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

July 29, 2008

10 CFR 50.55a

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

Gentlemen:

In the Matter of) Docket No. 50-260
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 2 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM, THIRD TEN-YEAR INSPECTION INTERVAL - REQUEST FOR RELIEF 2-ISI-18, REVISION 1

In accordance with 10 CFR 50.55a(g)(5)(iii), TVA is requesting relief from certain inservice inspection (ISI) requirements in Section XI of the ASME Boiler and Pressure Vessel Code. The need for this request for relief was identified during ISI examinations completed during the BFN Unit 2, Cycles 13 and 14 refueling outages.

TVA 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."

TVA has determined that 10 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 welds are Category R-A (Westinghouse Owners

A047
NRR

Group (WOG) WCAP-14572, Revision 1-NP-A) Class 1 piping welds. These weld examinations had calculated NDE examination coverage ranging between 50 and 87 percent. The limitations encountered during the performance of the ultrasonic (UT) examination were caused by component configuration. Three of the 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 (PDI) Program existed for single-side austenitic welds. Consequently, the percent examination coverage achieved for the three welds was 50, 50, and 75 percent respectively. The enclosure to this letter provides BFN Unit 2 request for relief, 2-ISI-18, Revision 1, which addresses the examination coverage limitations for the 10 welds described above.

This request for relief is consistent with 2-ISI-18, Revision 0 (Unit 2 Cycle 12 weld examinations) submitted by TVA letters dated June 2, 2003 and December 16, 2003. TVA's request was approved by NRC letter dated April 12, 2004.

TVA seeks review of this request for relief by February 2, 2009, to support resource planning for the Unit 2, Cycle 15 (Spring 2009) refueling outage.

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

Sincerely,

D. T. Langley
Manager of Licensing
and Industry Affairs

Enclosure
cc (Enclosure): see page 3

cc (Enclosure):
(Via NRC Electronic Distribution)

Mr. Eugene F. Guthrie, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

Ms. Eva A. Brown, Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
(MS 08G9)
11555 Rockville Pike
Rockville, Maryland 20852-2739

ENCLOSURE

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

REQUEST FOR RELIEF 2-ISI-18, REVISION 1

(SEE ATTACHED)

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

REQUEST FOR RELIEF 2-ISI-18, REVISION 1

EXECUTIVE SUMMARY:

This request for relief addresses four Reactor Recirculation (RECIRC) System full penetration piping Welds, one Reactor RECIRC weld overlay, four Reactor Water Cleanup (RWCU) System and one Residual Heat Removal (RHR) System full penetration piping welds examined during Cycles 13 and 14 in the second period of the Third Ten-Year ISI interval.

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, as mandated by 10 CFR 50.55a(g)(4).

Credit for the single side access ultrasonic examination of RECIRC Welds GR-2-38, GR-2-41 provided 50 percent coverage, weld KR-2-03 provided 62.5 percent coverage, and GR-2-48 provided 75 percent coverage because of the requirement mandated in 10 CFR 50.55a(b)(2)(xv)(A)(2), which states in part, "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 flaw on the opposite side of the weld." At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Under the original ASME Section XI Code requirements, UT coverage attained was essentially 100 percent.

An ultrasonic examination was performed on RHR weld DRHR-2-03 and provided 87.6 percent coverage due to component configuration (Valve to Flued Head).

An ultrasonic examination was performed on RECIRC weld GR-2-15 (OL) and provided 76 percent coverage due to design of the Structural Weld Overlay (SWOL) configuration (Pipe to Saddle).

An ultrasonic examination was performed on RWCU Weld RCRD-2-50 and provided 62.7 percent coverage due to joint configuration (Elbow to Pipe).

An ultrasonic examination was performed on RWCU Weld RCRD-2-52 and provided 87 percent coverage due to joint configuration (Pipe to Valve).

An ultrasonic examination was performed on RWCU Weld, RWCU-2-004-083 and provided 81.5 percent coverage due to joint configuration (Elbow to Valve).

An ultrasonic examination was performed on RWCU Weld CRD-2-005-003 and provided 64.8 percent coverage due to joint configuration (Pipe to Valve).

The ultrasonic examinations were performed on all accessible areas to the maximum extent practical.

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 judge the overall integrity of the piping welds. Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), it is requested that relief be granted for the third inspection interval.

This request for relief is consistent with 2-ISI-18, Revision 0 (Unit 2 Cycle 12 weld examinations) submitted by TVA letters dated June 2, 2003, and December 16, 2003. TVA's request was approved by NRC letter dated April 12, 2004.

Unit: Two (2)

ISI Interval: ASME Section XI, Third Ten-Year ISI Inspection Interval (May 25, 2001 to May 24, 2011)

Systems: Reactor Recirculation (RECIRC) System, Residual Heat Removal (RHR) System, and Reactor Water Cleanup (RWCU) System

Components: 9 Full Penetration Piping Welds, 1 Structural Weld Overlay (SWOL) listed in Table 1.

ASME Code Class: ASME Code Class 1

ASME Section XI Code Edition: 1995 Edition, 1996 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 depicted 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 the weld and adjacent base material.

LIST OF ITEMS ASSOCIATED WITH THE REQUEST FOR RELIEF:

Weld DRHR-2-03 - Valve (A351, CF8M, F316, S.S.) to Flued Head (A403, WP304, S.S.)

Weld KR-2-03 - Pipe (A358, TP304, S.S.) to Tee (A403, WP304, S.S.)

Weld GR-2-38 - Pipe (A358, TP304, S.S.) to Saddle (A403, WP304, S.S.)

Weld GR-2-41 - Pipe (A358, TP304, S.S.) to Reducer (A403, WP304, S.S.)

Weld GR-2-48 - Pipe (A358, TP304, S.S.) to Saddle (A403, WP304, S.S.)

Weld GR-2-15(OL) - Pipe (A358, TP304, S.S.) to Reducer (A403, WP304, S.S.) Overlayed Weld

RCRD-2-50 - Elbow (SA420, GR. WPL6, C.S.) to Valve (A182, F316, S.S.)

RCRD-2-52 - Pipe (A333, GR. 1, C.S.) to Valve (A182, F316, S.S.)
(Note: Weld removed, and replaced with CRD-2-005-003)

RWCU-2-004-083 - Pipe (A106, C.S.) to Valve (A351, CF8M, F316, S.S.)

CRD-2-005-003 - Pipe (A106, C.S.) to Valve (A182, F316, S.S.)
(Note: This weld replaced weld RCRD-2-52)

BASIS FOR REQUEST FOR RELIEF: It is not possible to achieve the required volumetric examination due to the configuration of these components or due to single side access. Because of the requirement mandated in 10 CFR 50.55a(b)(2)(xv)(A)(2), which in part 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 flaw on the opposite side of the weld." Only 50 percent coverage for welds GR-2-38 and GR-2-41, 62.5 percent for weld KR-2-03, and only 75 percent coverage for weld GR-2-48 can be claimed. At the time of the examinations, there was no Appendix VIII Program for single-sided austenitic welds.

Weld DRHR-2-03 limitations were due to the configuration of the component, Valve to Flued Head

Weld GR-2-15(OL) limitations were due to the design configuration of the structural weld overlay (SWOL) on the pipe to saddle weld.

RCRD-2-50 limitations were due to joint configuration consisting of piping elbow to valve.

RCRD-2-52 limitations were due to joint configuration consisting of pipe to valve.

RWCU-2-004-083 limitations were due to joint configuration consisting of piping elbow to valve.

CRD-2-005-003 limitations were due to joint configuration consisting of pipe to valve.

Under the ASME Section XI Code requirements, UT coverage attained 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 judge the overall integrity of the piping welds. Attached is a detailed description of the limitations in Table 1.

ALTERNATIVE EXAMINATION: None. In lieu of the Code required essentially 100 percent volume ultrasonic examination, TVA proposes an ultrasonic examination of the 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 welds were examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, as mandated by 10 CFR 50.55a(g)(4).

An ultrasonic examination was performed on the piping welds and structural weld overlay accessible areas to the maximum extent practical due to the configuration. Credit for the one-sided examination of GR-2-38 and GR-2-41 provided 50 percent coverage because of the requirement mandated in 10 CFR 50.55a(b)(2)(xv)(A)(2),which states in part, "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 flaw on the opposite side of the weld." At time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Under the original ASME Section XI Code requirements, UT coverage attained was essentially100 percent.

Credit for the one-sided examinations of KR-2-03 and GR-2-48 provided 62.5 and 75 percent coverage respectively since the requirement mandated in 10 CFR 50.55a(b)(2)(xv)(A)(2), which states in part, "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 flaw on the opposite side of the weld." At the time of the examination, there was no Appendix VIII Program for single sided austenitic welds. Under the original ASME Section XI Code requirements, UT coverage attained was essentially 100 percent for both welds.

Coverage for the Ultrasonic examination of Weld DRHR-2-03 was limited to the configuration of the components, valved to flued head. Coverage obtained was 87.6 percent.

Coverage for the Ultrasonic examination of Weld GR-2-15(OL) was limited due the configuration of the structural weld overlay covering the pipe to saddle weld. Coverage obtained was 76 percent.

Coverage for the Ultrasonic examination of Weld RCRD-2-50 was limited due the elbow to valve configuration of the weld. Coverage obtained was 62.7 percent.

Coverage for the Ultrasonic examination of Weld RCRD-2-52 was limited due the pipe to valve configuration of the weld. Coverage obtained was 87 percent.

Coverage for the Ultrasonic examination of Weld RWCU-2-004-083 was limited due the elbow to valve configuration of the weld. Coverage obtained was 81.5 percent. Coverage for the Ultrasonic examination of Weld CRD-2-005-003 was limited due the pipe to valve configuration of the weld. Coverage obtained was 64.8 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 judge the overall integrity of the piping welds.

Reference RFR 2-ISI-18, Revision 0, (Unit 2 Cycle 12 weld examinations) submitted by TVA letters dated June 2, 2003 and December 16, 2003. NRC approved TVA's request by letter dated April 12, 2004, (TAC NOS. MB9749 and MB9750.)

Welds associated with Request for Relief 2-ISI-18, Revision 1:

WELD	REPORT	CYCLE
DRHR-2-03	R-022	13
KR-2-03	R-043	13
GR-2-38	R-109	14
GR-2-41	R-112	14
GR-2-48	R-114	14
GR-2-15(OL)	R-115	14
RCRD-2-50	R-118	14
RCRD-2-52	R-074	14
RWCU-2-004-083	R-123	14
CRD-2-005-003	R-171	14

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), TVA requests that relief be granted for the third Ten-Year ISI inspection interval for the above listed welds.

IMPLEMENTATION SCHEDULE: This request for relief is applicable to the BFN Unit 2 Third Ten-Year ISI inspection interval (May 25, 2001 to May 24, 2011). The Reactor Recirculation (RECIRC) System welds, Residual Heat Removal (RHR) System welds, and Reactor Water Cleanup System (RWCUS) welds listed in Table 1 were examined during the second period (Cycles 13 and 14) of the Third Ten-Year ISI inspection interval.

REFERENCE:

TVA Nuclear power Group, Nondestructive Examination procedure, N-GP-31, "Calculation of ASME Code Coverage for Section XI, Appendix VIII Ultrasonic Examinations"

ATTACHMENTS:

Attachment A - 4 ISI Sketches:

2-ISI-0221-C, Sheet 1

2-ISI-0270-C, Sheets 1 and 2

2-ISI-0272-C, Sheet 1

Attachment B:

Ten Nondestructive Examination Reports:

R-022
R-043
R-109
R-112
R-114
R-115
R-118
R-074
R-123
R-171

TABLE 1

WELD NUMBER	NPS	ISI DRAWING	PERCENT EXAMINED	REMARKS
DRHR-2-03	24"	2-ISI-0221-C	87.6%	Limitation due to component configuration. The configuration is a Flued Head to Valve that prevents a complete examination of the required exam volume. This weld was examined using PDI qualified personnel, procedures, and equipment.
KR-2-03	28"	2-ISI-0270-C	62.5%	Limitation due to saddle to pipe component configuration and the requirement in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to 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.
GR-2-38	12"	2-ISI-0270-C	50%	Limitation due to saddle to pipe component configuration and the requirement in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to 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.

WELD NUMBER	NPS	ISI DRAWING	PERCENT EXAMINED	REMARKS
GR-2-41	12"	2-ISI-0270-C	50%	Limitation due to saddle to pipe component configuration and the requirement in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to 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.
GR-2-48	12"	2-ISI-0270-C	75%	Limitation due to saddle to pipe component configuration and the requirement in 10 CFR 50.55a(b)(2)(xv)(A)(2), which requires UT of one side of austenitic welds to be qualified to 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.
GR-2-15(OL)	12"	2-ISI-0270-C	76%	Limitation due the design configuration of the structural weld overlay covering the pipe to saddle weld. This weld was examined using PDI qualified personnel, procedures and equipment.
RCRD-2-50	4"	2-ISI-0272-C	62.7%	Limitation due to the elbow to valve joint configuration. Elbow intrados and the required transducer focusing values prevented interrogation of the required examination volume. This weld was examined using PDI qualified personnel, procedures and equipment.

WELD NUMBER	NPS	ISI DRAWING	PERCENT EXAMINED	REMARKS
RCRD-2-52	4"	2-ISI-0272-C	87%	Limitation due to the pipe to valve joint configuration. Weld contour prevented scanning on the weld surface in the axial direction to achieve full interrogation of the required examination volume. This weld was examined using PDI qualified personnel, procedures and equipment.
RWCU-2-004-083	4"	2-ISI-0272-C	81.5%	Limitation due to the elbow to valve joint configuration. Weld contour prevented scanning on the weld surface in the axial direction to achieve full interrogation of the required examination volume. This weld was examined using PDI qualified personnel, procedures and equipment.
CRD-2-005-003	4"	2-ISI-0272-C	64.8%	Limitation due to the pipe to valve joint configuration. Weld contour prevented scanning on this surface in the axial direction to achieve full interrogation of the required examination volume. This weld was examined using PDI qualified personnel, procedures and equipment.

ATTACHMENT A

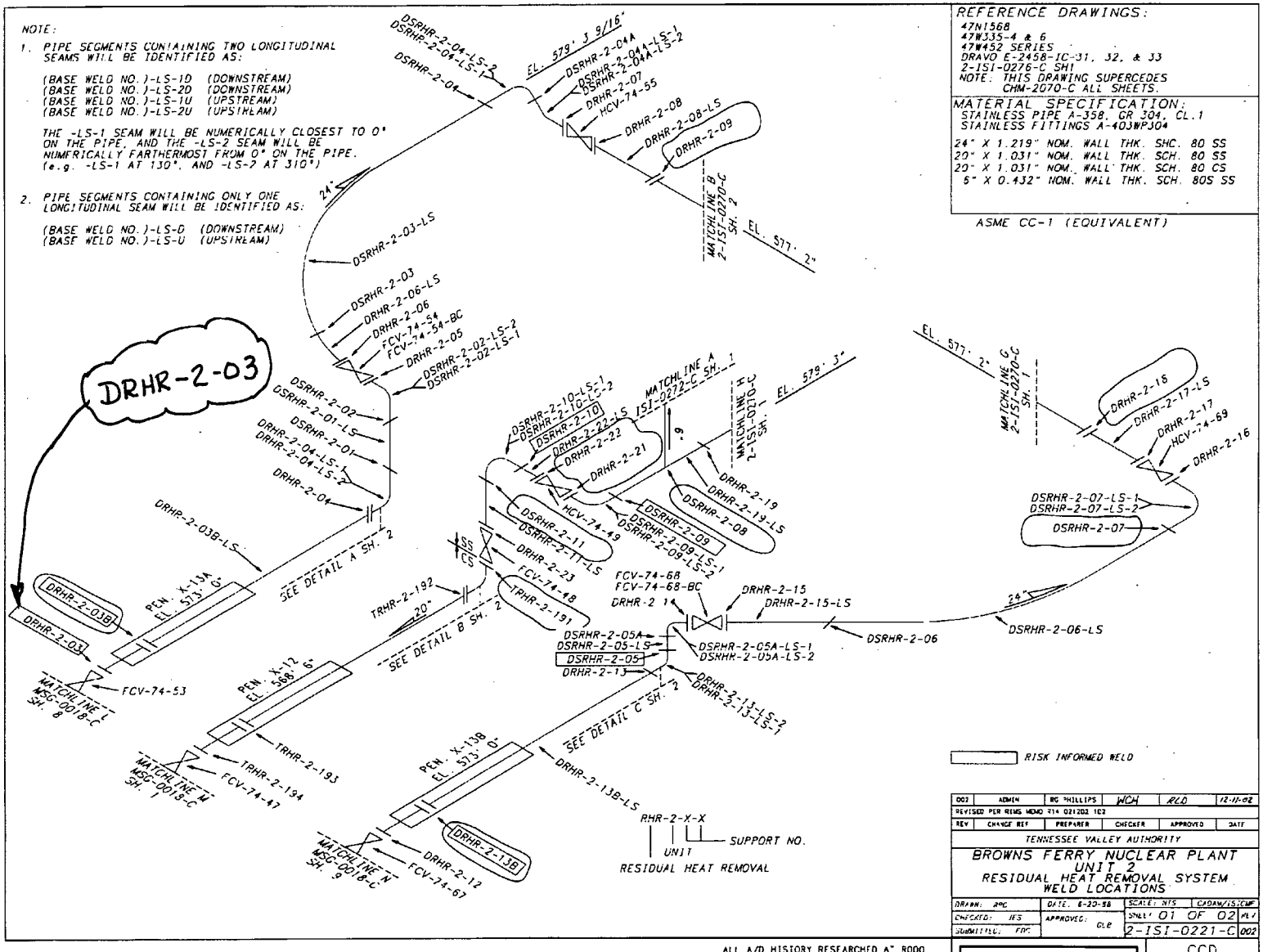
ISI SKETCHES

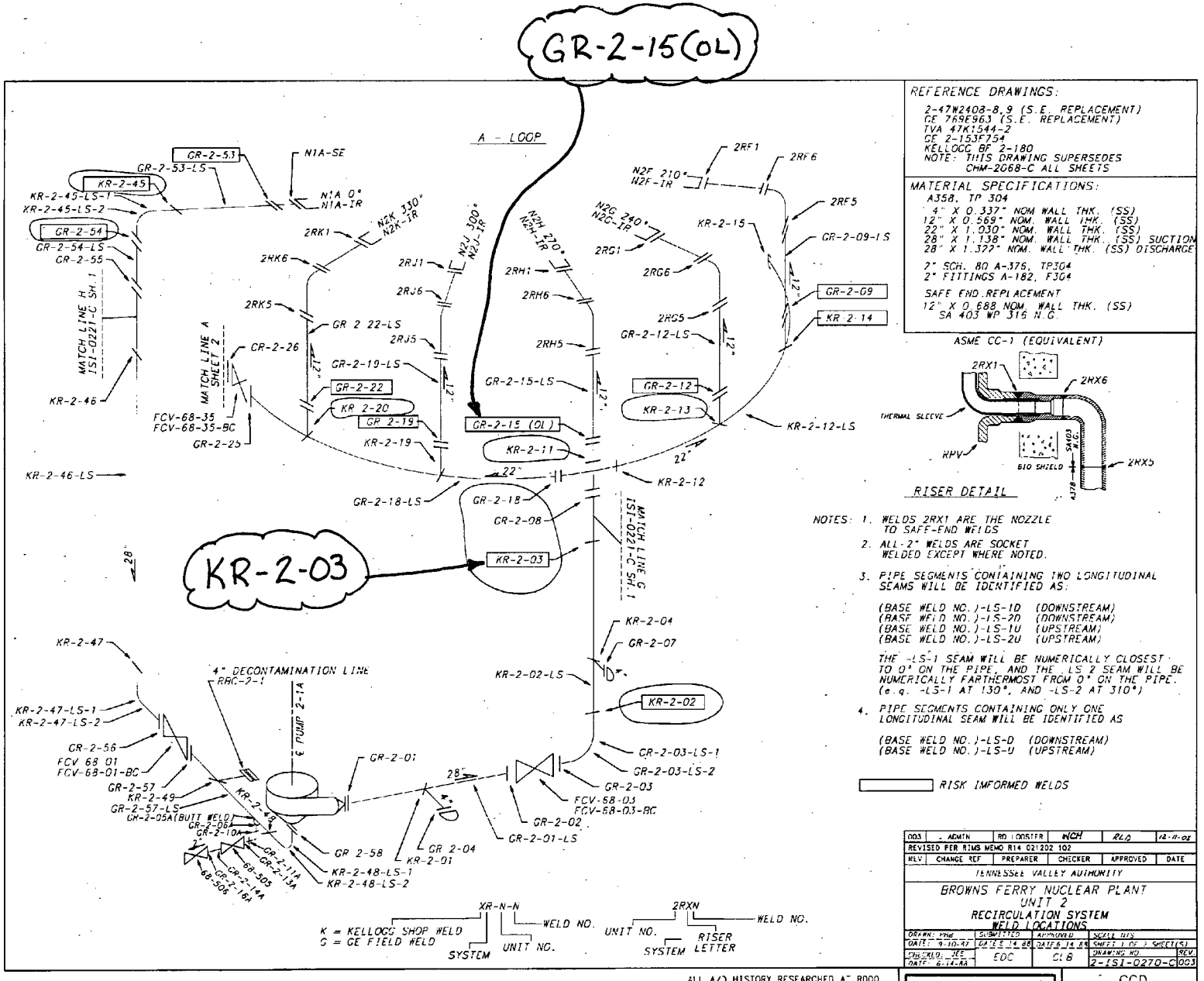
2-ISI-0221-C, Sheet 1

2-ISI-0270-C, Sheet 1

2-ISI-0270-C, Sheet 2

2-ISI-0272-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)
DRHR-2-03
DSRHR-2-04-LS-2
DSRHR-2-04-LS-1
DSRHR-2-04
EL. 579' 3 9/16"
DSRHR-2-04A
DSRHR-2-04A-LS-1
DSRHR-2-04A-LS-2
DRHR-2-07
HCV-74-55
DRHR-2-08
DRHR-2-08-LS
DRHR-2-09
MATCHLINE B 2-ISI-0270-C SH. 2
EL. 577' 2"
24"
DSRHR-2-03-LS
DSRHR-2-03
DSRHR-2-06-LS
DRHR-2-06
FCV-74-54
FCV-74-54-BC
DRHR-2-05
DSRHR-2-02-LS-2
DSRHR-2-02-LS-1
DSRHR-2-02
DSRHR-2-01-LS
DSRHR-2-01
DRHR-2-04-LS-1
DRHR-2-04-LS-2
DRHR-2-01
DRHR-2-03B-LS
SEE DETAIL A SH. 2
DRHR-2-03B
PEN. X-13A EL. 573' 0"
FCV-74-53
MATCHLINE L MSG-0018-C SH. 8
PEN. X-12 EL. 568' 6"
TRHR-2-193
FCV-74-47
MATCHLINE M MSG-0018-C SH. 7
PEN. X-13B EL. 573' 0"
DRHR-2-13B-LS
DRHR-2-13B
FCV-74-67
MATCHLINE N MSG-0018-C SH. 9
TRHR-2-192
20"
SEE DETAIL B SH. 2
TRHR-2-191
FCV-74-48
SS
CS
DSRHR-2-10-LS-1
DSRHR-2-10-LS-2
DSRHR-2-10
DRHR-2-22-LS
DRHR-2-22
DRHR-2-21
MATCHLINE A 1SI-0272-C SH. 1
MATCHLINE K 1-ISI-0270-C SH. 1
EL. 579' 3"
DRHR-2-19
DRHR-2-19-LS
DSRHR-2-08
DSRHR-2-09
DSRHR-2-09-LS-1
DSRHR-2-09-LS-2
HCV-74-49
DSRHR-2-11
DSRHR-2-11-LS
DRHR-2-23
FCV-74-68
FCV-74-68-BC
DRHR-2-14
DRHR-2-15
DRHR-2-15-LS
DSRHR-2-05A
DSRHR-2-05-LS
DSRHR-2-05
DRHR-2-13
DSRHR-2-05A-LS-1
DSRHR-2-05A-LS-2
DRHR-2-13-LS-2
DRHR-2-13-LS-1
SEE DETAIL C SH. 2
DSRHR-2-06
DSRHR-2-06-LS
24"
EL. 577' 2"
MATCHLINE G 2-ISI-0270-C SH. 1
DRHR-2-16
DRHR-2-17-LS
DRHR-2-17
HCV-74-69
DRHR-2-16
DSRHR-2-07-LS-1
DSRHR-2-07-LS-2
DSRHR-2-07
RHR-2-X-X
SUPPORT NO.
UNIT
RESIDUAL HEAT REMOVAL
RISK INFORMED WELD
ALL A/D HISTORY RESEARCHED AT ROOD
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.1
STAINLESS FITTINGS A-403WP304
24" X 1.219" NOM. WALL THK. SHC. 80 SS
20" X 1.031" NOM. WALL THK. SCH. 80 SS
20" X 1.031" NOM. WALL THK. SCH. 80 CS
6" X 0.432" NOM. WALL THK. SCH. 80S SS
ASME CC-1 (EQUIVALENT)
002 ADMIN RG PHILLIPS WCH RLD 12-11-02
REVISED PER REMS MEMO 214 021202 102
REV CHANGE REF PREPARER CHECKER APPROVED DATE
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT UNIT 2
RESIDUAL HEAT REMOVAL SYSTEM WELD LOCATIONS
DRAWN: RPC DATE: 8-20-58 SCALE: NTS CADAM/IS: CMF
CHECKED: HES APPROVED: CLE SHEET 01 OF 02 REV
SUBMITTED: FDC 2-ISI-0221-C 002
CAD MAINTAINED DRAWING
CCD



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 1.327" 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 IMFORMED WELDS

003	- ADMIN	RD ROOSTER	WCH	RLD	12-11-03
REVISED PER RIMS MEMO R14 021202 102					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

TENNESSEE VALLEY AUTHORITY

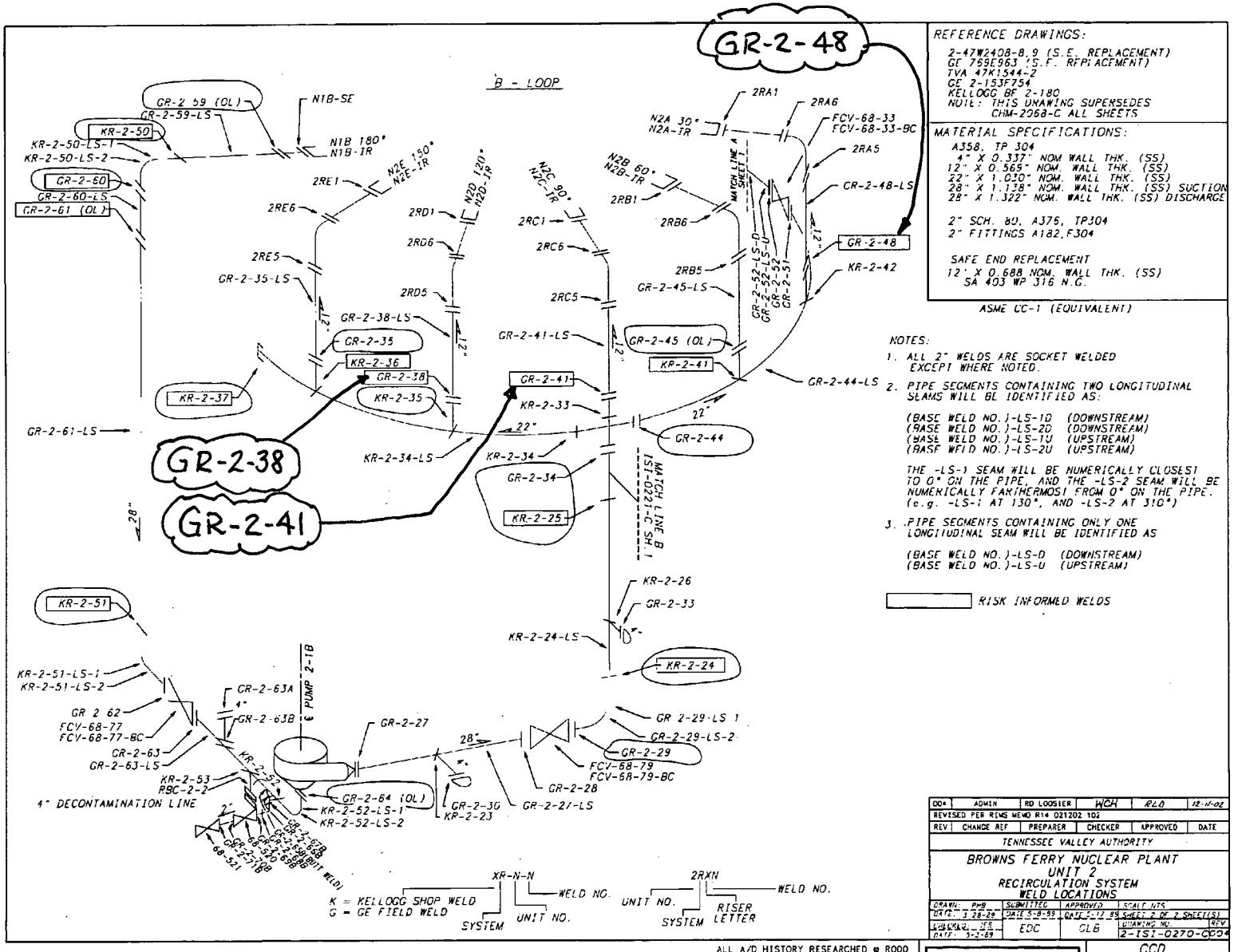
BROWNS FERRY NUCLEAR PLANT
UNIT 2
RECIRCULATION SYSTEM
WELD LOCATIONS

DRAWN: MHE	SUBMITTED	APPROVED	SCALE: NTS
DATE: 9-10-87	DATE 5-14-88	DATE 6-14-88	SHEET 1 OF 3 SHEET(S)
CHECKED: JES	EDC	C.I.B	DRAWING NO. 2-ISI-0270-C REV. 003
DATE: 6-14-88			

CAD MAINTAINED DRAWING

CCD

E-13



REFERENCE DRAWINGS:

2-47W2408-8,9 (S.E. REPLACEMENT)
GE 769E963 (S.E. REPLACEMENT)
TVA 47K1544-2
GE 2-153F254
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

004	ADMIN	RD LOOSIER	WCH	RLO	12-11-02
REVISED PER RIMS MEMO R14 021202 102					
REV	CHANGE REF	PREPARER	CHECKER	APPROVED	DATE

TENNESSEE VALLEY AUTHORITY

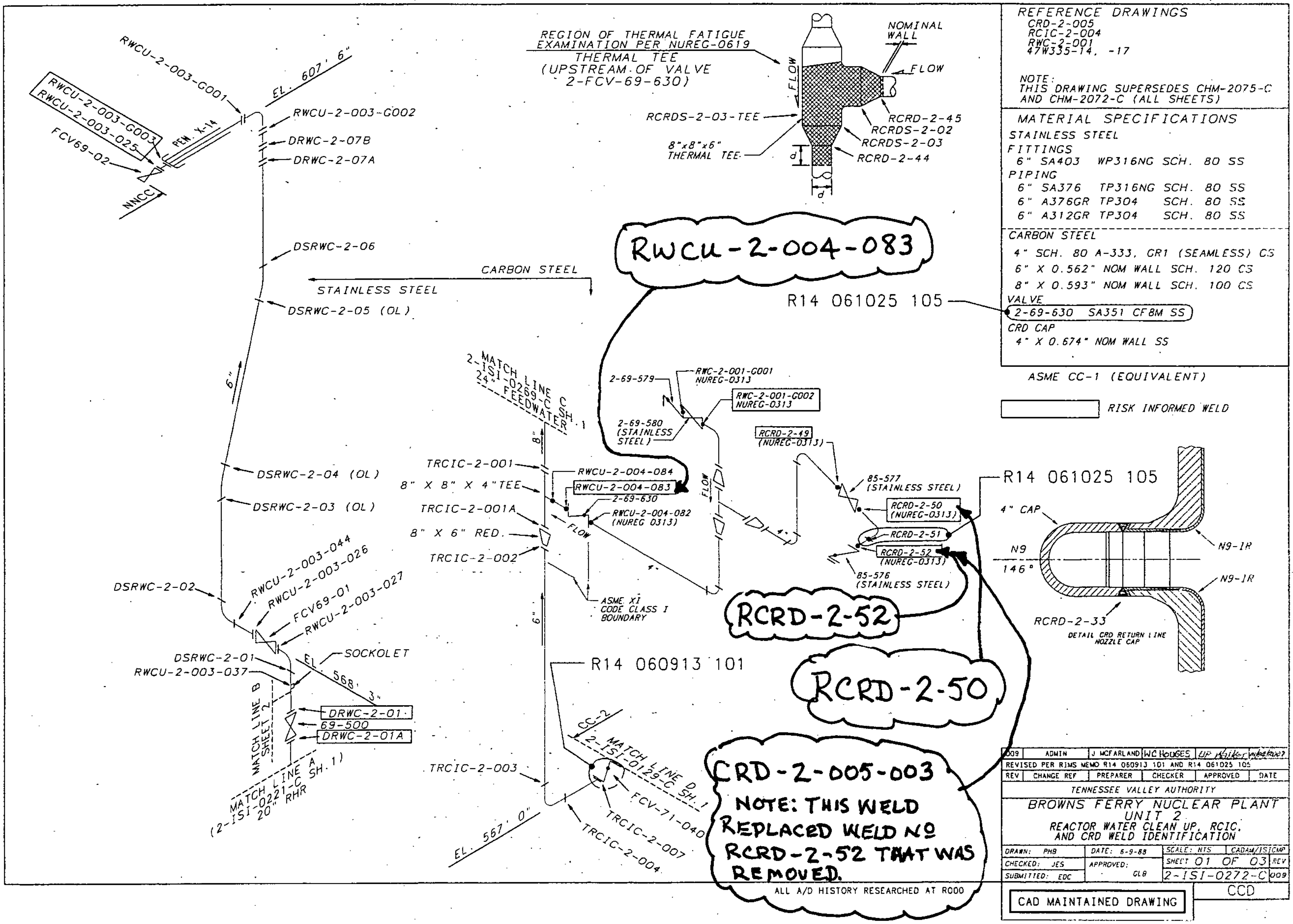
BROWNS FERRY NUCLEAR PLANT
UNIT 2
RECIRCULATION SYSTEM
WELD LOCATIONS

DRAWN: PHB	SUBMITTED	APPROVED	SCALE: NTS
DATE: 3-28-89	DATE: 5-8-89	DATE: 5-12-89	SHEET: 2 OF 2 SHEET(S)
CHECKED: JES	EDC	GLB	DRAWING NO. 2-ISI-0270-CCD4 REV
DATE: 5-3-89			

