit: 2	ISTEM: 06B RECIRC. WELD NO.: GR-2-15-OL	PORT NO. R-213

SCAN COVERAGE PLOT

SCAN COVERAGE CALC'S BASED ON PERCENTAGE ON REQUIRED VOLUME ACHIEVED.

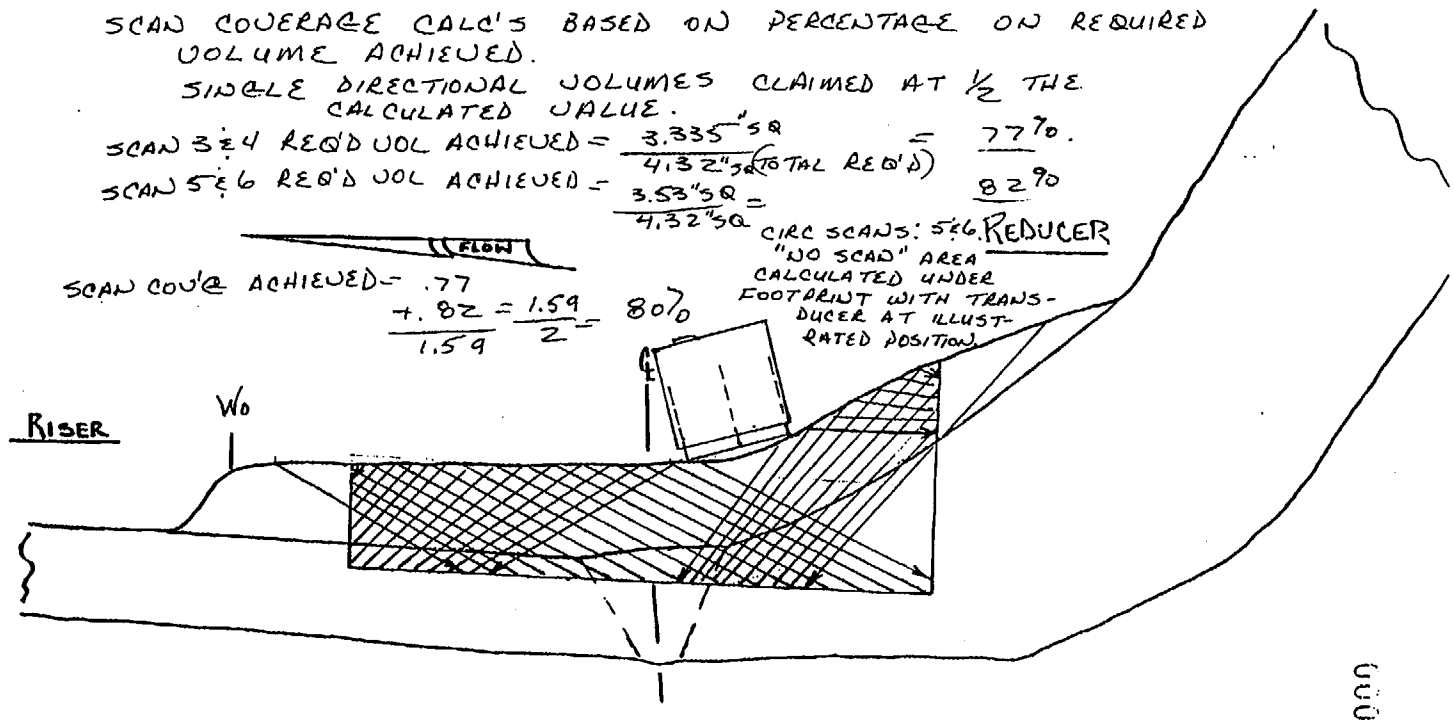
SINGLE DIRECTIONAL VOLUMES CLAIMED AT ½ THE CALCULATED VALUE.

SCAN 3 & 4 REQ'D VOL ACHIEVED = $\frac{3.335''SQ}{4.32''SQ}$ (TOTAL REQ'D) = 77%.

SCAN 5 & 6 REQ'D VOL ACHIEVED = $\frac{3.53''SQ}{4.32''SQ}$ = 82%

CIRC SCANS: 5 & 6. REDUCER "NO SCAN" AREA CALCULATED UNDER FOOTPRINT WITH TRANSDUCER AT ILLUSTRATED POSITION.

SCAN COV'G ACHIEVED = .77 + .82 = 1.59 / 1.59 = 1.59 / 2 = 80%



000442

HSB 5/14/01

BY: [signature] LEVEL: II DATE: 4-20-99 PAGE 5 OF 5

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-074

PROJECT: BFNP UNIT: 2	CYCLE: 11	COMPONENT ID: GR-2-18	
EXAMINATION METHOD		SYSTEM: RECIRC	ISI DWG. NO. 2-151-0210-C-01
MT ☐ PT ☐	UT ■ VT ☐	CONFIGURATION:	
PROCEDURE: N-UT-64	REV: 2 TC: 00-14	CROSS TEE	TO HEADER RING
EXAMINER: C. LaSoya	~~EXAMINER:~~ L. Thompson CL 4-2-01	EXAMINER:	EXAMINER:
LEVEL: II	LEVEL: TRN	LEVEL:	LEVEL:

This REPORT CONTAINS THE DATA ASSOCIATED WITH THE MANUAL UT EXAMINATION OF WELD GR-2-18. THE EXAMINATION SATISFIES THE REQUIREMENTS OF ASME SECTION XI, AND NUREG-0313. R1.16C

A 45° SHEAR WAVE FULL V AND A 60° REFRACTED LONGITUDINAL WAVE WERE UTILIZED IN ONE DIRECTION AXIALLY AND THE 45° SHEAR WAVE WAS UTILIZED IN (2) DIRECTIONS CIRCUMFERENTIALLY.

THERE WERE NO RECORDABLE INDICATIONS OBSERVED. NO INDICATIONS INDICATIVE OF CRACKS OR IGSCC WERE OBSERVED. ROOT GEOMETRY NOTE BELOW RECORDABLE LEVELS. 60° RL PRODUCED NO RECORDABLE CONDITIONS.

LIMITATION: ONE SIDED EXAMINATION DO TO CONFIGURATION.
APPROXIMATELY 50% CODE COVERAGE OBTAINED.

THIS EXAMINATION WAS PERFORMED WITH EQUIPMENT, PROCEDURES AND PERSONNEL QUALIFIED IN ACCORDANCE WITH ASME SECTION XI APPENDIX VIII AS AMENDED BY THE RULE.

50% COVERAGE OBTAINED USING 10CFR50.55a CRITERIA
100% COVERAGE OBTAINED USING SECTION XI CRITERIA [illegible] 4-6-01

RESOLUTION BY: C. LaSoya	REVIEWED BY: [illegible]	ANII: Frank C. Bellaire Jr.
	[illegible]	DATE: 4-18-01
LEVEL: II DATE: 4-2-01	LEVEL: III DATE: 4-4-01	PG. 1 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-074

PROJECT: BFNP UNIT: 2 CYCLE: 11 | CALIBRATION DATE: 4-02-01

PROC.: N-UT-64 REV: 2 TC: 00-14 | CALIBRATION BLOCK NO.: BF88 ✓ TEMP: 65 °F

INSTR. MFG: KBA DUE DATE: 6-20-01 | SIMULATOR BLOCK NO: 93-5724

MODEL/TYPE: USN 52 M & TE NO.: E25392 ✓ | THERMOMTER S/N: 562779 ✓ DUE DATE: 6-6-01

TRANSDUCER MFG: KBA COMP-G | COUPLANT ULTRAGEL BATCH: 99125 ✓

S/N 00FCYN ✓ SIZE: .500" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ■ LONG ☐ RL ☐

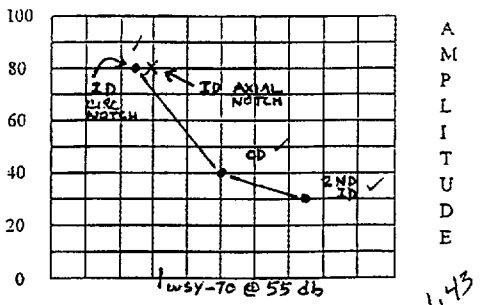
CABLE TYPE: RG-174/U LENGTH: 72" inches

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 93-5724

NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°

DAC



DISPLAY WIDTH: 5.819 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	18 dB	10
CIRC	■	☐	22 dB	10

FREQ: 2-8 MHz ✓		REJECT: 0 % ✓	
ANGLE: 44 deg ✓		DAMPING: 1000 ohms ✓	
DELAY: 0 msec		PULSER: SINGLE *	
ZERO: 6.258 msec		FILTER: FIXED * ✓	
VELOCITY: .1223 msec ✓		REP RATE: HIGH ✓	
RANGE: 5.819 inches ✓		TOF: ■ PEAK ☐ FLANK	
DISPLAY MODE: FULL ✓		POWER: BATTERY ✓	
DUAL: ☐ ON ■ OFF ✓		TCG: ☐ ON ■ OFF ✓	

REF. REFLECTOR: N GAIN: ~~dB~~

AMPLITUDE: % METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 1100 FINAL TIME: 1515

~~VERIFICATION~~ TIMES	1)	2) A	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	36	30	26	20	14	10	
ATTENUATOR	GAIN	SET	-6 dB		-12 dB	SET		+12	SET	÷6	
	AMP	80%	32 TO 48		16 TO 24	20 %		64 TO 96	40%	64 TO 96	
			40		20			80		80	

COMMENTS:

PRIMARY EXAMINATION TECHNIQUE 45°. WSY-70 @ 3.2 SD @ 55 db SUPPLEMENTAL TECHNIQUE.

WELDS/ITEMS EXAMINED:

GR-2-18

EXAMINER: Casey J. LaForge	~~EXAMINER:~~ LEE Thornton 4-04-01	REVIEWER:	ANII: Frank A. Ballard Jr.
LEVEL: II	LEVEL: TRN	LEVEL: III DATE: 4-6-01	DATE: 4-18-01
			PG.: 2 OF 5

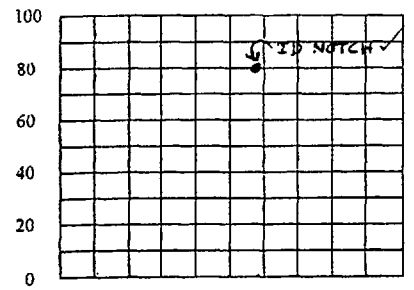
TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-074

PROJECT: BFNP UNIT: 2 CYCLE: 11 | CALIBRATION DATE: 4-02-01
PROC.: N-UT- 64 REV: 2 TC: 00-14 | CALIBRATION BLOCK NO.: BF88 ✓ TEMP: 65 °F
INSTR. MFG: KBA DUE DATE: 6-20-01 | SIMULATOR BLOCK NO: 93-5724
MODEL/TYPE: USN52 M & TE NO.: E25392 | THERMOMTER S/N: 562779 DUE DATE: 6-06-01
TRANSDUCER MFG: RTD/TRLA | COUPLANT ULTRAGEL BATCH: 99125 ✓
S/N 991219 ✓ SIZE: 2(8x14) FREQ: 2.0 MHz | EXAM TYPE: SHEAR☐ LONG☐ RL■ ✓
CABLE TYPE: BNC/LEMO DUAL RG-174 LENGTH: 72 inches

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 93-5724
NOMINAL ANGLE: 60° ACTUAL ANGLE: 57°

DAC



DISPLAY WIDTH: 3.200 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	62 dB	13
CIRC	☐	☐	N/A dB	N/A

FREQ: 2-8 MHz ✓ REJECT: 0 % ✓
ANGLE: 57 deg DAMPING: 1000 ohms ✓
DELAY: 0 msec PULSER: DUAL * ✓
ZERO: 8.867 msec FILTER: FIXED * ✓
VELOCITY: .2324 msec ✓ REP RATE: HIGH ✓
RANGE: 3.200 inches ✓ TOF: ■ PEAK ☐ FLANK
DISPLAY MODE: FULL POWER: BATTERY ✓
DUAL: ■ ON ✓ ☐ OFF TCG: ☐ ON ■ OFF ✓

REF. REFLECTOR: N GAIN: ~~dB~~
AMPLITUDE: ~~%~~ METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 1130 FINAL TIME: 1526

~~VERIFICATION~~ TIMES | 1) | 2) A | 3) | 4) | 5) | 6) | 7) | 8) | 9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	36	30	26	20	15	10	

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6	
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96	
			40	20		80		80	

COMMENTS:
SUPPLEMENTAL EXAMINATION

WELDS/ITEMS EXAMINED:
GR-2-18

EXAMINER: Casey L. LaRosa LEVEL: II
~~EXAMINER~~: L. Thomas LEVEL: TRN
REVIEWER: [illegible] LEVEL: III DATE: 4-6-01
ANII: Frank C. Ballard DATE: 4-18-01
PG.: 3 OF 5

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-07A

PROJECT: BFNP UNIT: 2 CYCLE: 11	EXAMINATION DATE: 4-2-01
PROCEDURE: N-UT-64 REV: 2 TC: 00-14	START TIME: 13:45 END TIME: 14:20
SYSTEM: RECIRC	EXAM SURFACE ☐ ID ■ OD
COMPONENT ID: GR-2-18	MATL. TYPE: ☐ CS ■ SS ☐ CSCL ☐ CCSS
CONFIGURATION: TEE CROSS TO PIPE (FLOW →)	SURFACE TEMP.: 81 °F PYRO. NO.: 562779
	CAL DUE DATE: 6-6-01
	EXAM ANGLE: 45° DEG / 60° RL DEG
Wo REFERENCE: ℄ OF WELD	CIRC. SCAN SENSITIVITY: 35 dB / 70 dB
Lo REFERENCE: TDC	AXIAL SCAN SENSITIVITY: 35 dB / 70 dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	3	45°	N/A	NO SCAN DO TO CONFIGURATION
							%	4	45°	X	
		N					%	5	45°	X	
							%	6	45°	X	
							%	4	60 RL	X	
							%				
							%				
							%		N		
							%				
							%				
					A		%				
							%				A
							%				
							%				

REMARKS / LIMITATIONS:

LIMITED EXAMINATION DUE TO TEE TO PIPE CONFIGURATION.
LONG SEAM LOCATED @ 67.5" TO 68.5"

EXAMINER: Casey L. La Joya	LEVEL: II	ANII: Frank E. Dallas
~~EXAMINER:~~ LEE Thompson 4-2-01	LEVEL: TRN	DATE: 4-18-01
REVIEWER:	LEVEL: III DATE: 4-6-01	PAGE 4 OF 5

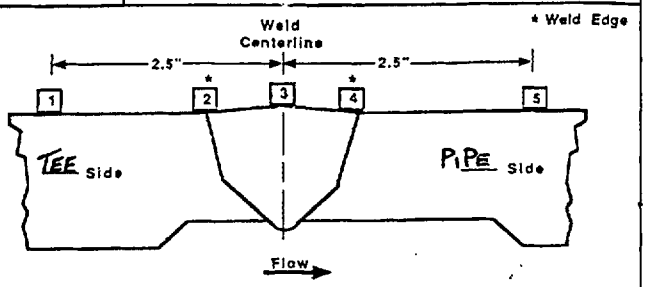
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-014

PROJECT: BFNP
UNIT: 2

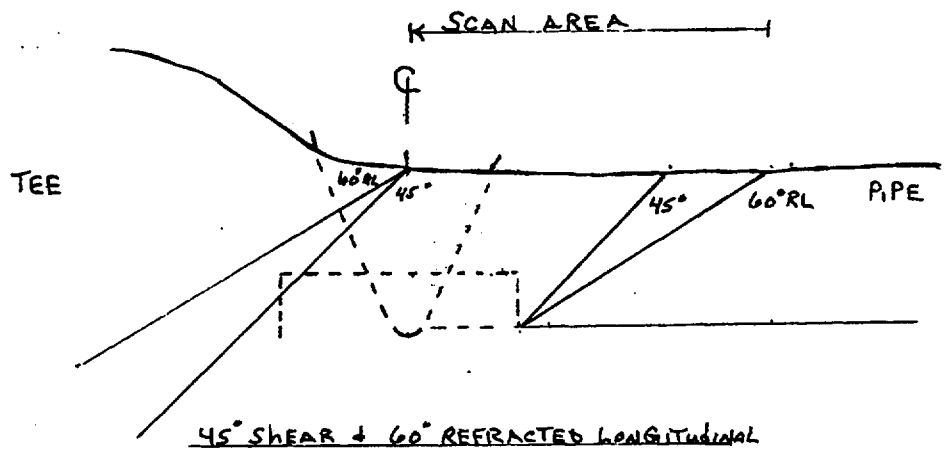
WELD NO: GR-2-18
SYSTEM: RECIRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N	N		
2	A			
3	1.22"			
4	1.10"			A
5	1.08			



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.25"
DIAMETER: 22"
WELD LENGTH: 69.75"



45° SHEAR & 60° REFRACTED LONGITUDINAL
EXAMINATION VOLUME DRAWING
CODE COVERAGE TO ℄ OF WELD ONLY

EXAMINER: Carey J. La Rosa
LEVEL: II
DATE: 4-2-01

REVIEWED BY: [illegible]
LEVEL: III
DATE: 4-6-01

ANII: [illegible]
DATE: 4-18-01

PAGE 5 OF 5

TVA 19668 (NP-5-89)

1-108-999-44

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-077

PROJECT: BFNP	UNIT: 2	CYCLE: 11		COMPONENT ID: GR-2-19	
EXAMINATION METHOD				SYSTEM: Recirc.	ISI DWG. NO. 2-ISI-0270-C Sh1
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: 1	CATEGORY: R-A
PROCEDURE: N-UT-64		REV: 2	TC: 00-14	COFIG.: Sweep o let TO Pipe	
EXAMINER: Dickey Michael		~~EXAMINER:~~		EXAMINER: N/A	EXAMINER: N/A
LEVEL: II		LEVEL: I Trainee		LEVEL:	LEVEL:

This report contains data associated with the manual UT examination of weld GR-2-19. The examination satisfies the requirements of ASME Section XI (Risk Informed) R1.16 C + NUREG 0313

The examination was performed utilizing a 45° Shear + 60° refraded longitudinal. Scans 45+6 were performed with 45° Shear. Scan 4 with 60° RL. The previously recorded indication was seen at below recordable levels verified with a 70° Shear wave to be Root Geometry

There were no Indications Indicative of Cracks or IGSCC

50% Coverage was obtained Per ODI Examination

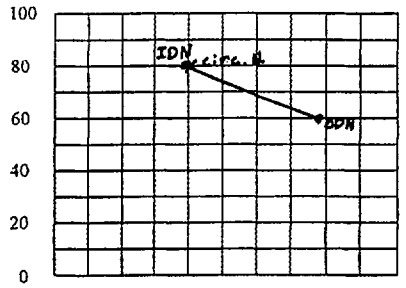
This Exam was performed with equipment + procedures and personnel qualified in accordance with ASME Section XI Appendix VIII as amended by the rule.

~100% COVERAGE OBTAINED UTILIZING ASME SECTION XI CRITERIA.
WMB 4-6-01

RESOLUTION BY:	REVIEWED BY:	ANII:
Dickey Michael		DATE: 4-18-01
LEVEL: II DATE: 43-01	LEVEL: III DATE: 4-6-01	PG. 1 OF 6

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-077

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-3-01
PROC.: N-UT-64 REV: 2 TC: 0014	CALIBRATION BLOCK NO.: BF-79 TEMP: 70 °F
INSTR. MFG: Krautkramer DUE DATE: 9-11-01	SIMULATOR BLOCK NO: 6026-83
MODEL/TYPE: USN 52L M & TE NO.: E 30219	THERMOMTER S/N: 558275 DUE DATE: 12-6-01
TRANSDUCER MFG: KBA Comp G	COUPLANT Ultragel II BATCH: 99125
S/N 00FCYT SIZE: 0.5" FREQ: 1.5 MHz	EXAM TYPE: SHEAR☒ LONG☐ RL☐
CABLE TYPE: RG-174/u LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: Rompus S/N: 6026-83
DAC	NOMINAL ANGLE: 45 ACTUAL ANGLE: 44



DISPLAY WIDTH: 2.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	24 dB	25
CIRC	☒	☐	27 dB	25

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: 44	deg	DAMPING: 1000	ohms
DELAY: 0.0	msec	PULSER: Single	*
ZERO: 6.231	msec	FILTER: Fixed	*
VELOCITY: .1240	msec	REP RATE: High	
RANGE: 2.5	inches	TOF: ☒PEAK ☐ FLANK	
DISPLAY MODE: Full		POWER: Batt.	
DUAL: ☐ ON ☒ OFF		TCG: ☒ ON ☐ OFF	

REF. REFLECTOR: N/A	GAIN: N/A dB
AMPLITUDE: N/A %	METAL PATH: N/A "

CALIBRATION TIMES

INITIAL TIME: 1055 FINAL TIME: 1530

VERIFICATION TIMES	1) N/A	2) N/A	3) N/A	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

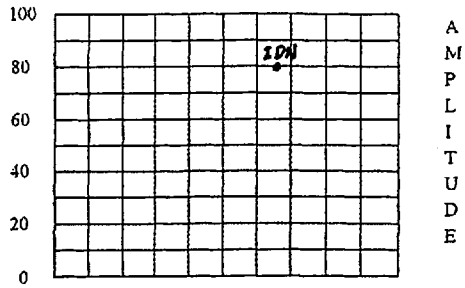
VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	15	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
DWG # 2-151-0270-6 Sheet 2	GR-2-19
	GR-2-22

EXAMINER:	~~EXAMINER:~~	REVIEWER:	ANII:
Dickey Michael			DATE: 4-18-01
LEVEL: II	LEVEL: I Trainee	LEVEL: III DATE: 4.6.01	PG.: 2 OF 6

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-077

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-3-01
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF-79 TEMP: 70 °F
INSTR. MFG: Krautkramer DUE DATE: 9-11-01	SIMULATOR BLOCK NO: 6026-83
MODEL/TYPE: USN 52L M & TE NO.: E 30219	THERMOMTER S/N: 558275 DUE DATE: 12-6-01
TRANSDUCER MFG: KBA Comp G	COUPLANT Ultragel II BATCH: 99125
S/N 00DNKV SIZE: 0.5" FREQ: 1.5 MHz	EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐
CABLE TYPE: RG-174/u LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: Rompus S/N: 6026-83
DAC	NOMINAL ANGLE: 70 ACTUAL ANGLE: 68



DISPLAY WIDTH: 2.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	42 dB	27
CIRC	N/A	N/A	N/A dB	N/A

FREQ: 2-8 MHz		REJECT: 0 %	
ANGLE: 68 deg		DAMPING: 1000 ohms	
DELAY: 0.0 msec		PULSER: Single *	
ZERO: 9.780 msec		FILTER: Fixed *	
VELOCITY: .1226 msec		REP RATE: High	
RANGE: 2.5 inches		TOF: ☒ PEAK ☐ FLANK	
DISPLAY MODE: Full		POWER: Batt.	
DUAL: ☐ ON ☒ OFF		TCG: ☐ ON ☒ OFF	

REF. REFLECTOR: N/A	GAIN: N/A dB
AMPLITUDE: N/A %	METAL PATH: N/A "

CALIBRATION TIMES

INITIAL TIME: 1045	FINAL TIME: 1640

VERIFICATION TIMES	1) N/A	2) N/A	3) N/A	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	15	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
DWG # 2-151-0270-C sheet 1	GR-2-19

EXAMINER:	~~EXAMINER:~~	REVIEWER:	ANII:
Rickey Michael			DATE: 4-18-01
LEVEL: II	LEVEL: I Trainee	LEVEL: III DATE: 4-6-01	PG.: 3 OF 6

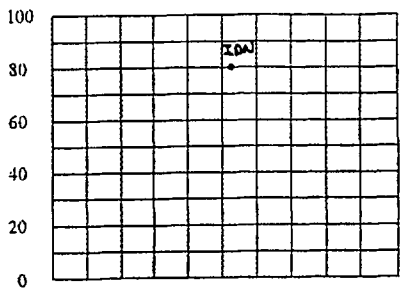
TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-077

PROJECT: BFNP UNIT: 2 CYCLE: 11 CALIBRATION DATE: 4-3-01
PROC.: N-UT-64 REV: 2 TC: 00-14 CALIBRATION BLOCK NO.: BF 79 TEMP: 70 °F
INSTR. MFG: Krautkramer DUE DATE: 9-11-01 SIMULATOR BLOCK NO: 6026-83
MODEL/TYPE: USN 52 L M & TE NO.: E30219 THERMOMTER S/N: 558275 DUE DATE: 12-6-01
TRANSDUCER MFG: RTD TRLA COUPLANT Ultrasol II BATCH: 99125
S/N 89-650 SIZE: 2 (8X14) FREQ: 2 MHz EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒
CABLE TYPE: RG 174 (DUAL) LENGTH: 72 inches

ANGLE VERIFICATION

BLOCK TYPE: Rompus S/N: 6026-83
NOMINAL ANGLE: 60 ACTUAL ANGLE: 60

DAC



DISPLAY WIDTH: 2.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	68 dB	26
CIRC	☐	☐	N/A dB	N/A

FREQ:	2-8 MHz	REJECT:	0 %
ANGLE:	60 deg	DAMPING:	1000 ohms
DELAY:	0.0 msec	PULSER:	Dual *
ZERO:	8.939 msec	FILTER:	Fixed *
VELOCITY:	2335 msec	REP RATE:	High
RANGE:	2.5 inches	TOF:	☒ PEAK ☐ FLANK
DISPLAY MODE:	Full	POWER:	Both
DUAL:	☒ ON ☐ OFF	TCG:	☐ ON ☒ OFF

REF. REFLECTOR: N/A GAIN: N/A dB
AMPLITUDE: N/A % METAL PATH: N/A "

CALIBRATION TIMES

INITIAL TIME: 1110 FINAL TIME: 1535

VERIFICATION TIMES 1) N/A 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL											
SIGNAL 1		100	90	80	70	60	50	40	30	20	
SIGNAL 2		50	45	40	36	30	26	20	15	10	
ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6			
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96			
			40	20		80		80			

COMMENTS:
DWG# 2-TSI-0270-C Sheet 1

WELDS/ITEMS EXAMINED:
GR-2-19
GR-2-22

EXAMINER:	~~EXAMINER:~~	REVIEWER:	ANII:
Dickey Michael	[signature]	WMB	[signature]
LEVEL: II	LEVEL: I Trainee	LEVEL: III DATE: 4-6-01	DATE: 4-18-01
			PG.: 4 OF 6

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-077

PROJECT: BFNP UNIT: 2 CYCLE: 11 EXAMINATION DATE: 4-3-01

PROCEDURE: N-UT-64 REV: 2 TC: 00-14 START TIME: 1405 END TIME: 1425

SYSTEM: Recirc. ISI DWG. NO: 2-151-0270-c EXAM SURFACE ☐ ID ☒ OD

COMPONENT ID: GR-2-19 MATL. TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS

CONFIGURATION: Sweep o let TO Pipe (FLOW →)

SURFACE TEMP.: 80 °F PYRO. NO.: 558275

CAL DUE DATE: 12-6-01

Wo REFERENCE: Weld ℄

Lo REFERENCE: OSR of Elbow Above

	45 DEG	60 DEG
EXAM ANGLE	45 DEG	60 DEG
CIRC. SCAN SENSITIVITY	36 dB	73 dB
AXIAL SCAN SENSITIVITY	36 dB	N/A dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	4	45°	X	
							%	5	45°	X	
							%	6	45°	X	
							%	4	60°	X	2D Geom seen below recordable levels
							%	4	70°	X	
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				

REMARKS / LIMITATIONS:

EXAMINER: Dickey Michael LEVEL: II ANII: Grant L. Bellamy

~~EXAMINER~~: [illegible] LEVEL: I Trainee DATE: 4-18-01

REVIEWER: [illegible] LEVEL: III DATE: 4-6-01 PAGE 5 OF 6

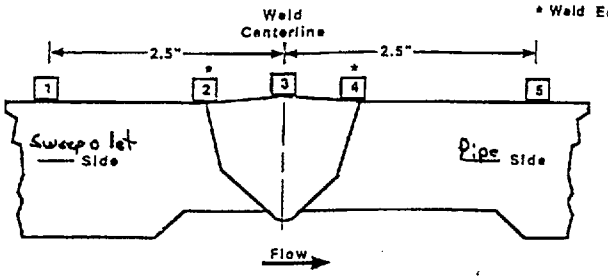
00075

TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-077

PROJECT: BFNP
UNIT: 2
WELD NO: GR-2-19
SYSTEM: Recirc.

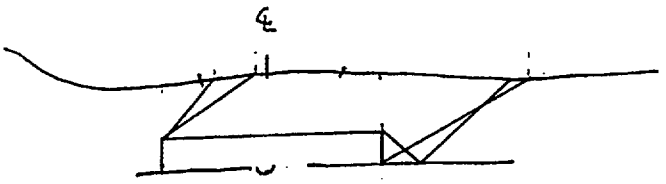
Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	.62			
3	.75			
4	.66			
5	.59			



CROWN HEIGHT: .035
CROWN WIDTH: 1.0
DIAMETER: 12"
WELD LENGTH: 40"

Previous T+C



Coverage Plot
50% coverage for PDI examination
100% coverage for Section XI examination

EXAMINER: Dickey Michael
LEVEL: II
DATE: 4-3-01

REVIEWED BY: WMB
LEVEL: III
DATE: 4-6-01

ANII: [illegible]
DATE: 4-18-01
PAGE 6 OF 6

TVA 19668 (NP 5-89)

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-076

PROJECT: BFNP	UNIT: 2	CYCLE: 11		COMPONENT ID: GR-2-22	
EXAMINATION METHOD				SYSTEM: Recirc	ISI DWG. NO. 2-151-0270-C SN#4
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: 1	CATEGORY: R-A
PROCEDURE: N-UT-64		REV: 2	TC: 00-14	COFIG.: Sweep • let TO Pipe	
EXAMINER: Dickey Michael		~~EXAMINER:~~ [signature]		EXAMINER:	EXAMINER:
LEVEL: II		LEVEL: I Trainee		LEVEL:	LEVEL:

This report contains data associated with the manual UT examination of weld GR-2-22. The examination satisfies the requirements of ASME Section XI (Risk Informed) R1.16C + NUREG 0313

The examination was performed utilizing a 45° shear wave and 60° retracted longitudinal. Scans 4,5,+6 were performed with 45° shear. Scan 4 with 60° Longitudinal. There was no Reportable Indications.

There were no indications indicative of cracks or IGSCC.

50% Coverage was obtained as per PDI Examination

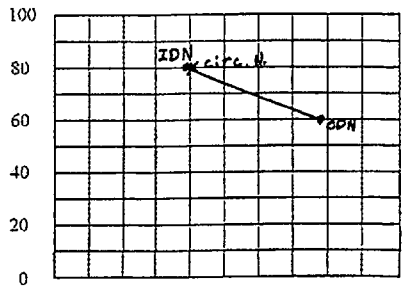
This Exam was performed with equipment, procedures and personnel qualified in accordance with ASME Section XI Appendix VIII as amended by the rule.

100% COVERAGE WAS ACHIEVED PER ASME SECTION XI CRITERIA
[initials] 4-6-01

RESOLUTION BY:	REVIEWED BY:	ANII: [signature]
Dickey Michael	[signature]	DATE: 4-18-01
LEVEL: II DATE: 4-3-01	LEVEL: III DATE: 4-6-01	PG. 1 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-076

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-3-01
PROC.: N-UT- 64 REV: 2 TC: 0014	CALIBRATION BLOCK NO.: BF-79 TEMP: 70 °F
INSTR. MFG: Krautkramer DUE DATE: 9-11-01	SIMULATOR BLOCK NO: 6026-83
MODEL/TYPE: USN 52L M & TE NO.: E 30219	THERMOMTER S/N: 558275 DUE DATE: 12-6-01
TRANSDUCER MFG: KBA Comp G	COUPLANT Ultragel II BATCH: 99125
S/N 00FCYT SIZE: 0.5" FREQ: 1.5 MHz	EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐
CABLE TYPE: RG-174/u LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: Rompus S/N: 6026-83
DAC	NOMINAL ANGLE: 45 ACTUAL ANGLE: 44.



DISPLAY WIDTH: 2.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	24 dB	25
CIRC	☒	☐	27 dB	25

FREQ: 2-8 MHz	REJECT: 0 %
ANGLE: 44 deg	DAMPING: 1000 ohms
DELAY: 0.0 msec	PULSER: Single *
ZERO: 6.231 msec	FILTER: Fixed *
VELOCITY: .1240 msec	REP RATE: High
RANGE: 2.5 inches	TOF: ☒ PEAK ☐ FLANK
DISPLAY MODE: Full	POWER: Batt.
DUAL: ☐ ON ☒ OFF	TCG: ☒ ON ☐ OFF

REF. REFLECTOR: N/A GAIN: N/A dB	CALIBRATION TIMES
AMPLITUDE: N/A % METAL PATH: N/A "	INITIAL TIME: 1055 FINAL TIME: 1530

VERIFICATION TIMES	1) N/A	2) N/A	3) N/A	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20
	SIGNAL 2	50	45	40	36	30	26	20	15	10

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	÷12	SET	÷6
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
			40	20		80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
DWG # 2-151-0270-6 sheet 1	GR-2-19
	GR-2-22

EXAMINER:	~~EXAMINER:~~	REVIEWER:	ANII:
Dickey Michael			DATE: 4-18-01
LEVEL: II	LEVEL: I Trainee	LEVEL: III DATE: 4.16.01	PG.: 2 OF 3

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-076

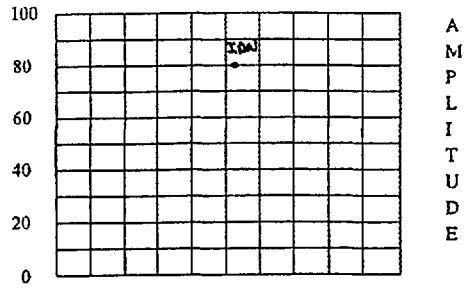
PROJECT: BFNP UNIT: 2 CYCLE: 11
PROC.: N-UT- 64 REV: 2 TC: 00-14
INSTR. MFG: Kraut Kramer DUE DATE: 9-11-01
MODEL/TYPE: USN 52 L M & TE NO.: E 30219
TRANSDUCER MFG: RTD
S/N 89-650 SIZE: 2 (8 X 14) FREQ: 2 MHz
CABLE TYPE: RG 174 (DUAL) LENGTH: 72 inches

CALIBRATION DATE: 4-3-01
CALIBRATION BLOCK NO.: BF 79 TEMP: 70 °F
SIMULATOR BLOCK NO: 6026-83
THERMOMTER S/N: 558275 DUE DATE: 12-6-01
COUPLANT Ultrasol II BATCH: 99125
EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

ANGLE VERIFICATION

BLOCK TYPE: Rampus S/N: 6026-83
NOMINAL ANGLE: 60 ACTUAL ANGLE: 60

DAC



DISPLAY WIDTH: 2.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	68 dB	26
CIRC	☐	☐	N/A dB	N/A

FREQ:	2-8 MHz	REJECT:	0 %
ANGLE:	60 deg	DAMPING:	1000 ohms
DELAY:	0.0 msec	PULSER:	Dual *
ZERO:	8.939 msec	FILTER:	Fixed *
VELOCITY:	.2335 msec	REP RATE:	High
RANGE:	2.5 inches	TOF:	☒ PEAK ☐ FLANK
DISPLAY MODE:	Full	POWER:	Batt.
DUAL:	☒ ON ☐ OFF	TCG:	☐ ON ☒ OFF

REF. REFLECTOR: N/A GAIN: N/A dB
AMPLITUDE: N/A % METAL PATH: N/A "

CALIBRATION TIMES

INITIAL TIME: 1110 FINAL TIME: 1535

VERIFICATION TIMES 1) N/A 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	15	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:
DWG # 2-IS1-0270-C Sheet 1

WELDS/ITEMS EXAMINED:
GR-2-19
GR-2-22

EXAMINER: Dickey Michael
LEVEL: II

~~EXAMINER:~~ 4/6/01
LEVEL: I Trainee

REVIEWER:
LEVEL: III DATE: 4-6-01

ANII: Frank E. Bellamy Jr
DATE: 4-18-01
PG.: 3 OF 9

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-076

PROJECT: BFNP UNIT: 2 CYCLE: 11 EXAMINATION DATE: 4-3-01

PROCEDURE: N-UT-64 REV: 2 TC: 00-14 START TIME: 1335 END TIME: 1400

SYSTEM: Recirc. ISI DWG. NO: 2-151-0270-C EXAM SURFACE ☐ ID ☒ OD

COMPONENT ID: GR-2-22 MATL. TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS

CONFIGURATION: Sweep o let TO Pipe (FLOW →)

SURFACE TEMP.: 81 °F PYRO. NO.: 558275

CAL DUE DATE: 12-6-01

Wo REFERENCE: Weld 4

Lo REFERENCE: OSR of Elbow Above

EXAM ANGLE	45 DEG	60 DEG
CIRC. SCAN SENSITIVITY	36 dB	73 dB
AXIAL SCAN SENSITIVITY	36 dB	73 dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	4	45°	X	
							%	5	45°	X	
							%	6	45°	X	
							%	4	60°	X	
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				

REMARKS / LIMITATIONS:

EXAMINER: Dickey Michael LEVEL: II ANII: Frank L. Sellars Jr.

~~EXAMINER:~~ [illegible] LEVEL: I Trainee DATE: 4-18-01

REVIEWER: [illegible] LEVEL: III DATE: 4-6-01 PAGE 4 OF 5

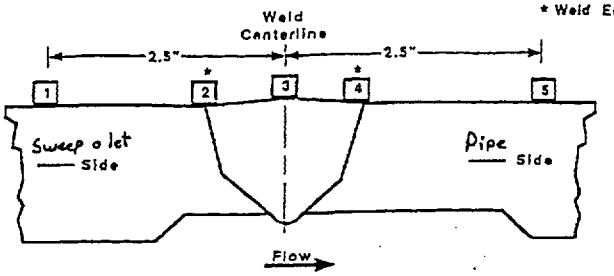
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-076

PROJECT: BFNP
UNIT: 2

WELD NO: GR-2-22
SYSTEM: Recirc.