CAD MAINTAINED DRAWING

CCD

ALL A/D HISTORY RESEARCHED @ R000


REFERENCE DRAWINGS
CRD-2-005
RCIC-2-004
RWC-2-001
47W335-14, -17
NOTE: THIS DRAWING SUPERSEDES CHM-2075-C AND CHM-2072-C (ALL SHEETS)
MATERIAL SPECIFICATIONS
STAINLESS STEEL
FITTINGS
6" SA403 WP316NG SCH. 80 SS
PIPING
6" SA376 TP316NG SCH. 80 SS
6" A376GR TP304 SCH. 80 SS
6" A312GR TP304 SCH. 80 SS
CARBON STEEL
4" SCH. 80 A-333, GR1 (SEAMLESS) CS
6" X 0.562" NOM WALL SCH. 120 CS
8" X 0.593" NOM WALL SCH. 100 CS
VALVE
2-69-630 SA351 CF8M SS
CRD CAP
4" X 0.674" NOM WALL SS
ASME CC-1 (EQUIVALENT)
RISK INFORMED WELD
REGION OF THERMAL FATIGUE EXAMINATION PER NUREG-0619
THERMAL TEE (UPSTREAM OF VALVE 2-FCV-69-630)
NOMINAL WALL
FLOW
RCRDS-2-03-TEE
8"x8"x6" THERMAL TEE
RCRD-2-45
RCRDS-2-02
RCRDS-2-03
RCRD-2-44
RWCU-2-004-083
R14 061025 105
CARBON STEEL
STAINLESS STEEL
RWCU-2-003-G001
EL. 607' 6"
RWCU-2-003-G003
RWCU-2-003-025
PEN. X-14
FCV69-02
NNCC
RWCU-2-003-G002
DRWC-2-07B
DRWC-2-07A
DSRWC-2-06
DSRWC-2-05 (OL)
6"
2-ISI-0269-C SH. 1 MATCH LINE C 24" FEEDWATER
8"
2-69-579
RWC-2-001-G001 NUREG-0313
RWC-2-001-G002 NUREG-0313
2-69-580 (STAINLESS STEEL)
RCRD-2-49 (NUREG-0313)
TRCIC-2-001
RWCU-2-004-084
8" X 8" X 4" TEE
RWCU-2-004-083
2-69-630
TRCIC-2-001A
RWCU-2-004-082 (NUREG 0313)
8" X 6" RED.
TRCIC-2-002
85-577 (STAINLESS STEEL)
RCRD-2-50 (NUREG-0313)
RCRD-2-51
RCRD-2-52 (NUREG-0313)
85-576 (STAINLESS STEEL)
ASME XI CODE CLASS I BOUNDARY
R14 061025 105
4" CAP
N9
146°
N9-1R
RCRD-2-33
DETAIL CRD RETURN LINE NOZZLE CAP
DSRWC-2-04 (OL)
DSRWC-2-03 (OL)
DSRWC-2-02
RWCU-2-003-044
RWCU-2-003-026
FCV69-01
RWCU-2-003-027
SOCKOLET
DSRWC-2-01
RWCU-2-003-037
EL. 568' 3"
MATCH LINE B SHEET 2
DRWC-2-01
69-500
DRWC-2-01A
MATCH LINE A (2-ISI-0221-C SH. 1) 20" RHR
RCRD-2-52
RCRD-2-50
R14 060913 101
CC-2
2-ISI-0129-C SH. 1 MATCH LINE D
TRCIC-2-003
FCV-71-040
TRCIC-2-007
TRCIC-2-004
EL. 567' 0"
CRD-2-005-003
NOTE: THIS WELD REPLACED WELD NO RCRD-2-52 THAT WAS REMOVED.
ALL A/D HISTORY RESEARCHED AT RODO
009 ADMIN J MCFARLAND WC HODGES
REVISED PER RIMS MEMO R14 060913 101 AND R14 061025 105
REV CHANGE REF PREPARER CHECKER APPROVED DATE
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT UNIT 2
REACTOR WATER CLEAN UP, RCIC, AND CRD WELD IDENTIFICATION
DRAWN: PHB DATE: 6-9-88 SCALE: NTS CADAM/ISICMP
CHECKED: JES APPROVED: SHEET 01 OF 03 REV
SUBMITTED: EDC GLB 2-ISI-0272-C 009
CCD
CAD MAINTAINED DRAWING

ATTACHMENT B

Examination Reports

R-022
R-043
R-109
R-112
R-114
R-115
R-118
R-074
R-123
R-171

Examination Report No. R-022

Weld No. DRHR-2-03

00056

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND	REPORT NUMBER: R-022

PROJECT: *BFN* UNIT: *2* CYCLE *13*				COMPONENT ID: *DRHR-2-03*	
EXAMINATION METHOD				SYSTEM: RHRS	ISI DWG NO: *2-ISI-0221-C-01*
MT ☐	PT ☐	UT ☑	VT ☐	CONFIGURATION	CATEGORY
PROCEDURE *N-UT-64*	REV *7*	TC *N/A*		*VERT LS TO P*	*D*
EXAMINER: JASON POLISENSKY	EXAMINER: N/A			EXAMINER: N/A	EXAMINER: N/A
LEVEL: II	LEVEL:			LEVEL:	LEVEL:

Total coverage calculated to be approximately 87.58 %

THE ABOVE MENTIONED WELD WAS EXAMINED WITH A 45°, 60° SHEAR AND A 60° RL. A HALF V CALIBRATION WAS UTILIZED AND SCANNED AT 5% TO 20% ID ROLL.

ROOT GEOMETRY WAS RECORDED WITH THE 60RL ON SCAN 4 360°. NO REJECTABLE INDICATIONS WERE OBSERVED.

CODE COVERAGE WAS LESS THAN 90% DUE TO COMPONENT CONFIGURATION.

This exam satisfies the requirements of NUREG 0313(1455C) and Section XI, R-A, R1.16A. Mark Welch 3/27/05

RESOLUTION BY	REVIEWED BY	ANII:
Jason Polisensky	Mark Welch	DATE 4/5/05
LEVEL II DATE 3/26/05	LEVEL: III DATE 3/27/05	Page: 1 OF 7

ACCESS: FORMS DATABASE R-10/04/01

00057

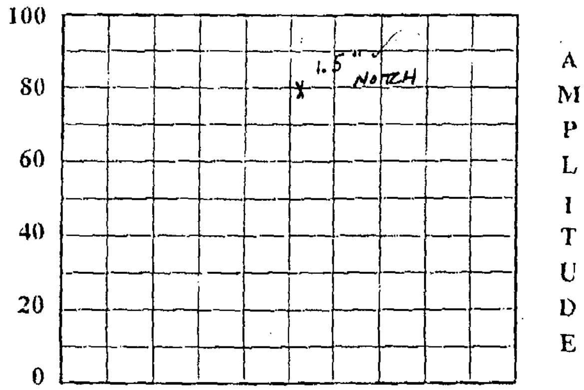
TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER R-022

PROJECT BFN UNIT/CYCLE 2/13
PROCEDURE: N-UT-64 REV: 7 TC: N/A

TRANSDUCER

MANUFACTURER KBA
MODEL: COMP G ✓ S/N 00YNC0 ✓
SIZE: .375 ✓ FREQ: 1.5 ✓ MH
SHAPE: RND # ELEMENTS: 2 # CONS: Ø
CABLE TYPE RG174 LENGTH: 6'
MODE: ☒ SHEAR ☐ LONG ☐ RL

DAC



DISPLAY WIDTH 4.0 inches

CALIBRATION DATE: 3/25/05
CALIBRATION BLOCK NO. WB85 ✓ TEMP: 72 °F
SIMULATOR BLOCK: 790398 ✓ ROMPAS
THERMOMETER S/N 558271 ✓ DUE DATE 6-9-05
COUPLANT: ULTRAGEL BATCH: 03125 ✓

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 790398 ✓
NOMINAL ANGLE: 45 ACTUAL ANGLE 45 °

INSTRUMENT

MANUFACTURER KBA DUE DATE 6-4-05
MODEL NO.: USN 52L S/N: 00F575 ✓

INSTRUMENT SETTINGS E30218

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	18.5 dB	10
CIRC.	☐	☐	N/A dB	N/A

FREQ: 2-8 ✓ MH REJECT: = 0 %
ANGLE: 45 deg DAMPING: 1000 ✓ ohms
DELAY 0.000 msec PULSER: SINGLE ✓ *
ZERO: 5.910 msec
VELOCITY .1244 msec PRR/PRF: HIGH ✓
RANGE: 4.0 inches TOF: PEAK
DISP. MODE: FULL WAV ✓ POWER: BAT

REF. REFLECTOR: FAR SDH GAIN: 30.5 dB
AMPLITUDE: 75 % METAL PATH: 1.035

CALIBRATION TIMES

INITIAL TIME: 1235 FINAL TIME 1500

VERIFICATION TIMES	1) 1345	2) 1440	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	-12dB	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	WELD / ITEMS EXAMINED
	DRHR-2-03

EXAMINER: Jason Polisnoy LVL.: II
EXAMINER: LVL.:
REVIEWER: [signature] LVL.: III DATE 3/27/05

ANII: [signature]
DATE 4/8/05
PAGE 2 OF 7

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER R-022

PROJECT: BFN UNIT/CYCLE: 2/13
PROCEDURE: N-UT-64 REV: 7 ✓ TC: N/A

TRANSDUCER

MANUFACTURER: KBA
MODEL: COMP G S/N: 00XD3R
SIZE: .375 FREQ: 1.5 MH
SHAPE: RND # ELEMENTS: 2 # CONS: Ø
CABLE TYPE: RG174 LENGTH: 6'
MODE: ☒ SHEAR ☐ LONG ☐ RL

CALIBRATION DATE: 3/25/05
CALIBRATION BLOCK NO. WB85 ✓ TEMP: 72 °F
SIMULATOR BLOCK: 790398 ✓ ROMPAS
THERMOMETER S/N 558271 ✓ DUE DATE 6-9-05
COUPLANT: ULTRAGEL BATCH: 03125

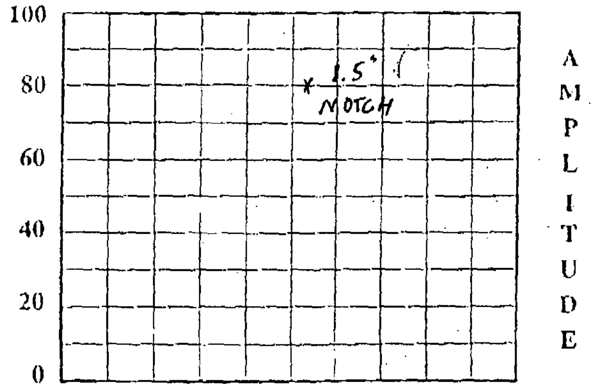
ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 790398 ✓
NOMINAL ANGLE: 60 ACTUAL ANGLE 60°

INSTRUMENT

MANUFACTURER: KBA DUE DATE 6-4-05
MODEL NO.: USN 52L S/N: 00F575

DAC



DISPLAY WIDTH 5.0 inches

INSTRUMENT SETTINGS E30218

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	38 dB	11
CIRC.	☐	☐	N/A dB	N/A

FREQ: 2-8 ✓ MH REJECT: = 0 % ✓
ANGLE: 60 deg DAMPING: 1000 ohms ✓
DELAY: 0.000 msec PULSER: SINGLE ✓ *
ZERO: 10.191 msec
VELOCITY: .1266 msec PRR/PRF: HIGH ✓
RANGE: 5.0 inches TOF: PEAK
DISP. MODE: FULL WAV ✓ POWER: BAT

REF. REFLECTOR: NEAR SDH GAIN: 32 dB
AMPLITUDE: 60 % METAL PATH: .624

CALIBRATION TIMES

INITIAL TIME: 1245 FINAL TIME 1501

VERIFICATION TIMES	1) 1410	2) 1430	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	-12dB	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	WELD / ITEMS EXAMINED
	DRHR-2-03

EXAMINER: Jason Polianoly LVL.: II
EXAMINER: LVL.:
REVIEWER: Matt Weld LVL.: III DATE 3/27/05

ANII: Mitchell
DATE 4/8/05
PAGE 3 OF 7

ACCESS: FORMS DATABASE 10-27-01

00059

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER R-022

PROJECT BFN UNIT/CYCLE 2/13
PROCEDURE: N-UT-64 REV: 7 TC: N/A

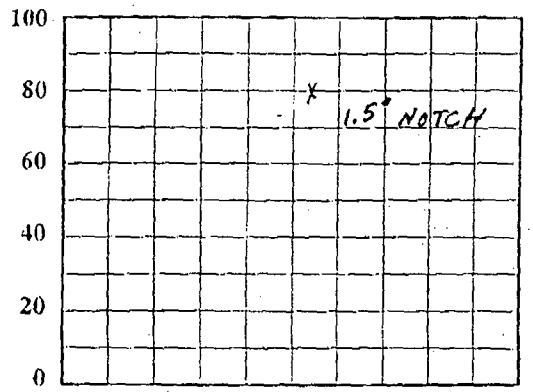
TRANSDUCER
MANUFACTURER RTD
MODEL: TRLA S/N 85-630
SIZE: 2 (10×18) FREQ: 2 MH
SHAPE: RECT # ELEMENTS: 2 # CONS: Ø
CABLE TYPE RG174 LENGTH: 6'
MODE: ☐ SHEAR ☒ LONG ☐ RL

CALIBRATION DATE: 3/25/05
CALIBRATION BLOCK NO. WB85 TEMP: 72 °F
SIMULATOR BLOCK: 790398 RompAS
THERMOMETER S/N 558271 DUE DATE 6-9-05
COUPLANT: ULTRAGEL BATCH: 03125

ANGLE VERIFICATION
BLOCK TYPE: RompAS S/N: 290398
NOMINAL ANGLE: 60 ACTUAL ANGLE 60°

INSTRUMENT
MANUFACTURER KBA DUE DATE 6-4-05
MODEL NO.: USN52L S/N: 00F575

DAC



DISPLAY WIDTH 5.0 inches

INSTRUMENT SETTINGS E30218

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	64 dB	12
CIRC.	☐	☐	N/A dB	N/A

FREQ: 2-8 MH REJECT: 0 %
ANGLE: 60 deg DAMPING: 1000 ohms
DELAY 0.000 msec PULSER: DUAL *
ZERO: 9.472 msec
VELOCITY .2278 msec PRR/PRF: HIGH
RANGE: 5.0 inches TOF: PEAK
DISP. MODE: FULL WAV POWER: BAT

REF. REFLECTOR: FAR SDH GAIN: 58 dB
AMPLITUDE: 55 % METAL PATH: 1.491

CALIBRATION TIMES
INITIAL TIME: 1250 FINAL TIME 1503

VERIFICATION TIMES	1) 1420	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	-12dB	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

WELD / ITEMS EXAMINED
DRHR-2-03

EXAMINER: Jason Robinowitz LVL.: II
EXAMINER: LVL.:
REVIEWER: Matt Welch LVL.: III DATE 3/27/05

ANII: Mike Hall
DATE 4/8/05
PAGE 4 OF 7

ACCESS: FORMS DATABASE 10-27-01

00060

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R-022

PROJECT: BFN UNIT/CYCLE 2/13
SYSTEM RHRS
WELD I.D.: DRHR-2-03
CONFIG.: VERT LS TO P
FLOW →
PROCEDURE: N-UT-64 REV: 7 ✓ TC: N/A
Wo REFERENCE: WELD ℄
Lo REFERENCE: TDC

EXAMINATION DATE 3/25/05
START TIME: 1345 END TIME: 1500
EXAM SURFACE ☐ID ☒OD
MATERIAL TYPE: ☐CS ☒SS ☐CSCL ☐CCSS
SURFACE TEMP. 82 PYRO NO. 558271

EXAMINATION ANGLE	45/60 SHEAR DEG.	60 LONG DEG.
AXIAL SCAN SENSITIVITY	30.5 / 44 dB	64 dB
CIRC. SCAN SENSITIVITY	30.5 / N/A 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45	☒	
								4	45	☒	
								5	45	☒	
								6	45	☒	
								3	60	☒	
								4	60	☒	
								3	60L	☒	
1		0"		1.4"	2.0"	N/A	100%	4	60L	☐	ROOT GEO 360°
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS
MAINTAINED 5% TO 20% ID ROLL, 60°L SCANNED AT REFERENCE dB
87.58% COVERAGE DUE TO CONFIGURATION
NO REJECTABLE INDICATIONS

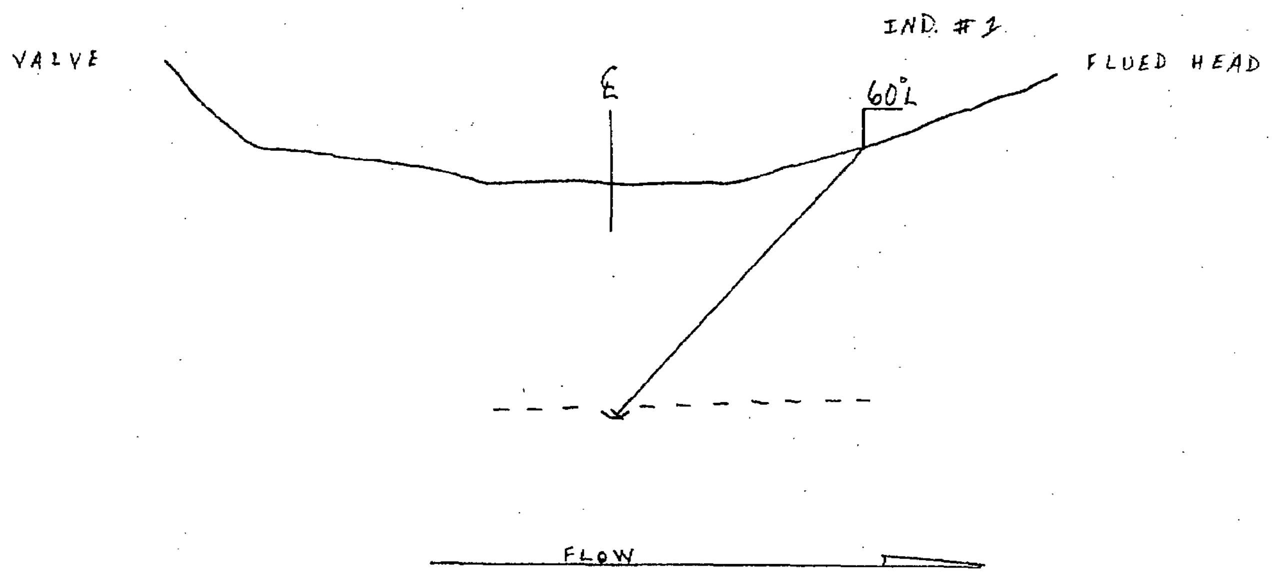
EXAMINER: Jason Polsinelli LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: Mitch Welch LEVEL: III DATE 3/27/05

ANII: [signature] DATE 4/8/05

PAGE 5 OF 7

ACCESS: FORMS DATABASE 10/18/0:

TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: RHR Unit: 2 WELD NO.: DRHR-2-03	REPORT NO.: R-022



BY: [signature] LEVEL: II DATE: 3/25/05 PAGE 6 OF 7

TVA 19669 (ONP-6-88)

00061

00062

TVA

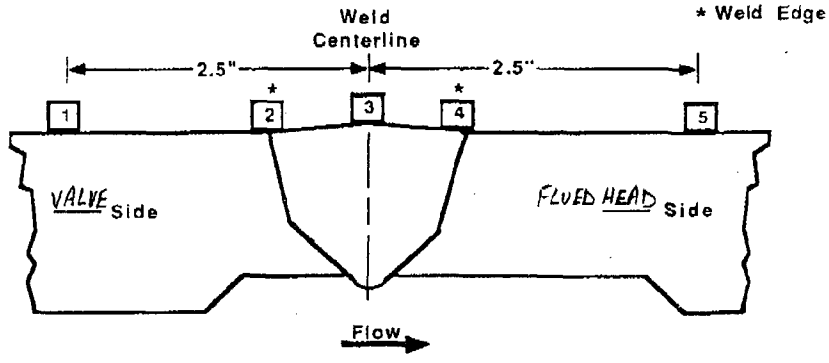
WALL THICKNESS PROFILE SHEET

REPORT NO: R-022

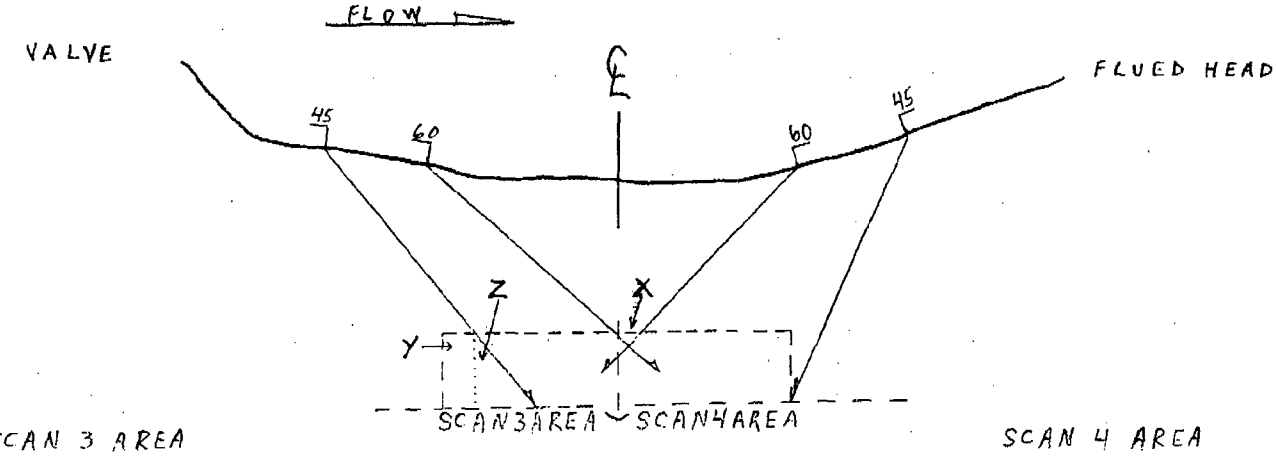
PROJECT: BFN
UNIT: 2
WELD NO: DRHR-2-03
SYSTEM: RHR

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

Position	0°	90°	180°	270°
1	N/A			
2	1.25		N	
3	1.3			A
4	1.2			
5	N/A			



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.4"
DIAMETER: 24"
WELD LENGTH: 75"



SCAN 3 AREA

$A = ab$

$.38 = .4 \times .95$

MISSING AREA

$Y = ab$

$.08 = .4 \times .2$

$Z = \frac{bh}{2}$

$.0053 = \frac{.33 \times .4}{2}$

TOTAL EXAM VOLUME

$.38 + .38 = .76"^2$

TOTAL MISSED VOLUME

$.08 + .0053 + .0091 = .0944"^2$

12.42% MISSING COVERAGE

SCAN 4 AREA

$A = ab$

$.38 = .4 \times .95$

MISSING AREA

$X = \frac{bh}{2}$

$.0091 = \frac{.13 \times .14}{2}$

87.58 % TOTAL CODE COVERAGE ACHIEVED

EXAMINER: Jason Polisoski
LEVEL: II
DATE: 3/25/05

REVIEWED BY: Mark Walker
LEVEL: III
DATE: 3/27/05

ANII: [signature]
DATE: 4/8/05

PAGE 7 OF 7

Examination Report No. R-043

Weld No. KR-2-03

00140

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND	REPORT NUMBER: R-043

PROJECT: *BFN* UNIT: *2* CYCLE *13*				COMPONENT ID: *KR-2-03*	
EXAMINATION METHOD				SYSTEM: RECIR	ISI DWG NO: *2-ISI-0270-C-01*
MT ☐	PT ☐	UT ☑	VT ☐	CONFIGURATION	CATEGORY
PROCEDURE *N-UT-64*	REV 7	TC N/A		*P* TO *TEE*	*C*

EXAMINER: JASON POLISENSKY	EXAMINER: N/A	EXAMINER: N/A	EXAMINER: N/A
LEVEL: II	LEVEL:	LEVEL:	LEVEL:

Total coverage calculated to be approximately 62.50 % ⊛

THE ABOVE MENTIONED WELD WAS EXAMINED WITH A 45° SHEAR .375" 1.5MHZ AND A 60° RL 10X18mm 2MHZ. BOTH TRANSDUCERS UTILIZED A 1/2 V CALIBRATION

THE EXAMINATION WAS LIMITED TO A SINGLE SIDED EXAM DUE TO TEE CONFIGURATION.

NO RECORDABLE INDICATIONS

MAINTAINED 10% TO 20% I D ROLL

Dual credit exam - satisfies ASME Section XI, category R-A, item R1.16 and NUREG 0313 requirements LC [signature] 4/1/04

⊛ 100% Code coverage achieved, 62.5% qualified credit coverage for single sided exam. [signature] 4/1/04

RESOLUTION BY [signature]	REVIEWED BY [signature]	ANII: [signature]
LEVEL II DATE 4/1/05	LEVEL: III DATE 4/1/05	DATE 4/1/05
		Page: 1 OF 5

00141

TENNESSEE VALLEY AUTHORITY

DIGITAL ULTRASONIC CALIBRATION DATA SHEET

REPORT NUMBER R-043

PROJECT *BFN* UNIT/CYCLE 2 / 13

PROCEDURE: *N-UT-64* REV: 7 TC: *N/A*

TRANSDUCER

MANUFACTURER KBA

MODEL: Comp G S/N 00YNCO

SIZE: .375 FREQ: 1.5 MH

SHAPE: RND # ELEMENTS: 1 # CONS: 0

CABLE TYPE RG 174 LENGTH: 6'

MODE: ☒ SHEAR | | LONG | | RL

CALIBRATION DATE: 4/01/05

CALIBRATION BLOCK NO. WB85 TEMP: 75 °F

SIMULATOR BLOCK: RomPAS 790393

THERMOMETER S/N 558271 DUE DATE 6-9-05

COUPLANT: ULTRAGEL BATCH: 03125

ANGLE VERIFICATION

BLOCK TYPE: RomPAS S/N: 790393

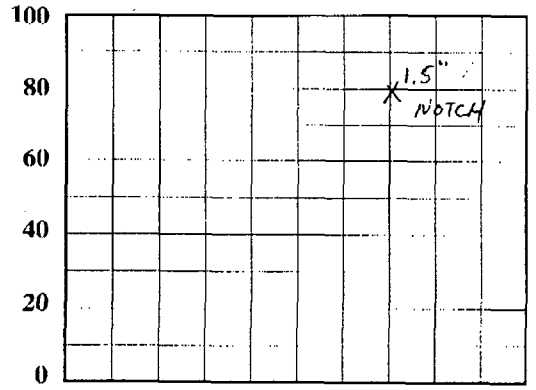
NOMINAL ANGLE: 45 ACTUAL ANGLE 45 °

INSTRUMENT

MANUFACTURER KBA DUE DATE 07/28/05

MODEL NO.: USN 60 S/N: E36311

DAC



DISPLAY WIDTH 3.0 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒		26.5 dB	45°1-5T SS
CIRC.		☐	N/A dB	N/A

FREQ:	2 MH	REJECT:=	0 %
ANGLE:	45 deg	DAMPING:	1000 ohms
DELAY	0.000 msec	PULSER:	SINGLE *
ZERO:	5.3409 msec	ENERGY	HIGH
VELOCITY	.1233 msec	PRR/PRF:	AUTO HIGH
RANGE:	3.0 inches	TOF:	PEAK
DISP. MODE:	FULL WAV	POWER:	BAT

REF. REFLECTOR: FAR SDH GAIN: 38.5 dB

AMPLITUDE: 70 % METAL PATH: 1.045

CALIBRATION TIMES

INITIAL TIME: 0920 FINAL TIME 1050

VERIFICATION TIMES	1) 0940	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	
	GAIN	SET	-6 dB		-12dB		SET	+12		SET	+6
ATTENUATOR	AMP	80%	32 TO 48		16 TO 24		20%	64 TO 96		40%	64 TO 96
			40		20			80			80

COMMENTS

WELD / ITEMS EXAMINED

KR-2-03

EXAMINER: Jason Polsinelli LVL.: II

EXAMINER: N/A LVL.:

REVIEWER: Matt Welch LVL.: III DATE 4/1/05

ANII: [signature]

DATE 4/1/05

PAGE 2 OF 5

ACCESS: FORMS DATABASE 10-27-01

00142

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER R-043

PROJECT BFN UNIT/CYCLE 2/13
PROCEDURE: N-UT-64 REV: 7 TC: N/A

TRANSDUCER

MANUFACTURER RTD
MODEL: TRLA S/N 85-735
SIZE: 2 (10X18) mm FREQ: 2 MH
SHAPE: RECT # ELEMENTS: 2 # CONS: 0
CABLE TYPE RG 174 LENGTH: 6'
MODE: ☐ SHEAR ☒ LONG ☐ RL

CALIBRATION DATE: 4/01/05
CALIBRATION BLOCK NO. WB 85 TEMP: 75 °F
SIMULATOR BLOCK: RomPAS 790393
THERMOMETER S/N 558271 DUE DATE 6-9-05
COUPLANT: ULTRAGEL BATCH: 03125

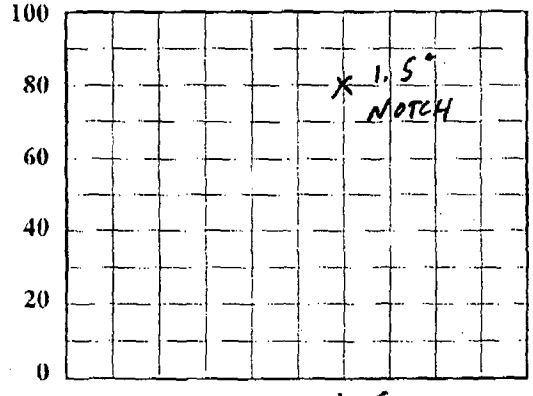
ANGLE VERIFICATION

BLOCK TYPE: RomPAS S/N: 790393
NOMINAL ANGLE: 60 ACTUAL ANGLE 60°

INSTRUMENT

MANUFACTURER KBA DUE DATE 7/28/05
MODEL NO.: USN-60 S/N: E36311

DAC



DISPLAY WIDTH 4.5 inches

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTC	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	83 dB	60°RL 1-5T 55
CIRC.	☐	☐	N/A dB	

FREQ: 2 MH REJECT:= 0 %
ANGLE: 60 deg DAMPING: 1000 ohms
DELAY 0.000 msec PULSER: DUAL *
ZERO: 8.3916 msec ENERGY HIGH
VELOCITY .2167 msec PRR/PRF: AUTO HIGH
RANGE: 4.5 inches TOF: PEAK
DISP. MODE: FULL WAV POWER: BAT

REF. REFLECTOR: FAR SDH GAIN: 75 dB
AMPLITUDE: 60 % METAL PATH: 1.390

CALIBRATION TIMES

INITIAL TIME: 0925 FINAL TIME 1052

VERIFICATION TIMES	1) 1005	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	-12dB	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	WELD / ITEMS EXAMINED
	KR-2-03

EXAMINER: Jason Polyard LVL.: II
EXAMINER: N/A LVL.:
REVIEWER: Matt Welch LVL.: III DATE 4/1/05

ANII:
DATE 4/16/05
PAGE 3 OF 5

00143

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R-043

PROJECT: BFN UNIT/CYCLE 2/13
SYSTEM RECIR
WELD I.D.: KR-2-03
CONFIG.: P TO TEE
FLOW →
PROCEDURE: N-UT-64 REV: 7 TC: N/A
Wo REFERENCE: WELD E
Lo REFERENCE: 180° FROM RX VESSEL

EXAMINATION DATE 4/01/05
START TIME: 0940 END TIME: 1030
EXAM SURFACE ☐ID ☒OD
MATERIAL TYPE: ☐CS ☒SS ☐CSCL ☐CCSS
SURFACE TEMP. 82°F PYRO NO. 558271

EXAMINATION ANGLE	45 DEG.	60L DEG.
AXIAL SCAN SENSITIVITY	38.5 dB	83 dB
CIRC. SCAN SENSITIVITY	38.5 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45	☒	
								5	45	☒	LIMITED TO PIPE SIDE ONLY
								6	45	☒	LIMITED TO PIPE SIDE ONLY
								3	60L	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

N/A

REMARKS/LIMITATIONS

NO SCAN 4 ON 45° SHEAR & 60RL DUE TO TEE CONFIGURATION.