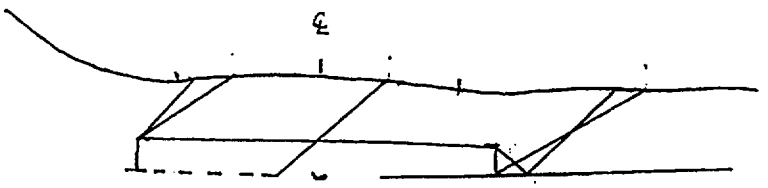
Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	.66			
3	.74			
4	.60			
5	.60			



CROWN HEIGHT: .08
CROWN WIDTH: 2"
DIAMETER: 12"
WELD LENGTH: 38"

Previous T+C



Coverage Plot
50% coverage for PDI examination
100% coverage for Section XI examination

EXAMINER: Dickey Michael
LEVEL: II
DATE: 4-3-01

REVIEWED BY: [signature]
LEVEL: III
DATE: 4-6-01

ANII: Frank E. Dellois Jr
DATE: 4-18-01
PAGE 5 OF 5

TVA 10004 (NP 5-89)

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-080

PROJECT: BFNP UNIT: 2	CYCLE: 11	COMPONENT ID: GR-2-35	
EXAMINATION METHOD		SYSTEM: RECIRC	ISI DWG. NO. 2-151-0370-C-02
MT ☐ PT ☐ UT ■ VT ☐		CONFIGURATION:	
PROCEDURE: N-UT-64	REV: 2 TC: 00-14	BRANCH TO PIPE	
EXAMINER: Casey T. LaSoya	EXAMINER: L. Thompson	EXAMINER:	EXAMINER:
LEVEL: II	LEVEL: TRN	LEVEL:	LEVEL:

50% COVERAGE OBTAINED USING 10CFR50.55a CRITERIA

100% COVERAGE OBTAINED USING SECTION XI CRITERIA

4-7-01

This report contains the data associated with weld GR-2-35 A branch to pipe configuration. The manual UT examination satisfies the requirements of ASME Section XI and the NUREG 0313.

A 45° shear wave, a 70° shear wave and a 60° refracted longitudinal wave examination techniques were utilized for interigation of weld volume. The 45° shear wave was used for (1) axial scan down stream side, and (2) scans circumferentially. The 70° shear was for determination of geometrical reflectors discovered with the 60°RL. 60°RL was performed over the weld crown for maximum coverage.

Root geometry was recorded. No indications indicative of cracks or IGSCC were observed.

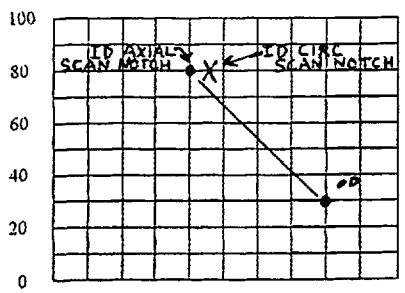
Limited examination due to weld configuration, down stream side only. Circ scans performed (2) dir. up stream side skewing towards ℄ of weld. 50% code coverage to ℄ of weld obtained. 100% code coverage obtained circumferentially.

This examination was performed with equipment, personnel and procedures qualified in accordance with ASME Section XI Appendix VIII as amended by the rule.

RESOLUTION BY: C. LaSoya	REVIEWED BY:	ANII:
LEVEL: II DATE: 4-5-01	LEVEL: III DATE: 4-7-01	DATE: 4-19-01
		PG. 1 OF 1

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-080

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-05-01
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF79 TEMP: 71 °F
INSTR. MFG: KBA DUE DATE: 6-20-01	SIMULATOR BLOCK NO: 93-5724
MODEL/TYPE: USN 52 M & TE NO.: E25392	THERMOMTER S/N: 562779 DUE DATE: 6-6-01
TRANSDUCER MFG: KBA ComP-G	COUPLANT ULTRAGEL BATCH: 99125 Ø CH4-5-01
S/N 00FCYK SIZE: .375" FREQ: 1.5 MHz	EXAM TYPE: SHEAR ■ LONG ☐ RL ☐
CABLE TYPE: RG-174/u LENGTH: 72" inches	ANGLE VERIFICATION
	BLOCK TYPE: ROMPAS S/N: 93-5724
DAC	NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°



DISPLAY WIDTH: 2.463 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	32.0 dB	15
CIRC	☐	☐	35.0 dB	15

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: 44	deg	DAMPING: 1000	ohms
DELAY: 0	msec	PULSER: SINGLE*	
ZERO: 6.413	msec	FILTER: FIXED *	
VELOCITY: .1251	msec	REP RATE: HIGH	
RANGE: 2.463	inches	TOF: ■ PEAK ☐ FLANK	
DISPLAY MODE: Full		POWER: BATTERY	
DUAL: ☐ ON ■ OFF		TCG: ☐ ON ■ OFF	

REF. REFLECTOR: N	GAIN: ~~dB~~
AMPLITUDE: %	METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 9:55 FINAL TIME: 11:50

~~VERIFICATION~~ TIMES	1)	2) A	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20
	SIGNAL 2	50	45	40	36	30	26	20	14	10

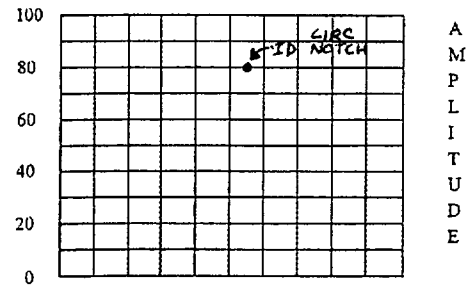
ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
			40	20		80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
PRIMARY EXAMINATION TECHNIQUE	GR-2-35

EXAMINER:	~~EXAMINER~~: L. Thompson	REVIEWER:	ANII:
Carey L. LaHoya	CL 4-5-01	WMB	DATE: 4-19-01
LEVEL: II	LEVEL: TRN	LEVEL: III DATE: 4-19-01	PG.: 2 OF 7

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-080

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-05-01
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF79 TEMP: 71 °F
INSTR. MFG: KBA DUE DATE: 6-20-01	SIMULATOR BLOCK NO: 93-5724
MODEL/TYPE: USN 52 M & TE NO.: E25392	THERMOMTER S/N: 562779 DUE DATE: 6-06-01
TRANSDUCER MFG: RTD TRLA	COUPLANT ULTRAGEL BATCH: 99125
S/N 99-1219 SIZE: 2(8x14) FREQ: 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL■
CABLE TYPE: BNC/LEMO DUAL RG-174 LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: ROMPAS S/N: 93-5724
DAC	NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°



DISPLAY WIDTH: 2.500 inches

INSTRUMENT SETTINGS				
REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	■	☐	62.0 dB	16
CIRC	☐	☐	N/A dB	N/A

FREQ: 2-8 MHz		REJECT: 0 %	
ANGLE: 58 deg		DAMPING: 1000 ohms	
DELAY: 0 msec		PULSER: DUAL *	
ZERO: 8.867 msec		FILTER: FIXED *	
VELOCITY: .2324 msec		REP RATE: HIGH	
RANGE: 2.500 inches		TOF: ■ PEAK ☐ FLANK	
DISPLAY MODE: FULL		POWER: BATTERY	
DUAL: ■ ON ☐ OFF		TCG: ☐ ON ■ OFF	

REF. REFLECTOR: N	GAIN: ~~dB~~	CALIBRATION TIMES	
AMPLITUDE: %	METAL PATH: "	INITIAL TIME: 10:00	FINAL TIME: 11:55

VERIFICATION TIMES	1)	2) A	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

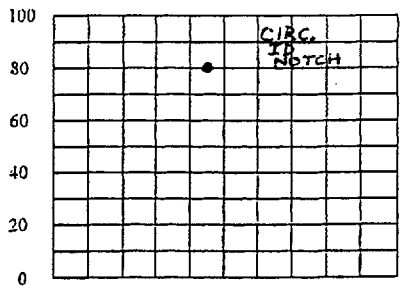
VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	14	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET	+12		SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %	64 TO 96		40%	64 TO 96
			40		20			80			80

COMMENTS:	WELDS/ITEMS EXAMINED:
SUPPLEMENTAL EXAMINATION	GR-2-35

EXAMINER:	~~EXAMINER~~: L. Thompson 4-5-01	REVIEWER:	ANII:
Carey L. La Hoya			DATE: 4-19-01
LEVEL: II	LEVEL: TRN	LEVEL: III DATE: 4.7.01	PG.: 3 OF 7

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-080

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-5-01
PROC.: N-UT- 64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF79 TEMP: 71 °F
INSTR. MFG: KBA DUE DATE: 6-20-01	SIMULATOR BLOCK NO: 93-5724
MODEL/TYPE: USN 52 M & TE NO.: E25392	THERMOMTER S/N: 562779 DUE DATE: 6-6-01
TRANSDUCER MFG: KBA COMP-G	COUPLANT ULTRAGEL BATCH: 99125
S/N 00FCYN SIZE: .375" FREQ: 1.5 MHz	EXAM TYPE: SHEAR ■ LONG ☐ RL ☐
CABLE TYPE: RG-174/u LENGTH: 72" inches	ANGLE VERIFICATION
	BLOCK TYPE: IIW S/N: 791539
DAC	NOMINAL ANGLE: 70° ACTUAL ANGLE: 67°



DISPLAY WIDTH: 3.500 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	■	☐	42.5 dB	17
CIRC	☐	☐	N/A dB	N/A

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: 67	deg	DAMPING: 1000	ohms
DELAY: 0	msec	PULSER: SINGLE*	
ZERO: 9.426	msec	FILTER: FIXED *	
VELOCITY: .1320	msec	REP RATE: HIGH	
RANGE: 3.500	inches	TOF: ■ PEAK ☐ FLANK	
DISPLAY MODE: FULL		POWER: BATTERY	
DUAL: ☐ ON ■ OFF		TCG: ☐ ON ■ OFF	

REF. REFLECTOR: N	GAIN: ~~dB~~
AMPLITUDE: %	METAL PATH: "

CALIBRATION TIMES

INITIAL TIME: 13:20 FINAL TIME: 14:30

~~VERIFICATION~~ TIMES	1)	2) A	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	14	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
SUPPLEMENTAL EXAMINATION	GR-2-35
SCANNED @ 40 dB TO MAINTAIN 5% TO 15%	
ID NOISE LEVEL	

EXAMINER:	EXAMINER: L. Thompson OK 4-5-01	REVIEWER:	ANII:
LEVEL: II	LEVEL: TRN	LEVEL: III DATE: 4-7-01	DATE: 4-19-01
			PG.: 4 OF 7

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-080

PROJECT: BFNP UNIT: 2	CYCLE: 11	EXAMINATION DATE: 4-05-01	
PROCEDURE: N-UT- 64 REV: 2	TC: 00-14	START TIME: 10:30	END TIME: 11:15
SYSTEM: RECIRC		EXAM SURFACE ☐ ID ■ OD	
COMPONENT ID: GR-2-35		MATL. TYPE: ☐ CS ■ SS ☐ CSCL ☐ CCSS	
CONFIGURATION		SURFACE TEMP.: 80 °F	PYRO. NO.: 562779
BRANCH TO PIPE		CAL DUE DATE: 6-06-01	
FLOW →		EXAM ANGLE	45 DEG / 60RL DEG
Wo REFERENCE: ℄ OF WELD		CIRC. SCAN SENSITIVITY	49 dB / N/A dB
Lo REFERENCE: OUTSIDE RADIUS OF ELBOW ABOVE		AXIAL SCAN SENSITIVITY	45 dB / 76 dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
			N				%	3	45	N/A	NO SCAN DUE TO CONFIGURATION
							%	4	45	X	
							%	5	45	X	SCANNED ACCROSS WELD ONTO BRANCH
					A		%	6	45	X	SIDE. SKEWING TO WARD ℄ OF WELD.
							%	3	60RL	X	*
1	*	3"	*	1.0"	1.3"	.72"	100 %	4	60RL		ROOT GEOMETRY
							%	4	70	X	
							%				
		N					%		N		
							%				
							%				
							%				
					A		%				A
							%				

REMARKS / LIMITATIONS: * 60°RL EXAMINATION SCAN #3 PERFORMED OVER THE WELD BEST EFFORT EXAM. 70° SHEAR WAVE EXAM PERFORMED @ 40 db TO MAINTAIN ID NOISE LEVEL @ 5% TO 20% 70° SHEAR WAVE EXHIBITED NO INDICATIONS INDICATIVE OF CRACKS OR IGSCC. LOW LEVEL ROOT GEOMETRY NOTED.

EXAMINER: Casey L. LaSaga	LEVEL: II	ANI: Frank E. Ballinger	
~~EXAMINER:~~ Cd 4-6-01 L. Thompson	LEVEL: TRN	DATE: 4-19-01	
REVIEWER: [illegible]	LEVEL: III	DATE: 4.7.01	PAGE 5 OF 7

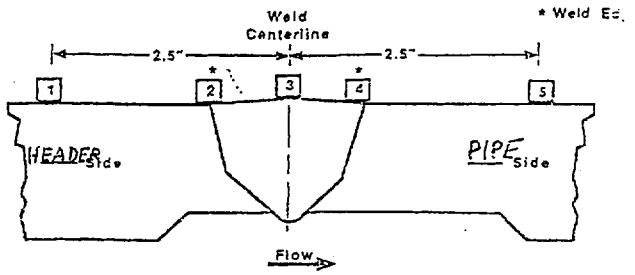
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R.080

PROJECT: BROWNS FERRY
UNIT: 2

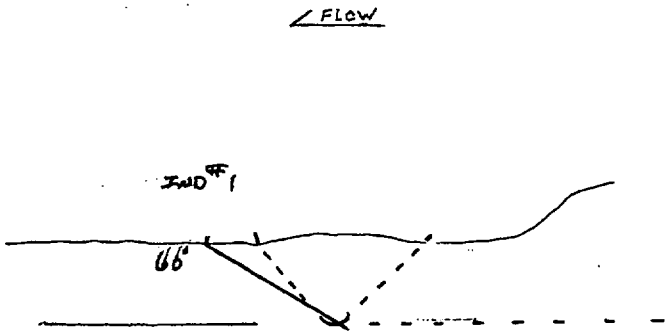
WELD NO: GR2-35
SYSTEM: RECIRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	N/A			
3	.640		N/A	
4	.60			
5	.59			



CROWN HEIGHT: .030"
DIAMETER: 12"
CROWN WIDTH: 1"
WELD LENGTH: 39"



60°RL INICATION PLOT
ROOT GEOMETRY

EXAMINER: Corey L. LaSoya
LEVEL: II
DATE: 4-5-01

REVIEWED BY: [illegible]
LEVEL: III
DATE: 4-7-01

ANII: Frank J. Bello Jr.
DATE: 4-19-01
PAGE 6 OF 7

TVA 19004 (SP 5 89)

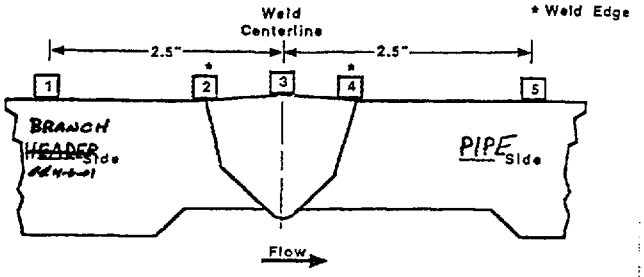
TVA	WALL THICKNESS PROFILE SHEET 00095	REPORT NO: R-080

PROJECT: BROWNS FERRY
UNIT: 2

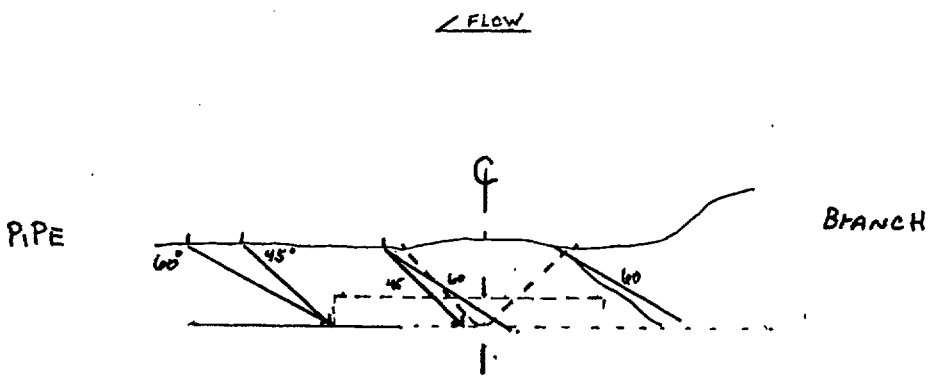
WELD NO: GR2-35
SYSTEM: RECIRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	N/A			
3	.640		N/A	
4	.60			
5	.59			



CROWN HEIGHT: .030"
DIAMETER: 12"
CROWN WIDTH: 1"
WELD LENGTH: 39"



EXAMINATION VOLUME PLOT
CODE COVERAGE TO ℄ OF WELD.
45° SHEAR WAVE / 60° RL

EXAMINER: Casey L. La Shoya	REVIEWED BY: [illegible]	ANII: [illegible]
LEVEL: II	LEVEL: III DATE: 4-7-01	DATE: 4-19-01
DATE: 4-5-01		PAGE 1 OF 1

TVA 19668 (NP-5-89) 1-104 996

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-073

PROJECT: BFNP	UNIT: 2	CYCLE: 11		COMPONENT ID: GR-2-48	
EXAMINATION METHOD				SYSTEM: RECIRC	ISI DWG. NO. 2-~~SSS~~-0370-C-02
MT ☐	PT ☐	UT ☒	VT ☐	CONFIGURATION:	
PROCEDURE: N-UT-64		REV: 2	TC: 00-14	TEE	TO PIPE
EXAMINER: [signature]		EXAMINER: N/A		EXAMINER: N/A	EXAMINER: N/A
LEVEL: II		LEVEL: N/A		LEVEL: N/A	LEVEL: N/A

THIS REPORT CONTAINS THE DATA ASSOCIATED WITH THE MANUAL EXAMINATION OF GR-2-48 TO REQUIREMENTS OF NUREG 0313 AND ASME SECTION XI.

A 45 DEGREE SHEAR WAVE WAS PERFORMED SCANS 4, 5 AND 6.

A 60 DEGREE RL PERFORMED SCAN 4

ONE SIDE EXAM DUE TO TEE.
50% COVERAGE OBTAINED USING 10 CFR 50.55a CRITERIA.
100% COVERAGE OBTAINED USING SECTION XI CRITERIA.