60°RL SCANNED AT REFERENCE. BOTH 45 & 60 MAINTAINED 10% TO 20% FD ROLL

NO RECORDABLE INDICATIONS

EXAMINER: Jason Robinson LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: Mark Tucker LEVEL: III DATE 4/1/05

ANII: [illegible]
DATE 4/14/05

00144

TVA

WALL THICKNESS PROFILE SHEET

REPORT NO: R-043

PROJECT: BFN

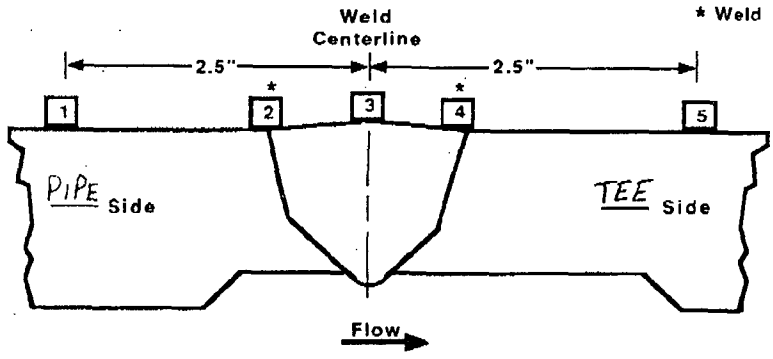
UNIT: 2

WELD NO: KR-2-03

SYSTEM: RECIRC

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

Position	0°	90°	180°	270°
1	1.34			
2	1.39		N	
3	1.45			A
4	N/A			
5	N/A			

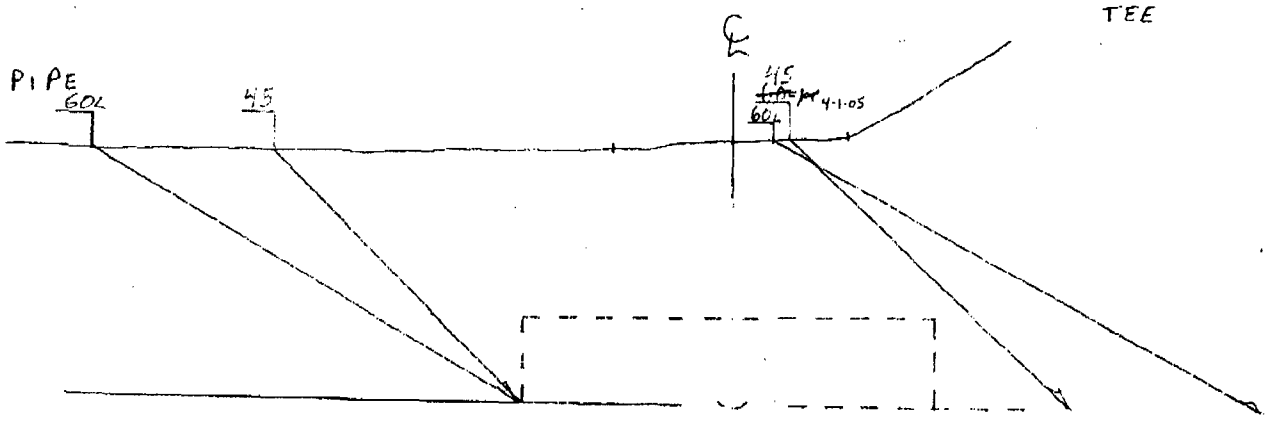


CROWN HEIGHT: FLUSH

CROWN WIDTH: 1.3"

DIAMETER: 28"

WELD LENGTH: 90"



EXAMINER: Jason Robinson

LEVEL: II

DATE: 4/1/05

REVIEWED BY: Wm Welch

LEVEL: III DATE: 4/1/05

ANII:

DATE: 4/14/05

PAGE 5 OF 5

TVA 19668 (NP-5-89)

1 108 999-44

Examination Report No. R-109

Weld No. GR-2-38

C00287

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R109

PROJECT: BFN	UNIT: 2	CYCLE: 14	COMPONENT ID: GR-2-38		
EXAMINATION METHOD			SYSTEM: Recirc	ISI DWG. NO. 2-ISI-270-C-02	
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: 1	CATEGORY: R-A
PROCEDURE: N-UT-64 67	REV 9	TC:N/A	CONFIG.:	Saddle TO Pipe	
EXAMINER: Patrick Mahoney	EXAMINER: N/A	EXAMINER: N/A	EXAMINER: N/A		
LEVEL: II	LEVEL:	LEVEL:	LEVEL:		

This report contains data associated with the Manual Ultrasonic Examination of Weld GR-2-38.
The examination satisfies the requirements of ASME Section XI (Risk Informed) R1.16E & NUREG 0313. (BWRVIP-75A)

Root Geometry was recorded at below recordable levels.

There were no recordable indications detected during the examination.

A 45° Shear Wave, a 60° Shear Wave, and a 60°RL transducer were used during the exam

50% coverage was achieved, using ASME Section XI, Appendix VIII qualified techniques.
100% ASME Section XI Code Coverage achieved. [signature] 3/15/07

This exam was performed with equipment, procedures, and personnel qualified I.A.W. ASME Section XI, Appendix VIII as amended by the final rule.

RESOLUTION BY: [signature]	REVIEWED BY: [signature]	ANII: [signature]
LEVEL: II DATE: 3/13/07	LEVEL: III DATE: 3/14/07	DATE: 4/13/07
		PG. 1 OF 7

000288

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R109

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/13/07

PROC.: N-UT-64 REV: 9 TC: N/A | CALIBRATION BLOCK NO.: WB 85 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 8/21/07 | SIMULATOR BLOCK NO: ALT CAL BLOCK

MODEL/TYPE: USN 60 M & TE NO.: E36303 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT Ultragel II BATCH: D5325

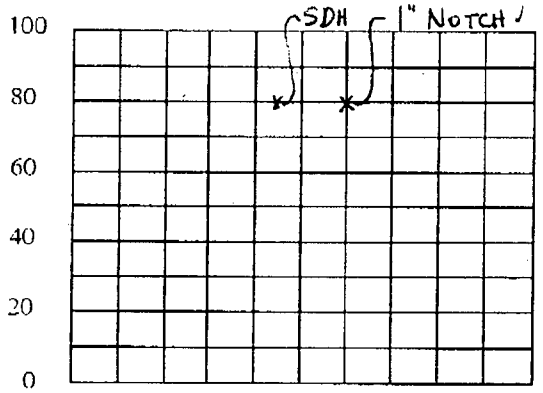
S/N DDYNCO SIZE: .375 FREQ: 1.5 MHz | EXAM TYPE: SHEAR [X] LONG [ ] RL [ ]

CABLE TYPE: RG-174 LENGTH: 72" inches | ANGLE VERIFICATION

BLOCK TYPE: Rompas S/N: 6026-83

NOMINAL ANGLE: 45° ACTUAL ANGLE: 45°

DAC



DISPLAY WIDTH: inches 2.375

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	[X]	[ ]	33.5 dB	45° S/S
CIRC	[X]	[ ]	38.5 dB	45° S/S

RANGE: 2.375 | *INST. FREQ.: 2 Mhz

PROBE DELAY: 8.5400 | *RECTIFY: FULL WAVE

VELOCITY: .1230 | DUAL [ ] ON [X] OFF

DISPLAY DELAY: 0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: 1P

*DAMPING: 1K | DET: [ ] PEAK [X] FLANK

*PRF MODE: AUTO HIGH | TCG: ON [ ] OFF [X]

REF. REFLECTOR: SDH GAIN: dB 42

AMPLITUDE: 80% METAL PATH: 1.040

CALIBRATION TIMES

INITIAL TIME: 1030 FINAL TIME: 1330

VERIFICATION TIMES	1) 1200	2) 1225	3) 1245	4) 1300	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	10	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05	
ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6				
	AMP	80	32-48	16-24	20	64-96	40	64-96				
			40	20		80		80				

COMMENTS: SEE ATTACHED

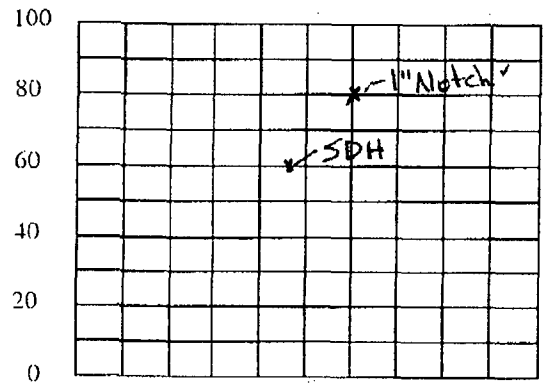
WELDS/ITEMS EXAMINED: GR-2-38

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/14/07	DATE: 4/13/07
			PG. 2 OF 7

000289

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R109

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 3/13/07
PROC.: N-UT-64 REV: 9 TC: N/A	CALIBRATION BLOCK NO.: WB 85 TEMP: 72 °F
INSTR. MFG: KRAUTKRAMER DUE DATE: 8/21/07	SIMULATOR BLOCK NO: ALT CAL BLOCK
MODEL/TYPE: USN 60 M & TE NO.: E36303	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: KBA	COUPLANT ULTRAGEL II BATCH: 05325
S/N 00YNCO SIZE: .375 FREQ: 1.5 MHz	EXAM TYPE: SHEAR [X] LONG [ ] RL [ ]
CABLE TYPE: RG-174 LENGTH: 72" inches	**ANGLE VERIFICATION**
	BLOCK TYPE: ROMPAS S/N: 6026-83
DAC	NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°



DISPLAY WIDTH: inches 3.350

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	[X]	[ ]	44 dB	60°
CIRC	[ ]	[ ]	N/A dB	N/A

RANGE: 3.350	*INST. FREQ.: 2 Mhz
PROBE DELAY: 6.2638	*RECTIFY: FULL WAVE
VELOCITY: .1236	DUAL [ ] ON [X] OFF
DISPLAY DELAY: 0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: 1P
*DAMPING: 1K	DET: [ ] PEAK [X] FLANK
*PRF MODE: AUTO HIGH	TCG: ON [ ] OFF [X]

REF. REFLECTOR: SDH GAIN: dB 44	**CALIBRATION TIMES**
AMPLITUDE: 60% METAL PATH: 1.59	INITIAL TIME: 1030 FINAL TIME: 1330

VERIFICATION TIMES	1) 1200	2) 1225	3) 1245	4) 1300	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

COMMENTS: SEE ATTACHED	WELDS/ITEMS EXAMINED: GR-2-38

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/14/07	DATE: 4/13/07
			PG. 3 OF 7

000290

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R109

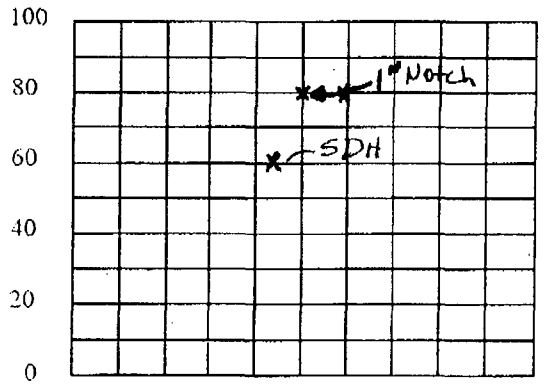
PROJECT: BFN UNIT 2 CYCLE: 14
PROC.: N-UT-64 REV: 9 TC: N/A
INSTR. MFG: KRAUTKRAMER DUE DATE: 8/21/07
MODEL/TYPE: USN 60 M & TE NO.: E36303
TRANSDUCER MFG: RTD
S/N 92-816 SIZE: 2(8x14) FREQ: 2.0 MHz
CABLE TYPE: RG-174 LENGTH: 72" inches

CALIBRATION DATE: 3/13/07
CALIBRATION BLOCK NO.: WB85 TEMP: 72 °F
SIMULATOR BLOCK NO: ALT CAL BLOCK
THERMOMTER S/N: 562774 DUE DATE: 12/12/07
COUPLANT ULTRAGEL II BATCH: 05325
EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

ANGLE VERIFICATION

BLOCK TYPE: ROMPAS S/N: 6026-83
NOMINAL ANGLE: 60°L ACTUAL ANGLE: 60°L

DAC



DISPLAY WIDTH: inches 4.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	76 dB	60-RL
CIRC	☐	☐	N/A dB	N/A

RANGE: 4.0 *INST. FREQ.: 2 Mhz
PROBE DELAY: 8.7716 *RECTIFY: FULL WAVE
VELOCITY: .2330 DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0 *REJECT: 0 %
*ENERGY: HIGH *DISPLAY START: 1P
*DAMPING: 1K DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH TCG: ON ☐ OFF ☒

REF. REFLECTOR: SDH GAIN: dB 76
AMPLITUDE: 60% METAL PATH: 1.52

CALIBRATION TIMES

INITIAL TIME: 1030 FINAL TIME: 1330

VERIFICATION TIMES	1) 1200	2) 1225	3) 1245	4) 1300	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

COMMENTS: SEE ATTACHED

WELDS/ITEMS EXAMINED: GR-2-38

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/14/07	DATE: 4/17/07
			PG. 4 OF 7

000291

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R109

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RECIR
WELD I.D.: GR-2-38
CONFIG.: SDL TO P
FLOW →
PROCEDURE: N-UT-64 REV: 9 TC: N/A
Wo REFERENCE: WELD E
Lo REFERENCE: REACTOR SIDE OF PIPE

EXAMINATION DATE 3/13/07
START TIME: 1030 END TIME: 1330
EXAM SURFACE ☐ID ☒OD
MATERIAL TYPE: ☐CS ☒SS ☐CSCL ☐CCSS
SURFACE TEMP. 72 PYRO NO. 562774

EXAMINATION ANGLE	45 DEG.	60/60RL DEG.	
AXIAL SCAN SENSITIVITY	48 dB	46/76 dB	
CIRC. SCAN SENSITIVITY	48 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45	~~☒~~ PM 3/13/07	SCAN 3, 45° shear, not PERFORMED DUE TO CONFIG
								4	45	☒	
								5	45	☒	
								6	45	☒	
								3	60	~~☒~~ PM 3/13/07	SCAN 3, 60° Shear NOT PERFORMED DUE TO CONFIGURATION
								4	60	☒	
								3	60RL	☒	
								4	60RL	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS ID GEOMETRY WAS NOTED AT BELOW RECORDABLE LEVELS 360° INTERMITTANTLY

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/14/07

ANII: [signature]
DATE 4/13/07

000292

TVA

WALL THICKNESS PROFILE SHEET

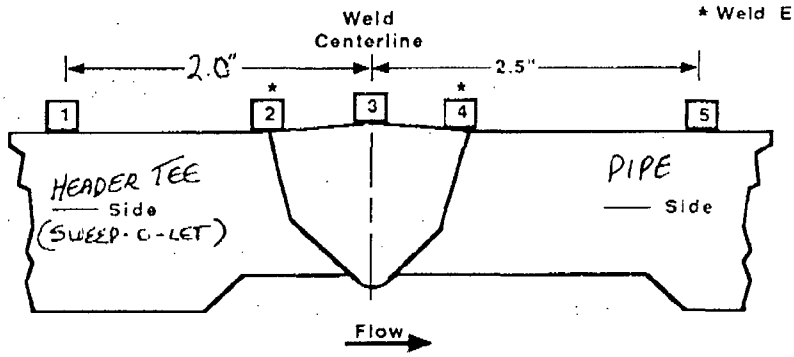
REPORT NO: R109

PROJECT: BFN
UNIT: 2 CYCLE 14

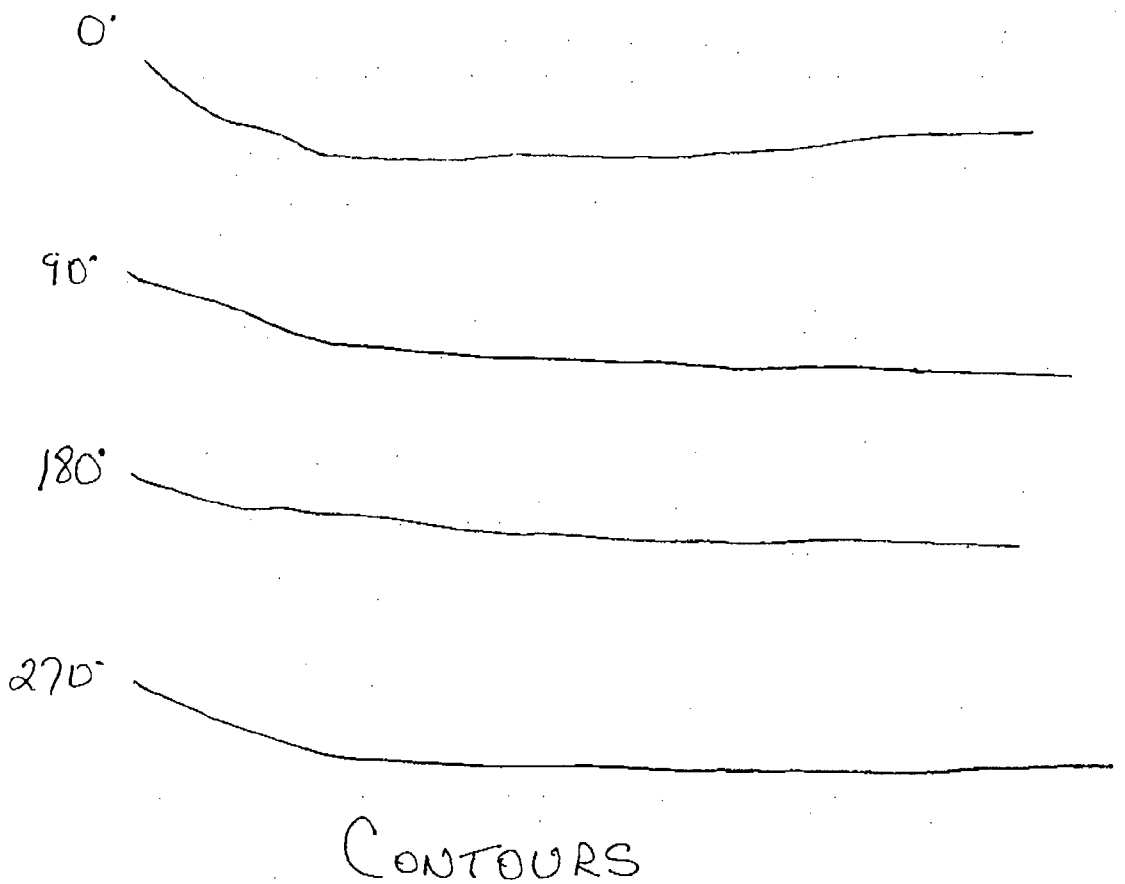
WELD NO: GR-2-38
SYSTEM: RECIRCULATION

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

Position	0°	90°	180°	270°
1	.96			
2	.60			
3	.65			
4	.60			
5	.61			



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.5"
DIAMETER: 12"
WELD LENGTH: 39.5"



CONTOURS

EXAMINER: [signature]
LEVEL: II
DATE: 3/13/07

REVIEWED BY: [signature]
LEVEL: III DATE: 3/14/07

ANII: [signature]
DATE: 4/13/07

PAGE 6 OF 7

TVA 10669 (NP-5-80)

1-108 999

000293

TVA

WALL THICKNESS PROFILE SHEET

REPORT NO: R109

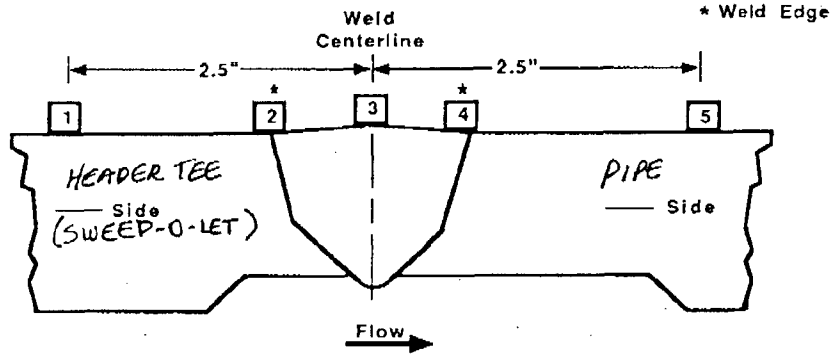
PROJECT: BFN
UNIT: 2 CYCLE 14

WELD NO: GR-2-38
SYSTEM: RECIRCULATION

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

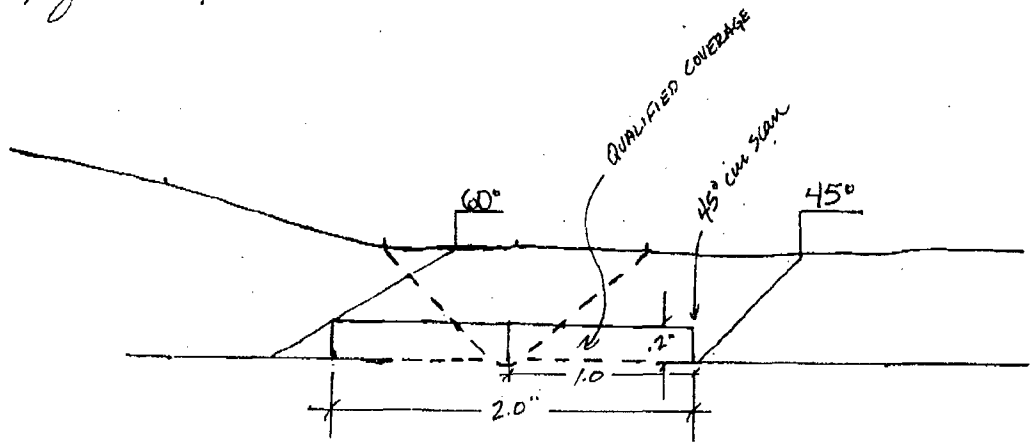
SEE CONTOUR SHEET

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



CROWN HEIGHT: FLUSH
CROWN WIDTH: 1.5"
DIAMETER: 12"
WELD LENGTH: 39.5"

Required exam volume = (.2x2.0) 39.5 = 15.8 cubic inches



ASME Section XI Code coverage = 100%

ASME Section XI Appendix VIII qualified coverage = 50%

Axial scans = (1.0x.2)x 39.5 = 7.9 cubic inches ÷ 15.8 = .5 x 100 = 50%

Circ scans = (1.0x.2)x 39.5 = 7.9 cubic inches ÷ 15.8 = .5 x 100 = 50%

(50+50)÷2 = 50

COVERAGE

EXAMINER: [signature]
LEVEL: II
DATE: 3/13/07

REVIEWED BY: [signature]
LEVEL: III DATE: 3/14/07

ANII: [signature]
DATE: 4/13/07

PAGE 2 OF 2

Examination Report No. R-112

Weld No. GR-2-41

000296

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R112

PROJECT: BFN UNIT: 2 CYCLE: 14				COMPONENT ID: GR-2-41	
EXAMINATION METHOD				SYSTEM: Recirc	ISI DWG. NO. 2-ISI-0270-C-02
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: 1	CATEGORY: R-A
PROCEDURE: N-UT-64	REV:9	TC:NA		CONFIG.: RED TO Pipe	
EXAMINER: [signature] LEVEL: II	EXAMINER: N/A LEVEL:			EXAMINER: N/A LEVEL:	EXAMINER: N/A LEVEL:

This report contains the data associated with the manual ultrasonic examination of GR-2-41 to met the requirements of ASME Section XI, category R-A (see assignment sheet), item number R1.16C and BWRVIP 75A, NU0313.

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component examined was a SS 22" to 12" reducer to pipe weld, having single sided access.

A 45° and 60° shear was used for scan directions 4, 5 and 6. A 60° RL wave was used for scan 4. Joint configuration prevented using the scan 3 direction.

Root geometry was seen intermittently° 360°at varying amplitudes.

There were no reportable indications.

10CFR50.55a qualified coverage obtained was 50% due to single sided access.
ASME Section XI Code coverage was 100%

RESOLUTION BY: [signature] LEVEL: II DATE: 3/16/07	REVIEWED BY: [signature] LEVEL: III DATE: 3/15/07	ANII: [signature] DATE: 4/17/07
		PG. 1 OF 8

000297

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R112

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM: RECIR
WELD I.D.: GR-2-41
CONFIG.: TEE REDUCER TO PIPE
FLOW →

EXAMINATION DATE: 3/13/07
START TIME: 1245 END TIME: 1303
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP. 88 PYRO NO. 56-2274

PROCEDURE: N-UT-64 REV: 9 TC:
Wo REFERENCE: WELD CENTER LINE
Lo REFERENCE: SIDE OPPOSITE RPV

EXAMINATION ANGLE	45°s DEG.	DEG.
AXIAL SCAN SENSITIVITY	38.0 dB	dB
CIRC. SCAN SENSITIVITY	42.0 dB	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45° SH	☐	NO SCAN DUE TO CONFIGURATION OF TEE
								4	"	☒	NO RECORDABLE INDICATIONS
								5	"	☒	" " "
								6	"	☒	" " "
										☐	
										☐	
										☐	
										☐	
										☐	
						N/A				☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS NO SCAN #3 DUE TO CONFIGURATION.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/15/07

ANII: [signature]
DATE 4/17/07
PAGE 2 OF 8

000298

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER B112

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RECIR
WELD I.D.: GR-2-41
CONFIG.: TEE REDUCER TO PIPE
FLOW →

PROCEDURE: N-UT-64 REV: 9 TC: ____
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: SIDE OPPOSITE RPV

EXAMINATION DATE 3/13/07
START TIME: 1222 END TIME: 1244
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP. 88 PYRO NO. 9E2724

EXAMINATION ANGLE	60°S DEG.	60°RL DEG.
AXIAL SCAN SENSITIVITY	dB	dB
CIRC. SCAN SENSITIVITY	dB	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								4	60°S	☐	ROOT GEOMETRY INT. 360°
								4	60°RL	☐	" " "
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
				N/A						☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS ROOT GEOMETRY SEEN INT 360° AT VARYING AMPLITUDES. NO OTHER RELEVANT INDICATIONS NOTED. NO SCAN #3 DUE TO CONFIGURATION.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL: ____
REVIEWED BY: [signature] LEVEL: III DATE 3/15/07

ANII: [signature]
DATE 4/17/07
PAGE 3 OF 8

000299

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R112

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/13/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ-123 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 92-7616

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT BATCH:

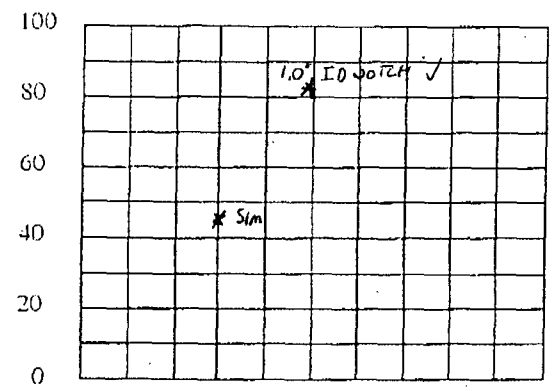
ELEMENTS: 1 SHAPE: ROUND | ULTRAGEL II 05325

S/N 00XD3R SIZE: 0.375" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

CONTOUR: FLAT FOCUS: N/A | ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72" #CNT: 0 | BLOCK TYPE: ROMPAS S/N: 6026-83

DAC | NOMINAL ANGLE: 45° ACTUAL ANGLE: 46°



DISPLAY WIDTH: inches 3.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	30.0 dB	45° P375
CIRC	☐	☐	dB	

RANGE: 3.0	*INST. FREQ.: 2.0 MHz
PROBE DELAY: 4.1400	*RECTIFY: FULL WAVE
VELOCITY: 0.1270	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: 1.0" NOTCH GAIN: dB 26.5 | CALIBRATION TIMES

AMPLITUDE: 80% METAL PATH: 1.439 | INITIAL TIME: 0845 FINAL TIME: 1340

VERIFICATION TIMES | 1) 1245 | 2) N/A | 3) ~~3)~~ | 4) ~~4)~~ | 5) ~~5)~~ | 6) ~~6)~~ | 7) ~~7)~~ | 8) ~~8)~~ | 9) ~~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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:	WELDS/ITEMS EXAMINED:
	GA-2-41

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/13/07	DATE: 4/17/07
			PG. 4 OF 8

000300

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R112

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/13/07

PROC.: N-UT-64 REV: 9 TC: | CALIBRATION BLOCK NO.: SQ-123 TEMP: 77 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 6026-83

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 05325

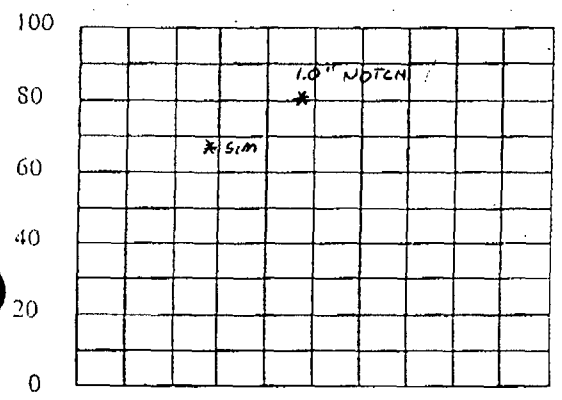
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR [X] LONG [ ] RL [ ]

S/N 00XD3R SIZE: 0.375" FREQ: 1.5 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: N/A | BLOCK TYPE: ROMPAS S/N: 6026-83

CABLE TYPE: RG-174 LENGTH: 72" #CNT: Ø | NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°

DAC



DISPLAY WIDTH: inches 4.0"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	[X]	[ ]	48.0 dB	60-375 RECIRC
CIRC	[ ]	[ ]	N/A dB	N/A

RANGE: 4.0	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 9.5900	*RECTIFY: FULLWAVE
VELOCITY: 0.1236	DUAL [ ] ON [X] OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: I P
*DAMPING: 1K	DET: [ ] PEAK [X] FLANK
*PRF MODE: AUTO HIGH	TCG: ON [ ] OFF [X]

REF. REFLECTOR: 1.0" NOTCH GAIN: dB 48.0

AMPLITUDE: 80% METAL PATH: 1.83

CALIBRATION TIMES

INITIAL TIME: 0905 FINAL TIME: 1342

VERIFICATION TIMES: 1) 1233 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED: GR-2-41

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/15/07	DATE: 4/17/07
			PG. 5 OF 8

000301

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R112

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/13/07

PROC.: N-UT-64 REV: 9 TC: | CALIBRATION BLOCK NO.: SQ-123 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 6026-83

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: RTD | COUPLANT: ULTRAGEL II BATCH: 05325

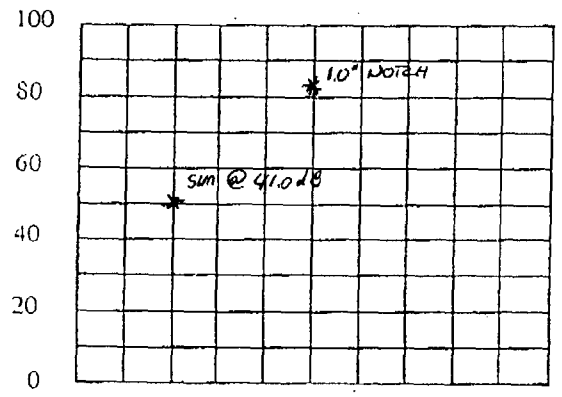
ELEMENTS: 2 SHAPE: RECT. | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N 92-816 SIZE: 2(8x14) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: FS-20 | BLOCK TYPE: ROMPAS S/N: 6026-83

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 60°L ACTUAL ANGLE: 60°L

DAC



DISPLAY WIDTH: inches 4.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	72.0 dB	92-816
CIRC	☐	☐	dB	

RANGE: 4.0" | *INST. FREQ.: 2.0 Mhz

PROBE DELAY: 8.7716 | *RECTIFY: FULLWAVE

VELOCITY: 0.2330 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: 1.0" NOTCH GAIN: dB 72.0

AMPLITUDE: 80% METAL PATH: 2.00

CALIBRATION TIMES

INITIAL TIME: 0834 FINAL TIME: 1345

VERIFICATION TIMES | 1) 1222 | 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED: GR-2-41

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
	N/A		DATE: 4/17/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/15/07	PG. 6 OF 8

TVA

WALL THICKNESS PROFILE SHEET 000302

REPORT NO: R112

PROJECT: BFNP

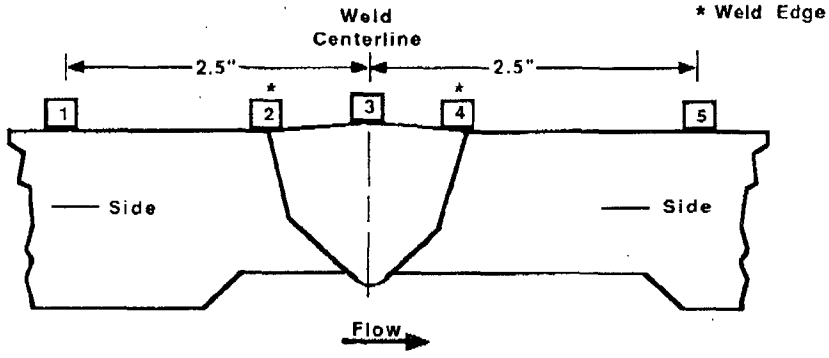
UNIT: 2

WELD NO: GR-2-41

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	.78			
4	.62			
5	.62			



CROWN HEIGHT: ISI PREP

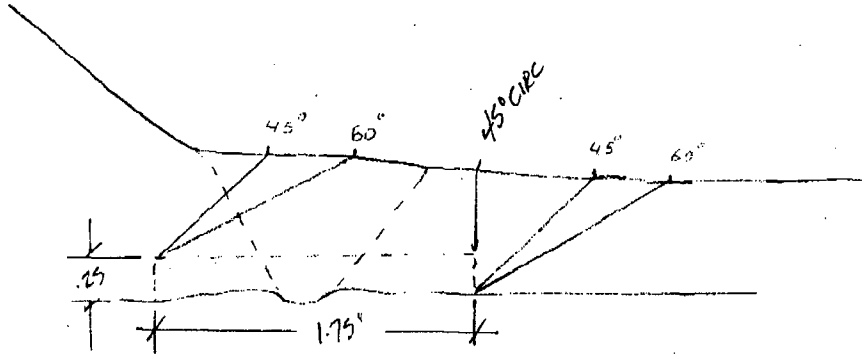
CROWN WIDTH: 1.25"

DIAMETER: 12"

WELD LENGTH: 41

Required grain volume = (.25 x 1.75) 40 = 17.5 cubic inches.

RING HANGER TEE



ASME Code Coverage Section XI = 100%

ASME Section XI, Appendix VII qualified coverage = 50%

• 17.5 ÷ 2 = 8.75 ÷ 17.5 = .5 x 100 = 50% axial & circ scans.

Mark Welch 3/15/07

EXAMINER: [signature]

LEVEL: II

DATE: 3/13/07

REVIEWED BY: Mark Welch

LEVEL: III DATE: 3/15/07

ANII: [signature]

DATE: 4/17/07

PAGE 1 OF 8

TVA

WALL THICKNESS PROFILE SHEET 030303

REPORT NO: R112

PROJECT: BFN

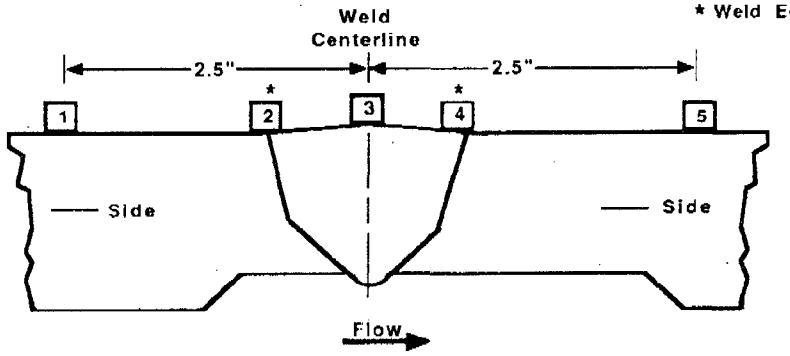
UNIT: 2

WELD NO: GR-2-41

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	.728			
4	.667			
5	.652			

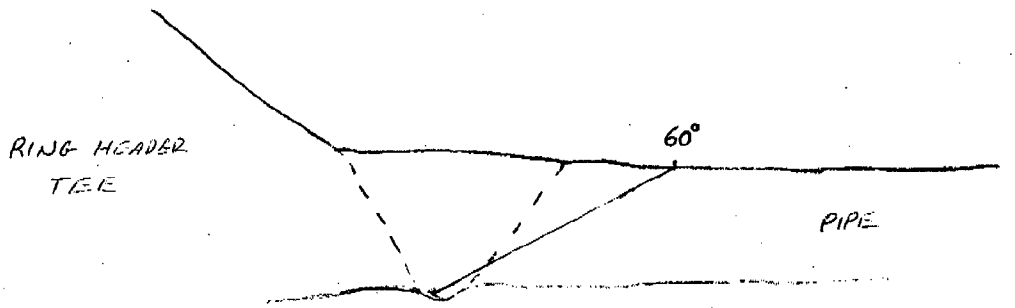


CROWN HEIGHT: TOO SMALL

CROWN WIDTH: 1.25

DIAMETER: 12"

WELD LENGTH: 41



ROOT GEOMETRY SEEN INT. 360°

EXAMINER: [signature]

LEVEL: II

DATE: 3/15/07

REVIEWED BY: [signature]

LEVEL: III DATE: 3/15/07

ANII: [signature]

DATE: 4/17/07

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Examination Report No. R-114

Weld No. GR-2-48

000309

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R114

PROJECT: BFN	UNIT: 2	CYCLE: 14	COMPONENT ID: GR-2-48	
EXAMINATION METHOD			SYSTEM: Recirc	ISI DWG. NO. 2-ISI-0270-C-02
MT ☐	PT ☐	UT ☒ VT ☐	CODE CLASS: 1	CATEGORY: R-A
PROCEDURE: N-UT-64	REV:9	TC:NA	CONFIG.: SDL TO Pipe	
EXAMINER: Dick Holley	EXAMINER:		EXAMINER:	EXAMINER:
LEVEL: II	LEVEL:		LEVEL:	LEVEL:

This report contains the data associated with the manual ultrasonic examination of GR-2-48 to met the requirements of ASME Section XI, category R-A (see assignment sheet), item number R1.16C and BWRVIP 75A, NU0313.

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component examined was a SS pipe to saddle weld, 12" diameter, having single side access.

A 45° and 60° shear was used for scan directions 4, 5 and 6. A 60° RL wave was used for scan 4. Joint configuration prevented using the scan 3 direction.

There were no reportable indications.

10CFR50.55a qualified coverage obtained was 50% due to single sided access.
ASME Section XI Code coverage was 100%

RESOLUTION BY: Dick Holley	REVIEWED BY: Matt Welch	ANII: Jack Hurd
LEVEL: II DATE: 3/16/07	LEVEL: III DATE: 3/16/07	DATE: 4/18/07
		PG. 1 OF 7

000310

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R114

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RECIR
WELD I.D.: GR-2-48
CONFIG.: SDL TO PIPE
FLOW →
PROCEDURE: N-UT-64 REV: 9 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 3/16/07
START TIME: 1120 END TIME: 1142
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP. 89 PYRO NO. 562774

EXAMINATION ANGLE	45° SH	DEG.	60° SH	DEG.
AXIAL SCAN SENSITIVITY	42.0	dB	59.0	dB
CIRC. SCAN SENSITIVITY	44.0	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45° SH	☐	NO SCAN DUE TO CONFIGURATION
								4	"	☒	
								5	"	☒	
								6	"	☒	
								4	60° SH	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

N/A

REMARKS/LIMITATIONS NO SCAN #3 DUE TO CONFIGURATION.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/16/07

ANII: [signature]
DATE 4/18/07

000311

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R114

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM: RECIR
WELD I.D.: GR-2-48
CONFIG.: SDL TO P
FLOW →
PROCEDURE: N-UT-64 REV: 9 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 3/10/07
START TIME: 1142 END TIME: 1152
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP. 89 PYRO NO. 562774

EXAMINATION ANGLE	60° RL DEG.	N/A DEG.
AXIAL SCAN SENSITIVITY	78.0 dB	N/A dB
CIRC. SCAN SENSITIVITY	N/A dB	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								4	60° RL	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
								N/A		☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS 60° RL USED FOR DETECTION OF FLAWS ON OPPOSITE SIDE OF WELD. NO IND. NOTED.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/16/07

ANII: [signature]
DATE 4/13/07

000312

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R114

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/10/07

PROC.: N-UT-64 REV: 9 TC: N/A | CALIBRATION BLOCK NO.: SQ-123 TEMP: 77 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 6026-83

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 05325

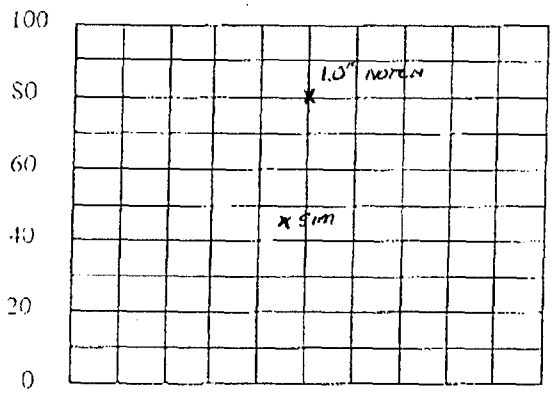
ELEMENTS: 1 SHAPE: ROUND

S/N 00XD3R SIZE: 0.375" FREQ: 1.5 MHz | EXAM TYPE: SHEAR [X] LONG [ ] RL [ ]

CONTOUR: FLAT FOCUS: N/A | ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72" #CNT: Ø | BLOCK TYPE: ROMPAS S/N: 6026-83

DAC | NOMINAL ANGLE: 45° ACTUAL ANGLE: 46°



DISPLAY WIDTH: inches 3.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	[X]	[ ]	30.0 dB	45° RECIRC
CIRC	[ ]	[ ]	dB	

RANGE: 3.0	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 7.4509	*RECTIFY: FULLWAVE
VELOCITY: 0.1236	DUAL [ ] ON [X] OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: I P
*DAMPING: 1 K	DET: [ ] PEAK [X] FLANK
*PRF MODE: AUTO HIGH	TCG: ON [ ] OFF [X]

REF. REFLECTOR: 1.0" NOTCH GAIN: dB 30.0

AMPLITUDE: 80% METAL PATH: 1.429

CALIBRATION TIMES

INITIAL TIME: 1000 FINAL TIME: 1554

VERIFICATION TIMES	1) 1120	2)	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS: SIM 4.5 @ 45% REF.

WELDS/ITEMS EXAMINED:

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/16/07	DATE: 4/18/07
			PG. 4 OF 7

000313

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R114

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/10/07

PROC.: N-UT-64 REV: 9 TC: N/A | CALIBRATION BLOCK NO.: SQ-123 TEMP: 78 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 6026-83

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: RTD | COUPLANT BATCH: ULTRAGEL II 05325

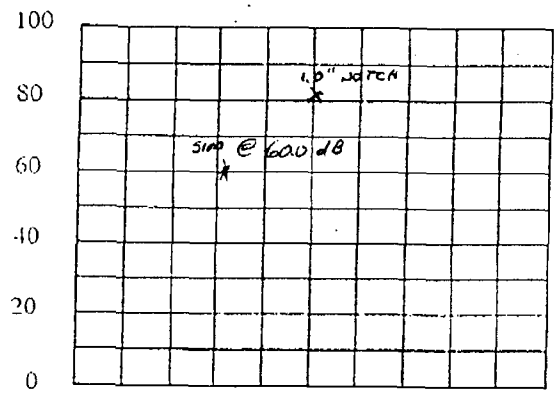
ELEMENTS: 2 SHAPE: RECT. | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N 92-816 SIZE: 2(8x14) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: FS-20 | BLOCK TYPE: ROMPAS S/N: 6026-83

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 60°L ACTUAL ANGLE: 60°L

DAC



DISPLAY WIDTH: inches 4.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	76.0 dB	92-816
CIRC	☐	☐	dB	

RANGE: 4.0	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 8.7716	*RECTIFY: FULLWAVE
VELOCITY: 0.2330	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: I P
*DAMPING: 1 K	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: 1.0" NOTCH GAIN: dB 76.0

AMPLITUDE: 80% METAL PATH: 1.995

CALIBRATION TIMES

INITIAL TIME: 0956 FINAL TIME: 1550

VERIFICATION TIMES	1) 1142	2) 1152	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS: Sim 3.2 @ 60% 60.0 dB

WELDS/ITEMS EXAMINED: GR-2-48

EXAMINER: Wade Holley	EXAMINER: N/A	REVIEWER:	ANII: Lonnie Floyd
LEVEL: II	LEVEL: TRN	LEVEL: III DATE: 3/16/07	DATE: 4/18/07
			PG. 5 OF 7

000314

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R114

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/10/07

PROC.: N-UT-64 REV: TC: N/A | CALIBRATION BLOCK NO.: SQ-123 TEMP: 77 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 6026-83

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 05325

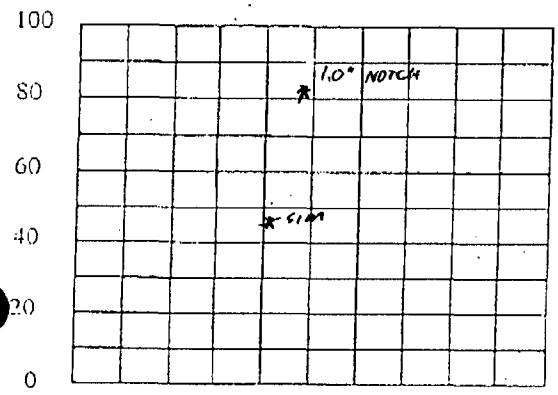
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

S/N OOXD3R SIZE: 0.375" FREQ: 1.5 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: N/A | BLOCK TYPE: ROMPAS S/N: 6026-83

CABLE TYPE: RG-174 LENGTH: 72" #CNT: Ø | NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°

DAC



DISPLAY WIDTH: inches 4.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	47.0 dB	60° RECIRC
CIRC	☐	☐	dB	

RANGE: 4.0	*INST. FREQ.: 2.0 MHz
PROBE DELAY: 9.5900	*RECTIFY: FULLWAVE
VELOCITY: 0.1236	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: NOTCH GAIN: dB 47.0

AMPLITUDE: 80% METAL PATH: 1.82"

CALIBRATION TIMES

INITIAL TIME: 1015 FINAL TIME: 1556

VERIFICATION TIMES: 1) 1135 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/16/07	DATE: 4/18/07
			PG. 6 OF 7

000315

TVA

WALL THICKNESS PROFILE SHEET

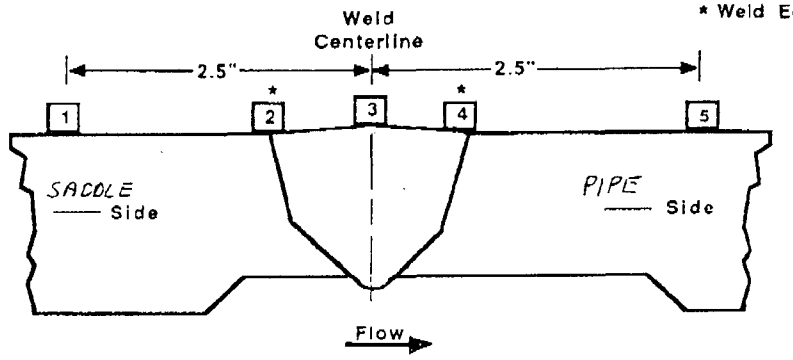
REPORT NO: R114

PROJECT: BFN
UNIT: 2

WELD NO: GR-2-48
SYSTEM: RECIRC

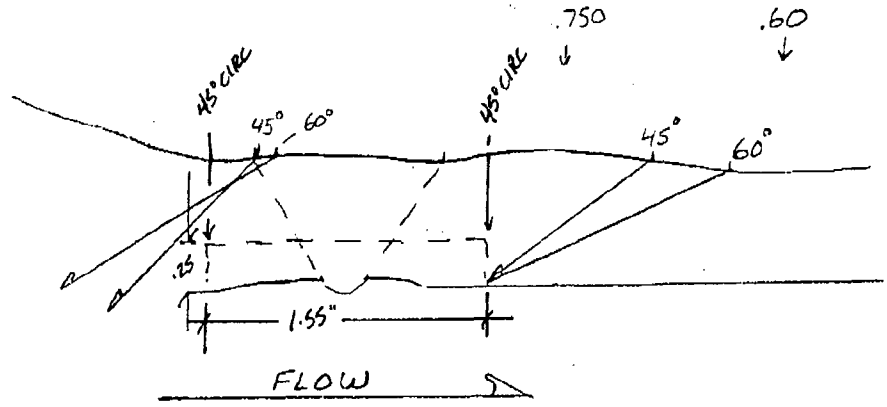
Record Thickness Measurements As Indicated, Including Weld Width, Edge-To-Edge At 0°

Position	0°	90°	180°	270°
1	N/A			
2	.69			
3	.77/.67	SPLIT		
4	.75			
5	.60			



CROWN HEIGHT: ISI PREF
CROWN WIDTH: 1.0"
DIAMETER: 12.0"
WELD LENGTH: 40.0"

Required exam volume = (.25 x 1.55) 40.0 = 15.5 cubic inches



WELD WAS SCANNED WITH 45°, 60° SHEAR AND 60° RL.

Single sided access coverage = 75%
Axial scans = 15.5/2 = 7.75 ÷ 15.5 = .5 x 100 = 50%
Circ scans = 15.5 obtained coverage = 100%
100 + 50 = ~~75~~ 150 ÷ 2 = 75% Appendix VII qualified coverage.
ASME code coverage = no limitations = 100% Walter Wabel 3/15/07

EXAMINER: [signature]
LEVEL: II
DATE: 3/16/07

REVIEWED BY: Walter Wabel
LEVEL: III DATE: 3/16/07

ANII: [signature]
DATE: 4/18/07

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Examination Report No. R-115

Weld No. GR-2-15(OL)

000316

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R115

PROJECT: BFN UNIT: 2 CYCLE: 14				COMPONENT ID: GR-2-15(OL)			
EXAMINATION METHOD				SYSTEM: RWCUS	ISI DWG. NO. 2-ISI-0272-C-01		
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: 1		CATEGORY: R-A	
PROCEDURE: N-UT-66		REV:5	TC:NA	CONFIG.:	SWOL	TO	NA
EXAMINER: MATT WELCH LEVEL: III		EXAMINER: N/A LEVEL:		EXAMINER: N/A LEVEL:		EXAMINER: N/A LEVEL:	

This report contains the data associated with the manual ultrasonic examination of GR-2-15(OL) to meet the requirements of ASME Section XI, category R-A, item number R1.16E and BWRVIP-75A, NU0313.

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component examined was a SS Structural Weld Overlay (SWOL) of a 12" diameter SS pipe branch connection to a 22" piping header.

There were scan limitations associated with the SWOL geometry (the SWOL has a non-standard profile).

There were no signals associated with flaw growth into the upper 25% of the exam volume.

A 60° RL was used for scan directions 3 and 4 (axial directions).
A 45° RL was used for scan directions 3, 4, 5 and 6 (circumferential directions).

10CFR50.55a qualified coverage obtained was 76%.
ASME Section XI Code coverage was 76%

RESOLUTION BY: Matt Welch LEVEL: III DATE: 3/15/07	REVIEWED BY: Patrick Mooney LEVEL: II DATE: 3/15/07	ANII: Carl Hurst DATE: 4/18/07 PG. 1 OF 9

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NO. R- R115 000317

PROJECT: BFN UNIT: U2C14
SYSTEM: RECIRC
WELD I.D.: GR-2-15(OL)
CONFIG: SWOL TO: PIPE
FLOW
PROCEDURE: N-UT- 66 REV.: 5 TC: N/A
Wo REFERENCE: 3.6" U/S FROM SWOL WELD TOE
Lo REFERENCE: O/S RADIUS OF RECIRC HEADER

EXAMINATION DATE: ~~3/16/07~~ ~~3/15/07~~ 3/11/07
START TIME: 2245 END TIME: 0300
EXAM SURFACE: ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
SURFACE TEMP: 76°F F PYRO NO: 558272

CALIBRATION SHEET NO.	C-	C-
EXAMINATION ANGLE	45 DEG.	60 DEG.
CIRC. SCAN SENSITIVITY	54.2 dB	~~71.2~~ ~~3/16/07~~ dB
AXIAL SCAN SENSITIVITY	54.2 dB	71.2 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	✓	
							4	45RL	✓	
							5	45RL	✓	
							6	45RL	✓	
							3	60RL	✓	S/N U0105
							4	60RL	✓	S/N U0106
					N					
					A					

REMARKS/LIMITATIONS: NONE

EXAMINER: [signature] LEVEL: III
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: II DATE: 3/15/07

ANII [signature]
DATE: 4/18/07

000318

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R115

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-66 REV: 5 TC: N/A | CALIBRATION BLOCK NO.: BF133 TEMP: 70 °F

INSTR. MFG: Krautkramer DUE DATE: 8/21/07 | SIMULATOR BLOCK NO: 79-7620

MODEL/TYPE: USN60 M & TE NO.: E36307 | THERMOMTER S/N: 558272 DUE DATE: 6/7/07

TRANSDUCER MFG: MEGASONICS | COUPLANT: Ultragel II BATCH: 05325

ELEMENTS: 2 SHAPE: RET | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0104 SIZE: 2(10x10) FREQ: 2 MHz

CONTOUR: FLAT FOCUS: 30mm

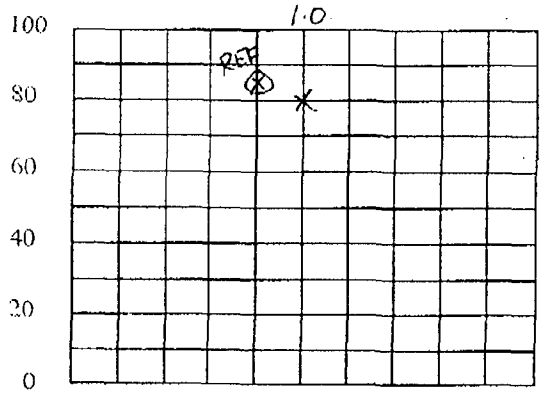
CABLE TYPE: RG174 LENGTH: 72 #CNT: 0

ANGLE VERIFICATION

BLOCK TYPE: ROMPUS S/N: 83-3236

NOMINAL ANGLE: 45 ACTUAL ANGLE: 45

DAC



DISPLAY WIDTH: inches 2.0" DEPTH

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☑	46.2 dB	104AXCR
CIRC	☐	☑	46.2 dB	104AXCR

RANGE: 2.84	*INST. FREQ.: 2 Mhz
PROBE DELAY: 6.6703	*RECTIFY: FULLWAVE
VELOCITY: .2369	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K ohm	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTOHIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: SDH GAIN: dB 46.2

AMPLITUDE: 85% METAL PATH: 1.11

CALIBRATION TIMES

INITIAL TIME: 2150 FINAL TIME: 0305

VERIFICATION TIMES: 1) N/A ~~2)~~ ~~3)~~ ~~4)~~ ~~5)~~ ~~6)~~ ~~7)~~ ~~8)~~ ~~9)~~ N/A 3/14/07

*** 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	10
	SIGNAL 2		50	45	40	35	30	25	20	15	10	5
ATTENUATOR	GAIN	SET	-6 dB		-12 dB	SET	+12		SET	+6		
	AMP	80	32-48		16-24	20	64-96		40	64-96		
			42		42		78			80		

COMMENTS:	WELDS/ITEMS EXAMINED:
	GR-2-15 (OL)

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: III	N/A LEVEL:	LEVEL: II DATE: 3/15/07	DATE: 4/18/07

PG. 3 OF 9

000319

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R115

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-66 REV: 5 TC: N/A | CALIBRATION BLOCK NO.: BF133 TEMP: 70 °F

INSTR. MFG: Krautkramer DUE DATE: 8/21/07 | SIMULATOR BLOCK NO: 79,-7620

MODEL/TYPE: USN 60 M & TE NO.: E36307 | THERMOMTER S/N: 558272 DUE DATE: 6/7/07

TRANSDUCER MFG: MEGASONICS | COUPLANT: Ultragel II BATCH: 05325

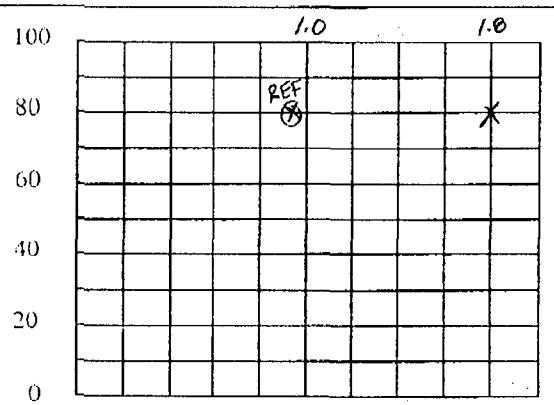
ELEMENTS: 2 SHAPE: RET | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N UD105 SIZE: 2(10x18) FREQ: 2 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: 40 mm | BLOCK TYPE: ROMPUS S/N: 83-3236

CABLE TYPE: RG174 LENGTH: 72 #CNT: 0 | NOMINAL ANGLE: 60 ACTUAL ANGLE: 60

DAC



DISPLAY WIDTH: inches 2.0" DEPTH

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☑	63.2 dB	105AX
CIRC	☐	☐	N/A dB	N/A

RANGE: 4.006	*INST. FREQ.: 2 Mhz
PROBE DELAY: 7.2103	*RECTIFY: FULLWAVE
VELOCITY: .2369	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K ohm	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO1HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: SDH GAIN: dB 52.2

AMPLITUDE: 80% METAL PATH: 1.5

CALIBRATION TIMES

INITIAL TIME: 2200 FINAL TIME: 0310

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

um 3/11/07

*** 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6	
	AMP	80	32-48	16-24	20	64-96	40	64-96	
			42	42		78		80	

COMMENTS:	WELDS/ITEMS EXAMINED:
	GR-2-15(OL)

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: III	N/A LEVEL:	LEVEL: II DATE: 3/15/07	DATE: 4/18/07
			PG. 4 OF 9

000320

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R115

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-66 REV: 5 TC: N/A | CALIBRATION BLOCK NO.: BE133 TEMP: 70 °F

INSTR. MFG: Krautkramer DUE DATE: 8/21/07 | SIMULATOR BLOCK NO: 79-7620

MODEL/TYPE: USN 60 M & TE NO.: E36307 | THERMOMTER S/N: 558272 DUE DATE: 6/7/07

TRANSDUCER MFG: MEGASONICS | COUPLANT: Ultragel II BATCH: 05325

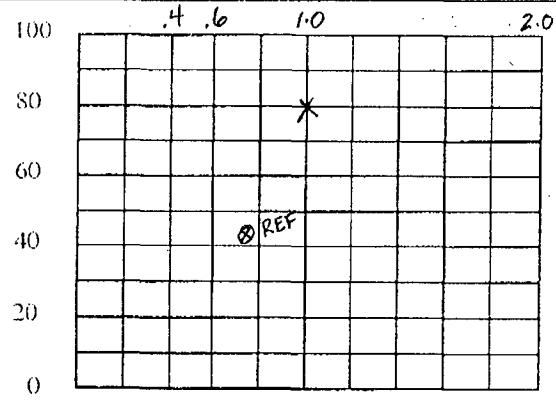
ELEMENTS: 2 SHAPE: RET | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0106 SIZE: 2(10x18) FREQ: 2 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: FS 20 mm | BLOCK TYPE: Rompus S/N: 83-3236

CABLE TYPE: RG174 LENGTH: 72 #CNT: Ø | NOMINAL ANGLE: 60 ACTUAL ANGLE: 60

DAC



DISPLAY WIDTH: inches 2" DEPTH

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☒	53.2 dB	106 AX
CIRC	☐	☐	N/A dB	N/A

RANGE: 3.456 | *INST. FREQ.: 2 Mhz

PROBE DELAY: 5.2806 | *RECTIFY: FULLWAVE

VELOCITY: .2369 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 1.505 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K ohm | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTOHIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: SDH GAIN: dB 53.2

CALIBRATION TIMES

AMPLITUDE: 45% METAL PATH: 1.5 | INITIAL TIME: 2220 FINAL TIME: 0315

VERIFICATION TIMES | 1) N/A | ~~2)~~ | ~~3)~~ | ~~4)~~ | ~~5)~~ | ~~6)~~ | ~~7)~~ | ~~8)~~ | ~~9)~~ N/A 3/16/07

*** 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

ATTENUATOR	GAIN	SET	-6 dB	-12 dB	SET	+12	SET	+6
	AMP	80	32-48	16-24	20	64-96	40	64-96
			42	42		78		80

COMMENTS:

WELDS/ITEMS EXAMINED:
GR-2-15 (OL)

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
Mark Welch	N/A		DATE: 4/18/07
LEVEL: III	LEVEL:	LEVEL: II DATE: 3/15/07	PG. 5 OF 9

GR-2-15 (OL)

ISI exam, RL Transducers:

Angle	Size	Freq	Focus	Scan Dir	Cntr.	T1	Mfg	Notes
45	2(10 X 18)	2	FS-30mm	Ax/Circ	FLAT	Y	MGS	U0104, DS side ax scan, US and DS circ scans
60	2(10 X 18)	2	FS-40mm	Ax	FLAT	Y	MGS	U0105, US side ax scan
60	2(10 X 18)	2	FS-20mm	Ax	FLAT	Y	MGS	U0106, DS side ax scan

C06321

R115

6/9/08

TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: RECIRC Unit: U2C14 WELD NO.: GR-2-15(02)	REPORT NO.: R115