NO RECORDABLE INDICATIONS

RESOLUTION BY:	REVIEWED BY:	ANII: Frank E Bellairs Jr
LEVEL: II DATE: 4-05-2001	LEVEL: III DATE: 4-6-01	DATE: 4-18-01
		PG. 1 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-073

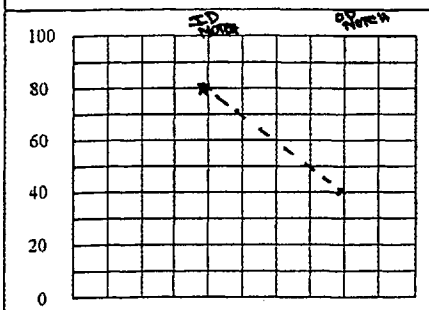
PROJECT: BFNP UNIT: 2 CYCLE: 11
PROC.: N-UT-G4 REV: 2 TC: 00-14
INSTR. MFG: KB DUE DATE: 12-07-01
MODEL/TYPE: 48K7D M & TE NO.: E17350
TRANSDUCER MFG: KB Comp G
S/N 00D8KF SIZE: .375 FREQ: 1.5 MHz
CABLE TYPE: BNC TO MICRO RG174 LENGTH: 72 inches

CALIBRATION DATE: 4-5-2001
CALIBRATION BLOCK NO.: BF-79 TEMP: 70 °F
SIMULATOR BLOCK NO: 94-7995
THERMOMTER S/N: 562777 DUE DATE: 12-6-01
COUPLANT ULTRAGEL II BATCH: 99125
EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 94-7995
NOMINAL ANGLE: 45 ACTUAL ANGLE: 44

DAC



DISPLAY WIDTH: 2.5 inches

REF. REFLECTOR: Rompas SDH GAIN: 34.5 dB
AMPLITUDE: 80 % METAL PATH: 4.0 SD

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	☒	☐	21 dB	7
CIRC	☒	☐	26 dB	7

FREQ: 1-5 MHz REJECT: OFF %
ANGLE: 44 deg DAMPING: FIXED ohms
DELAY: 5.4 msec PULSER: HIGH
ZERO: 5.07 msec FILTER: FIXED
VELOCITY: 123.0 msec REP RATE: HIGH
RANGE: 2.5 inches TOF: ☒ PEAK ☐ FLANK
DISPLAY MODE: FULL POWER: BATT
DUAL: ☐ ON ☒ OFF TCG: ☐ ON ☒ OFF

CALIBRATION TIMES

INITIAL TIME: 0925 FINAL TIME: 1427

VERIFICATION TIMES	1) 0930	2) 1138	3) 1305	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL										
SIGNAL 1	100	90	80	70	60	50	40	30	20
SIGNAL 2	50	45	40	34	29	24	19	14	9

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
			40	18		82		80

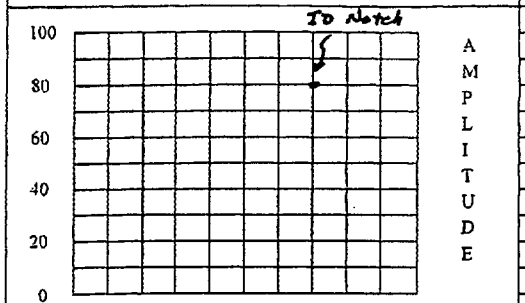
COMMENTS: N/A

WELDS/ITEMS EXAMINED: GR-2-48

EXAMINER:	EXAMINER: N/A	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 4-6-01	DATE: 4-18-01
			PG.: 2 OF 5

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-073

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4/5/01
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO. 8F-8168 TEMP: 70 °F
INSTR. MFG: KB DUE DATE: 12-7-01	SIMULATOR BLOCK NO: 94-7995
MODEL/TYPE: USB 7D / M & TE NO.: E17350	THERMOMTER S/N: 562777 DUE DATE: 12/6/01
TRANSDUCER MFG: RTD TR LN2	COUPLANT: ULTRAGEL II BATCH: 99125
S/N 99-1216 SIZE: 8X14 FREQ: 2.0 MHz	EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒
CABLE TYPE: RG-174 LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: Rompas S/N: 94-7995
DAC	NOMINAL ANGLE: 60° ACTUAL ANGLE: 60°



DISPLAY WIDTH: 1.0 inches Depth

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	66.5 dB	2
CIRC	☒/A	☐	N/A dB	N/A

FREQ: 1-5	MHz	REJECT: OFF	%
ANGLE: 60	deg	DAMPING: FIXED	ohms
DELAY: 10.0	msec	PULSER: DUAL	*
ZERO: 9.62	msec	FILTER: FIXED	*
VELOCITY: 295.2	msec	REP RATE: HIGH	
RANGE: 2.0	inches	TOF: ☒ PEAK ☐ FLANK	
DISPLAY MODE: FULL		POWER: BATT	
DUAL: ☒ ON ☐ OFF		TCG: ☐ ON ☒ OFF	

REF. REFLECTOR: Rompas SDH GAIN: 51 dB	CALIBRATION TIMES
AMPLITUDE: 80 % METAL PATH: 34 Depth	INITIAL TIME: 0940 FINAL TIME: 1422

VERIFICATION TIMES	1) 0944	2) 1206	3) 1230	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	34	29	24	19	14	9
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET	+12		SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %	64 TO 96		40%	64 TO 96
			40		18			82			80

COMMENTS: N/A	WELDS/ITEMS EXAMINED:
	GR-2-48

EXAMINER:	EXAMINER: N/A	REVIEWER:	ANII:
LEVEL:	LEVEL: N/A	LEVEL: III DATE: 4-6-01	DATE: 4-18-01
			PG.: 3 OF 5

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-073

PROJECT: BFNP UNIT: 2 CYCLE: 11	EXAMINATION DATE: 4-05-2001
PROCEDURE: N-UT-64 REV: 2 TC: 00-14	START TIME: 1140 END TIME: 1230
SYSTEM: RECIRC ISI DWG. NO: 2-ISI-0270-C-02	EXAM SURFACE ☐ ID ☒ OD
COMPONENT ID: GR-2-48	MATL. TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
CONFIGURATION: TEE TO PIPE (FLOW →)	SURFACE TEMP.: 80 °F PYRO. NO.: 562799
	CAL DUE DATE: 12-06-2001
Wo REFERENCE: Center line OF WELD	EXAM ANGLE: 45 DEG / 60 DEG
Lo REFERENCE: OUTSIDE RADIUS OF ELBOW DOWNSTREAM	CIRC. SCAN SENSITIVITY: 34 dB / N/A dB
	AXIAL SCAN SENSITIVITY: 32 dB / 64.5 dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
							%	4	60	X	
							%	4	45	X	
							%	5	45	X	
							%	6	45	X	
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				

REMARKS / LIMITATIONS: NO RECORDABLE INDICATIONS
ONE SIDE EXAM DUE TO TEE UPSTREAM
NO SCAN #3 DUE TO TEE
50% COVERAGE OBTAINED USING 10CFR 50.55a CRITERIA
100% COVERAGE OBTAINED USING SECTION XI CRITERIA.
SCANNED AT 15% NOISE LEVEL. ALL SCANS

EXAMINER: [signature]	LEVEL: II	ANII: [signature]
EXAMINER: N/A	LEVEL: N/A	DATE: 4-18-01
REVIEWER: [signature]	LEVEL: III DATE: 4-6-01	PAGE 4 OF 5

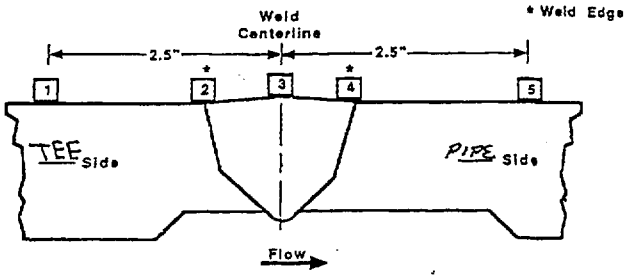
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-073

PROJECT: BFNP
UNIT: 2

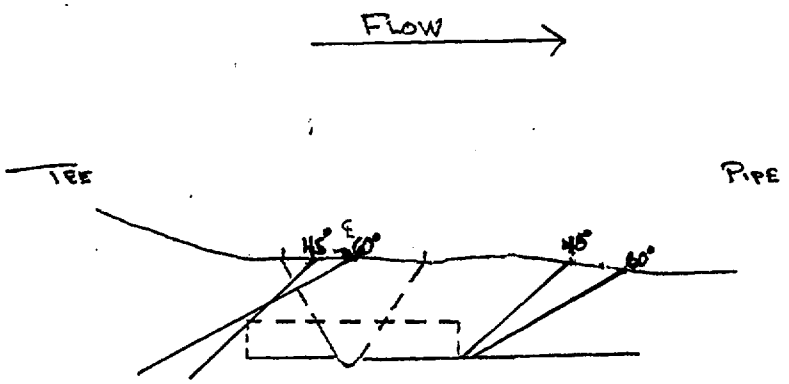
WELD NO: GR-2-48
SYSTEM: 068 REC IRC

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	.68		N	
3	.78		A	
4	.70			
5	.58			



CROWN HEIGHT: Flush
DIAMETER: 12"
CROWN WIDTH: 1.0"
WELD LENGTH: 40"



THICKNESS AND PROFILE FROM PREVIOUS DATA

EXAMINER: [signature]	REVIEWED BY: [signature]	ANII: Frank J. DeRosa Jr
LEVEL: II	LEVEL: III DATE: 4-6-01	DATE: 4-18-01
DATE: 4-05-2001		PAGE 5 OF 5

TVA 19668 (NP-5-89)

000164 D

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-105

PROJECT: BFN	UNIT: 2	CYCLE: 10	COMPONENT ID: D/RHR-2-03
EXAMINATION METHOD			SYSTEM: RHRS
MT ☐ PT ☐	UT ☒	VT ☐	CONFIGURATION:
PROCEDURE: N-UT-64	REV: 1	TC: NA	VALVE TO FLUED HEAD

EXAMINER:	EXAMINER:	EXAMINER:	EXAMINER:
NORMAN P SINIAHO	SAMUEL T. SHARP		
LEVEL: II	LEVEL: II	LEVEL:	LEVEL:

THIS REPORT CONTAINS THE DATA ASSOCIATED WITH THE ULTRASONIC EXAMINATION OF WELD D-RHR-2-03

A MANUAL ULTRASONIC EXAMINATION WAS PERFORMED UTILIZING 45°S, 60°S AND 45°RL TECHNIQUES.

HALF VEE CALIBRATIONS WERE ESTABLISHED AND SCANNING PERFORMED AT 5 to 10% NOISE LEVELS.

ROOT GEOMETRY WAS NOTED AT VARIOUS AMPLITUDES WITH THE 60° SHEAR WAVE WITH SCAN 4. NO OTHER INDICATIONS WERE NOTED AS RECORDABLE.
COVERAGE CALCULATION WAS PERFORMED AND IS ESTIMATED AT 85% BI DIRECTIONAL COVERAGE.

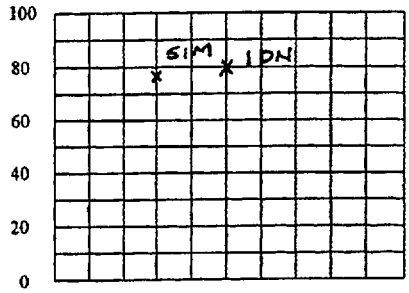
EXAMINATION SATISFIES NUREG 0313 REQUIREMENTS.
4/1/99

This examination satisfies the requirements of ASME Section XI (Risk Informed) RR16D.
4/20/01

RESOLUTION BY:	REVIEWED BY:	ANII: 5/14/01
LEVEL: II DATE: 4/1/99	LEVEL: III DATE: 4-1-99	DATE: 8/1/01
		PG. 1 OF 9

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-109

PROJECT: BFN UNIT: 2 CYCLE: 10	CALIBRATION DATE: 4-1-99
PROCEDURE: N-UT- 64 REV: 1 TC: N/A	CALIBRATION BLOCK NO.: BF57 TEMP: 78 °F
INSTRUMENT: KRAUT. BRAN DUE DATE: 12-15-99	SIMULATOR BLOCK NO: 935723
MODEL/TYPE: USN 50 SERIAL NO.: E21663	THERMOMTER S/N: 531986 DUE DATE: 8-6-99
TRANSDUCER MANUF: KB-A	COUPLANT ULTRAGEL II BATCH: 093011
S/N 15240 SIZE: .375 FREQ: 1.5 MHz	EXAM TYPE: SHEAR☒ LONG☐ RL☐
CABLE TYPE: RG174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: ROMPAS S/N: 935723
DAC	NOMINAL ANGLE: 45 ACTUAL ANGLE: 45



DISPLAY WIDTH: 3.599 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	35 dB	12
CIRC	☐	☐	N/A dB	N/A

FREQ: FIXED MHz	REJECT: 0 %
ANGLE: 45 deg	DAMPING: FIXED ohms
DELAY: 4.820 msec	PULSER: HIGH *
ZERO: 6.090 msec	FILTER: FIXED *
VELOCITY: .1242 msec	REP RATE: HIGH
RANGE: 3.599 inches	TOF: ☒PEAK ☐ FLANK
RECTIFIER: N/A	POWER: BATTERY
DUAL: ☐ ON ☒ OFF	TCG: ☐ ON ☒ OFF

REF. REFLECTOR: ROMPAS SDH GAIN: 42 dB	**CALIBRATION TIMES**
AMPLITUDE: 75 % METAL PATH: 1.007"	INITIAL TIME: 8:30 FINAL TIME: 1050

VERIFICATION TIMES	1) N/A	2) N/A	3) N/A	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	35	30	25	20	15	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		20				80		80

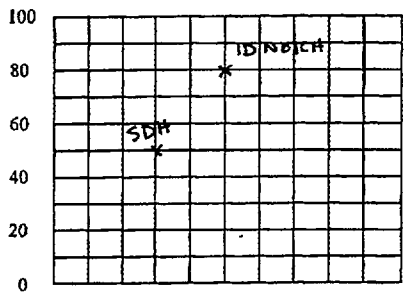
COMMENTS:	WELDS/ITEMS EXAMINED:
	DRHR-2-03

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
Samuel T. Shaw	N/A	W W Bentley	5/14/01
LEVEL: II	LEVEL:	LEVEL: II DATE: 4-1-99	DATE: N/A 8-21/8/01
			PG.: 1 OF 9

000166

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-105

PROJECT: BFN UNIT: 2 CYCLE: 10	CALIBRATION DATE: 4/1/99
PROCEDURE: N-UT- 64 REV: 1 TC: NA	CALIBRATION BLOCK NO.: BF 57 TEMP: 78 °F
INSTRUMENT: KRAUTKRAMER DUE DATE: 12/3/99	SIMULATOR BLOCK NO: 790662
MODEL/TYPE: USK7D SERIAL NO.: E 173500	THERMOMTER S/N: 531986 DUE DATE: 8/6/99
TRANSDUCER MANUF: KBA	COUPLANT: ULTRAGEL II BATCH: 09311
S/N 18331 SIZE: .375 FREQ: 1.5 MHz	EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐
CABLE TYPE: RG-174 LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: 11W S/N: 791639
DAC	NOMINAL ANGLE: 60 ACTUAL ANGLE: 57



DISPLAY WIDTH: 4.15 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	48 dB	20
CIRC	☒	☐	48 dB	20

FREQ: 1-5 MHz		REJECT: 0 %	
ANGLE: 57 deg		DAMPING: fixed ohms	
DELAY: 7.8 msec		PULSER: high *	
ZERO: 6.69 msec		FILTER: fixed *	
VELOCITY: 122.8 msec		REP RATE: high	
RANGE: 4.15 inches		TOF: ☐ PEAK ☒ FLANK	
RECTIFIER: NA		POWER: Battery	
DUAL: ☐ ON ☒ OFF		TCG: ☒ ON ☒ OFF	

REF. REFLECTOR: SDH GAIN: 42 dB	CALIBRATION TIMES
AMPLITUDE: 50 % METAL PATH: "	INITIAL TIME: 0815 FINAL TIME: 1330

VERIFICATION TIMES	1) 0920	2) 1040	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

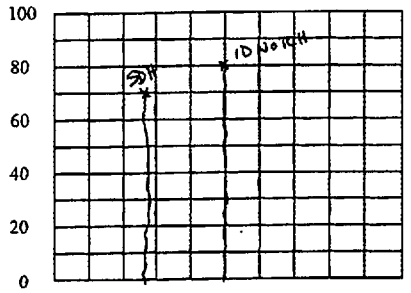
VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	
ATTENUATOR	GAIN	SET	-6 dB	-12 dB		SET	+12	SET	+6		
	AMP	80%	32 TO 48	16 TO 24		20 %	64 TO 96	40%	64 TO 96		
			40	20			84		80		

COMMENTS:	WELDS/ITEMS EXAMINED:
	D/RHR-2-03

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: II DATE: 4-7-99	DATE: 5/14/01 N/A 7/8/01
			PG.: 3 OF 9

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-105

PROJECT: BFN UNIT: 2 CYCLE: 10	CALIBRATION DATE: 4/1/99
PROCEDURE: N-UT- 64 REV: 1 TC: NA	CALIBRATION BLOCK NO.: BF 57 TEMP: 78°F
INSTRUMENT: KRAUTKRAMER DUE DATE: 12/3/99	SIMULATOR BLOCK NO: 790662
MODEL/TYPE: USK 7D SERIAL NO.: E 17350	THERMOMTER S/N: 531986 DUE DATE: 8/6/99
TRANSDUCER MANUF: RTD	COUPLANT ULTRAGEL II BATCH: 09311
S/N 85644 SIZE: 2(10x18) FREQ: 2 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CABLE TYPE: RG174 (PR) LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: 11W S/N: 791539
DAC	NOMINAL ANGLE: 45RL ACTUAL ANGLE: 47RL



DISPLAY WIDTH: 3.75 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	68 dB	19
CIRC	☒	☐	68 dB	19

FREQ: 1-5 MHz		REJECT: 0 %	
ANGLE: 47RL deg		DAMPING: fixed ohms	
DELAY: 9.1 msec		PULSER: Dual *	
ZERO: 98.62 msec		FILTER: fixed *	
VELOCITY: 233.6 msec		REP RATE: high	
RANGE: 3.75 inches		TOF: ☐PEAK ☒FLANK	
RECTIFIER: NA		POWER: Battery	
DUAL: ☒ ON ☐ OFF		TCG: ☒ ON ☐ OFF	

REF. REFLECTOR: SDH GAIN: 61 dB	CALIBRATION TIMES
AMPLITUDE: 70 % METAL PATH: 1.039"	INITIAL TIME: 0820 FINAL TIME: 1335

VERIFICATION TIMES	1) 0925	2) 1030	3)	4)	5)	6)	7)	8)	9)

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20
	SIGNAL 2	50	45	40	35	30	25	20	15	10

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
			40	20		84		80

COMMENTS:	WELDS/ITEMS EXAMINED:
	D-RHR-2-03

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL:	LEVEL: II DATE: 4-7-99	DATE: NA 5/14/01 PG.: 4 OF 9

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NO. R- 105 000168

PROJECT: BFN UNIT: 2
SYSTEM: RHRS
WELD I.D.: DRHR-2-03
CONFIG: VALVE TO: FLUIDED HEAD
FLOW
PROCEDURE: N-UT- 64 REV.: 1 TC: NA
Wo REFERENCE: WELD ℄
Lo REFERENCE: TDC

EXAMINATION DATE: 4-1-99
START TIME: 0920 END TIME: 1050
EXAM SURFACE: ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP: 78° F PYRO NO: S 31986

CALIBRATION SHEET NO.	C- N/A	C- N/A
EXAMINATION ANGLE	45 S DEG.	60 S DEG.
CIRC. SCAN SENSITIVITY	47 dB	54 dB
AXIAL SCAN SENSITIVITY	47 dB	54 dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
							3	45	X	
							4	45	X	
							5	45	X	
							6	45	X	
							3	60	X	
1	NA	5.7	NA	1.4	1.98	68	4	60		ID Geometry Seen at Lower Amplitudes 360°
							5	60	X	
							6	60	X	
					✓					
					A					

REMARKS/LIMITATIONS: SCANS PERFORMED AT 5 to 10% NOISE LEVELS

EXAMINER: Samuel J. Sharp LEVEL: II
EXAMINER: [illegible] LEVEL: II
REVIEWED BY: [illegible] LEVEL: III DATE: 4-1-99

ANII: [illegible] 5/14/01
DATE: [illegible]
PAGE 5 OF 9

TVA 19670 (NP 7/92)