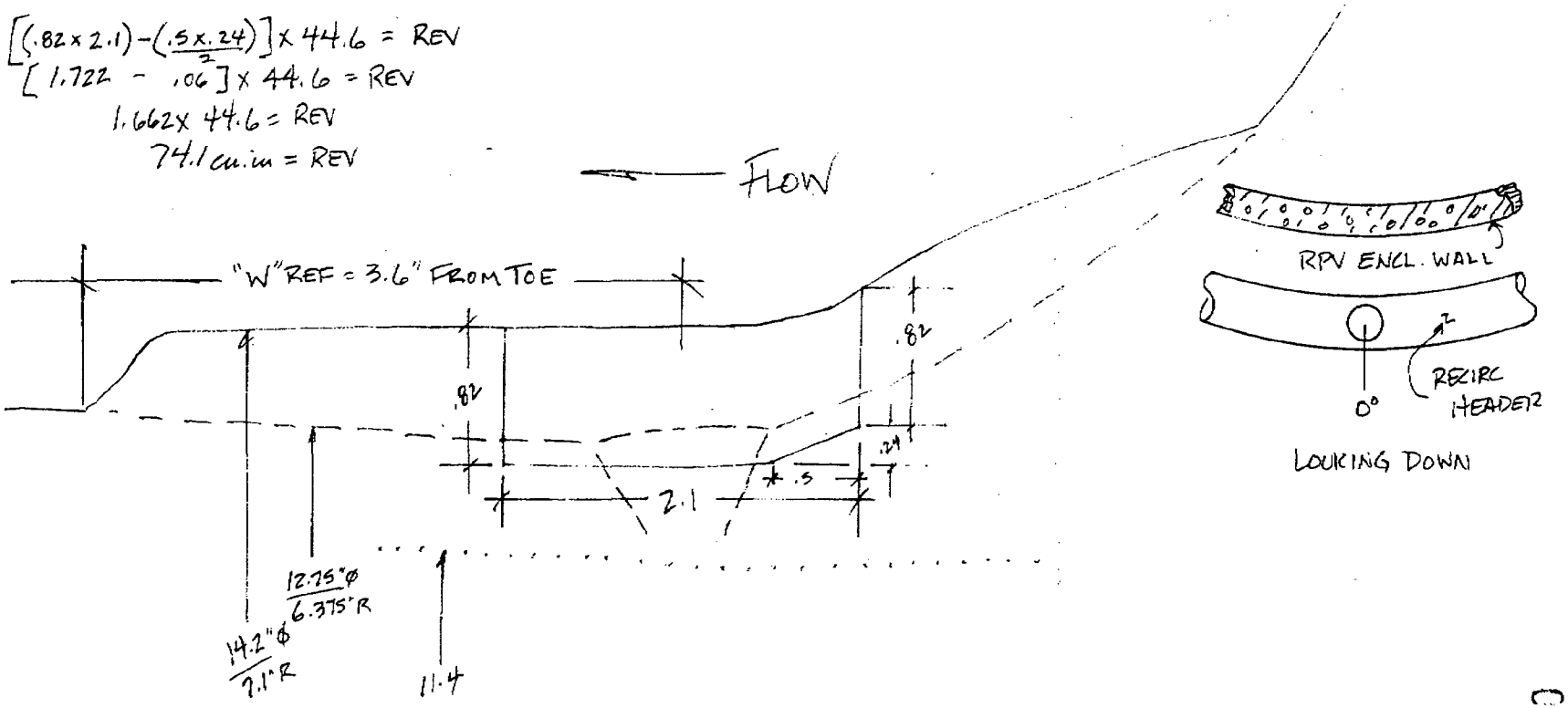
REQUIRED EXAM VOLUME = 74.1 cubic inches

$\left[(.82 \times 2.1) - \left(\frac{.5 \times .24}{2}\right)\right] \times 44.6 = REV$

$[1.722 - .06] \times 44.6 = REV$

$1.662 \times 44.6 = REV$

$74.1 \text{ cu.in} = REV$



ACHIEVED EXAM VOLUME = $(81.52 + 70.44) \div 2 = 75.98 = 76\%$

AXIAL SCANS = 81.52%

CIRC SCANS = 70.44%

CIRCUMFERENCE = 44.6"

22803

BY: Alan Welch	LEVEL: III	DATE: 3/15/07	PAGE 7 OF 9

TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: RECIRC Unit: U2C14 WELD NO.: GR-2-15(02)	REPORT NO.: R115

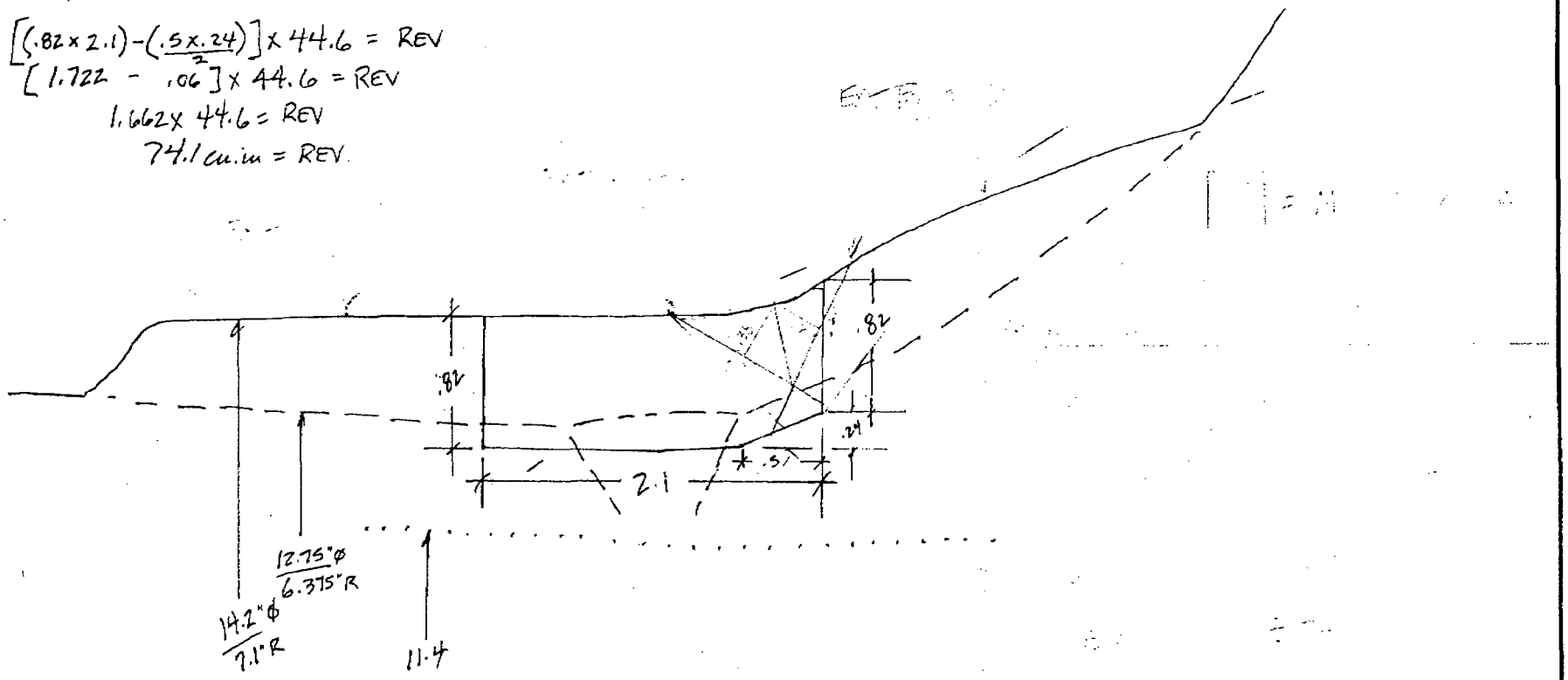
REQUIRED EXAM VOLUME = 74.1 cubic inches

$\left[(.82 \times 2.1) - \left(\frac{.5 \times .24}{2}\right)\right] \times 44.6 = REV$

$[1.722 - .06] \times 44.6 = REV$

$1.662 \times 44.6 = REV$

$74.1\ cu.in = REV$



CIRCUMFERENCE = 44.6"

C00323

BY: [signature] LEVEL: III DATE: 3/15/07 PAGE 8 OF 9

TVA 19669 (ONP-6-88)

TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: RECIRC Unit: U2C14 WELD NO.: GR-2-15(OL)	REPORT NO.: R115

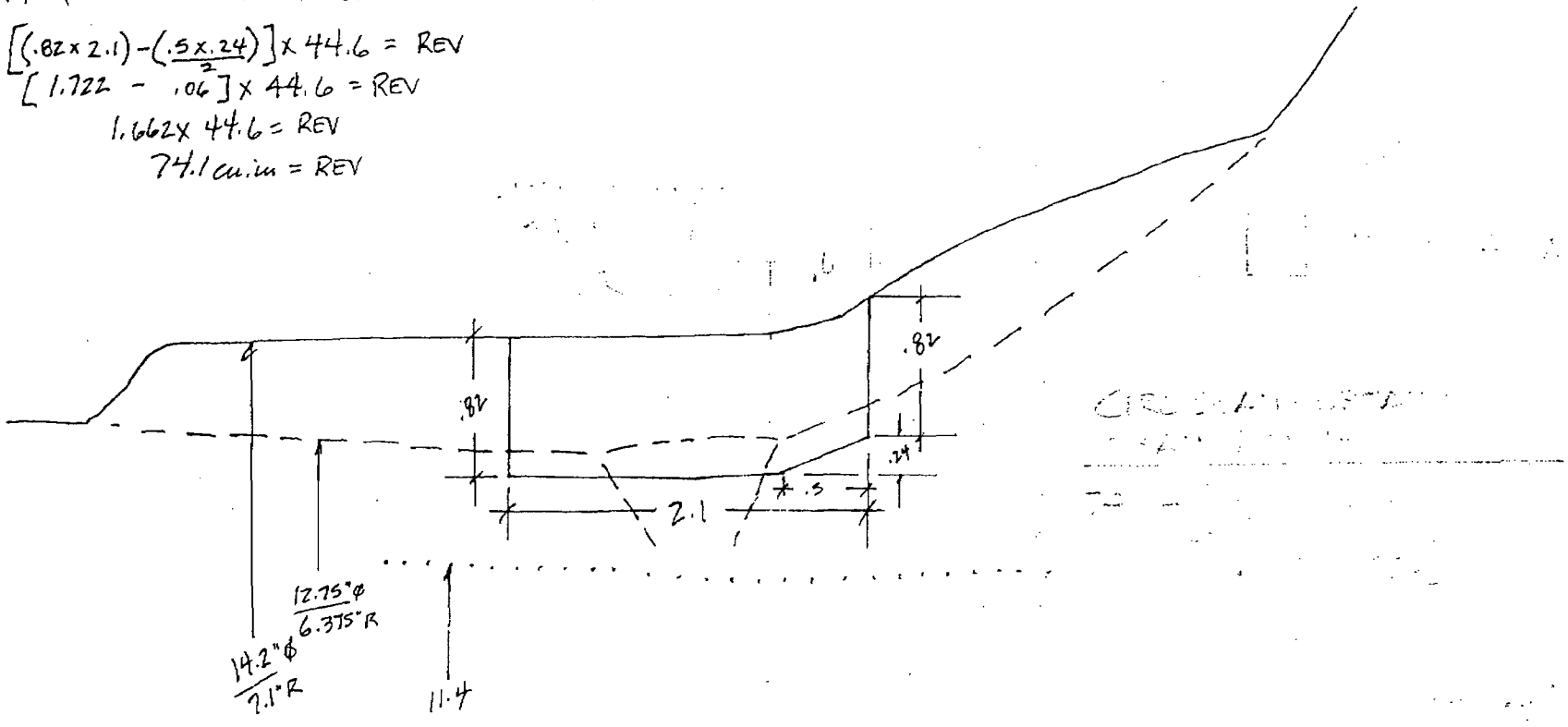
REQUIRED EXAM VOLUME = 74.1 cubic inches

$[(.82 \times 2.1) - (\frac{.5 \times .24}{2})] \times 44.6 = REV$

$[1.722 - .06] \times 44.6 = REV$

$1.662 \times 44.6 = REV$

$74.1\ cu.in = REV$



CIRCUMFERENCE = 44.6"

000324

BY: Mark Welch LEVEL: III DATE: 3/15/07 PAGE 9 OF 9

TVA 19669 (ONP-6-88)

Examination Report No. R-118

Weld No. RCRD-2-50

C00333

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN	UNIT: 2	CYCLE: 14	COMPONENT ID: RCRD-2-50	
EXAMINATION METHOD			SYSTEM: RWCUS	ISI DWG. NO. 2-ISI-0272-C-01
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: NA	CATEGORY: R-A
PROCEDURE: N-UT-82	REV:2	TC:NA	CONFIG.:	C/S Pipe TO S/S Valve

EXAMINER: Wade Holloway	EXAMINER: N/A	EXAMINER: N/A	EXAMINER: N/A
LEVEL: II	LEVEL:	LEVEL:	LEVEL:

This report contains the data associated with the manual ultrasonic examination of RCRD-2-50 to meet the requirements of ASME Section XI, category R-A, item number R1.16D, exreq A14-03 and BWRVIP-75A, NU0313, exreq B12-02 for expanded scope examinations.

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component examined was a CS pipe to a forged SS valve piping weld, 4.0" nominal diameter, having single sided access.

A 45° shear was used for scan directions 3, 5, and 6.
A 60° shear was used for scan direction 3.
A 45° RL was used for scan direction 3.
A 60° RL was used for scan direction 3.
A 70° RL was used for scan direction 3.
A ~~41°~~ RL was used for scan directions 5 and 6.
42° mdm 5-15-07
Scan direction 4 was not performed due to weld joint configuration (could not scan on the valve body).
Scan direction 3 was limited for the 45°RL scan due the elbow intradose from 4.1" to 10.1".
Scan directions 5 and 6 for the 41° RL could not be performed from the valve body due to taper.

Axial scan coverage achieved for the 45° and 60° RL wave modes was 57.5%.
Circumferential scan coverage achieved for the 41°RL wave modes was 67.9%.
Combined shear wave 45°and 60°axial and 45°circumferential coverage was 35%.

The reported achieved qualified coverage is 62.7%.

No recordable indications. Matt Welch 4/18/06

RESOLUTION BY: Wade Holloway	REVIEWED BY: Matt Welch	ANII: [signature]
LEVEL: II DATE: 3/-/07	LEVEL: II DATE: 3/16/07	DATE: 5/16/07
		PG. 1 OF 10

000334

TVA

WALL THICKNESS PROFILE SHEET

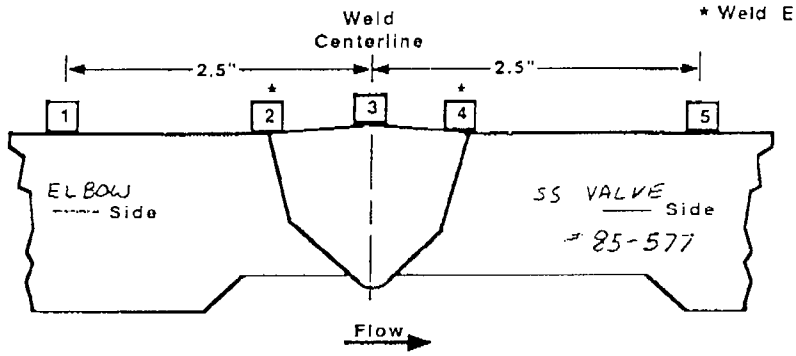
REPORT NO: R118

PROJECT: BFN
UNIT: 2

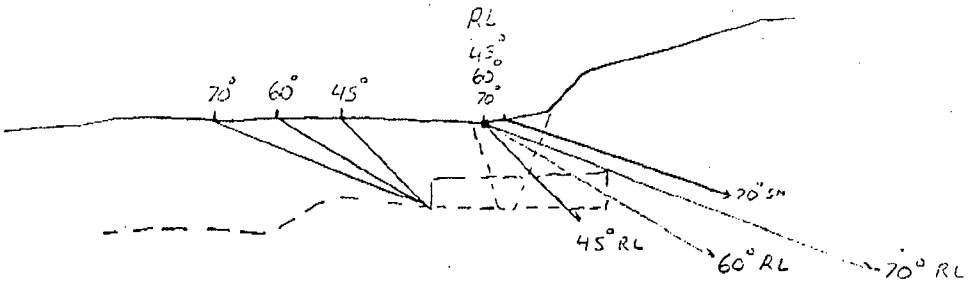
WELD NO: RCRD-2-50
SYSTEM: CRD 085

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

Position	0°	90°	180°	270°
1	.58"			
2	.46"			
3	.48"			
4	N/A			
5	N/A			



CROWN HEIGHT: IST PREP
CROWN WIDTH: 0.4"
DIAMETER: 4.0"
WELD LENGTH: 141.15"



COULD NOT SCAN 6.0" OF WELD IN THE ELBOW INNER RADIUS WITH THE RL TRANSDUCERS DUE TO BRIDGING. THE SHEAR WAVE TRANSDUCERS WERE USED FOR THE ENTIRE CIRCUMFERENCE OF THE WELD.

EXAMINER: [signature]
LEVEL: II
DATE: 3/16/07

REVIEWED BY: [signature]
LEVEL: III DATE: 3/16/07

ANII: [signature] 5/16/07
DATE:

PAGE 2 OF 16

1 108 999 4

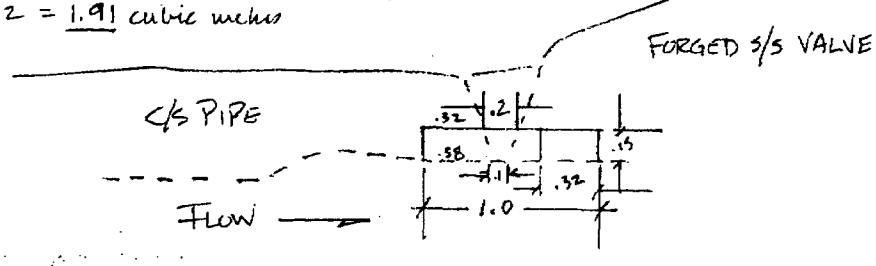
TVA Office of Nuclear Power	PROJECT: BFN SYSTEM: RWCUS Unit: U2C14 WELD NO.: RCRD-2-50	REPORT NO.: R118

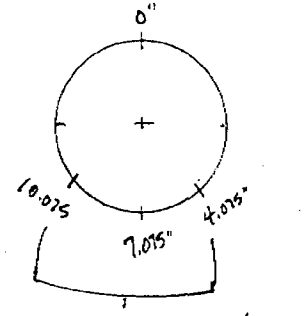
REQUIRED EXAM VOLUME = (.15 x 1.0) x 14.15 = 2.12 cubic inches

REQUIRED EXAM VOLUME (RL) = 2.12 cubic inches

REQUIRED EXAM VOLUME (SHEAR) = [(.2 * .10) ÷ 2] x .15 = → .015 x 14.15 = .212 cubic inches

\# 2.12 - .212 = 1.91 cubic inches





SCAN LIMITATION
DUE TO ELBOW INTRADOSE
R/L TRANSDUCERS ONLY
4.075" – 10.075"

BY:	LEVEL:	DATE:	PAGE	OF
	III	3/16/07	3	16

TVA 1966 (NP-6-88)

000336

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R118

PROJECT: BFN UNIT/CYCLE 2 / 14
SYSTEM RWCUS
WELD I.D.: RCRD-2-50
CONFIG.: EL TO VLV
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 3/11/07
START TIME: 1610 END TIME: 1625
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 85°F PYRO NO. 562774

EXAMINATION ANGLE	70° SN DEG.	60° SN DEG.
AXIAL SCAN SENSITIVITY	64.5 dB	51.0 dB
CIRC. SCAN SENSITIVITY	N/A 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	70°	☒	NO RELEVANT IND NOTED
								3	60°	☒	NO RELEVANT IND. NOTED
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
							N/A			☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS THIS IS A BEST EFFORT EXAMINATION OF BI-METALIC WELD CONSISTING OF A CARBON STEEL ELBOW TO STAINLESS STEEL VALVE.

ROOT GEOMETRY WAS SEEN AT VARYING AMP 360°

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/16/07

ANI: [signature]
DATE 5/10/07

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R118

PROJECT: BFN UNIT/CYCLE 2 / 14
SYSTEM RWCUS
WELD I.D.: RCRD-2-50
CONFIG.: EL TO VLV
FLOW
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 3/11/07
START TIME: 1638 END TIME: 1642
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 85°F PYRO NO. 562774

EXAMINATION ANGLE	60° RL	DEG.	70° RL	DEG.
AXIAL SCAN SENSITIVITY	56.0	dB	65.5	dB
CIRC. SCAN SENSITIVITY	N/A	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	60° RL	☒	
								3	70° RL	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
							N/A			☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS SCANNED AT REF. LEVEL DUE TO SIGNAL TO NOISE RATIO.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/16/07

ANII: [signature]
DATE 5/16/07
PAGE 5 OF 16

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R118

PROJECT: BFN UNIT/CYCLE 2 / 14
SYSTEM RWCUS
WELD I.D.: RCRD-2-50
CONFIG.: EL TO VLV
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 3/11/07
START TIME: 1630 END TIME: 1640
EXAM SURFACE ☐ID ☒OD
MATERIAL TYPE: ☐CS ☐SS ☐CSCL ☒CCSS
SURFACE TEMP. 85° F PYRO NO. 562774

EXAMINATION ANGLE	5.0 MHz 45° SH DEG.	1.5 MHz 45° SH DEG.
AXIAL SCAN SENSITIVITY	34.0 dB	36.0 dB
CIRC. SCAN SENSITIVITY	40.0 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	5.0 MHz 45° SH	☒	
								5	"	☒	
								6	"	☒	
								4	1.5 MHz 45° SH	☒	BEST EFFORT FROM VALVE SIDE
							N/A			☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS 1.5 MHz 45° SHEAR WAS USED ON VALVE SIDE. DID NOT CLAIM COVERAGE FROM VALVE SIDE DUE TO VALVE SURFACE IRREGULARITY.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/16/07

ANII: [signature]
DATE 5/16/07
PAGE 6 OF 16

C00339

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: BF-131 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMITER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT: ULTRAGEL II BATCH: 05325

ELEMENTS: 2 SHAPE: RECT.

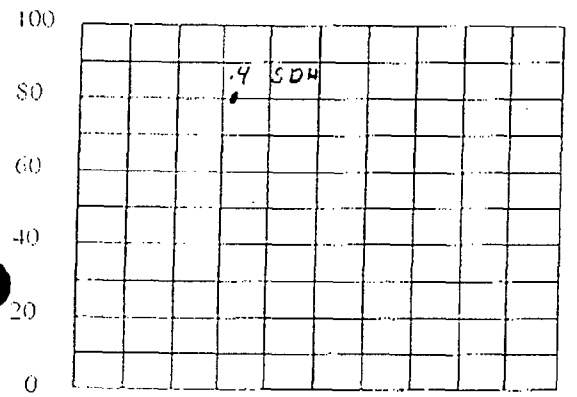
S/N U0109 SIZE: 2(10x18) FREQ: 2.0 MHz | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

CONTOUR: 6.0" OD AXIAL FOCUS: FS=17mm | ANGLE VERIFICATION

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | BLOCK TYPE: S/N: BF-131

NOMINAL ANGLE: 60° ACTUAL ANGLE: 57°

DAC



DISPLAY WIDTH: inches 2.0"

INSTRUMENT SETTINGS

REFLECTOR	SCAN DIRECT	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐	☒	56.0 dB	U0109
CIRC	☐	☐	☐	N/A dB	N/A

RANGE: 2.0" | *INST. FREQ.: 2.0 MHz

PROBE DELAY: 7.1650 | *RECTIFY: FULLWAVE

VELOCITY: .2367 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START:

*DAMPING: 1K | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 56.0

AMPLITUDE: 80% METAL PATH: 0.636

CALIBRATION TIMES

INITIAL TIME: 1438 FINAL TIME: 1640

VERIFICATION TIMES: 1) 1638 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:

RCRD-2-50

EXAMINER: LEVEL: II

EXAMINER: N/A LEVEL:

REVIEWER: LEVEL: III DATE: 3/16/07

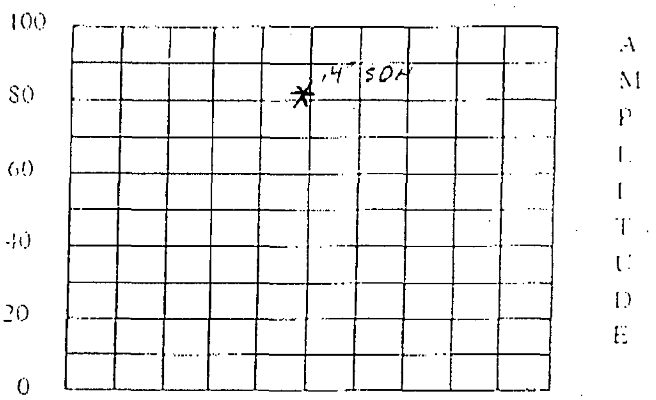
ANII: DATE: 6/16/07

PG. 1 OF 10

C00340

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 3/11/07
PROC.: N-UT-82 REV: 2 TC: N/A	CALIBRATION BLOCK NO.: BF-131 TEMP: 72 °F
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07	SIMULATOR BLOCK NO: N/A
MODEL/TYPE: USN-60 M & TE NO.: E34054	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONICS	COUPLANT: ULTRAGEL II BATCH: 05325
ELEMENTS: 2 SHAPE: RECT	
S/N U0110 SIZE: 2(10x18) FREQ. 2.0 MHz	EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒
CONTOUR: 6" OD AXIAL FOCUS: FS=28mm	ANGLE VERIFICATION
CABLE TYPE: 2(RG-174) LENGTH 72" #CNT: 0	BLOCK TYPE: S/N: BF-131
DAC	NOMINAL ANGLE: 70° ACTUAL ANGLE: 67°



DISPLAY WIDTH, inches 2.0

INSTRUMENT SETTINGS

REFLECTOR	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☒	65.5 dB	U0110
CIRC	☐	☐	N/A dB	N/A

RANGE:	*INST. FREQ: 2.0 MHz
PROBE DELAY:	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: 0.0
*DAMPING: 1K	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 65.5	CALIBRATION TIMES
AMPLITUDE: 80% METAL PATH: .945	INITIAL TIME: 1440 FINAL TIME: 1642

VERIFICATION TIMES 1) 1640 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:	WELDS/ITEMS EXAMINED:
	RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
[signature]	N/A	[signature]	[signature] DATE: 5/16/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/16/07	PG. 4 OF 16

000341

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ-115 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 92-7616

MODEL/TYPE: USN-60 M&TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 05325

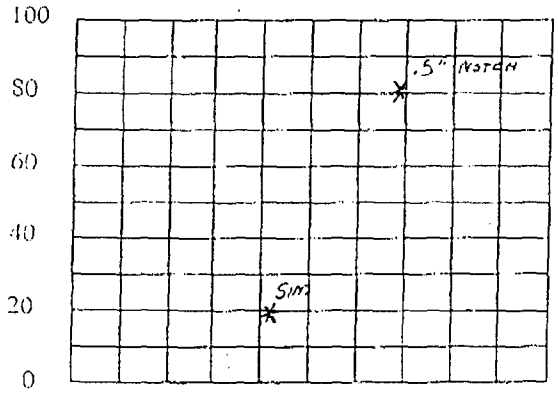
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR [X] LONG [ ] RL [ ]

S/N 0156YP SIZE: 0.25" FREQ: 5.0 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: N/A | BLOCK TYPE: ROMPAS S/N: 92-7616

CABLE TYPE: RG-174 LENGTH: 72" #CNT: Ø | NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°

DAC



DISPLAY WIDTH: inches 1.0"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	[X]	[ ]	28.0 dB	RWCU 45
CIRC	[ ]	[ ]	N/A dB	N/A

RANGE: 1.0"	*INST. FREQ.: 5.0 MHz
PROBE DELAY: 3.5750	*RECTIFY: FULL WAVE
VELOCITY: 0.1270	DUAL [ ] ON [X] OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: I P
*DAMPING: 1K	DET: [ ] PEAK [X] FLANK
*PRF MODE: AUTO HIGH	TCG: ON [ ] OFF [X]

REF. REFLECTOR: .5" NOTCH GAIN: dB 28.0

AMPLITUDE: 80% METAL PATH: 0.692

CALIBRATION TIMES

INITIAL TIME: 1425 FINAL TIME: 1705

VERIFICATION TIMES: 1) 1630 2) N/A 3) ~~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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED: RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
	N/A		DATE: 3/16/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/16/07	PG. 9 OF 10

000342

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ-123 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 92-7616

MODEL/TYPE: USN-60 M&TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT BATCH:

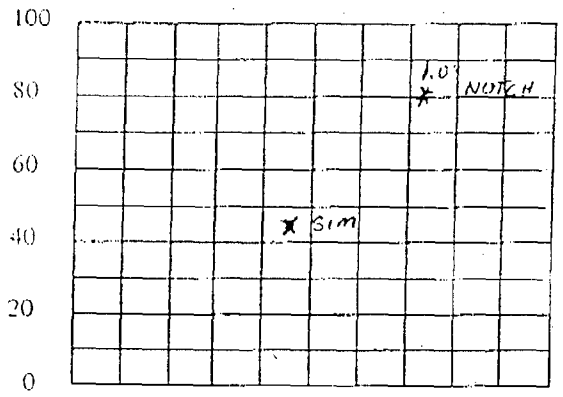
ELEMENTS: 1 SHAPE: ROUND | ULTRAGEL II 05325

S/N 00XD3R SIZE 0.375" FREQ: 1.5 MHz | EXAM TYPE: SHEAR ☒ LONG ☐ R: ☐

CONTOUR: FLAT FOCUS: N/A | ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72" #CNT: Ø | BLOCK TYPE: ROMPAS S/N: 6026-83

DAC | NOMINAL ANGLE: 45° ACTUAL ANGLE: 46°



DISPLAY WIDTH: inches 2.0

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	30.0 dB	45° P375
CIRC	☐	☐	N/A dB	N/A

RANGE: 2.0	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 4.1400	*RECTIFY: FULLWAVE
VELOCITY: 0.1270	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: 1.0" NOTCH GAIN: dB 30.0 | CALIBRATION TIMES

AMPLITUDE: 80% METAL PATH: 1.42" | INITIAL TIME: 1435 FINAL TIME: 1707

VERIFICATION TIMES	1) 1635	2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/16/07	DATE: 5/16/07
			PG. 10 OF 10

000343

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ-123 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 92-7616

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 05325

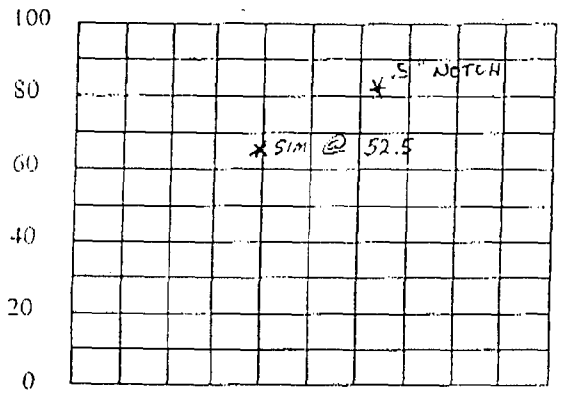
ELEMENTS: 1 SHAPE: ROUND

S/N 00Y8DV SIZE: 0.25 FREQ: 2.25 MHz | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

CONTOUR: FLAT FOCUS: N/A | ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72 #CNT: Ø | BLOCK TYPE: ROMPAS S/N: 92-7616

DAC | NOMINAL ANGLE: 70° ACTUAL ANGLE: 67.5°



DISPLAY WIDTH: inches 2.0

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☒	☐	58.5 dB	70°-2P2S
CIRC	☐	☐	N/A dB	N/A

RANGE: 2.0	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 6.4403	*RECTIFY: FULLWAVE
VELOCITY: 0.1270	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: 0.5" NOTCH GAIN: dB 58.5

AMPLITUDE: 80% METAL PATH: 1.250

CALIBRATION TIMES

INITIAL TIME: 1415 FINAL TIME: 1710

VERIFICATION TIMES: 1) 1610 2) — 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED: RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/16/07	DATE: 5/16/07
			PG. 11 OF 16

000344

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ-115 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: 92-7616

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 05325

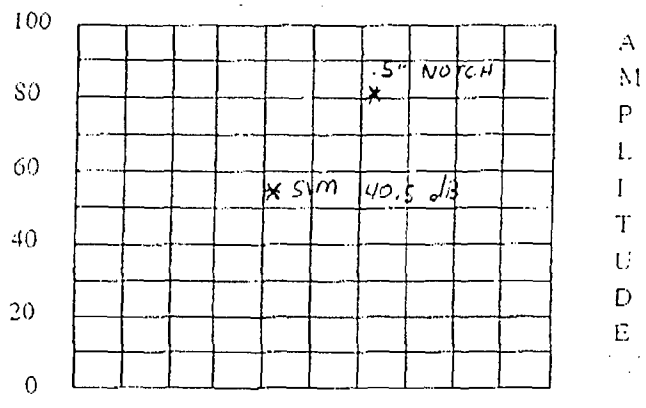
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

S/N 0156YP SIZE: 0.25" FREQ: 5.0 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: N/A | BLOCK TYPE: ROMPAS S/N: 92-7616

CABLE TYPE: RG-174 LENGTH: 72" #CNT: Ø | NOMINAL ANGLE: 60° ACTUAL ANGLE: 57°

DAC



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	45.0 dB	RWCU 60
CIRC	☐	☐	N/A dB	N/A

RANGE: 1.5	*INST. FREQ.: 5.0 MHz
PROBE DELAY: 4.885	*RECTIFY: FULLWAVE
VELOCITY: 0.1270	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: .5" NOTCH GAIN: dB 45.0

AMPLITUDE: 80% METAL PATH: .905"