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NO. R- 10000169

PROJECT: BFN UNIT: 2
SYSTEM: RHRS
WELD I.D.: DRHR-2-03
CONFIG: VALVE TO: FLUED HEAD
FLOW
PROCEDURE: N-UT- 64 REV.: 1 TC: UA
Wo REFERENCE: WELD ℄
Lo REFERENCE: TPC

EXAMINATION DATE: 4-1-99
START TIME: 0920 END TIME: 1050
EXAM SURFACE: ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP: 78 °F PYRO NO: 531986

CALIBRATION SHEET NO.	C- N/A	C- N/A
EXAMINATION ANGLE	45RL DEG.	U/A DEG.
CIRC. SCAN SENSITIVITY	76 dB	dB
AXIAL SCAN SENSITIVITY	76 dB	dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
							3	45RL	X	
							4	45RL	X	
							5	45RL	X	
							6	45RL	X	
					N/A					

REMARKS/LIMITATIONS: SCANNING PERFORMED AT 5 TO 10 % NOISE LEVELS

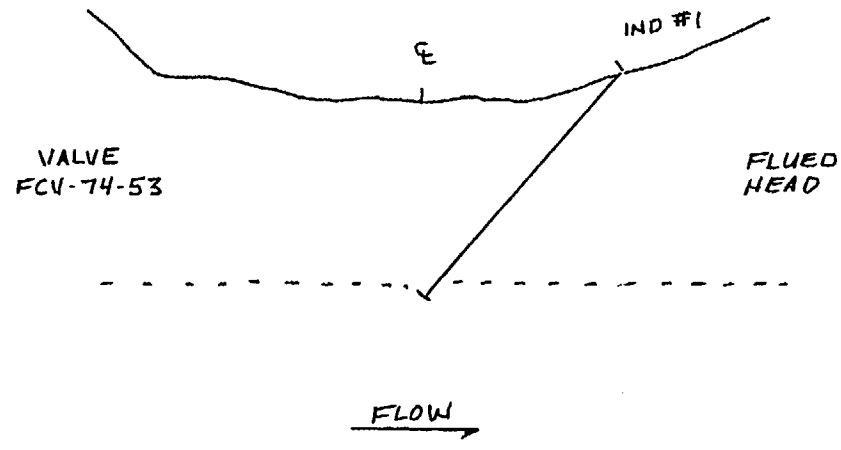
EXAMINER: [signature] LEVEL: II
EXAMINER: NA LEVEL: NA
REVIEWED BY: [signature] LEVEL: III DATE: 4-7-99

ANII: [signature]
DATE: [signature] 9/14/01

PAGE 6 OF 9

TVA 19670 (NP 7/92)

TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: 074 RHR Unit: 2 WELD NO.: DRHR-2-03	REPORT NO.: R-105



000170

HSB
5/14/01

R-109

BY: Samuel L. Sharp LEVEL: II DATE: 4-1-99 PAGE 7 OF 9

TVA 19669 (ONP-6-88)

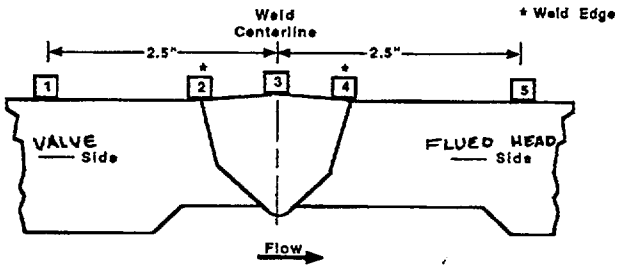
TVA	WALL THICKNESS PROFILE SHEET 000171	REPORT NO: R-105

PROJECT: BFN
UNIT: 2

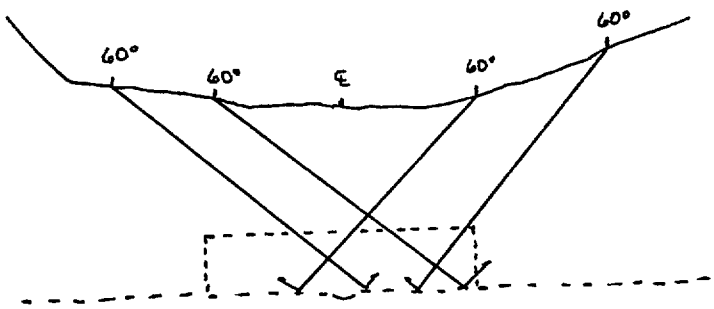
WELD NO: DRHR-2-03
SYSTEM: 074 RHR

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	NA			
2	1.25			
3	1.3			
4	1.2			
5	NA			



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.4"
DIAMETER: 24"
WELD LENGTH: 74.25



NOTE: CONTOUR FROM PREVIOUS DATA. THICKNESS DATA CONFIRMED

EXAMINER: Samuel J. Sharp	REVIEWED BY: [illegible]	ANII: [illegible]
LEVEL: II	LEVEL: III DATE: 4-1-99	DATE: 5-14-01
DATE: 4-1-99		PAGE 8 OF 9

TVA 19668 (NP-5-89)

1-108-999-44

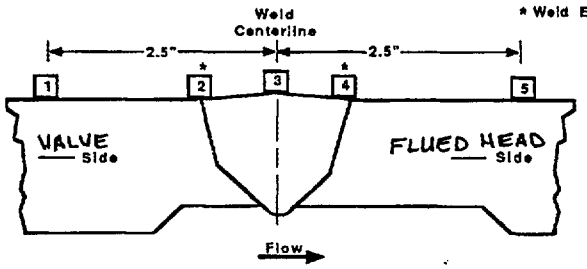
TVA	WALL THICKNESS 000172 PROFILE SHEET	REPORT NO: R-105

PROJECT: BFN
UNIT: 2

WELD NO: DRHR-2-03
SYSTEM: 074 RHR

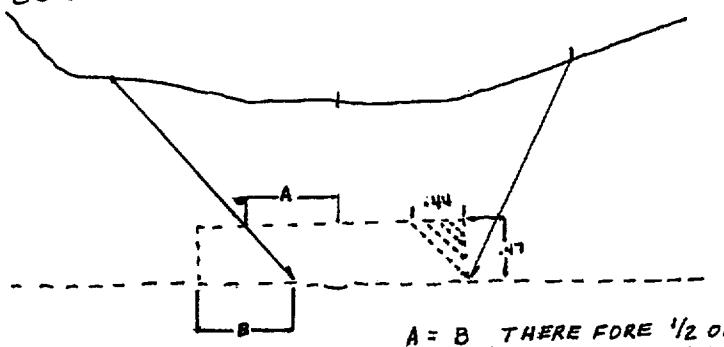
Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1				
2	1.25			
3	1.3			
4	1.2			
5				



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.4"
DIAMETER: 24"
WELD LENGTH: 74.25"

SCAN 3 12.5
4 22.5
5 25
6 25
85% BI DIRECTIONAL COVERAGE ACHIEVED



A = B THEREFORE 1/2 OF SCAN 3 REQUIREMENTS ACHIEVED 12.5%

DUE TO CONFIGURATION COULD NOT BACK UP FAR ENOUGH TO GET BOUNCE IN AN AREA OUTSIDE CORNER OF BOX .44 X .47 THEREFORE ONLY 22.5% OF SCAN 4 COULD BE ACHIEVED BIDIRECTIONAL

EXAMINER: Samuel I Sharp	REVIEWED BY: [signature]	ANII: Albert Tadd 5/14/01
LEVEL: II	LEVEL: III DATE: 4-1-99	DATE: 7-21/2001
DATE: 4-1-99		PAGE 9 OF 9

TVA 19668 (NP-5-89) 1-108-999-4

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-085

PROJECT: BFNP	UNIT: 2	CYCLE: 11		COMPONENT ID: DRHR-2-09	
EXAMINATION METHOD				SYSTEM: RHR	ISI DWG. NO. 2-33-0221-C
MT ☐	PT ☐	UT ☒	VT ☐	CONFIGURATION:	
PROCEDURE: N-UT-64		REV: 2	TC: 00-14	PIPE	TO TEE
EXAMINER:		EXAMINER: N/A		EXAMINER: N/A	EXAMINER: N/A
LEVEL: II		LEVEL: N/A		LEVEL: N/A	LEVEL: N/A

THIS REPORT CONTAINS THE DATA ASSOCIATED WITH THE MANUAL ULTRASONIC EXAMINATION OF DRHR-2-09 TO SECT XI AND NUREC 0313.

A 45 DEGREE SHEAR AND 60 DEGREE RL WAS USED SCAN 3 AXIAL. A 45 DEGREE SHEAR WAS USED SCANS 5 AND 6 CIRCUMFERENTIAL

NO SCAN 4 WAS PERFORMED DUE TO TEE.

TWO RECORDABLE INDICATIONS REPORTED CONFIRMED WITH 70 DEGREE SHEAR WAVE ALSO. SEE DATA SHEETS

ONE SIDE EXAM DUE TO TEE

50% COVERAGE OBTAINED USING 10CFR 50.55a CRITERIA.
100% COVERAGE OBTAINED USING SECTION XI CRITERIA.

Reference NOI # U2CIF-006 4/20/01

RESOLUTION BY:	REVIEWED BY:	ANII:
LEVEL: II DATE: 4-09-2001	LEVEL: III DATE: 4-10-01	DATE: 4-20-01
		PG. 1 OF ~~11~~ ~~14~~ 18

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-085

PROJECT: BFN UNIT: 2 CYCLE: 11 EXAMINATION DATE: 04-09-01
PROCEDURE: N-UT-64 REV: 2 TC: 0014 START TIME: 0935 END TIME: 1030
SYSTEM: RHR | ISI DWG. NO: EXAM SURFACE ☐ ID ☒ OD
COMPONENT ID: D RHR-2-09 MATL. TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
CONFIGURATION: PIPE TO TEE (FLOW →) SURFACE TEMP.: 87 °F PYRO. NO.: 562777
CAL DUE DATE: 12-06-01
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAM ANGLE	45 DEG	N/A DEG
CIRC. SCAN SENSITIVITY	35 dB	N/A dB
AXIAL SCAN SENSITIVITY	30 dB	N/A dB

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
1	69	23¾	36	1.30	1.50	1.08	100 %	3	45		*
							%	4		X	
							%	5		X	
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				

#1 INDICATION COULD NOT BE CONFIRMED WITH THE 70° SHEAR WAVE AT A 9.19% NOISE FROM ID ROLL. [illegible] 4/10/01

REMARKS / LIMITATIONS: NO SCAN 4 DUE TO TEE

* INDICATION(@) COULD ONLY BE CONFIRMED WITH 60 RL AND 70 SHEAR AT TWO LOCATIONS 24"-27.5" AND 34"-36". See 60 RL AND 70 SHEAR DATA SHEET. LOW AMPLITUDE IN NO CONFIRMED AREAS.

EXAMINER: [signature] LEVEL: II ANII: [signature]
EXAMINER: N/A LEVEL: N/A DATE: 4-20-01
REVIEWER: [signature] LEVEL: III DATE: 4-10-01 PAGE 2 OF 18 [illegible] 4-9-01 [illegible] 4/20/01

(@) INDICATIONS INDICATIVE OF IGSCC COULD ONLY BE CONFIRMED AT LOCATIONS 24-27.5" AND 34"-36". [illegible] 4/10/01

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-085

PROJECT: BFN UNIT: 2 CYCLE: 11 EXAMINATION DATE: 04-09-01

PROCEDURE: N-UT-64 REV: 2 TC: 0014 START TIME: 1035 END TIME: 1200

SYSTEM: RHR EXAM SURFACE ☐ ID ☒ OD

COMPONENT ID: D RHR-2-09 MATL. TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS

CONFIGURATION: PIPE TO TEE (FLOW →) SURFACE TEMP.: 87°F PYRO. NO.: 562777

CAL DUE DATE: 12-06-01

EXAM ANGLE	60 DEG	70 DEG
CIRC. SCAN SENSITIVITY	N/A dB	N/A dB
AXIAL SCAN SENSITIVITY	64 dB	52 dB

Wo REFERENCE: WELD CENTERLINE

Lo REFERENCE: TOP DEAD CENTER

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
2	24.0	26.5	27.5	2.12	2.15	1.00	40 %	3	60RL		PREVIOUSLY RECORDED
2	24.0	27.0	27.5	2.90	3.09	1.16	100 %	3	70		IGSCC FLAW
							%				
3	34.0	35.0	36.0	2.10	2.15	.95	40 %	3	60RL		IGSCC *
3	34.0	35.0	36.0	2.90	2.93	1.09	100 %	3	70		FLAW
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				

REMARKS / LIMITATIONS: NO SCAN 4 DUE TO TEE

* IGSCC FLAW THAT WAS NOT PREVIOUSLY REPORTED. THE AUTOMATED UT DATA IN CYCLE 7 (1994) INCORRECTLY IDENTIFIED THIS FLAW AS "BEAM REDIRECT".

4/10/01

EXAMINER: [signature]	LEVEL: II	ANII: [signature]
EXAMINER: N/A	LEVEL: N/A	DATE: 4-20-01
REVIEWER: [signature]	LEVEL: III	DATE: 4.10.01

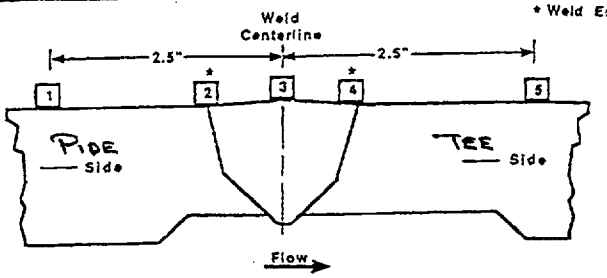
PAGE 3 OF 14 18 4-9-01 4/20/01

TVA	WALL THICKNESS PROFILE SHEET 00124	REPORT NO: R-085

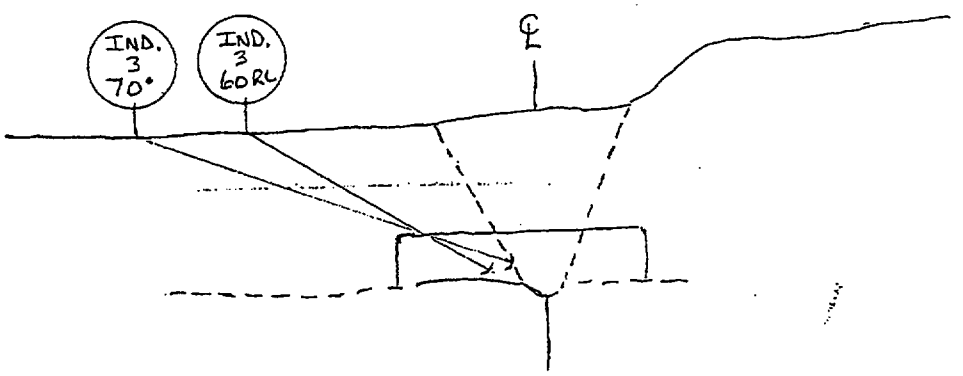
PROJECT: BFN
UNIT: 2
WELD NO: DRHR-2-09
SYSTEM: RHR

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1				1.24
2		N		1.16
3			A	1.28
4				N/A
5				N/A



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.55
DIAMETER: 24"
WELD LENGTH: 76"



THICKNESS AND PROFILES FROM PREVIOUS DATA

AMINER: [signature]
LEVEL: II
DATE: 4-09-2001

REVIEWED BY: [signature]
LEVEL: III
DATE: 4-10-01

ANII: [signature]
DATE: 4-10-01

PAGE 4 OF 14 [signature] 4-9-01

18 [signature] 8/20/01

TVA 19600 (NT 5 89)

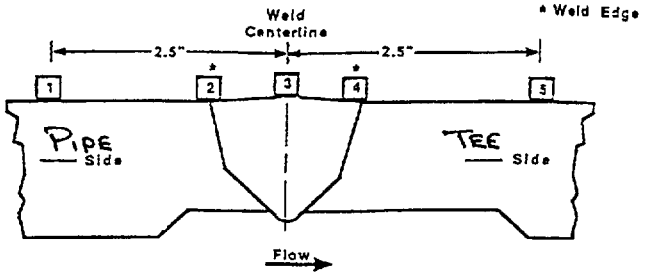
TVA	WALL THICKNESS PROFILE SHEET 00125	REPORT NO: R-085

PROJECT: BFN
UNIT: 2

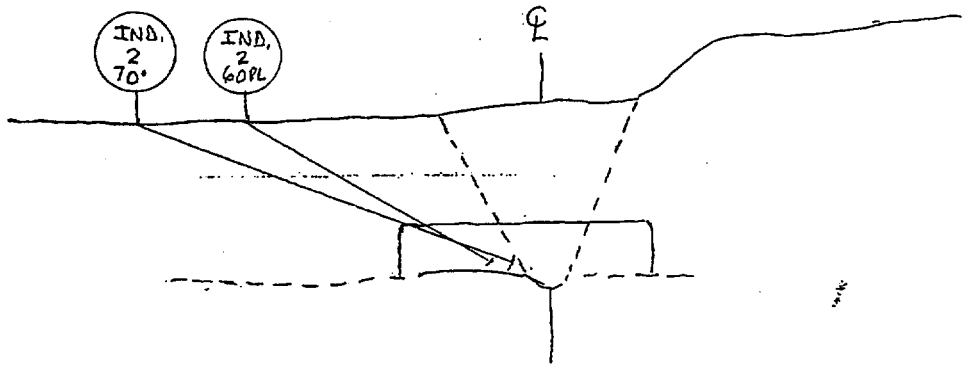
WELD NO: DRHR-2-09
SYSTEM: RHR

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1				1.24
2		N		1.16
3			A	1.28
4				N/A
5				N/A



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.55
DIAMETER: 24"
WELD LENGTH: 76"



THICKNESS AND PROFILE FROM PREVIOUS DATA

EXAMINER: [signature]
LEVEL: II
DATE: 4-09-2001

REVIEWED BY: [signature]
LEVEL: III
DATE: 4-10-01

ANII: Frank D. Bellis Jr
DATE: 4-10-01
PAGE 6 OF 18

TVA 19668 (NP-5 89)

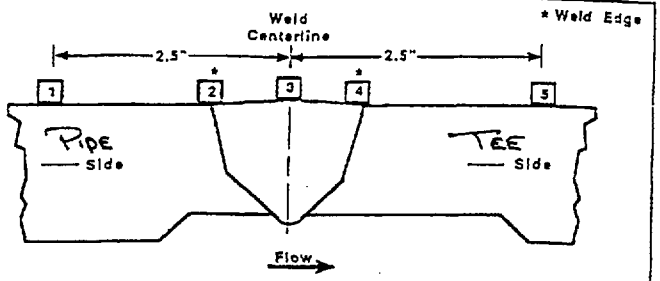
TVA	WALL THICKNESS PROFILE SHEET 00126	REPORT NO: R-085

PROJECT: BFN
UNIT: 2

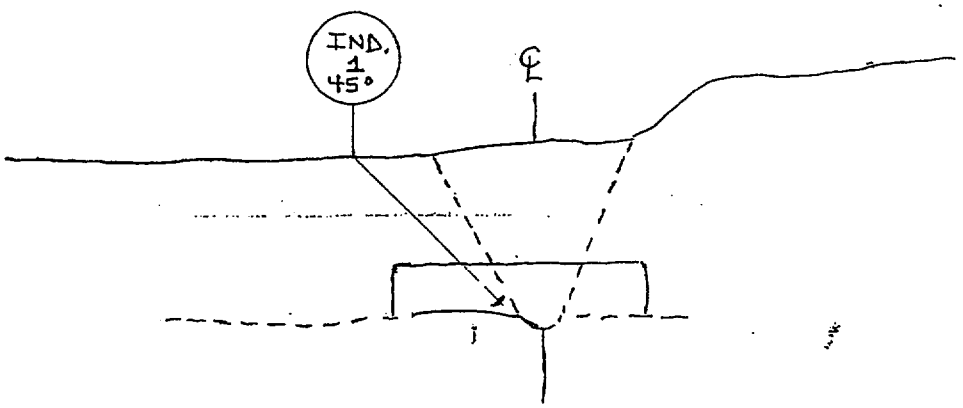
WELD NO: DRHR-2-09
SYSTEM: RHR

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1				1.24
2		N		1.16
3			A	1.28
4				N/A
5				N/A