CALIBRATION TIMES

INITIAL TIME: 1430 FINAL TIME: 1702

VERIFICATION TIMES: 1) 1620 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/16/07	DATE: 5/16/07
			PG. 12 OF 16

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R118

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RCRD-2-50
CONFIG.: EL TO VLV
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 3/11/07
START TIME: 1642 END TIME: 1648
EXAM SURFACE ☐ID ☒OD
MATERIAL TYPE: ☐CS ☐SS ☐CSCL ☒CCSS
SURFACE TEMP. 85° PYRO NO. 562774

EXAMINATION ANGLE	45° RL DEG.	42° CW (CCW) DEG.
AXIAL SCAN SENSITIVITY	59.5 dB	dB
CIRC. SCAN SENSITIVITY	dB	57.0 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45° RL	☒	
								5	42° CW RL	☒	
								6	42° CCW RL	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

N/A

REMARKS/LIMITATIONS 42° RL CIRC SCANS PERFORMED WITH TRANSDUCER ON TOP OF WELD CROWN.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/16/07

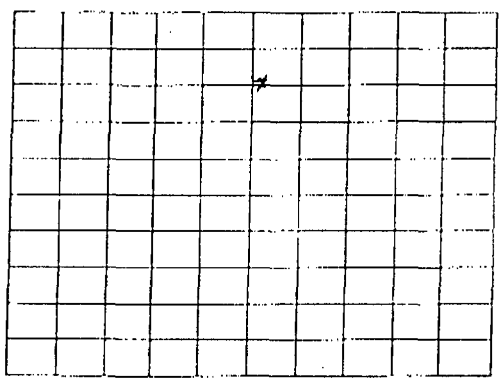
ANII: [signature]
DATE 5/16/07

000346

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 3/11/07
PROC.: N-UT-82 REV: 2 TC:	CALIBRATION BLOCK NO.: BF-131 TEMP: 72 °F
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07	SIMULATOR BLOCK NO: N/A
MODEL/TYPE: USN-60 M & TE NO.: E34054	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONICS	COUPLANT: ULTRAGEL II BATCH: 05325
ELEMENTS: 2 SHAPE: RECT	
S/N: U0111 SIZE: 2(10X18) FREQ 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CONTOUR: 6" OD AXIAL FOCUS: FS=20mm	ANGLE VERIFICATION
CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0	BLOCK TYPE: S/N: BF-131
DAC	NOMINAL ANGLE: 45° ACTUAL ANGLE: 44.5°

DAC



DISPLAY WIDTH: inches 1.0"

INSTRUMENT SETTINGS

SCAN DIRECT	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☒	59.5 dB	U0111
CIRC	☐	☐	N/A dB	N/A

RANGE: 1.0	*INST. FREQ: 2.0 MHz
PROBE DELAY: 6.4384	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: 0.0
*DAMPING: 1K	DET: ☒PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: .4" SDH GAIN: dB 59.5	CALIBRATION TIMES
AMPLITUDE: 80% METAL PATH: 0.522	INITIAL TIME: 1442 FINAL TIME: 1644

VERIFICATION TIMES 1) 1642 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:	WELDS/ITEMS EXAMINED:
	RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
[signature]	N/A	[signature]	[signature] DATE: 5/16/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/16/07	PG. 14 OF 16

000347

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: BF-132 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT ULTRAGEL II BATCH:

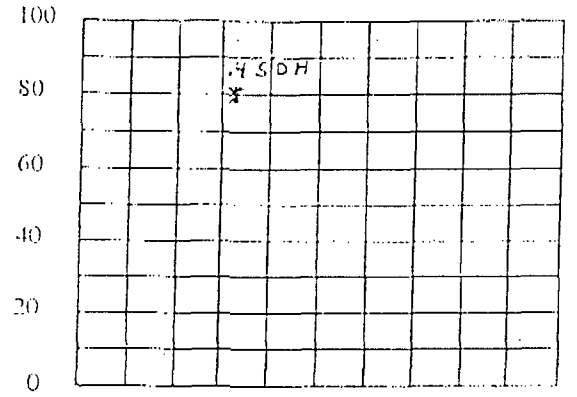
ELEMENTS: 2 SHAPE: RECT. | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0271 SIZE: 2(4x12mm) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: 6.0" OD CIRC FOCUS: FS=14mm | BLOCK TYPE: S/N: BF-132

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 42 ACTUAL ANGLE: 42

DAC



DISPLAY WIDTH: inches 2.0

REF. REFLECTOR: .4" SDH GAIN: dB 57.0

AMPLITUDE: 80% METAL PATH: .662

VERIFICATION TIMES: 1) 1644 2) 3) 4) 5) 6) 7) 8) 9) 10)

INSTRUMENT SETTINGS

REFLECTOR	SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐	☐	N/A dB	N/A
CIRC	☐	☐	☒	57.0 dB	U0271

RANGE: 2.0	*INST. FREQ.: 2.0 MHz
PROBE DELAY: 5.1888	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL: ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: 0.0
*DAMPING: 1K	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

CALIBRATION TIMES

INITIAL TIME: 14 46 FINAL TIME: 1646

* 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS: THIS TRANSDUCER HAS A 6° CCW TAPER

WELDS/ITEMS EXAMINED: RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 3/16/07	DATE: 5/16/07
			PG. 15 OF 16

000348

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R118

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 3/11/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: BF-132 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT BATCH: ULTRAGEL II

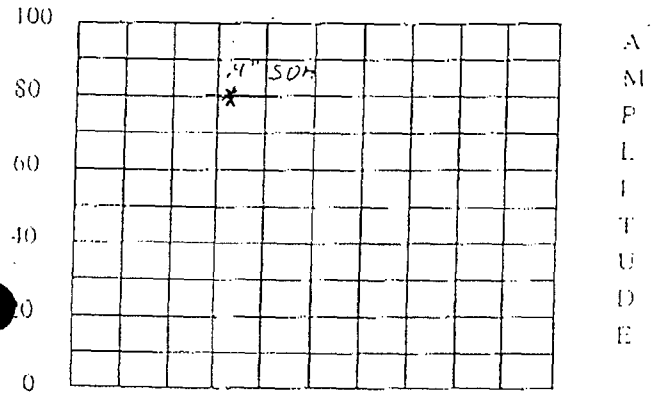
ELEMENTS: 2 SHAPE: RECT 5-15-07 | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0270 SIZE: 2 (4 x 12/14 mm) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: 6.0" OD CIRC FOCUS: FS=14 mm | BLOCK TYPE: S/N: BF-132

CABLE TYPE: 2 (RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 42 ACTUAL ANGLE: 42

DAC



DISPLAY WIDTH: inches 2.0

INSTRUMENT SETTINGS

REFLECTOR	SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐		N/A dB	N/A
CRS	☐	☐	☒	57.0 dB	U0270

RANGE: 2.0" | *INST. FREQ: 2.0 MHz

PROBE DELAY: 4.2459 | *RECTIFY: FULLWAVE

VELOCITY: .2367 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: 0.0

*DAMPING: 1K | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 57.0

AMPLITUDE: 80% METAL PATH: .662

CALIBRATION TIMES

INITIAL TIME: 1448 FINAL TIME: 1648

VERIFICATION TIMES	1) 1646	2)	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS: THIS TRANSDUCER HAS A 6° CW TAPER

WELDS/ITEMS EXAMINED: RCRD-2-50

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/14/07	DATE: 5/16/07
			PG. 16 OF 16

Examination Report No. R-074

Weld No. RCRD-2-52

000188

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT: 2		CYCLE: 14		COMPONENT ID: RCRD-2-52		
EXAMINATION METHOD				SYSTEM: RWCUS	ISI DWG. NO. 2-ISI-0272-C-01	
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: NA		CATEGORY: R-A
PROCEDURE: N-UT-82		REV:2	TC:NA	CONFIG.:	Valve TO Elbow	
EXAMINER:		EXAMINER:		EXAMINER:		EXAMINER:
LEVEL: II		LEVEL:		LEVEL:		LEVEL:

This report contains the data associated with the manual ultrasonic examination of RCRD-2-52 to meet the requirements of ASME Section XI, Category R-A, Item Number R1.16D, and BWRVIP-75.

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component configuration is a 4" diameter, Sch 80 carbon steel pipe, welded to a forged stainless steel valve.

Both refracted longitudinal (RL) and shear wave search units were used as defined in procedure PDI-UT-10. The ultrasonic examination is limited due to the taper configuration of the dissimilar metal weld.

During the examination, a planar indication was detected that was oriented in the circumferential direction with a recorded length of 1.10 inches. The indication was detected using a 60° shear wave and a 60° RL wave search units. The indication was confirmed using a 70° shear wave and a 70° RL wave search units.

Notice of Indication (NOI) report number U2C14-017 generated.

Due the inherent component geometry, it is not possible to obtain depth measurements of this indication using PDI ultrasonic qualified techniques. However, a best effort through wall sizing technique was applied and indicated an estimated remaining ligament of 0.20" in depth.

ASME Section XI Coverage:
Circumferential scan coverage was 100%. Axial scan coverage was 74%
Combined ASME Section XI Code coverage was 87%

RESOLUTION BY:	REVIEWED BY: 3/19/07	ANII:
LEVEL: II DATE: 3/3/07	LEVEL: III DATE: 3/3/07	DATE: 5/15/07
		PG. 1 OF 70

ISI report no. R-017

000189

NOI no. U2C14-017

Component I.D. RCRD-2-52

Additional resolution details:

Weld configuration:

4" Carbon Steel, sch. 80 pipe to a forged stainless steel check valve. The joint configuration exhibits a dissimilar metal weld with a pipe wall thickness at the weld joint of .36" connected to a SS check valve body. The weld crown is tapered from the pipe to the valve at an angle of 18°. This configuration limits the ability to scan across the weld crown in the axial direction.

Examination technique:

The examination was performed in accordance with ASME Section XI, Appendix VIII qualified techniques for examination of dissimilar metal welds. The procedure utilized was TVA/ISO NDE Procedure N-UT-82 that implements the PDI Generic procedure PDI-UT-10.

Indication discrimination:

The joint configuration limited the ultrasonic examination angles to 60 and 70 degrees. The weld taper and width prevented the use of a 45° inspection angle.

The indication presented signal characteristics indicative of a planer reflector located in the weld. The reflector continued to return energy until the transducer contacted the weld taper. The higher examination angle returned more reflected energy than the lower examination angle. The reflector maintained echo dynamic motion during the axial raster scan and during skewing of the search unit.

The PDI dissimilar metal examination does not contain qualified through wall sizing techniques. However, a best effort through wall sizing technique was applied and indicated an estimated remaining ligament of 0.20" in depth.

Conclusion:

The weld configuration does not allow for all of the indication discrimination tools defined in the PDI generic procedure. The discrimination tools utilized indicate the presence of a planer flaw located in the weld metal. The available data indicates the presence of a planer reflector that would not meet the ASME Section XI, Table IWB-3514-2, for allowable planer flaws.

Level III 3/9/07

Level II 3/9/07

000190

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R074

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RCRD-2-52
CONFIG.: VALVE TO PIPE
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/28/07
START TIME: 1805 END TIME: 1846
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 82 PYRO NO. 562774

EXAMINATION ANGLE	45° SH	DEG.	60° SH	DEG.
AXIAL SCAN SENSITIVITY	38.0	dB	54.0	dB
CIRC. SCAN SENSITIVITY	42.0	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								4	45° SH	☒	
								5		☒	
								6		☒	
1	3.0	3.5	4.1	.68	0.65*		130%	4	60° SH	☐	* CAN NOT MAX OUT AMP. DUE TO OD GEOMETRY.
						N/A				☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS IND. #1 SHOWS SIGNAL CHARACTERISTICS OF CRACKING. FURTHER EVAL. REQUIRED.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: Matt Welch LEVEL: III DATE 3/3/07
Lm 3/19/07

ANII: [signature]
DATE 5/15/07

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ACCESS FORMS DATABASE 10/18/01

000191

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R074

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RCRD-2-52
CONFIG.: VLV TO P
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTER LINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/28/07
START TIME: 1846 END TIME: 1910
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 82 PYRO NO. 562774

EXAMINATION ANGLE	60° RL DEG.	70° RL DEG.
AXIAL SCAN SENSITIVITY	56.0 dB	65.5 dB
CIRC. SCAN SENSITIVITY	dB	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								4	60° RL	☒	
1	3.0"	3.5"	4.1"	.8"	.73"		120%	4	70° RL	☐	LINEAR IND. FURTHER EVAL. REQUIRED.
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
								N/A		☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS IND. #1 CAN NOT BE MAXIMIZED DUE TO PROBE HITTING WELD TAPER. SIGNAL CHARACTERISTICS ARE INDICATIVE OF CRACKING AND NOT ID OR ROOT GEOMETRY. SCANNING WAS PERFORMED AT REF. LEVEL DUE TO SIGNAL TO NOISE RATIO.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/3/07
mm 3/19/07

ANII: [signature]
DATE 5/15/07
PAGE 4 OF 10

000192

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R074

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RCRD-2-52
CONFIG.: VLV TO P
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTER LINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/28/07
START TIME: 1718 END TIME: 1935
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 82 PYRO NO. 562774

EXAMINATION ANGLE	41° CW DEG.	41° CCW DEG.
AXIAL SCAN SENSITIVITY	N/A dB	N/A dB
CIRC. SCAN SENSITIVITY	63.6 dB	66.6 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								5	41°	☒	
								6	41°	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
						N/A				☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] 3/19/07 LEVEL: III DATE 3/3/07

ANII: [signature]
DATE 5/15/07

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000193

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R074

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RCRD-2-52
CONFIG.: VLV TO P
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTER LINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/28/07
START TIME: 1832 END TIME: 1915
EXAM SURFACE ☐ID ☒OD
MATERIAL TYPE: ☐CS ☐SS ☐CSCL ☒CCSS
SURFACE TEMP. 82 PYRO NO. 562774

EXAMINATION ANGLE	45° SH DEG.	45° RL DEG.
AXIAL SCAN SENSITIVITY	38.0 dB	59.5 dB
CIRC. SCAN SENSITIVITY	42.0 dB	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								3	45° SH	☒	
								4	"	☒	
								5	"	☒	
								6	"	☒	
								4	45° RL	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
						N/A				☐	
										☐	
										☐	
										☐	
										☐	

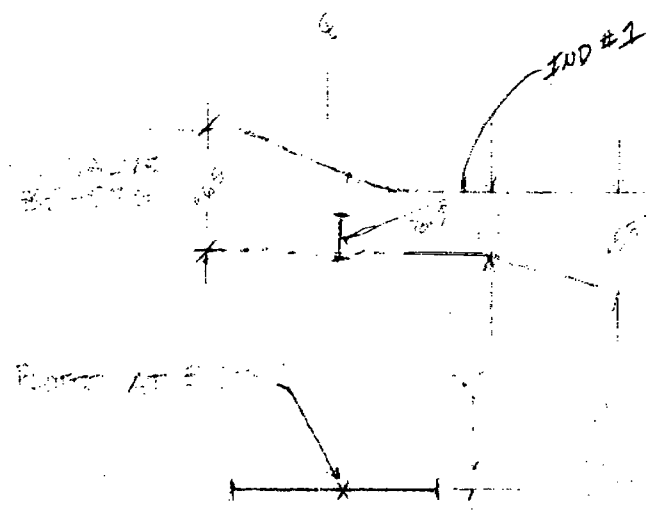
REMARKS/LIMITATIONS SCAN #3 AND 4 COVERAGE IS LIMITED DUE TO WELD TAPER AT VALVE.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/3/07
on 3/19/07

ANII: [signature]
DATE 3/19/07
PAGE 6 OF 20

ACCESS: FORMS DATABASE 10/18/01

TVA Office of Nuclear Power	PROJECT: [illegible] SYSTEM: [illegible] Unit: 2 WELD NO.: [illegible]	REPORT NO.: RC74



- [illegible]
- [illegible]

BY: [illegible] mm 3/19/07	LEVEL: III	DATE: 3/3/07	PAGE 7	OF 20

TVA 19669 (ONP-6-88)

C001194

000195

TVA

WALL THICKNESS PROFILE SHEET

REPORT NO: R074

PROJECT: BFN CF-14

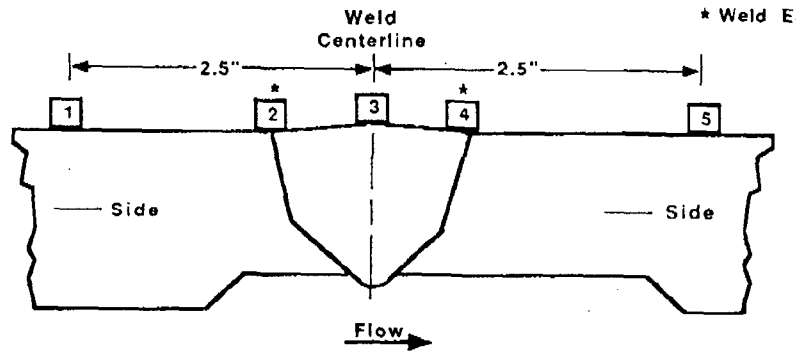
UNIT: 2

WELD NO: RCRD-2-52

SYSTEM: RWCU

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	—	N/A	—	
4	.56	.56	.56	.56
5	.53	.53	.53	.53

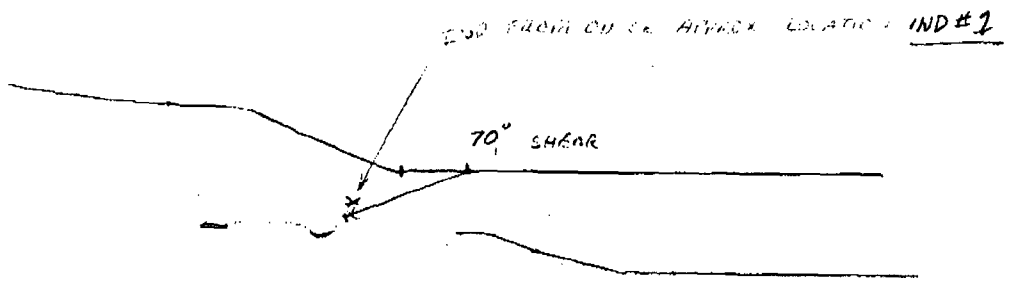


CROWN HEIGHT: _____ DIAMETER: _____

CROWN WIDTH: _____ WELD LENGTH: _____

* O' READING ON TAPER IS APPROXIMATE

.62" .56* .42" .48" .55" .55"



70° RL PEAKED JUST SHORT OF 90° SHEAR DUE TO FEATHER.

OD CREEPER DETECTED AN IND. IN SAME AREA THAT PRODUCED A RESPONSE GREATER THAN THAT OF THE SDH OR NOTCH AT A DEPTH OF APPROX .175 TO .25" FROM OD. COULD NOT PEAK OUT IND. DUE TO TAPER.

EXAMINER: _____
LEVEL: II
DATE: 2/28/07

REVIEWED BY: _____ 3/3/07
LEVEL: III DATE: 3/3/07

ANII: _____
DATE: 3/15/07

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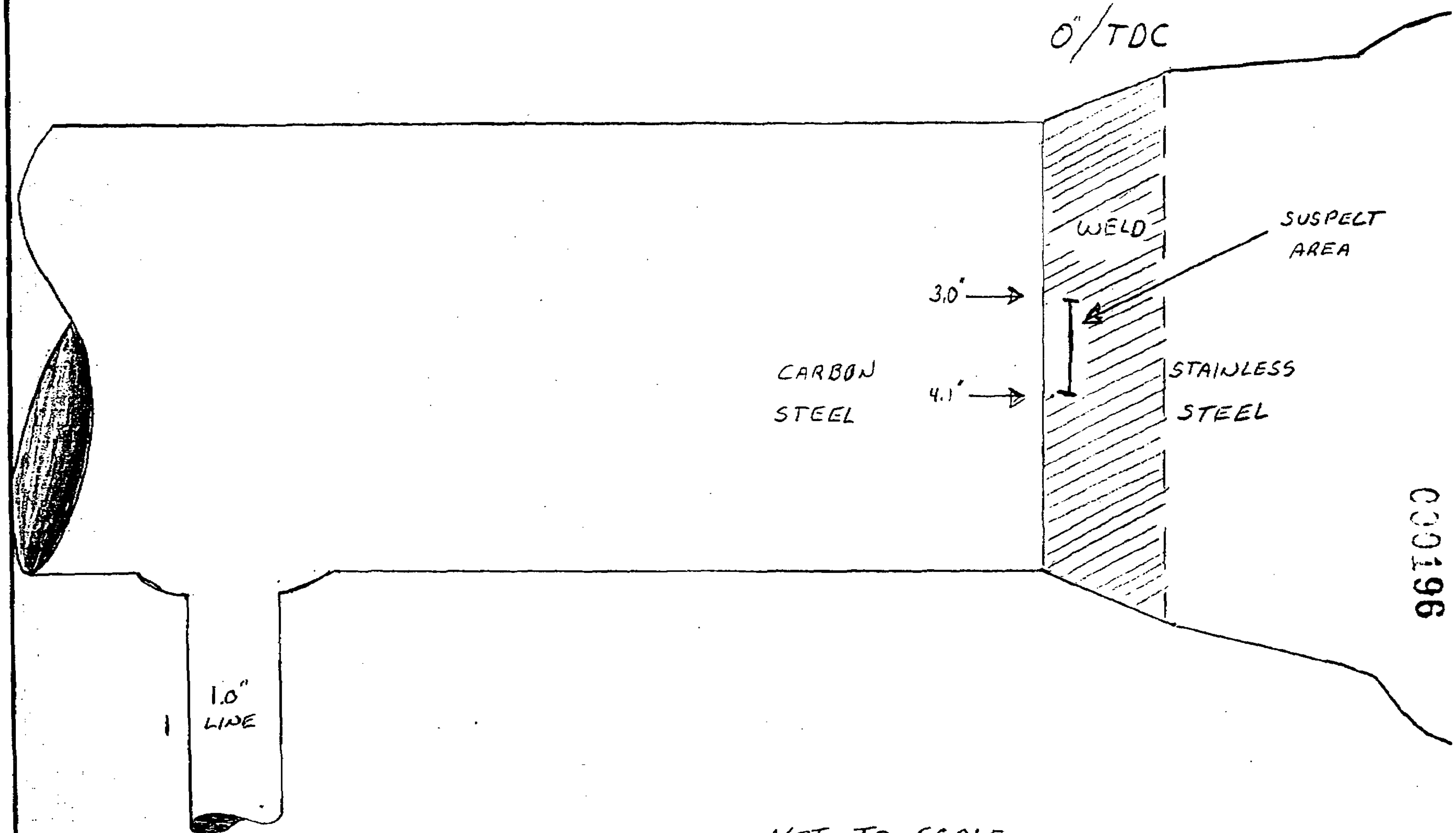
TVA 19668 (NP-5-89)

1 108-999 44

TVA Office of Nuclear Power	PROJECT: BFN	SYSTEM: RWCU	REPORT NO.: R074
	Unit: 2	WELD NO.: RCRD-2-52	



NOT TO SCALE

C00196

BY: Wade Holloway LEVEL: II DATE: 3/3/07 PAGE 9 OF 20

TVA 19669 (ONP-6-88)

000197

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R014

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ 115 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO:

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMETER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 04125

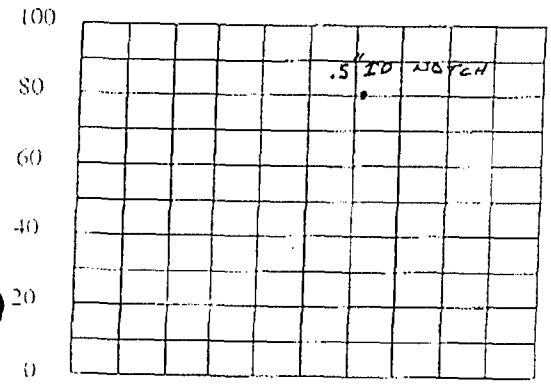
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

S/N 00YCH3 SIZE: 0.375" FREQ. 5.0 MHz

CONTOUR: FLAT FOCUS: N/A | ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72" #CNT: 0 | BLOCK TYPE: CS ROMPAS S/N: 790918

DAC | NOMINAL ANGLE: 60° ACTUAL ANGLE: 58°



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	44.0 dB	60°.375 5.0
CIRC	☐	☐	dB	

RANGE: 1.5" | *INST. FREQ.: 5.0 MHz

PROBE DELAY: 6.5444 | *RECTIFY: FULLWAVE

VELOCITY: 0.1270 | DUAL ☐ ON ☒ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☐ PEAK ☒ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .5" NOTCH GAIN dB: 44.0 | CALIBRATION TIMES

AMPLITUDE: 80% METAL PATH: .901 | INITIAL TIME: 1338 FINAL TIME: 1805

VERIFICATION TIMES: 1) 1730 2) — 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-49 ; RCRD-2-52
RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 3/19/07	DATE: 5/15/07
			PG. 10 OF 20

000198

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: SQ115 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT BATCH: ULTRAGEL II 04125

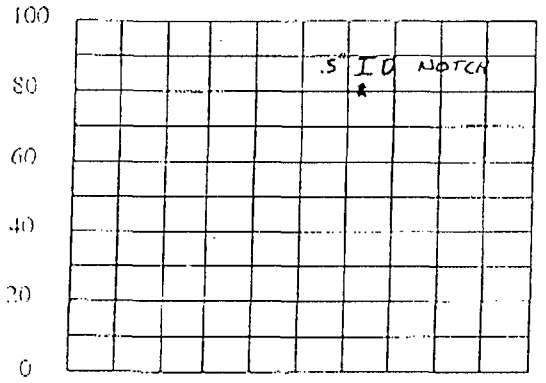
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

S/N 0156YP SIZE: 0.25" FREQ: 5.0 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: N/A | BLOCK TYPE: CS ROMPAS S/N: 790918

CABLE TYPE: RG-174 LENGTH: 72" #CNT 0 | NOMINAL ANGLE: 60° ACTUAL ANGLE: 57°

DAC



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	45.0 dB	60°.25
CIRC	☐	☐	dB	

RANGE: 1.5" | *INST. FREQ 5.0 MHz

PROBE DELAY: 5.0478 | *RECTIFY: FULLWAVE

VELOCITY: 0.1270 | DUAL ☐ ON ☒ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☐ PEAK ☒ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .5" NOTCH GAIN: dB 45.0

AMPLITUDE: 80% METAL PATH: .905

CALIBRATION TIMES

INITIAL TIME: 1345 FINAL TIME: 1820

VERIFICATION TIMES: 1) 1805 2) 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:

RCRD-2-49 ; RCRD-2-52

RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 3/15/07
			PG. 11 OF 20

000199

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: SQ115 (ACT) TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMITER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 04125

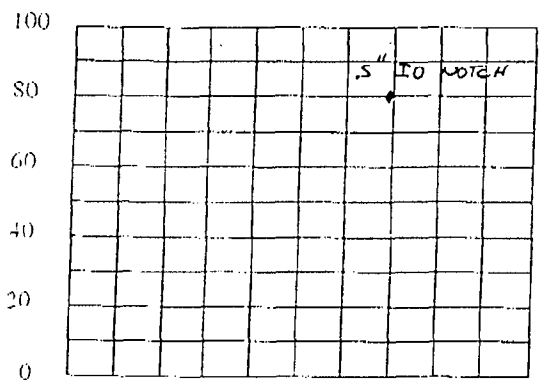
ELEMENTS: 1 SHAPE: ROUND

S/N 0156YP SIZE: 0.25" FREQ 5.0 MHz | EXAM TYPE: SHEAR ☒ LONG ☐ R: ☐

CONTOUR: FLAT FOCUS: N/A | ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72" #CNT: 0 | BLOCK TYPE: CS ROMPAS S/N: 790918

DAC | NOMINAL ANGLE: 45° ACTUAL ANGLE 44°



DISPLAY WIDTH: inches 1.0"

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	☒	☐	28.0 dB	45°25.5
CIRC	☐	☐	dB	

RANGE: 1.0" | *INST. FREQ: 5.0 MHz

PROBE DELAY: 3.7184 | *RECTIFY: FULLWAVE

VELOCITY: 0.1270 | DUAL ☐ ON ☒ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☐ PEAK ☒ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .5" NOTCH GAIN: dB 28.0 | CALIBRATION TIMES

AMPLITUDE: 80% METAL PATH: 0.692 | INITIAL TIME: 1342 FINAL TIME: 1846

VERIFICATION TIMES: 1) 1840 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-49, RCRD-2-52
RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 5/15/07
			PG. 12 OF 20

000200

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: BF-131 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT BATCH: ULTRAGEL II 04125

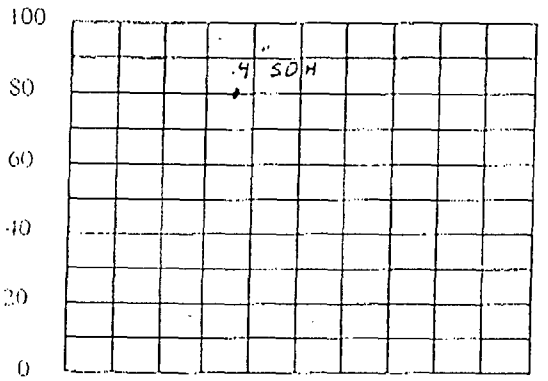
ELEMENTS: 2 SHAPE: RECT. | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0111 SIZE: 2(10x18) FREQ. 2.0 MHz | ANGLE VERIFICATION

CONTOUR: 6.0" OD Axial FOCUS: FS=20mm | BLOCK TYPE: S/N: BF-131

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 45° ACTUAL ANGLE: 44.5°

DAC



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☐	☒	59.5 dB	U0111
CIRC	☐	☐	dB	

RANGE: 1.5"	*INST. FREQ.: 2.0 MHz
PROBE DELAY: 6.4384	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 59.5

AMPLITUDE: 80% METAL PATH: .522"

CALIBRATION TIMES

INITIAL TIME: 1400 FINAL TIME: 1915

VERIFICATION TIMES 1) 1910 2) 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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-52

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 5/15/07

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000201

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

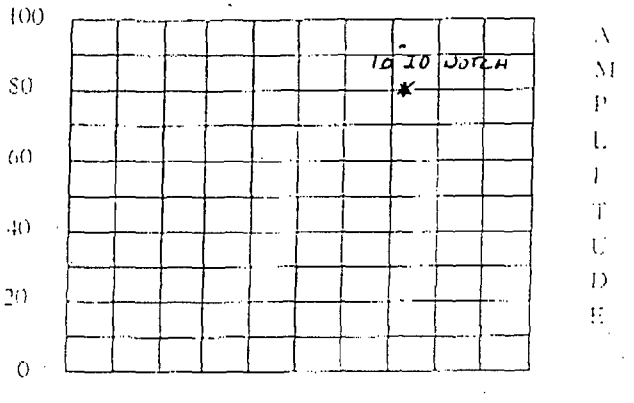
PROJECT: BFN UNIT 2 CYCLE: 14
PROC.: N-UT-82 REV: 2 TC:
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07
MODEL/TYPE: USN-60 M&TE NO.: E34054
TRANSDUCER MFG: KBA
ELEMENTS: 1 SHAPE: ROUND
S/N 00X03R SIZE: .375" FREQ 1.5 MHz
CONTOUR FLAT FOCUS N/A
CABLE TYPE: RG-174 LENGTH: 72" #CNT 0

CALIBRATION DATE: 2/28/07
CALIBRATION BLOCK NO.: SQ 123 TEMP: 72 °F
SIMULATOR BLOCK NO: N/A
THERMOMITER S/N: 562774 DUE DATE: 12/12/07
COUPLANT: ULTRAGEL II BATCH: 04125
EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

ANGLE VERIFICATION

BLOCK TYPE: SS ROMPAS S/N: 6026-83
NOMINAL ANGLE: 45° ACTUAL ANGLE: 46°

DAC



DISPLAY WIDTH inches: 2.0"

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE SENSITIVITY	MEMORY NUMBER
SCAN DIRECT.	NTCH	SDH		
AXIAL	☒	☐	30.0 dB	45°.375IS
CIRC	☐	☐	dB	

RANGE: 2.0" *INST. FREQ.: 2.0 MHz
PROBE DELAY: 7.7631 *RECTIFY: FULLWAVE
VELOCITY: 0.1270 DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0 *REJECT: 0 %
*ENERGY: HIGH *DISPLAY START: IP
*DAMPING: 1K DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH TCG: ON ☐ OFF ☒

REF. REFLECTOR: 1.0" NDRH GAIN dB: 30.0
AMPLITUDE: 80% METAL PATH: 1.42

CALIBRATION TIMES

INITIAL TIME: 1330 FINAL TIME: 1840

VERIFICATION TIMES: 1) 1832 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-49; RCRD-2-52