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.55
DIAMETER: 24"
WELD LENGTH: 76"



Thickness and Profiles From Previous Data

EXAMINER: [signature]
LEVEL: II
DATE: 4-09-2001

REVIEWED BY: [signature]
LEVEL: III
DATE: 4-10-01

ANII: Frank E. Ballinger Jr.
DATE: 4-10-01

PAGE 6 OF 11

TVA 19668 (NP-5 89)

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-085

PROJECT: BFNP UNIT: 2 CYCLE: 11 | CALIBRATION DATE: 4-09-2001

PROC.: N-UT- G4 REV: 2 TC: 00-14 | CALIBRATION BLOCK NO.: BF-89 TEMP: 73 °F

INSTR. MFG: KB DUE DATE: 12-07-01 | SIMULATOR BLOCK NO: 94-7995

MODEL/TYPE: USK 7D M & TE NO.: E 17350 | THERMOMITER S/N: 562777 DUE DATE: 12-06-01

TRANSDUCER MFG: KB comp G | COUPLANT ULTRAGEL II BATCH: 99125

S/N 00DNKX SIZE: .5" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

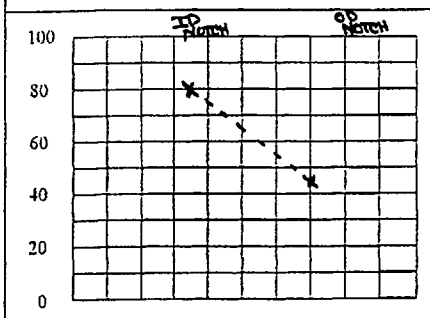
CABLE TYPE: BNC TO MICRO RG 174 LENGTH: 72 inches

ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 94-7995

NOMINAL ANGLE: 45 ACTUAL ANGLE: 44

DAC



DISPLAY WIDTH: 5.0 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	17.5 dB	4
CIRC	☒	☐	22.0 dB	4

FREQ: 1-5	MHz	REJECT: OFF	%
ANGLE: 44	deg	DAMPING: OFF FIXED	ohms
DELAY: 6.4	msec	PULSER: HIGH	*
ZERO: 6.35	msec	FILTER: FIXED	*
VELOCITY: 123.0	msec	REP RATE: HIGH	
RANGE: 5.0	inches	TOF: ☒ PEAK ☐ FLANK	
DISPLAY MODE: FULL		POWER: BATT	
DUAL: ☐ ON ☒ OFF		TCG: ☐ ON ☒ OFF	

REF. REFLECTOR: Rompas SDH GAIN: 26 dB

AMPLITUDE: 80 % METAL PATH: 1.003"

CALIBRATION TIMES

INITIAL TIME: 0815 FINAL TIME: 1225

VERIFICATION TIMES 1) 0816 2) 0935 3) 1030 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	26	21	16	10	
ATTENUATOR	GAIN	SET	-6 dB	-12 dB		SET	+12		SET	+6	
	AMP	80%	32 TO 48	16 TO 24		20 %	64 TO 96		40%	64 TO 96	
			40	22			82			80	

COMMENTS: N/A

WELDS/ITEMS EXAMINED: DRHR-2-09

EXAMINER:	EXAMINER: N/A	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 4-10-01	DATE: 4-20-01
			PG.: 7 OF 17

4-9-01

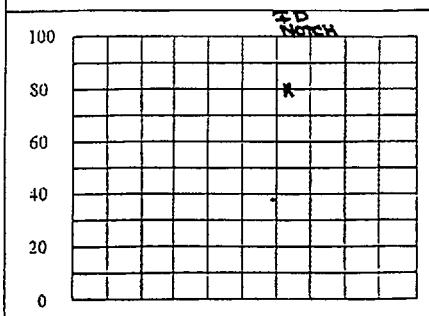
18 4/24

4/18

24 4/26/01

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-085

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-09-2001
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF-89 TEMP: 73 °F
INSTR. MFG: KB DUE DATE: 12-07-01	SIMULATOR BLOCK NO: 94-7995
MODEL/TYPE: USK 7D M & TE NO.: E 17350	THERMOMTER S/N: 562777 DUE DATE: 12-06-01
TRANSDUCER MFG: KB comp G	COUPLANT WLTRAGEL II BATCH: 99125
S/N 00DNKX SIZE: .5" FREQ: 1.5 MHz	EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐
CABLE TYPE: BNC to micro RG174 LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: IIW S/N: 791539
DAC	NOMINAL ANGLE: 70 ACTUAL ANGLE: 68



DISPLAY WIDTH: inches

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	☒	☐	43.5 dB	6
CIRC	☒/A	☐	N/A dB	N/A

FREQ: 1-5 MHz		REJECT: OFF %	
ANGLE: 68 deg		DAMPING: FIXED ohms	
DELAY: 8.9 msec		PULSER: HIGH *	
ZERO: 8.85 msec		FILTER: FIXED *	
VELOCITY: 123.0 msec		REP RATE: HIGH	
RANGE: 5.0 inches		TOF: ☒ PEAK ☐ FLANK	
DISPLAY MODE: FULL		POWER: BATT	
DUAL: ☐ ON ☒ OFF		TCG: ☐ ON ☒ OFF	

REF. REFLECTOR: Pompon SDH GAIN: 30.5 dB	CALIBRATION TIMES
AMPLITUDE: 80 % METAL PATH: .873 "	INITIAL TIME: 0825 FINAL TIME: 1227

VERIFICATION TIMES	1) 0827	2) 1035	3) 1110	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20	
	SIGNAL 2	50	45	40	35	30	26	21	16	10	
ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6			
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96			
			40	22		82		80			

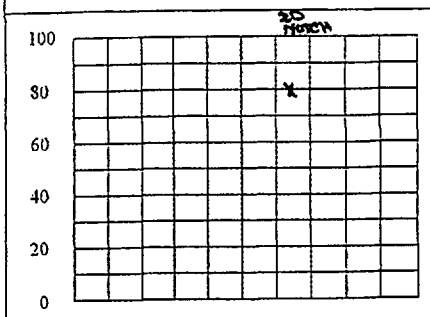
COMMENTS: N/A	WELDS/ITEMS EXAMINED:
	DRHR-2-09

EXAMINER:	EXAMINER: N/A	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: II DATE: 4-10-01	DATE: 4-20-01
			PG.: 8 OF 18

4-9-01
4/20/01

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-085

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-9-2001
PROC.: N-UT- 64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF-89 TEMP: 73 °F
INSTR. MFG: KB DUE DATE: 12-07-01	SIMULATOR BLOCK NO: 94-7995
MODEL/TYPE: USK-70 M & TE NO.: E17350	THERMOMTER S/N: 562777 DUE DATE: 12-06-01
TRANSDUCER MFG: RTD TRL2	COUPLANT ULTRAGEL II BATCH: 99125
S/N 89-647 SIZE: 2(1.5x2.5) FREQ: 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CABLE TYPE: BNC TO LEMO OMI RG 174 LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: IIW S/N: 791539
DAC	NOMINAL ANGLE: 60 ACTUAL ANGLE: 60



DISPLAY WIDTH: 2.0 inches DEPTH

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	66.5 dB	3
CIRC	☒ / ☒		N/A dB	N/A

FREQ: 1-5	MHz	REJECT: OFF	%
ANGLE: 60	deg	DAMPING: FIXED	ohms
DELAY: 11.7	msec	PULSER: DUAL	*
ZERO: 9.71	msec	FILTER: FIXED	*
VELOCITY: 259.6	msec	REP RATE: HIGH	
RANGE: 4.0	inches	TOF: ☒PEAK ☐ FLANK	
DISPLAY MODE: FULL		POWER: BATT	
DUAL: ☒ ON ☐ OFF		TCG: ☐ ON ☒ OFF	

REF. REFLECTOR: Rompas SDH GAIN: 60 dB	CALIBRATION TIMES
AMPLITUDE: 80 % METAL PATH: .7 DEPTH	INITIAL TIME: 0833 FINAL TIME: 1230

VERIFICATION TIMES	1) 0835	2) 1115	3) 1200	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL											
	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	35	30	26	21	16	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET		+12	SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %		64 TO 96	40%	64 TO 96
			40		22				82		80

COMMENTS: N/A	WELDS/ITEMS EXAMINED: DRHR-2-09

EXAMINER:	EXAMINER: N/A	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 4-10-01	DATE: 4-20-01
			PG.: 9 OF 17

4-9-01
18 4/20/01

00130

TVA Office of Nuclear Power	ULTRASONIC SIZING DATA SHEET	CALIBRATION NO. R-085

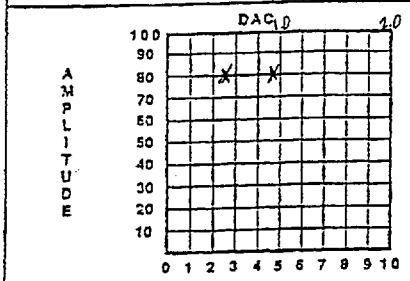
PROJECT: BFN
UNIT: 2

WELD NO: DRHR-2-09
SYSTEM: RHRS

PROCEDURE NO: N-UT-65
REVISION NO: 2 PCR N/A
INSTRUMENT: KRAUTKRAMER
MODEL/TYPE: USN-52L
SERIAL NO: E-30216

TRANSDUCER: SIGMA - SDA
SERIAL NUMBER: 2348-93002
SIZE: 2(17x8) FREQ: 2
CABLE TYPE/LENGTH: RG-174 6'
NOMINAL ANGLE: 70°
MEASURED ANGLE: 68°

CAL. BLK. NO: 151-137
CAL. BLK. THKNS: 1.511
TEMP: 63° PYRO. NO: 558276
COUPLANT: METRAGEL
BATCH NO: 99125
TYPE OF EXAM: ☒ LONGITUDINAL ☐ SHEAR ☐ OTHER



SCALE RANGE: 0-10= 2.0 DEPTH

FIELD SIMULATOR: N/A S/N: N/A

REFLECTOR		
MAXIMUM AMPLITUDE	N	A
METAL PATH		

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	VARIOUS dB	10
CIRC	☐	☐	dB	

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: 68°	deg	DAMPING: 1000	ohms
DELAY: 0.00	msec	PULSER: DUAL	*
ZERO: 10.80	msec	FILTER: FIXED	*
VELOCITY: .2669	msec	REP RATE: HIGH	
RANGE: 2.500	inches	TOF: ☒ PEAK ☐ FLANK	
RECTIFIER: FULL		POWER: BATT.	
DUAL: ☒ ON ☐ OFF		TCG: ☐ ON ☒ OFF	

INITIAL CALIBRATION TIME	4-4-01 0730	VERIFICATION TIMES 4-4-01 1325	4-9-01 0630
FINAL CALIBRATION TIME	4-9-01 1100		N/A

LINEARITY CHECK

VERTICAL

SIGNAL 1	100	90	80	70	60	50	40	30	20	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR

SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1 ±5% OF FULL SCALE

TESTER GAIN	SET	- 6	- 12	SET	+ 12	SET	+ 6
SIGNAL AMP	80%	32 to 48	15 to 24	20%	64 to 96	40%	64 to 96
		40	20		80		80

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO.

TECHNIQUE: ☐ SPOT ☐ PATT ☐ MOST ☐ RL ☐ OTHER

INDICATION NUMBER	L(in) FROM ZERO REF.	TOTAL LENGTH	THRUWALL DIMENSION	SIDE OF WELD	TYPE OF REFLECTOR
1 (4-4-01)	~24.0"-27.5"	3.5"	0.20"	U/S	IGSCC CIRC.
2 (4-9-01)	~34"-36"	2.0"	0.75"	U/S	IGSCC CIRC.
#1 FLAW	REMAINS ESSENTIALLY UNCHANGED		- NO GROWTH		
#2 FLAW	WAS IDENTIFIED	THIS CYCLE AS	IGSCC		

EXAMINER: [illegible] LEVEL: III DATE: 4-9-01

REVIEWED BY: [illegible] LEVEL: III DATE: 4/13/01

ANII: Frank C. [illegible] DATE: 4-10-01

PAGE 10 OF 178

00131

TVA

Office of Nuclear Power

ULTRASONIC SIZING DATA SHEET

CALIBRATION NO. R-085

PROJECT: BFN

UNIT: 2

WELD NO: RHR-2-09

SYSTEM: RHRS

PROCEDURE NO: N-UT-109

REVISION NO: 2 PCR N/A

INSTRUMENT: KRAUTKRAMER

MODEL/TYPE: USM-32L

SERIAL NO: E-30216

TRANSDUCER: SIGMA-SDA

SERIAL NUMBER: 223A-94003

SIZE: 2(18x10) FREQ: 2

CABLE TYPE/LENGTH: RG-174 6'

NOMINAL ANGLE: 60°

MEASURED ANGLE: 57°

CAL. BLK. NO: 151-137

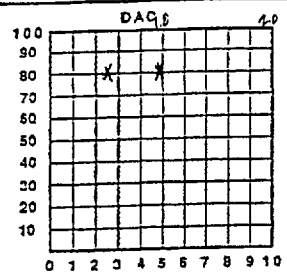
CAL. BLK. THKNS: 1.911

TEMP: 63° PYRO. NO: 558276

COUPLANT: Ultragel

BATCH NO: 93126

TYPE OF EXAM: ☑ LONGITUDINAL ☐ SHEAR ☐ OTHER



SCALE RANGE: 0-10= 2.0 Depth

FIELD SIMULATOR: N/A S/N: N/A

REFLECTOR		
MAXIMUM AMPLITUDE	N	A
METAL PATH		

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	☑	☐	VARIOUS dB	9
CIRC	☐	☐	dB	

FREQ:	2-B	MHz	REJECT:	0 %
ANGLE:	57°	deg	DAMPING:	1000 ohms
DELAY:	0.156	msec	PULSER:	DUAL *
ZERO:	9.528	msec	FILTER:	FIXED *
VELOCITY:	.2352	msec	REP RATE:	HIGH
RANGE:	2.50	inches	TOF:	☑ PEAK ☐ FLANK
RECTIFIER:	FULL		POWER:	BATT.
DUAL:	☑ ON	☐ OFF	TCG:	☐ ON ☑ OFF

INITIAL CALIBRATION TIME	4-4-01 0730	VERIFICATION TIMES	4-4-01 1325	4-9-01 0630
FINAL CALIBRATION TIME	4-9-01 1100			N A

LINEARITY CHECKS

VERTICAL

SIGNAL 1	100	90	80	70	60	50	40	30	20	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR

SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1 ±5% OF FULL SCALE

TESTER GAIN	SET	- 6	- 12	SET	+ 12	SET	+ 6
SIGNAL AMP	80%	32 to 43	16 to 24	20%	64 to 96	40%	64 to 95
		40	20		80		80

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO. _____

TECHNIQUE: ☐ SPOT ☐ PATT ☐ MOST ☐ RL ☐ OTHER _____

INDICATION NUMBER	L(in) FROM ZERO REF.	TOTAL LENGTH	THRUWALL DIMENSION	SIDE OF WELD	TYPE OF REFLECTOR
1	~24"-27.5"	3.5"	0.20"	U/S	IGSCC CIRC
2	~34"-36"	2.0"	0.25"	U/S	IGSCC CIRC.
#1 PLAN REMAINS ESSENTIALLY UNCHANGED - NO GROWTH					
#2 PLAN WAS IDENTIFIED THIS CYCLE AS IGSCC					

EXAMINER: M. Roger Bentley LEVEL: III DATE: 4-09-01

REVIEWED BY: [signature] LEVEL: III DATE: 4/13/01

ANII: [signature] DATE: 4-20-01

PAGE 11 OF ~~11~~ 18 4/20/01

00132

TVA

Office of Nuclear Power

ULTRASONIC SIZING DATA SHEET

CALIBRATION NO. R-085

PROJECT: BFN
UNIT: 2

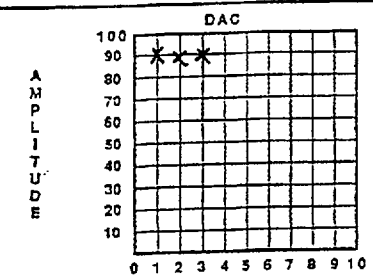
WELD NO: RHR-2-09
SYSTEM: RHRS

PROCEDURE NO: N-UT-65
REVISION NO: 2 PCR N/A
INSTRUMENT: KRAUTKRAMER
MODEL/TYPE: USN-52L
SERIAL NO: E-30216

TRANSDUCER: RTD-TRCR
SERIAL NUMBER: 89-6661
SIZE: 2(6X18) FREQ: 2
CABLE TYPE/LENGTH: RG-174 6'
NOMINAL ANGLE: ODCR
MEASURED ANGLE: N/A

CAL. BLK. NO: 151-129
CAL. BLK. THKNS: 1.0"
TEMP: 70° PYRO. NO: 55B215
COUPLANT: UltraGel
BATCH NO: 93123
TYPE OF EXAM: ☑ LONGITUDINAL ☐ SHEAR ☐ OTHER

DAC



SCALE RANGE: 0-10= 1.0

FIELD SIMULATOR: N/A S/N: N/A

REFLECTOR		
MAXIMUM AMPLITUDE	N	A
METAL PATH		

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☑	VARIOUS dB	
CIRC	☐	☐	dB	

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: N/A	deg	DAMPING: 1000	ohms
DELAY: 0.391	msec	PULSER: DUAL	*
ZERO:	msec	FILTER: FIXED	*
VELOCITY: .2330	msec	REP RATE: HIGH	
RANGE: 2.00	inches	TOF: ☑ PEAK ☐ FLANK	
RECTIFIER: FULL		POWER: BATT.	
DUAL: ☑ ON ☐ OFF		TCG: ☐ ON ☑ OFF	

		VERIFICATION TIMES		
INITIAL CALIBRATION TIME	4-4-01 0730	4-4-01 1525	4-9-01 0630	
FINAL CALIBRATION TIME	4-9-01 1100		N/A	

LINEARITY CHECK

VERTICAL

SIGNAL 1	100	90	80	70	60	50	40	30	20	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR

SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1 ±5% OF FULL SCALE

TESTER GAIN	SET	- 6	- 12	SET	+ 12	SET	+ 6
SIGNAL AMP	80%	32 to 48	15 to 24	20%	64 to 95	40%	64 to 95
		40	20		80		80

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO. _____

TECHNIQUE: ☐ SPOT ☐ PATT ☐ MOST ☐ RL ☐ OTHER _____

INDICATION NUMBER	L(in) FROM ZERO REF.	TOTAL LENGTH	THRUWALL DIMENSION	SIDE OF WELD	TYPE OF REFLECTOR
1	23"-29"	N/A	N/A	N/A U/S	
2	33"-39"	N/A	N/A	N/A U/S	
	NO DISCERNABLE CRACK TIPS WERE IDENTIFIED WITH THE DORE.				
					4-9-01

EXAMINER: M. Roger Bentley
LEVEL: III DATE: 4-9-01

REVIEWED BY: [signature]
LEVEL: III DATE: 4/13/01

ANII: [signature]
DATE: 4-20-01

PAGE 16 OF 18 pg 4/20/01

TVA 19671 (ONP-6-83)

00133

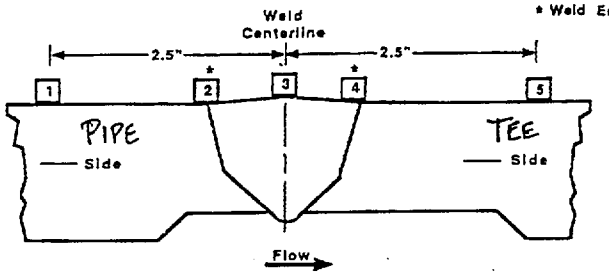
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-085

PROJECT: BFN
UNIT: 2

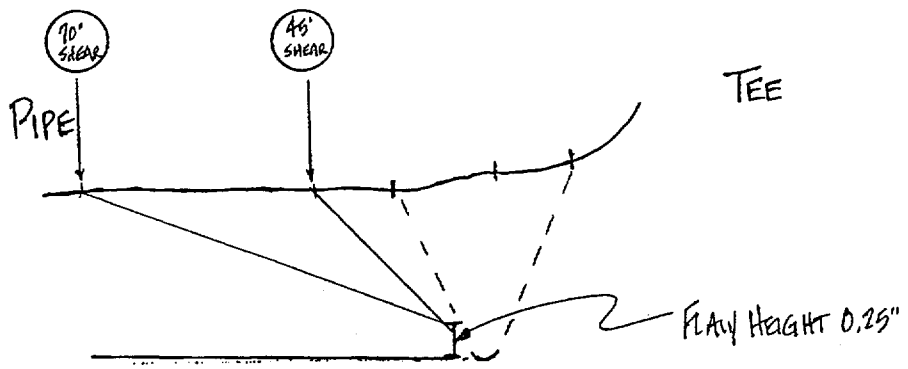
WELD NO: DRHR-2-09
SYSTEM: RHRS

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

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



CROWN HEIGHT: 0.20"
CROWN WIDTH: 1.30
DIAMETER: 24"
WELD LENGTH: 76"



LENGTH STARTS AT 34" AND EXTENDS TO 36" = 2.0
REMAINING LIGAMENT AT 'DEEPEST' LOCATION IS - 0.95"

EXAMINER: Roger Bentley
LEVEL: III
DATE: 4-9-01

REVIEWED BY: [signature]
LEVEL: III
DATE: 4/11/01

ANII: [signature]
DATE: 4-19-01
PAGE 13 OF 14

TVA 19668 (NP 5-89)

TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: RHRS Unit: 2 WELD NO.: DRHR 2-09	REPORT NO.: R-085

DRHR-2-09 FLAW INDICATIVE OF IGSCC LOCATED AT 34-36-INCHES ON THE PIPE SIDE OF THE WELD (UPSTREAM SIDE).

LENGTH = 2.0"

THROUGH WALL = 0.25"

THICKNESS = 1.20"

a = 0.25" a/l = 0.125

l = 2.00"

t = 1.20" a/t = 20.83%

BASED ON ASME SECTION XI TABLE IWB-3514-2 THE MAXIMUM ALLOWABLE FLAW WITH ASPECT RATIO OF 0.13 WOULD BE 11.06% THROUGH WALL OR 0.133". THIS FLAW IS UNACCEPTABLE PER TABLE IWB-3514-2.

00134 R-085

BY: Roger Bentley LEVEL: III DATE: 4-9-01 PAGE 14 OF 18

TVA 19669 (ONP-6-88) Review by: 4/9/01

14 of 18

NOTIFICATION OF INDICATION FORM

PART I - FINDINGS

NOI No. U2C11-006 Plant/Unit BFN/2 ISI Dwg./Sh. No. 2-ISI-0221-C Sheet 1

Examination Report No. R-085 Component ID DRHR-2-09

Description of Indication (Sketch/Photograph if Required for Clarification): IGSCC Flaw found within exam boundary. Flaw location located at 34" to 36" from top dead center measuring clockwise. Additional sizing information included in exam report # R-085. The flaw is unacceptable per ASME Sec XI Table IWB-3514-2.

Signature of Examiner/Certification Level: [signature] /Date: 4-10-01
Signature of ISO Coordinator (Field Supervisor): [signature] /Date: 4/10/01
Signature of ISI Program Owner: [signature] /Date: 4-10-01

PART II - DISPOSITION

SEE ATTACHMENT FOR DISPOSITION.

Corrective Action Program or Administrative Control document number (PER, WR/WO) if applicable: 01-003713-000

ASME XI Subsection IWE ☐ Yes ☒ No If Yes, complete the supplemental information Parts II and III of Page 2 of this form in addition to Parts II, III, and IV, of Page 1. If No, completion of Parts II and III of Page 2 of this form is not required and attachment of Page 2 with Page 1 is not required.

Disposition Prepared/Recorded By: [signature] Org. SE-MN Date: 04/16/01

PART III - ADDITIONAL EXAMINATIONS

Additional Sample Required [IW(X)-2430]: ☐ Yes ☒ No Page 2 of 2 additional samples attached? ☐ Yes ☒ No

(Attach list of items in additional sample, if yes.)

[signature] 4-17-01
ISI or CISI Program Owner Date

Successive Examination Required: ☐ Yes ☒ No

[signature] 4-20-01
ISI or CISI Program Owner Date

PART IV - VERIFICATION OF CLOSURE

Reexamination Report number, if Applicable: N/A
Signature of ISO Coordinator: [signature] Date: 4-20-01

Finding resulted from performance of the General visual Examination ☐ Yes ☒ No If Yes, concurrence of the Registered Professional Engineer (RPE) or Individual Responsible for performance is required (N/A otherwise):

N/A
RPE/Responsible Engineer Date

Comments: See attached letter of approval from NRC Rated April 20, 2001, attached

Verification of Complete Corrective Action Required by Disposition (Including Page 2, if applicable)
Signature of ISI or CISI Program Owner: [signature] Date: 4-20-01

Page 15 of 18

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 20, 2001

Mr. J. A. Scalice
Chief Nuclear Officer
and Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

SUBJECT: BROWNS FERRY, UNIT 2 - REVIEW OF INTERGRANULAR STRESS CORROSION CRACKING (IGSCC) INDICATION ON RESIDUAL HEAT REMOVAL SYSTEM PIPING WELD DRHR-2-09 (TAC NO. MB1649)

Dear Mr. Scalice:

During the Unit 2 Cycle 11 refueling outage, while performing scheduled inservice inspection of the residual heat removal system piping, Tennessee Valley Authority (TVA) identified an IGSCC indication in weld DRHR-2-09 that was not previously identified as a flaw. The indication is approximately 2 inches in length and .25 inches in depth. The affected piping is 24 inches in diameter with a pipe wall thickness of 1.20 inches. In accordance with licensee commitments to NRC Generic Letter 88-01, titled "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping," TVA submitted its proposed evaluation for NRC staff approval prior to resumption of operation.

TVA completed a stress corrosion crack growth analysis in accordance with NUREG-0313, Revision 2, "Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping." The analysis stated that "weld DRHR-2-09 is acceptable for at least two additional 24-month operating cycles." This information was submitted to the NRC staff for review along with a request to approve the evaluation and permit restart of the unit.

Based on the information provided in the submittal, the staff concludes that:

1. The subject IGSCC indication is not a new flaw, and its existence can be traced back to ultrasonic testing (UT) performed in the 1994 outage. It appears that this flaw has not grown significantly in length since 1994. The subject indication was missed or was not identified as IGSCC in previous examinations due to geometry limitations. In the current outage, the indication was found due to implementation of improved UT techniques and procedures based on Performance Demonstration Initiative requirements.

2. TVA has reviewed the Induction Heat Stress Improvement (IHSI) process control parameters and has determined that the actual IHSI data recorded for this weld met all the control parameters in the process specification. Therefore, the IHSI treatment of this weld is expected to be effective in mitigating the initiation and growth of cracks.

3. The flaw found in the 1989 outage is similar in size and is about 7 inches away from the flaw found in the current outage. This 1989 flaw was re-inspected in the 1994, 1997, and 2001 outages, and did not show any significant growth.

4. The results of the licensee's flaw evaluation have shown that the structural integrity of the subject weld will be maintained during operation for the next two 24-month fuel cycles. This is expected because of the IHSI treatment of the subject weld.

Therefore, we conclude that the Browns Ferry Unit 2 facility can be returned to operation with reasonable assurance that the integrity of the subject weld in the residual heat removal system piping will continue to be maintained. The safety evaluation which provides the bases for the above conclusions will be transmitted under separate cover. If you have any questions regarding this issue, please contact the Browns Ferry Project Manager, William Long, at 301-415-3026.

Sincerely,

Richard L. Emch, Jr.

for Herbert N. Berkow, Director
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-260

cc: See next page

J. A. Scalice

Mr. J. A. Scalice
Tennessee Valley Authority

BROWNS FERRY NUCLEAR PLANT

cc:
Mr. Karl W. Singer, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Jack A. Bailey, Vice President
Engineering & Technical Services
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Karl W. Singer, Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

General Counsel
Tennessee Valley Authority
ET 10H
400 West Summit Hill Drive
Knoxville, TN 37902.

Mr. Robert J. Adney, General Manager
Nuclear Assurance
Tennessee Valley Authority
5M Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Ashok S. Bhatnagar, Plant Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Mark J. Burzynski, Manager
Nuclear Licensing
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Timothy E. Abney, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, AL 35611

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611

TOTAL P.04

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION SHEET	REPORT NUMBER: R-104

PROJECT: BFNP UNIT: 2		CYCLE: 11		COMPONENT ID: DRHR-2-22	
EXAMINATION METHOD				SYSTEM: RHR	ISI DWG. NO. 2-ISI-0221-C ✓
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: 1	CATEGORY: R-A ✓
PROCEDURE: N-UT-64 ✓	REV: 2 ✓	TC: 00-14 ✓		COFIG.: Valve	TO Pipe
EXAMINER: Dickey Michael	~~EXAMINER:~~ [signature] 4/10/01			EXAMINER:	EXAMINER:
LEVEL: II	LEVEL: I Trainee			LEVEL:	LEVEL:

This report contains data associated with the manual UT examination of weld DRHR-2-22. The examination satisfies the requirement of ASME Section XI (Risk Informed) RI. 16E ✓ and NUREG 0313 ✓

This Exam was performed with a 45° ✓ Shearwave and 60° ✓ refracted longitudinal. Scans 4, 5 + 6 was performed with 45° + Scan 4 with 60° The previous IGSCC indication was seen and Recorded with 45° scans 4 5 + 6. ID Geometry was seen at below recordable with 45° + 60° and verified with 70° ✓ Shearwave

There were no new indications indicative of cracks or IGSCC

50% Coverage was obtained Per the PDI examination

This exam was performed with equipment and procedures and personnel qualified in accordance with ASME Section XI Appendix VIII as amended by the rule

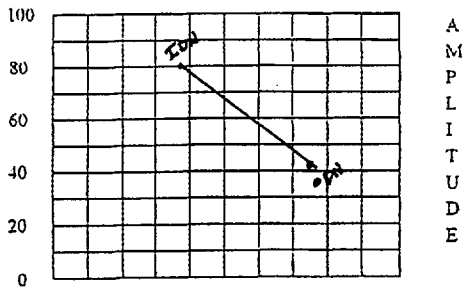
50% COVERAGE WAS OBTAINED USING 10CFR50.55a CRITERIA
100% COVERAGE WAS OBTAINED USING ASME SECTION XI CRITERIA

[signature] 4/12/01

RESOLUTION BY:	REVIEWED BY:	ANII: [signature]
Dickey Michael	[signature]	DATE: 4-24-01
LEVEL: II DATE:	LEVEL: III DATE: 4-12-01	PG. 1 OF 10

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-104

PROJECT: BFNP UNIT: 2 CYCLE: 11	CALIBRATION DATE: 4-9-01
PROC.: N-UT-64 REV: 2 TC: 00-14	CALIBRATION BLOCK NO.: BF-87 ✓ TEMP: 72 °F
INSTR. MFG: Krautkramer DUE DATE: 9-11-01	SIMULATOR BLOCK NO: 6026-83
MODEL/TYPE: USN-52L M & TE NO.: E30219 ✓	THERMOMTER S/N: 568275 ✓ DUE DATE: 12-6-01
TRANSDUCER MFG: KBA Comp G	COUPLANT Ultragel II BATCH: 99125 ✓
S/N 00FCYT ✓ SIZE: 0.5 ✓ FREQ: 1.5 MHz	EXAM TYPE: SHEAR ☒ ✓ LONG ☐ RL ☐
CABLE TYPE: RG-174/u LENGTH: 72 inches	ANGLE VERIFICATION
	BLOCK TYPE: Rompus S/N: 6026-83
DAC	NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°



DISPLAY WIDTH: 4.0 inches ✓

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	☒	☐	24 dB	6
CIRC	☐	☐	dB	

FREQ: 2-8 MHz ✓	REJECT: 0 % ✓
ANGLE: 45 deg ✓	DAMPING: 1000 ohms ✓
DELAY: 0.0 msec	PULSER: Single * ✓
ZERO: 6.889 msec	FILTER: Fixed * ✓
VELOCITY: .1238 msec ✓	REP RATE: High ✓
RANGE: 4.0 inches ✓	TOF: ☒ PEAK ✓ ☐ FLANK
DISPLAY MODE: Full ✓	POWER: Batt. ✓
DUAL: ☐ ON ☒ OFF ✓	TCG: ☒ ON ✓ ☐ OFF

REF. REFLECTOR: N/A GAIN: N/A dB	CALIBRATION TIMES
AMPLITUDE: N/A % METAL PATH: N/A "	INITIAL TIME: 0902 FINAL TIME: 1449

VERIFICATION TIMES	1) N/A	2) N/A	3) N/A	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20
	SIGNAL 2	50	45	40	36	30	26	20	15	10

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	÷12	SET	+6
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
			40	20		80		80

COMMENTS:	WELDS/ITEMS EXAMINED:
DWG# 2-151-0221-C	OSRHR-2-10

EXAMINER:	~~EXAMINER:~~	REVIEWER:	ANII:
Dickens Michael	[signature]	[signature]	[signature]
LEVEL: II	LEVEL: I Trainee	LEVEL: III DATE: 4-12-01	DATE: 4-24-01
			PG.: 2 OF 20

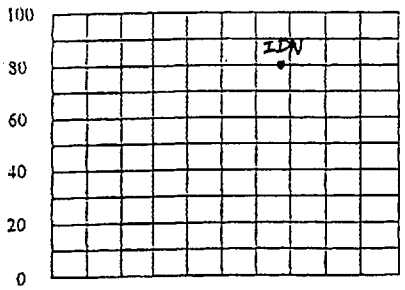
TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-104

PROJECT: BFNP UNIT: 2 CYCLE: 11
PROC.: N-UT-64 ✓ REV: 2 ✓ TC: 00-14 ✓
INSTR. MFG: Krautkramer DUE DATE: 9-11-01
MODEL/TYPE: USN-52L M & TE NO.: E 30219 ✓
TRANSDUCER MFG: KBA Comp G
S/N 00DNKV ✓ SIZE: 0.5 FREQ: 1.5 MHz
CABLE TYPE: RG-174/u LENGTH: 72 inches

CALIBRATION DATE: 4-9-01
CALIBRATION BLOCK NO.: BF-87 ✓ TEMP: 72 °F
SIMULATOR BLOCK NO: 6026-83
THERMOMTER S/N: 558275 DUE DATE: 12-6-01
COUPLANT Ultragel II BATCH: 99125 ✓
EXAM TYPE: SHEAR ☒ ✓ LONG ☐ RL ☐

ANGLE VERIFICATION
BLOCK TYPE: IIW S/N: 791539
NOMINAL ANGLE: 70° ACTUAL ANGLE: 68°

DAC



DISPLAY WIDTH: 4.0 inches ✓

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	45 dB	7
CIRC	☐	☐	dB	

FREQ:	2-8 MHz ✓	REJECT:	0 % ✓
ANGLE:	68 deg ✓	DAMPING:	1000 ohms ✓
DELAY:	0.0 msec	PULSER:	Single * ✓
ZERO:	9.666 msec	FILTER:	Fixed * ✓
VELOCITY:	.1225 msec	REP RATE:	High ✓
RANGE:	4.0 inches ✓	TOF:	☒ PEAK ✓ ☐ FLANK
DISPLAY MODE:	Full	POWER:	Batt
DUAL:	☐ ON ☒ OFF ✓	TCG:	☐ ON ☒ OFF

REF. REFLECTOR: N/A GAIN: N/A dB
AMPLITUDE: N/A % METAL PATH: N/A "

CALIBRATION TIMES
INITIAL TIME: 0915 FINAL TIME: 1452

VERIFICATION TIMES 1) N/A 2) N/A 3) N/A 4) N/A 5) N/A 6) N/A 7) N/A 8) N/A 9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1	100	90	80	70	60	50	40	30	20
	SIGNAL 2	50	45	40	36	30	26	20	15	10

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6
	AMP	80%	32 TO 48	16 TO 24	20 %	64 TO 96	40%	64 TO 96
			40	20		80		80

COMMENTS:
DWG# 2-131-0221-C

WELDS/ITEMS EXAMINED:
DRHR-2-22

EXAMINER: Dickey Michael
LEVEL: II

~~EXAMINER:~~
LEVEL: I Trainee

REVIEWER: WRB
LEVEL: III DATE: 4-12-01

ANII: [signature]
DATE: 4-24-01
PG.: 3 OF 10

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R-104

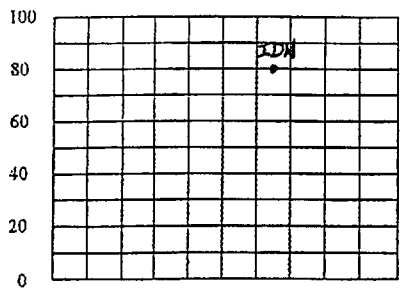
PROJECT: BFNP UNIT: 2 CYCLE: 11
PROC.: N-UT-64 REV: 2 TC: 00-14
INSTR. MFG: Krautkramer DUE DATE: 9-11-01
MODEL/TYPE: USN 52L M & TE NO.: E30219
TRANSDUCER MFG: RTD TRLA
S/N 99-1216 SIZE: 2(8x14) FREQ: 2 MHz
CABLE TYPE: RG-174 (Dual) LENGTH: 72 inches

CALIBRATION DATE: 4-9-01
CALIBRATION BLOCK NO.: BF-87 TEMP: 72 °F
SIMULATOR BLOCK NO: 6026-83
THERMOMTER S/N: 558275 DUE DATE: 12-6-01
COUPLANT Ultragel II BATCH: 99125
EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

ANGLE VERIFICATION

BLOCK TYPE: II W S/N: 791539
NOMINAL ANGLE: 60° ACTUAL ANGLE: 57°

DAC



DISPLAY WIDTH: 3.0 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	65 dB	5
CIRC	☐	☐	dB	

FREQ: 2-8	MHz	REJECT: 0	%
ANGLE: 57	deg	DAMPING: 1000	ohms
DELAY: 0.0	msec	PULSER: Dual	*
ZERO: 9.010	msec	FILTER: Fixed	*
VELOCITY: .2331	msec	REP RATE: High	
RANGE: 3.0	inches	TOF: ☒ PEAK ☐ FLANK	
DISPLAY MODE: Full		POWER: BATT.	
DUAL: ☒ ON ☐ OFF		TCG: ☐ ON ☒ OFF	

REF. REFLECTOR: N/A GAIN: N/A dB
AMPLITUDE: N/A % METAL PATH: N/A "

CALIBRATION TIMES

INITIAL TIME: 0845 FINAL TIME: 1446

VERIFICATION TIMES	1) N/A	2) N/A	3) N/A	4) N/A	5) N/A	6) N/A	7) N/A	8) N/A	9) N/A

*** PDI QUALIFIED INSTRUMENT SETTINGS:**
VERIFY INSTRUMENT SETTINGS AND CALIBRATION SEQUENCE ARE IN ACCORDANCE WITH TABLE 2 OF THE APPLICABLE PDI QUALIFICATION IMPLEMENTATION PROCEDURE !