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
	N/A		DATE: 5/15/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/19/07	PG. 14 OF 20

000202

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: BF-131 TEMP: 72, °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT ULTRAGEL II BATCH: 04125

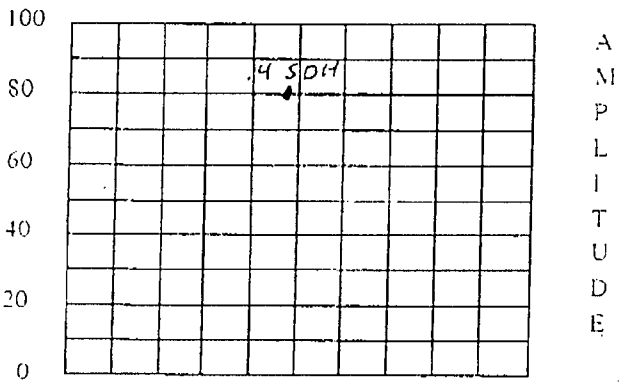
ELEMENTS: 2 SHAPE: RECT. | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0110 SIZE: 2(10X18) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: 6.0" OD AXIAL FOCUS: FS-28 | BLOCK TYPE: S/N: BF-131

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 70° ACTUAL ANGLE: 67°

DAC



DISPLAY WIDTH: inches 2.0

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☐	☒	65.5 dB	U0110
CIRC	☐	☐	dB	

RANGE: 2.0 | *INST. FREQ.: 2.0 Mhz

PROBE DELAY: 7.9159 | *RECTIFY: FULLWAVE

VELOCITY: .2367 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 65.5

AMPLITUDE: 80% METAL PATH: .945

CALIBRATION TIMES

INITIAL TIME: 1355 FINAL TIME: 1910

VERIFICATION TIMES | 1) 1857 | 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:

RCRD-2-49; RCRD-2-52

RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 3/19/07	DATE: 5/15/07
			PG. 15 OF 20

000203

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: BF-131 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT BATCH: ULTRAGEL II 04125

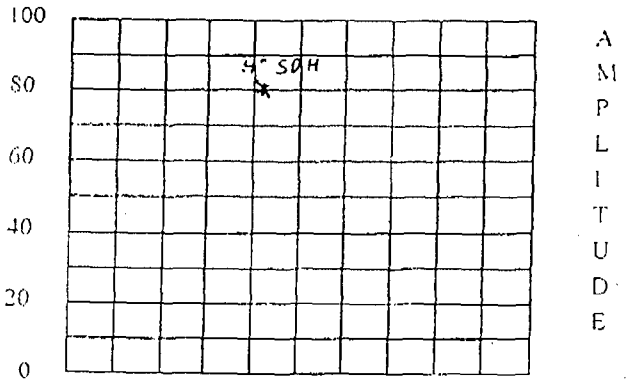
ELEMENTS: 2 SHAPE: RECT | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0109 SIZE: 2(10x18) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: 6.0" OD AXIAL FOCUS: FS = 17 mm | BLOCK TYPE: S/N: BF-131

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 60° ACTUAL ANGLE: 57.0

DAC



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☐	☒	56.0 dB	U0109
CIRC	☐	☐	dB	

RANGE: 1.5" | *INST. FREQ.: 2.0 Mhz

PROBE DELAY: .1650 | *RECTIFY: FULLWAVE

VELOCITY: .2367 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 56.0

AMPLITUDE: 80% METAL PATH: .636

CALIBRATION TIMES

INITIAL TIME: 1350 FINAL TIME: 1857

VERIFICATION TIMES 1) 1846 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:

RCRD-2-49; RCRD-2-52

RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 3/19/07	DATE: 5/15/07

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000204

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2-28-07

PROC.: N-UT-82 REV: 2 TC: | CALIBRATION BLOCK NO.: BF-132 TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO:

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT: ULTRAGEL II BATCH: 04125

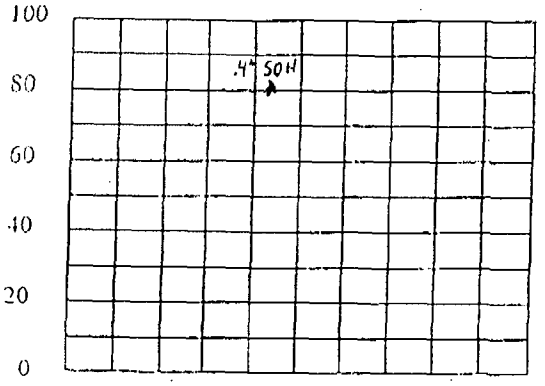
ELEMENTS: 2 SHAPE: RECT | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0114 SIZE: 2(7x12) FREQ: 2.0 MHz | ANGLE VERIFICATION

CONTOUR: 60" OD 18° CCW TAPER FOCUS: FS = 17mm | BLOCK TYPE: S/N: BF-132

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 41° ACTUAL ANGLE: 41°

DAC



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐	dB	
CIRC	☐	☒	60.0 dB	

RANGE: 1.5"	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 5.1888	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 60

AMPLITUDE: METAL PATH:

CALIBRATION TIMES

INITIAL TIME: 1420 FINAL TIME: 1922

VERIFICATION TIMES	1) 1918	2)	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

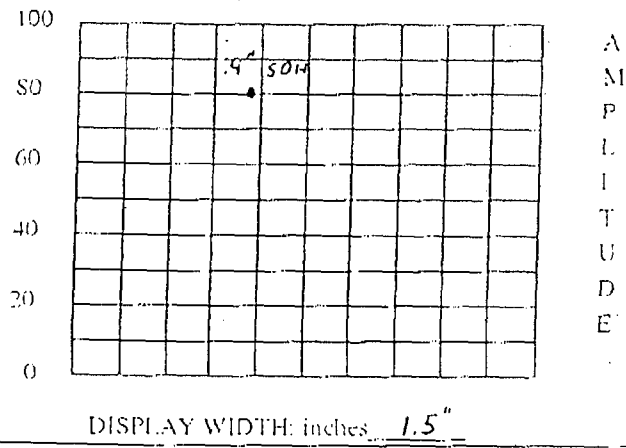
WELDS/ITEMS EXAMINED:
RCRD-2-52

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 5/15/07
			PG. 17 OF 20

000205

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R074

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 2/28/07
PROC.: N-UT-82 REV: 2 TC:	CALIBRATION BLOCK NO.: BF-132 TEMP: 72 °F
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07	SIMULATOR BLOCK NO:
MODEL/TYPE: USN-60 M & TE NO.: E34054	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONICS	COUPLANT: ULTRAGEL II BATCH: 04125
ELEMENTS: 2 SHAPE: RECT.	
S/N U0272 SIZE: 2(7x12) FREQ: 2.0 MHz	EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒
CONTOUR: 6.0" OD TAPER 2@18° FOCUS: FS: 17mm	ANGLE VERIFICATION
CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0	BLOCK TYPE: S/N: BF-132
DAC	NOMINAL ANGLE: 41° ACTUAL ANGLE: 42°



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐	dB	U0272
CIRC	☐	☒	57.0 dB	

RANGE: 1.5"	*INST. FREQ: 2.0 Mhz
PROBE DELAY: 5.1888	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 57.0	CALIBRATION TIMES
AMPLITUDE: 80% METAL PATH: 0.567	INITIAL TIME: 1415 FINAL TIME: 1935

VERIFICATION TIMES	1) 1930	2)	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:	WELDS/ITEMS EXAMINED:
	RCRD-2-52

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 3/19/07	DATE: 5/15/07
			PG. 18 OF 20

TVA

WALL THICKNESS 000206 PROFILE SHEET

REPORT NO: R074

PROJECT: BFN

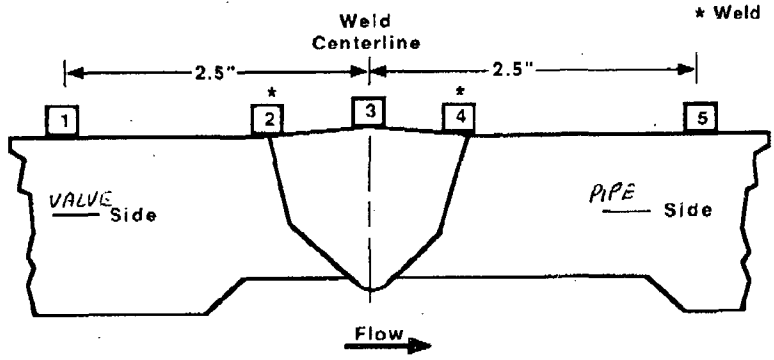
UNIT: 2

WELD NO: RCRD-2-52

SYSTEM: RWCU

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

Position	0°	90°	180°	270°
1	N/A			
2	.62			
3	.50		N/A	
4	.36			
5	.53			

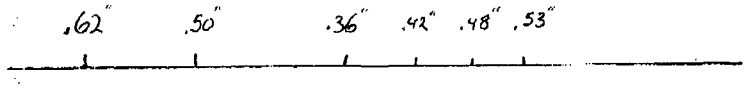


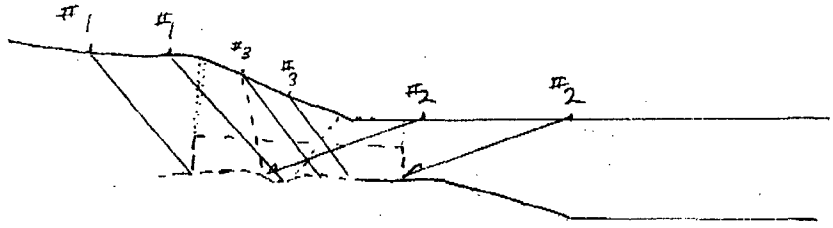
CROWN HEIGHT: TSI PREP

CROWN WIDTH: 0.6"

DIAMETER: 4.0"

WELD LENGTH: 14.5"





#1 45°

#2 70°

#3 60°

EXAMINER: [signature]

LEVEL: II

DATE: 2/28/07

REVIEWED BY: [signature]

LEVEL: III DATE: 3/19/07

ANII: [signature]

DATE: 5/16/07

PAGE 19 OF 20

RERD-2-52 000207 ID/OD RATIO = .835 R014

DWG - 2-ISI-0272-C-01 Max ∅ for ID insp. = 56.62"

4" S/80 C/S , .337 NOM WALL, 4.5" OD

Req'd transducers

RL: 60°/70° axial scans, 45° circ scans,

FREQ = WT < .50; 2.0 TO 5.0 mhz (DS SIDE) / WT > .50; 1.0 - 2.25 mhz (US SIDE)

SIDE = AS REQUIRED

SHEAR: 45°/60° axial scans, 45° circ scans

FREQ = WT < .5"; 2.0 - 2.25 mhz (DS SIDE) / WT > .5 ...

Metal Paths US .362" / DS .582

.60° DS SIDE = .724 (18.4mm) 70° DS = 1.1" (28mm) 45° DS = .52" (13mm) } axial scans

60° US SIDE = ... 70° US = 1.7" (43.2mm) 45° US = .82 (21mm)

use 60% - 110% = DS (11 - 20mm) US (18 - 32) ... DS (17 - 31) US (26 - 48) ... DS ... DS (15 - 26) = 75% - 125%

45° DS = .59" (15mm) } circ scans FOCUS = 75% - 125% DS (11 - 19)

45° US = .82 (20mm) US (15 - 25)

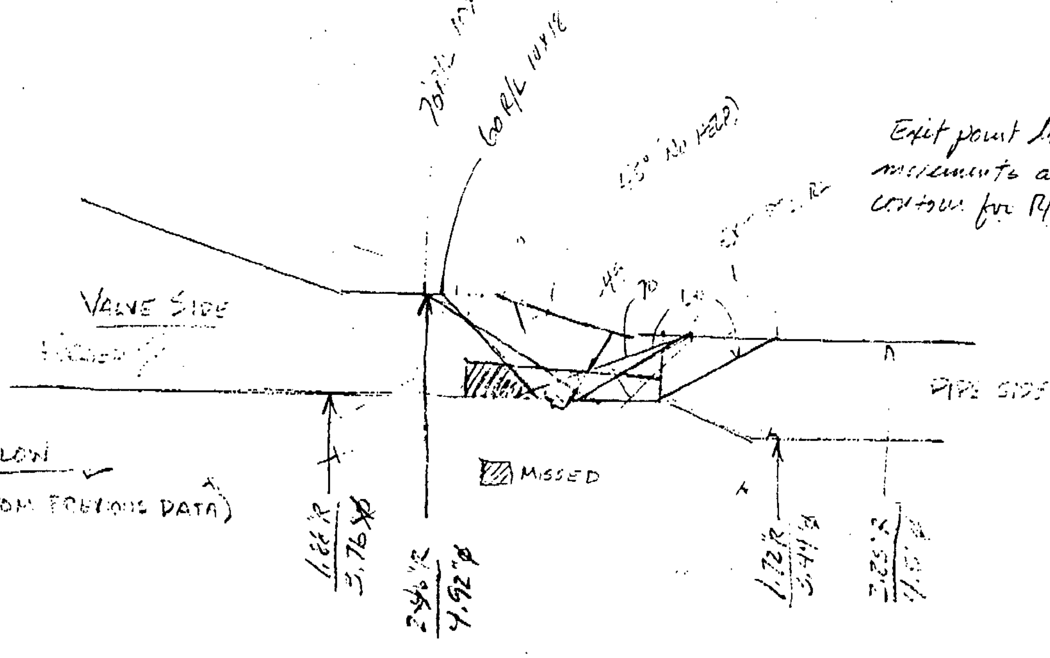
Exam Volume = 1.05 x .2 = .21 in^2

Est % obtained = .21 in^2 - [(.7 x .2) + (.15 x .2 / 2)] = .155 ÷ .21 x 100 = 73.8% - axial scans R/L & SHR

Est % obtained circ scans:

100% (combined R/L & SHR)

Est coverage = 86.9%



PS 20/20

000208

NOTIFICATION OF INDICATION FORM

NOI No. 4214-07 Plant/Unit BFN 2 — PART I - FINDINGS — ISI Dwg./Sh. No. 2-ISI-0272-C, SHT. 1 of 3

Examination Report No. R-074 Component ID RCRD-2-52

Description of Indication (Sketch/Photograph if Required for Clarification): Ultrasonic examination of 4" CS/SS weld RCRD-2-52 detected a planar indication. Reference attached UT report.

Signature of Examiner/Certification Level: [signature] /Date: 3/3/07
Signature of ISO Coordinator (Field Supervisor): [signature] /Date: 3/03/07
Signature of ISI Program Owner: [signature] /Date: 3/3/07

PART II - DISPOSITION

See attached.

Corrective Action Program or Administrative Control document number (PER, WO) if applicable: 121003

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: Victor D. Johnson Org. SE-M/N Date: 05-10-2007

PART III - ADDITIONAL EXAMINATIONS

Additional Sample Required [IW(X)-2430]: ☑ Yes ☑ No SCW 5/11/07 — Page 2 of 2 additional samples attached? ☑ Yes ☑ No SCW 5/11/07

(Attach list of items in additional sample, if yes.)

Stephen C. Williams 5/11/07
ISI or CISI Program Owner Date

Successive Examination Required: ☐ Yes ☑ No

Stephen C. Williams 5/11/07
ISI or CISI Program Owner Date

PART IV - VERIFICATION OF CLOSURE

Reexamination Report number, if Applicable: N/A
Signature of ISO Coordinator: _____ Date: _____

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: _____

Verification of Complete Corrective Action Required by Disposition (Including Page 2, if applicable)
Signature of ISI or CISI Program Owner: Stephen C. Williams Date: 5/11/07

OA 5/15/07

NOTIFICATION OF INDICATION FORM ATTACHMENT

NOI No. U2C14-017 Plant/Unit BFN Unit 2

Examination Report No. R-074 Component ID RCRD-2-52

Part II - Disposition

This NOI documents a planar indication that was observed during manual ultrasonic examination of dissimilar metal weld RCRD-2-52 (4-inch Carbon Steel, Schedule 80 pipe to stainless steel check valve 2-CKV-085-0576) during the Unit 2 Cycle 14 Refueling Outage. This examination was performed in accordance with ASME Section XI, Appendix VIII qualified techniques for examination of dissimilar metal welds (Report Number R-074). The procedure utilized was TVA/ISO NDE Procedure N-UT-82 that implements the PDI Generic Procedure PDI-UT-10. The indication presented signal characteristics indicative of a planar reflector located in the weld. The available data indicated that the planar reflector would not meet the ASME Section XI, Table IWB-3514-2, criteria for allowable planar flaws.

The planar indication was removed when check valve 2-CKV-085-0576 was cut out and replaced under Work Order Number 07-713160-000. The indication was removed in such a manner to allow subsequent metallurgical evaluation. Westinghouse, LLC has been contracted to determine the cause of the planar indication, and is expected to have preliminary results of their evaluation by June 2007.

Prepared By: Victor D. Schiavone Org. SE-M/N Date 05-10-2007

NOI U2C14-017
List of Items in Additional Sample

Weld ID	ISI Exam	Report Number	Exam Results
RCRD-2-33	manual UT	R-116	No Recordable Indications
RCRD-2-50	manual UT	R-118	No Recordable Indications
DRHR-2-11	manual UT	R-119	No Recordable Indications
DRHR-2-03	manual UT	R-121	No Recordable Indications

NOTIFICATION OF INDICATION FORM
SUBSECTION IWE

Complete this page in addition to Page 1 for findings affecting Class MC/Subsection IWE.

NOI No. 02C14-017 Plant/Unit BFN/2

Examination Report No. R-074 Component ID RCRD-2-52

PART II - DISPOSITION (Supplemental Information)

Evaluation of inaccessible areas as required by 10CFR50.55a(b)(2)(ix)(A)
(Include (1) A description of the type and estimated extent of degradation, and the conditions that led to the degradation; (2) An evaluation of each area, and the result of the evaluation; and (3) A description of necessary corrective actions) [additional separate continuation sheets may be attached, as necessary].

Corrective Action Program or Administrative Control document number (PER, WO) if applicable:

Disposition Prepared By: N Org. [illegible] 8/26/07 Date

PART III - ADDITIONAL EXAMINATIONS (Supplemental Information)

Additional examinations required per 10CFR50.55a(b)(2)(ix)(D) ☐ Yes ☐ No
If Yes, provide (1) A description of each flaw or area, including the extent of degradation, and the conditions that led to the degradation; (2) The acceptability of each flaw or area, and the need for additional examinations to verify that similar degradation does not exist in similar components; (3) A description of the necessary corrective actions; and (4) The number and type of additional examinations to ensure detection of similar degradation in similar components [additional separate continuation sheets may be attached, as necessary].

Specified By: Org. Date:

Examination Report No. R-123

Weld No. RWCU-2-004-083

C00376

TENNESSEE VALLEY AUTHORITY		EXAMINATION SUMMARY AND RESOLUTION DATA SHEET		REPORT NUMBER: R123	
PROJECT: BFN UNIT: 2 CYCLE: 14				COMPONENT ID: RWCU-2-004-083	
EXAMINATION METHOD				SYSTEM: RWCUS	ISI DWG. NO. 2-ISI-0272-C-01
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: NA	CATEGORY: R-A
PROCEDURE: N-UT-82	REV:2		TC:NA	CONFIG.:	C/S Pipe TO S/S Valve
EXAMINER: [signature] LEVEL: II	EXAMINER: N/A LEVEL:			EXAMINER: N/A LEVEL:	EXAMINER: N/A LEVEL:

This report contains the data associated with the manual ultrasonic examination of ~~RCRD-2-50~~ RWCU 2-004-083 (initialed 4/19/07) to meet the requirements of ASME Section XI, category R-A, item number R1.16A.

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component examined was a CS pipe to a cast SS valve piping weld, 4.0" nominal diameter, having single sided access.

A 45° shear was used for scan directions 4, 5, and 6.
A 60° shear was used for scan direction 4.
A 60° RL was used for scan direction 4.
A 70° RL was used for scan direction 4.
A 42° RL was used for scan directions 5 and 6.

Scan direction 3 was not performed due to weld joint configuration (could not scan on the valve body).
Scan directions 5 and 6 for the 42° RL could not be performed from the valve body due to cast SS material.

<u>Obtained exam volumes:</u>

Lower 1/3T axial scan coverage achieved was 100%.
Lower 1/3T circumferential scan coverage was 63%.
Full volume axial scan direction coverage was 69.1%
Full volume circumferential scan direction coverage was 65.8%

The reported achieved coverage is 81.5%.

No recordable indications. Matt Welch 4/18/07

RESOLUTION BY: [signature] LEVEL: II DATE: 2/28/07	REVIEWED BY: [signature] LEVEL: III DATE: 3/19/07	ANII: [signature] DATE: 4/18/07 PG. 1 OF 13

000377

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R123

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RWCU-2-004-083
CONFIG.: VLV TO P
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/28/07
START TIME: 1730 END TIME: 1820
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 82°F PYRO NO. 562774

EXAMINATION ANGLE	45° SH DEG.	60° SH DEG.
AXIAL SCAN SENSITIVITY	38.0 dB	52.0 dB
CIRC. SCAN SENSITIVITY	42.0 dB	dB

IND NO.	L (in) FROM REF. L1	L Max	L2	AT MAX AMP W MAX	MP MAX	O MAX	MAX AMP %DAC	EXAM NO. 3-14	NOM. ANG.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								4	45° SH	☒	
								5	"	☒	
								6	"	☒	
1		INT 360		0.65	0.812		100%	4	60° SH	☐	ROOT GEOMETRY INT. 360°
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

N/A

REMARKS/LIMITATIONS NO SCAN #3 DUE TO CONFIGURATION. ROOT GEOMETRY SEEN INT. 360° WITH 60°. NO SERVICE INDUCED INDICATIONS NOTED.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/19/07

ANII: [signature]
DATE 4/18/07
PAGE 2 OF 13

ACCESS FORMS DATABASE 10.18.01

C00378

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R123

PROJECT: BFN UNIT/CYCLE 2 / 14
SYSTEM RWCUS
WELD I.D.: RWCU-2-004-083
CONFIG.: VLV TO P
FLOW →
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/28/07
START TIME: 1922 END TIME: 1930
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 82°F PYRO NO. 562774

EXAMINATION ANGLE	42° cw DEG.	42° ccw DEG.
AXIAL SCAN SENSITIVITY	N/A dB	N/A dB
CIRC. SCAN SENSITIVITY	63.0 dB	63.0 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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
								5	42° cw	☒	
								6	42° ccw	☒	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	
						N/A				☐	
										☐	
										☐	
										☐	
										☐	
										☐	
										☐	

REMARKS/LIMITATIONS SCANS 5 AND 6 WERE PERFORMED USING 42° RL CONTOURED PROBE WITH A 6° ROOF ANGLE NO INDICATIONS NOTED.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/19/07

ANII: [signature]
DATE 4/18/07

PAGE 3 OF 13

ACCESS: FORMS DATABASE 10/18/01

C00379

TENNESSEE VALLEY AUTHORITY	MANUAL ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER R123

PROJECT: BFN UNIT/CYCLE 2/14
SYSTEM RWCUS
WELD I.D.: RWCU-2-004-083
CONFIG.: VLV TO P
FLOW >
PROCEDURE: N-UT-82 REV: 2 TC: N/A
Wo REFERENCE: WELD CENTERLINE
Lo REFERENCE: TOP DEAD CENTER

EXAMINATION DATE 2/23/07
START TIME: 1846 END TIME: 1910
EXAM SURFACE ☐ ID ☒ OD
MATERIAL TYPE: ☐ CS ☐ SS ☐ CSCL ☒ CCSS
SURFACE TEMP. 82°F PYRO NO. 562774

EXAMINATION ANGLE	60° RL DEG.	70° RL DEG.
AXIAL SCAN SENSITIVITY	56.0 dB	65.5 dB
CIRC. SCAN SENSITIVITY	dB	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.	NRI	INDICATION INFORMATION: TYPE, DAMPING, ETC.
1		INT 360		.675"	0.82		100%	4	60	☐	ROOT GEOMETRY
								4	70	☒	
						N/A				☐	

REMARKS/LIMITATIONS ROOT GEOMETRY SEEN INT. 360°, PREVIOUSLY RECORDED NO OTHER RELEVANT IND. NOTED.

EXAMINER: [signature] LEVEL: II
EXAMINER: N/A LEVEL:
REVIEWED BY: [signature] LEVEL: III DATE 3/19/07

ANII: [signature]
DATE 4/18/07
PAGE 4 OF 13

ACCESS. FORMS DATABASE 10/18/01

000380

TVA

WALL THICKNESS PROFILE SHEET

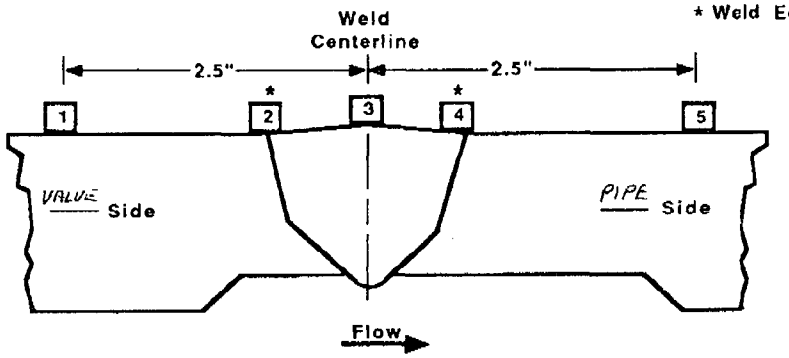
REPORT NO: R123

PROJECT: BFN
UNIT: 2

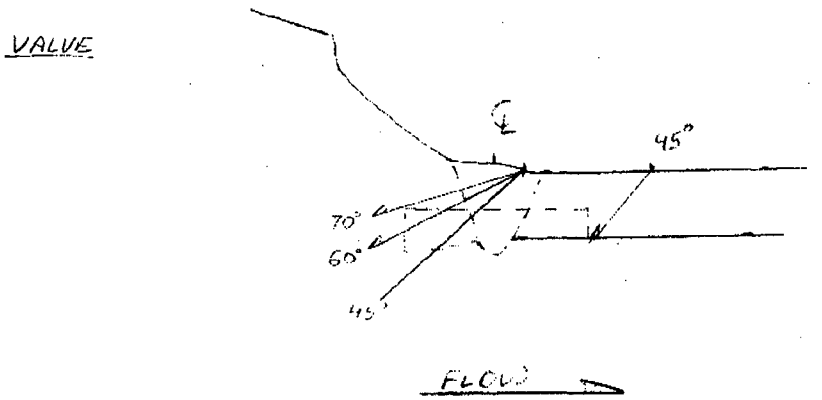
WELD NO: RWCU-2-004-083
SYSTEM: RWCU

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	.5		N/A	
4	.36			
5	.36			



CROWN HEIGHT: ISI PREP
CROWN WIDTH: .5
DIAMETER: 4.5"
WELD LENGTH: 14.1"



EXAMINER: [signature]
LEVEL: II
DATE: 2/23/07

REVIEWED BY: [signature]
LEVEL: III
DATE: 3/19/07

ANII: [signature]
DATE: 4/18/07

PAGE 5 OF 13

000381

TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R123

PROJECT: BFN

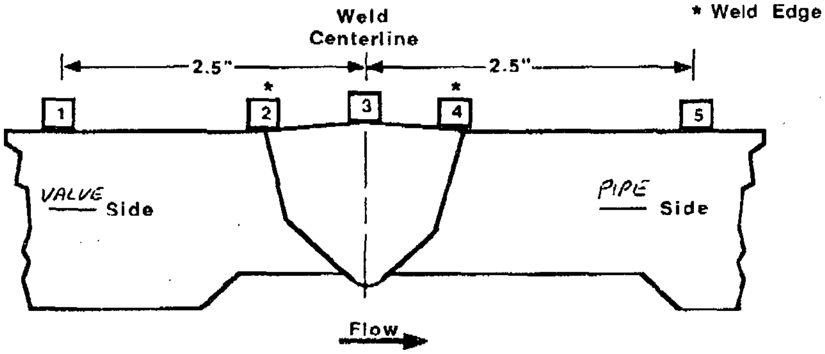
UNIT: 2

WELD NO: RWCU-2-004-083

SYSTEM: RWCU

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	.5		N/A	
4	.36			
5	.36			

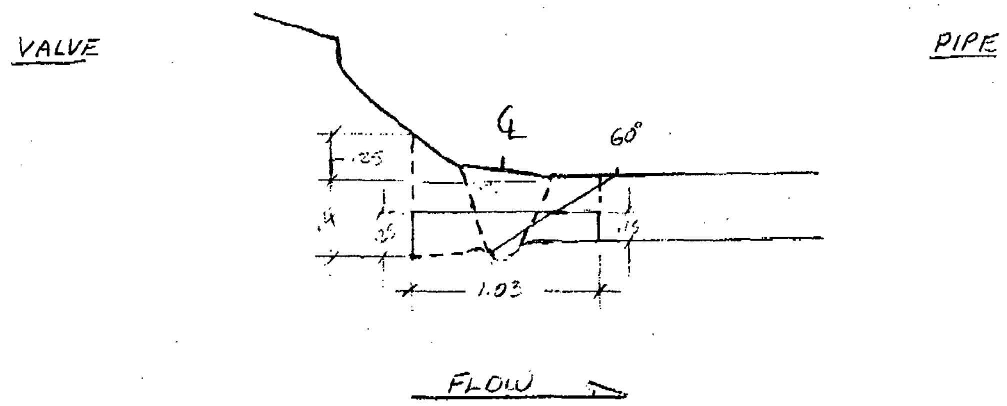


CROWN HEIGHT: ISI PREP

CROWN WIDTH: .5

DIAMETER: 4.5"

WELD LENGTH: 14.1"



ROOT GEOMETRY SEEN INT. 360°

[illegible] = [illegible] = 2.9 [illegible]

[illegible] (.4 x [illegible]) + [[illegible]] x 14.1 = X

([illegible] + .094) x 14.1 = 7.13 [illegible]

[signature] 3/19/07

EXAMINER: [signature]

LEVEL: II

DATE: 2/23/07

REVIEWED BY: [signature]

LEVEL: III DATE: 3/19/07

ANII: [signature]

DATE: 4/18/07

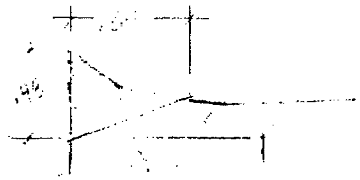
PAGE 6 OF 13

TVA 19668 (NP-5-89)

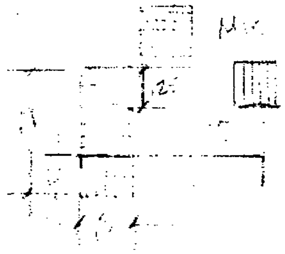
1-108 999-44

TVA Office of Nuclear Power	**PROJECT:** BFN **SYSTEM:** RWCUS **Unit:** U2C14 **WELD NO.:** RWCU-2-004-083	**REPORT NO.:** R123

MISSED AREA - AXIAL SCAN [illegible] = 2.2 [illegible]



[illegible] = [illegible]



MISSED AREA [illegible] - LOWER ½ T = [illegible] = 1.06 [illegible]

OBTAINED EXAM VOLUME:

LOWER ½ T AXIAL SCAN [illegible] = NO [illegible]

[illegible]

(signature) III
3/19/07

BY: (signature) **LEVEL:** III **DATE:** 3/19/07 **PAGE** 7 **OF** 13

TVA 19669 (ONP-6-88)

C003382

000383

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R123

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ115 (ACT) TEMP: 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMITER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 04125

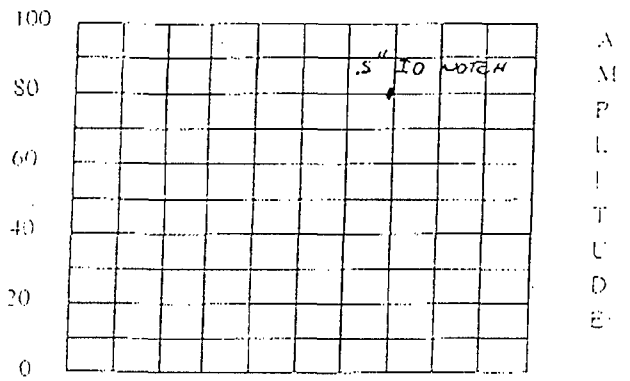
ELEMENTS: 1 SHAPE: ROUND | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