LINEARITY CHECK

VERTICAL	SIGNAL 1		100	90	80	70	60	50	40	30	20
	SIGNAL 2		50	45	40	36	30	26	20	15	10
ATTENUATOR	GAIN	SET	-6 dB		-12 dB		SET	+12		SET	+6
	AMP	80%	32 TO 48		16 TO 24		20 %	64 TO 96		40%	64 TO 96
			40		20			80			80

COMMENTS:
DWG# 2-151-0221-C

WELDS/ITEMS EXAMINED:
DRHR-2-22

EXAMINER:	~~EXAMINER:~~	REVIEWER:	ANII:
Dickey Michael	[signature]	[signature]	[signature]
LEVEL: II	LEVEL: I Trainee	LEVEL: III DATE: 4-12-01	DATE: 4-24-01
			PG.: 4 OF 10

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R-104

PROJECT: BFNP UNIT: 2 CYCLE: 11 EXAMINATION DATE: 4-9-01

PROCEDURE: N-UT-64 ✓ REV: 2 ✓ TC: 00-14 ✓ START TIME: 1320 ✓ END TIME: 1420 ✓

SYSTEM: RHR ISI DWG. NO: 2-ISI-0221-C ✓ EXAM SURFACE ☐ ID ☒ OD ✓

COMPONENT ID: DRHR-2-22 MATL. TYPE: ☐ CS ☒ SS ✓ ☐ CSCL ☐ CCSS

CONFIGURATION: Valve TO Pipe (FLOW →)

SURFACE TEMP.: 87 °F PYRO. NO.: 558275

CAL DUE DATE: 12-6-01

	45 DEG	60 DEG
EXAM ANGLE	45 DEG	60 DEG
CIRC. SCAN SENSITIVITY	36 dB	65 dB
AXIAL SCAN SENSITIVITY	36 dB	N/A dB

Wo REFERENCE: Weld E

Lo REFERENCE: TDC

IND. NO.	L (in) FROM REF. L1	L MAX	L2	AT MAX AMP W MAX	MP MAX	D MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	N R I	IND. INFO: TYPE, DAMPING, ETC.
1	45.7"	46"	46.6"	1.6"	1.53	1.08	50 %	4	45		PREVIOUSLY RECORDED
1	-	45"	-	.8"	1.61	1.14	20 %	5	45		IGSCC
1	-	47.5"	-	.8"	1.67	1.17	15 %	6	45		" "
							%	4	60	X	
							%	4	70	X	Circ. Scan Sens. 45 DB
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				
							%				

REMARKS / LIMITATIONS:

ID Geometry seen at below recordable levels verified with 70° Shear

EXAMINER: Dickey Michael LEVEL: II ANII: [signature]

~~EXAMINER:~~ [signature] 4-12-01 LEVEL: I Trainee DATE: 4-24-01

REVIEWER: [signature] LEVEL: III DATE: 4-12-01 PAGE 5 OF 10

00223

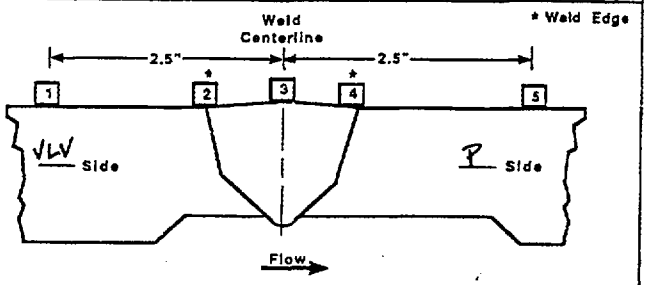
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-104

PROJECT: BFNP
UNIT: 2

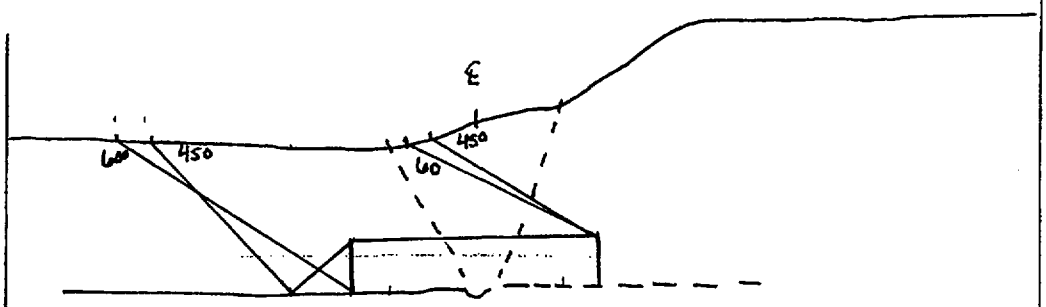
WELD NO: DRHR-2-22
SYSTEM: RHR

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	Previous			
2	T	*	C	
3		N		
4				
5			A	



CROWN HEIGHT: 0.05"
CROWN WIDTH: 1.25"
DIAMETER: 20"
WELD LENGTH: 62.8"



PDI Coverage 50%
Section XI Coverage 100%

Previous Contour

EXAMINER: Dickey Michael
LEVEL: II
DATE: 4-9-01

REVIEWED BY: [illegible]
LEVEL: III
DATE: 4-12-01

ANII: Frank L. Bellair Jr.
DATE: 4-24-01
PAGE 6 OF 10

TVA 19668 (NP 5-89)
1-10a 999 44

00224

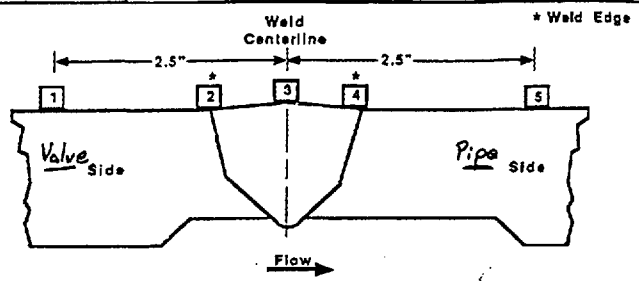
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R-104

PROJECT: BFNP
UNIT: 2

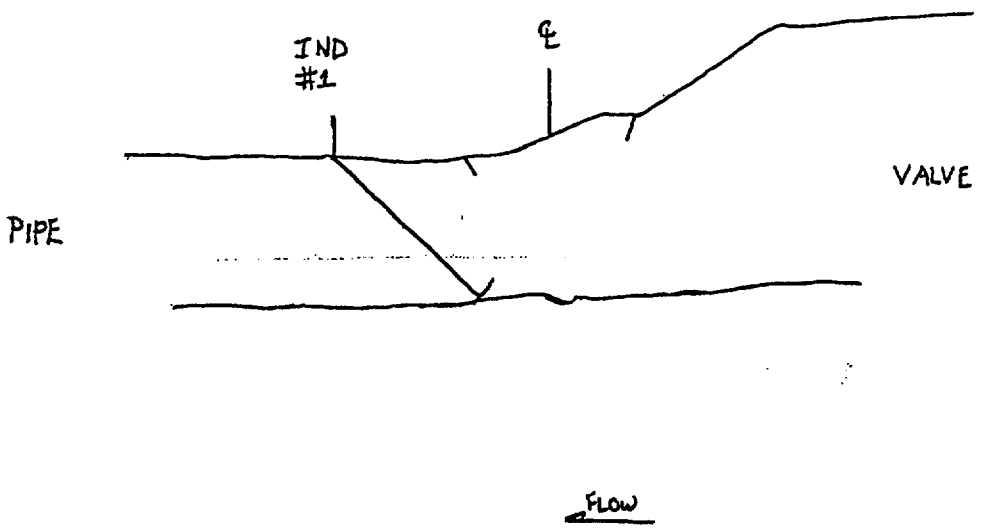
WELD NO: DRHR
SYSTEM: RHR

Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

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



CROWN HEIGHT: 0.05"
CROWN WIDTH: 1.25"
DIAMETER: 20.00"
WELD LENGTH: 62.8



Previous T+C

EXAMINER: Dickey Michael
LEVEL: II
DATE: 4-9-01

REVIEWED BY: MMB
LEVEL: III
DATE: 4-12-01

ANI: Frank L. Bellini Jr
DATE: 4-24-01

PAGE 7 OF 10

TVA 19668 (NP-5-89)

2-108 499 44

00225

TVA
Office of Nuclear Power

ULTRASONIC SIZING DATA SHEET

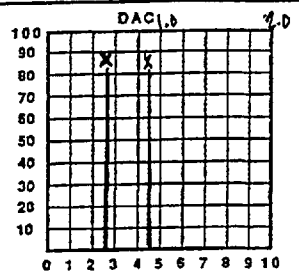
CALIBRATION NO. R-104

PROJECT: BFN
UNIT: 2
WELD NO: DRHR-2-22
SYSTEM: RHRS

PROCEDURE NO: N-UT-109
REVISION NO: 2 PCR N/A
INSTRUMENT: KRAUTKRAMER
MODEL/TYPE: USM-32L
SERIAL NO: E-30216

TRANSDUCER: SIGMA-SDA
SERIAL NUMBER: 223A-94003
SIZE: 2(18x10) FREQ: 2
CABLE TYPE/LENGTH: RG-174 6'
NOMINAL ANGLE: 60°
MEASURED ANGLE: 57°

CAL. BLK. NO: 151-137
CAL. BLK. THKNS: ~1.90
TEMP: 63° PYRO. NO: 558275
COUPLANT: UNBRAND
BATCH NO: 99120
TYPE OF EXAM: ☒ LONGITUDINAL ☐ SHEAR ☐ OTHER



SCALE RANGE: 0-10= 2.0 DEPTH

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☑	☐	VARIOUS dB	9
CIRC	☐	☐	N/A dB	

FREQ: 2-8	MHz		REJECT: 0	%
ANGLE: 57°	deg		DAMPING: 1000	ohms
DELAY: 0.156	msec		PULSER: DUAL	*
ZERO: 9.528	msec		FILTER: FIXED	*
VELOCITY: .2352	msec		REP RATE: HIGH	
RANGE: 2.50	inches		TOF: ☑ PEAK ☐ FLANK	
RECTIFIER: FULL			POWER: BATT.	
DUAL: ☑ ON ☐ OFF			TCG: ☐ ON ☑ OFF	

FIELD SIMULATOR: N/A S/N: N/A

REFLECTOR		
MAXIMUM AMPLITUDE	N	A
METAL PATH		

		VERIFICATION TIMES		
INTITIAL CALIBRATION TIME	0720			
FINAL CALIBRATION TIME	1320		N	A

LINEARITY CHECK

VERTICAL

SIGNAL 1	100	90	80	70	60	50	40	30	20	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR

SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1 ±5% OF FULL SCALE

TESTER GAIN	SET	- 6	- 12	SET	+ 12	SET	+ 6
SIGNAL AMP	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
		40	20		80		80

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO.

TECHNIQUE: ☐ SPOT ☐ PATT ☐ MOST ☐ RL ☐ OTHER

INDICATION NUMBER	L(in) FROM ZERO REF.	TOTAL LENGTH	THRUWALL DIMENSION	SIDE OF WELD	TYPE OF REFLECTOR
1	45.5 – 46.5	1.0"	0.20	D/S	EGSCC CIRC & AXIAL
	PLANT REPORTS ESSENTIALLY UNCHANGED – [illegible] 4/9/01				

EXAMINER: [illegible] LEVEL: III DATE: 4-9-01
REVIEWED BY: [illegible] LEVEL: III DATE: 4/13/01
ANII: [illegible] DATE: 4-24-01
PAGE 8 OF 10

TVA 19671 (ONP-6-88)

00226

TVA

Office of Nuclear Power

ULTRASONIC SIZING DATA SHEET

CALIBRATION NO. R-104

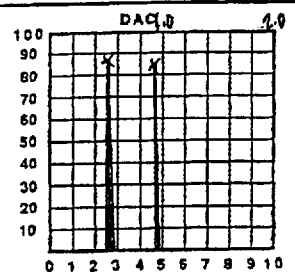
PROJECT: BFN
UNIT: 2

WELD NO: DRHR-2-22
SYSTEM: RHRS

PROCEDURE NO: N-UT-69
REVISION NO: 2 PCR N/A
INSTRUMENT: KRAUTKRAMER
MODEL/TYPE: USN-52L
SERIAL NO: E-30216

TRANSDUCER: SIGMA-50A
SERIAL NUMBER: 2348-93002
SIZE: 2(1x8) FREQ: 2
CABLE TYPE/LENGTH: RG-174 6'
NOMINAL ANGLE: 70°
MEASURED ANGLE: 68°

CAL. BLK. NO: 151-137
CAL. BLK. THKNS: 1.511
TEMP: 63° PYRO. NO: 558275
COUPLANT: ULTRAGEL
BATCH NO: 59125
TYPE OF EXAM: ☒ LONGITUDINAL ☐ SHEAR ☐ OTHER



SCALE RANGE: 0-10= 2.0 DEPTH

FIELD SIMULATOR: N/A S/N: N/A

REFLECTOR		
MAXIMUM AMPLITUDE	N	A
METAL PATH		

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☑	☐	VARIOUS dB	10
CIRC	☐	☐	N/A dB	

FREQ: 2-B	MHz	REJECT: 0	%
ANGLE: 68°	deg	DAMPING: 1000	ohms
DELAY: 0.00	msec	PULSER: DUAL	*
ZERO: 10.80	msec	FILTER: FIXED	*
VELOCITY: .2669	msec	REP RATE: HIGH	
RANGE: 2.500	inches	TOF: ☑ PEAK ☐ FLANK	
RECTIFIER: FULL		POWER: BATT.	
DUAL: ☑ ON ☐ OFF		TCG: ☐ ON ☑ OFF	

		VERIFICATION TIMES		
INITIAL CALIBRATION TIME	0720			
FINAL CALIBRATION TIME	1320		N/A	

LINEARITY CHECK

VERTICAL

SIGNAL 1	100	90	80	70	60	50	40	30	20	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR

SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1 ±5% OF FULL SCALE

TESTER GAIN	SET	- 6	- 12	SET	+ 12	SET	+ 6
SIGNAL AMP	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
		40	20		80		80

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO. _____

TECHNIQUE: ☐ SPOT ☐ PATT ☐ MOST ☐ RL ☐ OTHER _____

INDICATION NUMBER	L(in) FROM ZERO REF.	TOTAL LENGTH	THRUWALL DIMENSION	SIDE OF WELD	TYPE OF REFLECTOR
	44.5 – 46.5	1.0	0.70	D/S	IGSCC CIR & MAN
	PLANT REMAINS ESSENTIALLY UNCHANGED –			MMS 4/9/01	

EXAMINER: M. Roger Bentley
LEVEL: III DATE: 4-9-01

REVIEWED BY: [signature]
LEVEL: III DATE: 4/13/01

ANII: Frank L. Bellini
DATE: 4-24-01

PAGE 9 OF 10

TVA 19671 (ONP-6-88)

00227

TVA

Office of Nuclear Power

ULTRASONIC SIZING DATA SHEET

CALIBRATION NO. R-104

PROJECT: BFN
UNIT: 2

WELD NO: DRHR-2-22
SYSTEM: RHRS

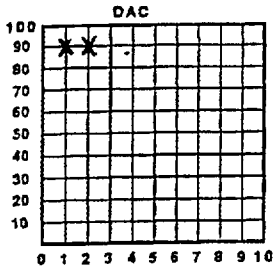
PROCEDURE NO: N-UT-65
REVISION NO: 2 PCR: N/A

INSTRUMENT: KRAUTKRAMER
MODEL/TYPE: USN-52L
SERIAL NO: E-30216

TRANSDUCER: RTD-TRCR
SERIAL NUMBER: 89-661
SIZE: 2(6x18) FREQ: 2
CABLE TYPE/LENGTH: RG-174 6'
NOMINAL ANGLE: ODCR
MEASURED ANGLE: N/A

CAL. BLK. NO: 151-137 & 151-129
CAL. BLK. THKNS: 1.511
TEMP: 63° PYRO. NO: 558276
COUPLANT: ULTRAGEL
BATCH NO: 99125
TYPE OF EXAM: ☑ LONGITUDINAL ☐ SHEAR ☐ OTHER

DAC



SCALE RANGE: 0-10= 1.0

FIELD SIMULATOR: N/A S/N: N/A

REFLECTOR		
MAXIMUM AMPLITUDE	N	A
METAL PATH		

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☑	VARIOUS dB	11
CIRC	☐	☐	N/A dB	

FREQ: 2-B	MHz	REJECT: 0	%
ANGLE: N/A	deg	DAMPING: 1000	ohms
DELAY: 0.391	msec	PULSER: DUAL	*
ZERO: 11.994	msec	FILTER: FIXED	*
VELOCITY: .2330	msec	REP RATE: HIGH	
RANGE: 2.00	inches	TOF: ☑ PEAK ☐ FLANK	
RECTIFIER: FULL		POWER: BATT.	
DUAL: ☑ ON ☐ OFF		TCG: ☐ ON ☑ OFF	

		VERIFICATION TIMES		
INITIAL CALIBRATION TIME	0720			
FINAL CALIBRATION TIME	1325		N	A

LINEARITY CHECK

VERTICAL

SIGNAL 1	100	90	80	70	60	50	40	30	20	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR

SIGNAL 2 SHALL EQUAL 50% OF SIGNAL 1 ±5% OF FULL SCALE

TESTER GAIN	SET	- 6	- 12	SET	+ 12	SET	+ 6
SIGNAL AMP	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
		40	20		80		80

DAILY LINEARITY CHECKS SATISFACTORY REFER TO CAL. NO.

TECHNIQUE: ☐ SPOT ☐ PATT ☐ MOST ☐ RL ☐ OTHER

INDICATION NUMBER	L(in) FROM ZERO REF.	TOTAL LENGTH	THRUWALL DIMENSION	SIDE OF WELD	TYPE OF REFLECTOR
1	44.0 - 49.0	N/A	N/A	D/S	NONE
	NO RECORDABLE CRACK HAS BEEN OBSERVED				

EXAMINER: W. Roger Bentley
LEVEL: II DATE: 4-9-01

REVIEWED BY: [illegible]
LEVEL: III DATE: 4/13/01

ANII: [illegible]
DATE: 4-24-01

PAGE 10 OF 10

TVA 19671 (ONP-6-88)