S/N 0156YP SIZE: 0.25" FREQ 5.0 MHz | ANGLE VERIFICATION

CONTOUR: FLAT FOCUS: N/A | BLOCK TYPE: CS ROMPAS S/N: 790918

CABLE TYPE: RG-174 LENGTH: 72" #CNT 0 | NOMINAL ANGLE: 45° ACTUAL ANGLE: 44°

DAC



DISPLAY WIDTH inches 1.0"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	28.0 dB	45°25.5
CIRC	☐	☐	dB	

RANGE:	1.0"	*INST. FREQ	5.0 MHz
PROBE DELAY:	3.7184	*RECTIFY:	FULLWAVE
VELOCITY:	0.1270	DUAL ☐ ON ☒ OFF	
DISPLAY DELAY:	0.0	*REJECT:	0 %
*ENERGY:	HIGH	*DISPLAY START:	IP
*DAMPING:	IK	DET: ☐ PEAK ☒ FLANK	
*PRF MODE:	AUTO HIGH	TCG: ON ☐ OFF ☒	

REF. REFLECTOR: .5" NOTCH GAIN dB 28.0

AMPLITUDE: 80% METAL PATH: 0.692

CALIBRATION TIMES

INITIAL TIME: 1342 FINAL TIME: 1846

VERIFICATION TIMES 1) 1840 2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-49 RCRD-2-52
RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 4/18/07

C00384

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R123

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: SQ 115 TEMP. 72 °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: KBA | COUPLANT: ULTRAGEL II BATCH: 04125

ELEMENTS: 1 SHAPE: ROUND

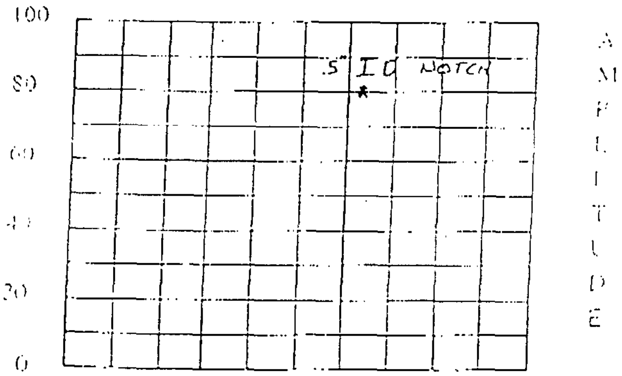
S/N: 0156YP SIZE: 0.25" FREQ: 5.0 MHz | EXAM TYPE: SHEAR ☒ LONG ☐ RL ☐

CONTOUR: FLAT FOCUS: N/A

ANGLE VERIFICATION

CABLE TYPE: RG-174 LENGTH: 72" #CNT: 0 | BLOCK TYPE: CS Rompas | S/N: 790918

DAC | NOMINAL ANGLE: 60° | ACTUAL ANGLE: 57°



DISPLAY WIDTH, inches: 1.5"

INSTRUMENT SETTINGS

REFLECTOR	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	45.0 dB	60°25
CIRC	☐	☐	dB	

RANGE: 1.5"	*INST. FREQ: 5.0 MHz
PROBE DELAY: 5.0478	*RECTIFY: FULLWAVE
VELOCITY: 0.1270	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☐ PEAK ☒ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: .5" NOTCH GAIN dB: 45.0

AMPLITUDE: 80% METAL PATH: .905

CALIBRATION TIMES

INITIAL TIME: 1345 FINAL TIME: 1820

VERIFICATION TIMES	1) 1805	2)	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS: | WELDS/ITEMS EXAMINED: RCRD-2-49 ; RCRD-2-52; RWCU-2-004-083

EXAMINER: [signature]	EXAMINER: N/A	REVIEWER: [signature]	ANII: [signature] DATE: 4/18/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/19/07	PG. 9 OF 13

000385

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R123

PROJECT: BFN UNIT 2 CYCLE: 14 | CALIBRATION DATE: 2/28/07

PROC.: N-UT-82 REV: 2 TC: N/A | CALIBRATION BLOCK NO.: BF-132 TEMP: 72. °F

INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07 | SIMULATOR BLOCK NO: N/A

MODEL/TYPE: USN-60 M & TE NO.: E34054 | THERMOMTER S/N: 562774 DUE DATE: 12/12/07

TRANSDUCER MFG: MEGASONICS | COUPLANT ULTRAGEL II BATCH: 04125

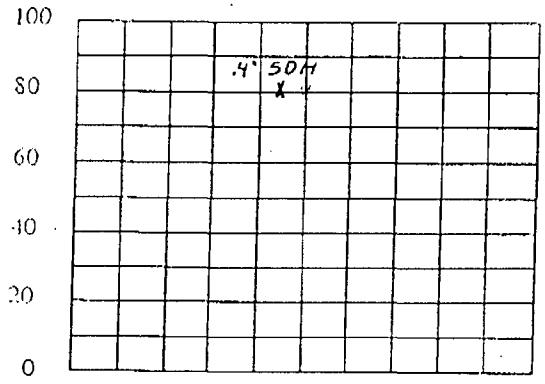
ELEMENTS: 2 SHAPE: RECT. | EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

S/N U0270 SIZE: 2(4x12) FREQ: 2.0 Mhz | ANGLE VERIFICATION

CONTOUR: 6.0" 6°CW TAPER FOCUS: FS=14 mm | BLOCK TYPE: S/N: BF-132

CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0 | NOMINAL ANGLE: 42° ACTUAL ANGLE: 42°

DAC



DISPLAY WIDTH: inches 1.5

REF. REFLECTOR: .4" SDH GAIN: dB 57

AMPLITUDE: 80% METAL PATH: .662

VERIFICATION TIMES 1) 1922 2) 3)

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐	dB	
CIRC	☐	☒	57.0 dB	U0270

RANGE: 1.5" | *INST. FREQ.: 2.0 Mhz

PROBE DELAY: 4.2459 | *RECTIFY: FULLWAVE

VELOCITY: .2367 | DUAL ☒ ON ☐ OFF

DISPLAY DELAY: 0.0 | *REJECT: 0 %

*ENERGY: HIGH | *DISPLAY START: IP

*DAMPING: 1K | DET: ☒ PEAK ☐ FLANK

*PRF MODE: AUTO HIGH | TCG: ON ☐ OFF ☒

CALIBRATION TIMES

INITIAL TIME: 1405 FINAL TIME: 1926

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	10	
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5	

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

COMMENTS: ① CIRC SCAN CONTOUR

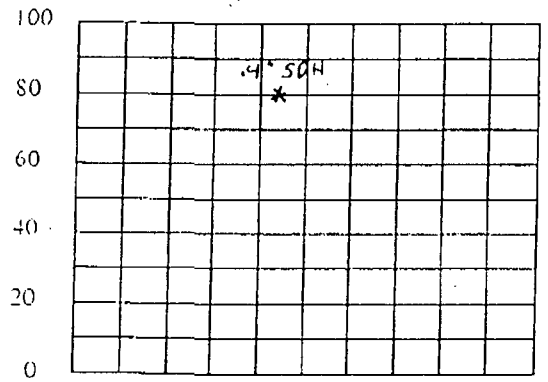
WELDS/ITEMS EXAMINED: RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 4/16/07
			PG. 10 OF 13

000386

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R123

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 2/28/07
PROC.: N-UT-82 REV: 2 TC: N/A	CALIBRATION BLOCK NO.: BF-132 TEMP: 72.'F
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07	SIMULATOR BLOCK NO: N/A
MODEL/TYPE: USN-60 M & TE NO.: E34054	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONICS	COUPLANT BATCH:
ELEMENTS: 2 SHAPE: RECT.	ULTRAGEL II 04125
S/N U0271 SIZE: 2(4X12) FREQ: 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CONTOUR: 60"OD 6°CCW TAPER FOCUS: FS=14 mm	ANGLE VERIFICATION
CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0	BLOCK TYPE: S/N: BF-132
DAC	NOMINAL ANGLE: 42° ACTUAL ANGLE: 42°



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☐	☐	dB	
CIRC	☐	☒	57.0 dB	U0271

RANGE: 1.5"	*INST. FREQ.: 2.0 Mhz
PROBE DELAY:	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☒PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: .4" SDH GAIN: dB 57.0	CALIBRATION TIMES
AMPLITUDE: 80% METAL PATH: 0.630	INITIAL TIME: 1407 FINAL TIME: 1930

VERIFICATION TIMES	1) 1920	2)	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

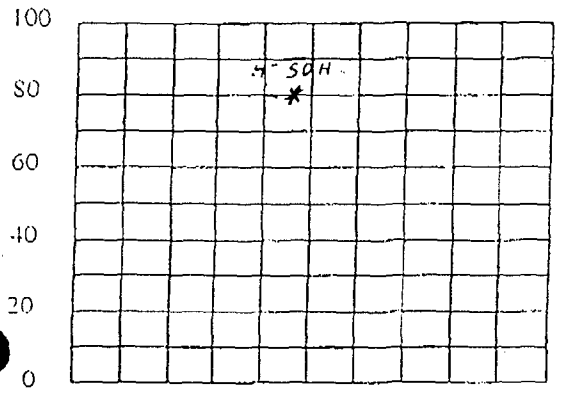
COMMENTS: ① CIRC SCAN CONTOUR	WELDS/ITEMS EXAMINED:
	RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
	N/A		DATE: 4/18/07
LEVEL: II	LEVEL:	LEVEL: III DATE: 3/19/07	PG. 11 OF 13

000387

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R123

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 2/28/07
PROC.: N-UT-82 REV: 2 TC: N/A	CALIBRATION BLOCK NO.: BF-131 TEMP: 72.'F
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07	SIMULATOR BLOCK NO: N/A
MODEL/TYPE: USN-60 M & TE NO.: E34054	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONICS	COUPLANT BATCH:
ELEMENTS: 2 SHAPE: RECT.	ULTRAGEL II 04125
S/N U0109 SIZE: 2(10X18) FREQ: 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CONTOUR: 6.0" OD AXIAL FOCUS: FS = 17 mm	ANGLE VERIFICATION
CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0	BLOCK TYPE: S/N: BF-131
DAC	NOMINAL ANGLE: 60° ACTUAL ANGLE: 57.0



DISPLAY WIDTH: inches 1.5"

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☒	56.0 dB	U0109
CIRC	☐	☐	N/A dB	N/A

RANGE: 1.5"	*INST. FREQ.: 2.0 MHz
PROBE DELAY: 7.1650	*RECTIFY: FULLWAVE
VELOCITY: .2367	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: IP
*DAMPING: 1K	DET: ☒PEAK☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: .4" SDH	GAIN: dB 56.0	CALIBRATION TIMES	
AMPLITUDE: 80%	METAL PATH: 0.690	INITIAL TIME: 1350	FINAL TIME: 1857

VERIFICATION TIMES	1) 1846	2) N/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	10
	SIGNAL 2		50	45	40	35	30	25	20	15	10	5
ATTENUATOR	GAIN	SET	-6 dB		-12 dB	SET	+12		SET	+6		
	AMP	80	32-48		16-24	20	64-96		40	64-96		
			40		20		80			80		

COMMENTS:	WELDS/ITEMS EXAMINED:
	RCRD-2-49; RCRD-2-52
	RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 3/19/07	DATE: 4/18/07
			PG: 12 OF 13

000383

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R123

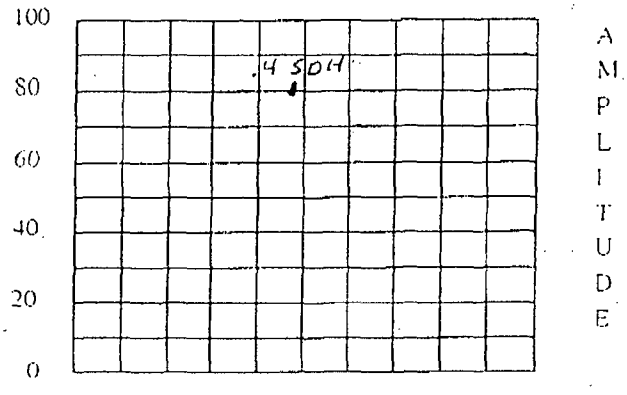
PROJECT: BFN UNIT 2 CYCLE: 14
PROC.: N-UT-82 REV: 2 TC: N/A
INSTR. MFG: KRAUTKRAMER DUE DATE: 12/11/07
MODEL/TYPE: USN-60 M & TE NO.: E34054
TRANSDUCER MFG: MEGASONICS
ELEMENTS: 2 SHAPE: RECT.
S/N U0110 SIZE: 2(10X18) FREQ: 2.0 MHz
CONTOUR: 6.0" OD AXIAL FOCUS: FS-28
CABLE TYPE: 2(RG-174) LENGTH: 72" #CNT: 0

CALIBRATION DATE: 2/28/07
CALIBRATION BLOCK NO.: BF-131 TEMP: 72 °F
SIMULATOR BLOCK NO: N/A
THERMOMTER S/N: 562774 DUE DATE: 12/12/07
COUPLANT: ULTRAGEL II BATCH: 04125
EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒

ANGLE VERIFICATION

BLOCK TYPE: S/N: BF-131
NOMINAL ANGLE: 70° ACTUAL ANGLE: 67°

DAC



DISPLAY WIDTH: inches 2.0

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☐	☒	65.5 dB	U0110
CIRC	☐	☐	N/A dB	N/A

RANGE: 2.0 *INST. FREQ.: 2.0 MHz
PROBE DELAY: 7.9159 *RECTIFY: FULLWAVE
VELOCITY: .2367 DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0 *REJECT: 0 %
*ENERGY: HIGH *DISPLAY START: IP
*DAMPING: 1K DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH TCG: ON ☐ OFF ☒

REF. REFLECTOR: .4" SDH GAIN: dB 65.5
AMPLITUDE: 80% METAL PATH: .945

CALIBRATION TIMES

INITIAL TIME: 1355 FINAL TIME: 1910

VERIFICATION TIMES	1) 1857	2) N/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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	5

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

COMMENTS:

WELDS/ITEMS EXAMINED:
RCRD-2-49; RCRD-2-52
RWCU-2-004-083

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 3/19/07	DATE: 4/18/07
			PG. 13 OF 13

Examination Report No. R-171

Weld No. CRD-2-005-003

000376

TENNESSEE VALLEY AUTHORITY	EXAMINATION SUMMARY AND RESOLUTION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN	UNIT: 2	CYCLE: 14		COMPONENT ID: **CRD-2-005-003**		
EXAMINATION METHOD				SYSTEM: RWCUS	ISI DWG. NO. 2-ISI-0272-C-01	
MT ☐	PT ☐	UT ☒	VT ☐	CODE CLASS: NA		CATEGORY: R-A
PROCEDURE: N-UT-82		REV:2	TC:NA	CONFIG.:	C/S Pipe TO S/S Valve	
EXAMINER: Patrick Mahoney LEVEL:II		**EXAMINER:** NA LEVEL:		**EXAMINER:** NA LEVEL:		**EXAMINER:** NA LEVEL:

This report contains the data associated with the manual ultrasonic examination of CRD-2-003-005 to meet the requirements of BFRVIP-75-A, category D and ASME Section XI, category R-A, item number R1.16D, exreq P95-96 for pre-service examinations. W/O# 07-713160-000 4/15/07

This exam was performed using equipment, procedures and personnel qualified in accordance with ASME Section XI, Appendix VIII as amended by 10CFR50.55a final rule.

The component examined was a CS pipe to a forged SS valve piping weld, 4.0" nominal diameter, having single side access.

A 45° shear was used for scan directions 4, 5, and 6.
A 60° shear was used for scan direction 4.
A 45° RL was used for scan direction 4, 5 and 6.
A 60° RL was used for scan direction 4.
A 70° RL was used for scan direction 4.

Scan direction 3 was not performed from the valve body due to surface condition.

Scan directions 5 and 6 for the 45° RL could not be performed from the valve body due surface condition.

Axial scan coverage achieved for the 45° and 60° RL wave modes was 52.6%.
Circumferential scan coverage achieved for the 45°RL wave modes was 77%.
Combined axial and circumferential coverage was 64.8%.

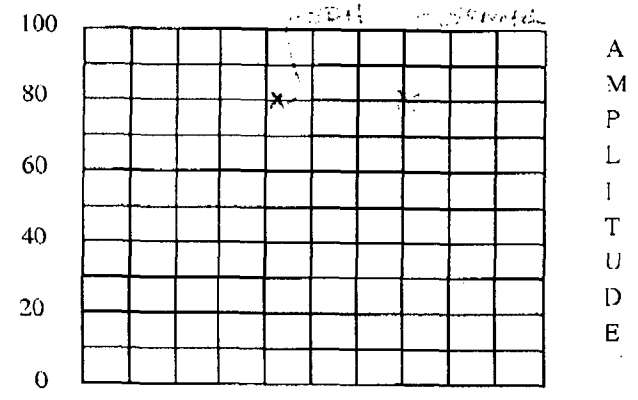
Ref: W/O# 07-713160-000.

RESOLUTION BY: Patrick Mahoney PATRICK MAHONEY LEVEL: II DATE: 4/16/07	REVIEWED BY: LEVEL: III DATE: 4/16/07	ANII: DATE: 5/2/07 PG. 1 OF 10

000377

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 04/01/2007
PROC.: N-UT-82 REV:2 TC:N/A	CALIBRATION BLOCK NO.: SQ-116 TEMP: 75°F
INSTR. MFG: KRAUTKRAMER DUE DATE: 08/21/07	SIMULATOR BLOCK NO: 790662
MODEL/TYPE: USN-60 M & TE NO.: E36302	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: KBA	COUPLANT ULTRAGEL II BATCH: 05325
S/N 00W40F SIZE: .375 FREQ: 2.25 MHz	EXAM TYPE: SHEAR☒ LONG☐ RL☐
CABLE TYPE: RG-174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: ROMPAS S/N: 790662
DAC	NOMINAL ANGLE: 45 ACTUAL ANGLE: 45



DISPLAY WIDTH: inches 1.035

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☒	☐	26.5 dB	PAC-45SS
CIRC	☒	☐	26.5 dB	PAC-45SS

RANGE: 1.035	*INST. FREQ.: 2.25 Mhz
PROBE DELAY: 4.9788	*RECTIFY: F.W.
VELOCITY: .1274	DUAL☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %% %
*ENERGY: HIGH	*DISPLAY START: I.P.
*DAMPING: 1000 Ohms	DET: ☒PEAK☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒
REF. REFLECTOR: SDH	GAIN: dB 37
AMPLITUDE: 80	METAL PATH: .426

CALIBRATION TIMES

INITIAL TIME: 1400 FINAL TIME: 1645

VERIFICATION TIMES	1)1430	2)1515	3)1540	4)1555	5)1610	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

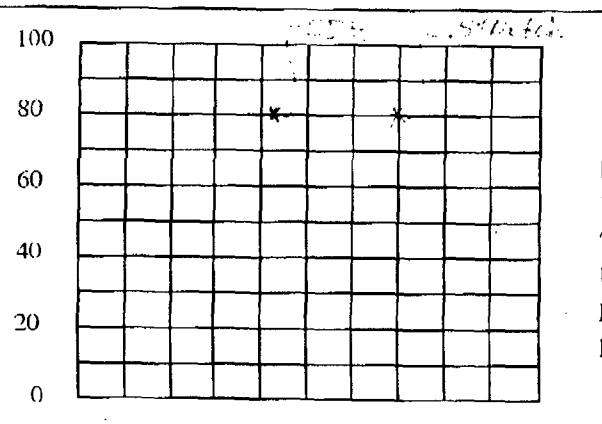
COMMENTS: SEE ATTACHED	WELDS/ITEMS EXAMINED:
	CRD-2-005-003

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL:	LEVEL: III DATE: 4/16/07	DATE: 4/2/07
			PG. 2 OF 10

000378

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 04/01/2007
PROC.: N-UT-82 REV:2 TC:N/A	CALIBRATION BLOCK NO.: SQ-116 TEMP: 75°F
INSTR. MFG: KRAUTKRAMER DUE DATE: 08/21/07	SIMULATOR BLOCK NO: 790662
MODEL/TYPE: USN-60 M & TE NO.: E36302	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: KBA	COUPLANT ULTRAGEL II BATCH: 05325
S/N 00W40F SIZE: .375 FREQ: 2.25 MHz	EXAM TYPE: SHEAR☒ LONG☐ RL☐
CABLE TYPE: RG-174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: ROMPAS S/N: 790662
DAC	NOMINAL ANGLE: 60 ACTUAL ANGLE: 57



DISPLAY WIDTH: inches 1.33

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☒	☐	43.5 dB	PAC-60SS
CIRC	☐	☐	N/A dB	

RANGE: 1.62	*INST. FREQ.: 2.25 Mhz
PROBE DELAY: 6.4938	*RECTIFY: F.W.
VELOCITY: .1297	DUAL ☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %% %
*ENERGY: HIGH	*DISPLAY START: I.P.
*DAMPING: 1000 Ohms	DET: ☒PEAK☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: SDH	GAIN: dB 40
AMPLITUDE: 80	METAL PATH: .588

CALIBRATION TIMES

INITIAL TIME: 1400	FINAL TIME: 1645

VERIFICATION TIMES	1)1430	2)1515	3)1540	4)1555	5)1610	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

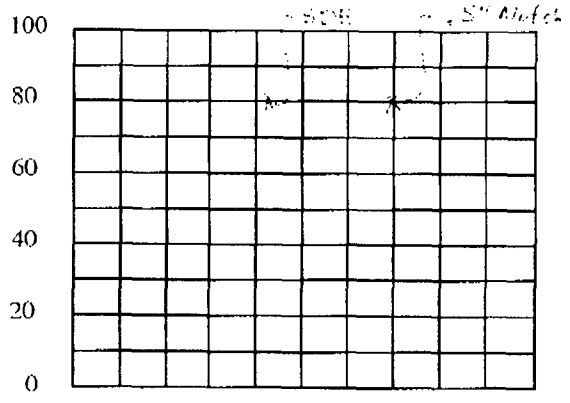
COMMENTS: SEE ATTACHED	WELDS/ITEMS EXAMINED:
	CRD-2-005-003

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL: N/A	LEVEL: III DATE: 4/16/07	DATE: 5/2/07
			PG. 3 OF 10

000379

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 04/01/2007
PROC.: N-UT-82 REV:2 TC:N/A	CALIBRATION BLOCK NO.: SQ-116 TEMP: 75°F
INSTR. MFG: KRAUTKRAMER DUE DATE: 08/21/07	SIMULATOR BLOCK NO: 790662
MODEL/TYPE: USN-60 M & TE NO.: E36302	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: KBA	COUPLANT ULTRAGEL II BATCH: 05325
S/N 00W40F SIZE: .375 FREQ: 2.25 MHz	EXAM TYPE: SHEAR☒ LONG☐ RL☐
CABLE TYPE: RG-174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: ROMPAS S/N: 790662
DAC	NOMINAL ANGLE: 70 ACTUAL ANGLE: 67



DISPLAY WIDTH: inches 2.2

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☒	☐	50.0 dB	PAC-70SS
CIRC	☐	☐	N/A dB	

RANGE: 2.2	*INST. FREQ.: 2.25 Mhz
PROBE DELAY: 6.1662	*RECTIFY: F.W.
VELOCITY: .1270	DUAL☐ ON ☒ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 % % %
*ENERGY: HIGH	*DISPLAY START: I.P.
*DAMPING: 1000 Ohms	DET: ☒PEAK☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: SDH GAIN: dB 42	**CALIBRATION TIMES**
AMPLITUDE: 80 METAL PATH: .88	INITIAL TIME: 1400 FINAL TIME: 1645

VERIFICATION TIMES	1)1430	2)1515	3)1540	4)1555	5)1610	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

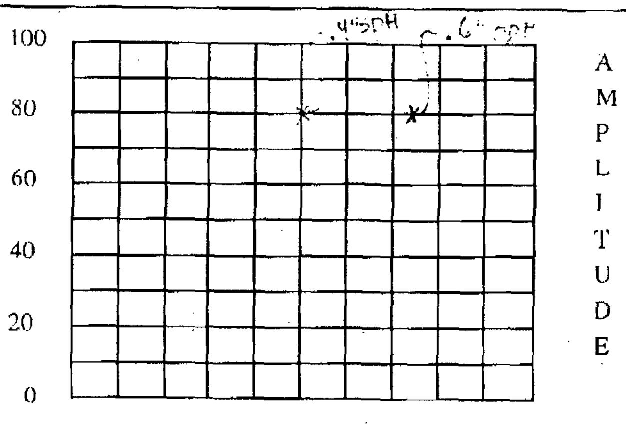
COMMENTS: SEE ATTACHED	WELDS/ITEMS EXAMINED:
	CRD-2-005-003

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	LEVEL:	LEVEL: III DATE: 4/10/07	DATE: 5/2/07
			PG. 4 OF 10

000380

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 04/01/2007
PROC.: N-UT-82 REV:2 TC:N/A	CALIBRATION BLOCK NO.: BF-132 TEMP: 75°F
INSTR. MFG: KRAUTKRAMER DUE DATE: 08/21/07	SIMULATOR BLOCK NO: BF-132
MODEL/TYPE: USN-60 M & TE NO.: E36302	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONIC	COUPLANT ULTRAGEL II BATCH: 05325
S/N ~~U-SN-0112~~ C SIZE: ~~10X18~~ C FREQ: 2.0 MHz	EXAM TYPE: SHEAR ☐ LONG ☐ RL ☒
CABLE TYPE: RG-174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: CAL / REF — S/N: BF-132 CIRC.
DAC	NOMINAL ANGLE: 45 — ACTUAL ANGLE: 46



DISPLAY WIDTH: inches 1.14

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☐	☐	N/A dB	N/A
CIRC	☒	☐	53.5 dB	PAC-U0112

RANGE: 1.14	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 6.0903	*RECTIFY: F.W.
VELOCITY: .2408	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %% %
*ENERGY: HIGH	*DISPLAY START: I.P.
*DAMPING: 1000 Ohms	DET: ☒ PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON ☐ OFF ☒

REF. REFLECTOR: SDH GAIN: dB 53.5	**CALIBRATION TIMES**
AMPLITUDE: 80 METAL PATH: .565	INITIAL TIME: 1400 FINAL TIME: 1645

VERIFICATION TIMES	1)1430	2)1515	3)1540	4)1555	5)1610	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

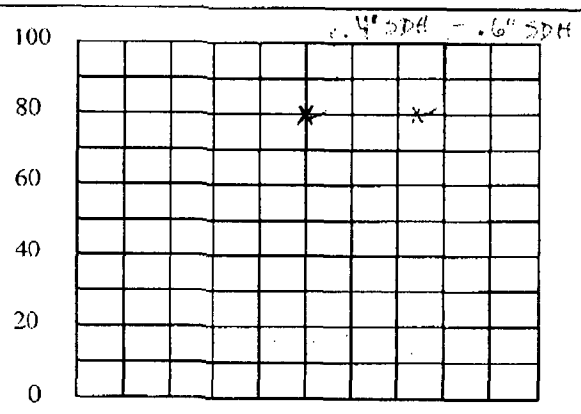
COMMENTS: SEE ATTACHED	WELDS/ITEMS EXAMINED:
C Correction - S/N LC112 SIZE: 8x14 [initials] 3/?/07	CRD-2-005-003

EXAMINER: [signature] LEVEL: II	EXAMINER: [signature] LEVEL:	REVIEWER: [signature] LEVEL: III DATE: 4/11/07	ANII: [signature] DATE: 5/2/07
			PG. 5 OF 10

000381

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 04/01/2007
PROC.: N-UT-82 REV:2 TC:N/A	CALIBRATION BLOCK NO.: BF-131 TEMP: 75°F
INSTR. MFG: KRAUTKRAMER DUE DATE: 08/21/07	SIMULATOR BLOCK NO: BF-131
MODEL/TYPE: USN-60 M & TE NO.: E36302	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONIC	COUPLANT ULTRAGEL II BATCH: 05325
S/N ~~SN-0109~~ SIZE: 10X18 FREQ: 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CABLE TYPE: RG-174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: CAL / REF S/N: BF-131
DAC	NOMINAL ANGLE: 60 ACTUAL ANGLE: 57



DISPLAY WIDTH: inches 1.62

INSTRUMENT SETTINGS

REFLECTOR			REFERENCE	MEMORY
SCAN DIRECT.	NTCH	SDH	SENSITIVITY	NUMBER
AXIAL	☒	☐	49.5 dB	PAC-U0109
CIRC	☐	☐	N/A dB	

RANGE: 1.62	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 5.8200	*RECTIFY: F.W.
VELOCITY: .2384	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %% %
*ENERGY: HIGH	*DISPLAY START: I.P.
*DAMPING: 1000 Ohms	DET: ☒PEAK☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: SDH GAIN: dB 49.5	**CALIBRATION TIMES**
AMPLITUDE: 80 METAL PATH: .808	INITIAL TIME: 1400 FINAL TIME: 1645

VERIFICATION TIMES	1)1430	2)1515	3)1540	4)1555	5)1610	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	10
	SIGNAL 2	50	45	40	35	30	25	20	15	10	05

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

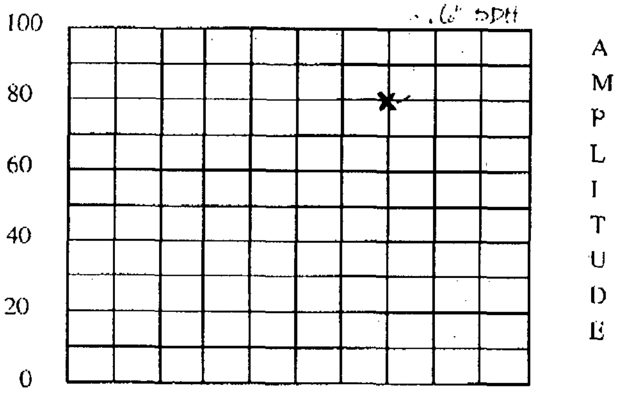
COMMENTS: SEE ATTACHED	WELDS/ITEMS EXAMINED:
C Correction - S/N 60164 Walt Miller 5/2/07	CRD-2-005-003

EXAMINER:	EXAMINER:	REVIEWER:	ANII:
LEVEL: II	N/A LEVEL:	LEVEL: III DATE: 4/6/07	DATE: 5/2/07
			PG. 6 OF 10

000382

TENNESSEE VALLEY AUTHORITY	DIGITAL ULTRASONIC CALIBRATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT 2 CYCLE: 14	CALIBRATION DATE: 04/01/2007
PROC.: N-UT-82 REV:2 TC:N/A	CALIBRATION BLOCK NO.: BF-131 TEMP: 75°F
INSTR. MFG: KRAUTKRAMER DUE DATE: 08/21/07	SIMULATOR BLOCK NO: BF-131
MODEL/TYPE: USN-60 M & TE NO.: E36302	THERMOMTER S/N: 562774 DUE DATE: 12/12/07
TRANSDUCER MFG: MEGASONIC	COUPLANT ULTRAGEL II BATCH: 05325
S/N ~~SN-0110C~~ [illegible] SIZE: 10X18 FREQ: 2.0 MHz	EXAM TYPE: SHEAR☐ LONG☐ RL☒
CABLE TYPE: RG-174 LENGTH: 72 inches	**ANGLE VERIFICATION**
	BLOCK TYPE: CAL / REF — S/N: BF-131
DAC	NOMINAL ANGLE: 70 — ACTUAL ANGLE: 67



DISPLAY WIDTH: inches 2.465

INSTRUMENT SETTINGS

REFLECTOR SCAN DIRECT.	NTCH	SDH	REFERENCE SENSITIVITY	MEMORY NUMBER
AXIAL	☒	☐	64 dB	PAC-U0110
CIRC	☐	☐	N/A dB	

RANGE: 2.465	*INST. FREQ.: 2.0 Mhz
PROBE DELAY: 5.000	*RECTIFY: F.W.
VELOCITY: .2384	DUAL ☒ ON ☐ OFF
DISPLAY DELAY: 0.0	*REJECT: 0 %
*ENERGY: HIGH	*DISPLAY START: I.P.
*DAMPING: 1000 Ohms	DET: ☒PEAK ☐ FLANK
*PRF MODE: AUTO HIGH	TCG: ON☐ OFF☒

REF. REFLECTOR: SDH GAIN: dB 64.5 ↙1.73"	**CALIBRATION TIMES**
AMPLITUDE: 80 METAL PATH: .600(depth)	INITIAL TIME: 1400 FINAL TIME: 1645

VERIFICATION TIMES	1)1430	2)1515	3)1540	4)1555	5)1610	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	10
SIGNAL 2	50	45	40	35	30	25	20	15	10	**05**

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

COMMENTS: SEE ATTACHED	**WELDS/ITEMS EXAMINED:**
© Correction - S/N [illegible] [illegible] 5/2/07	**CRD-2-005-003**

EXAMINER: [signature] **LEVEL:** II	**EXAMINER:** N/A **LEVEL:**	**REVIEWER:** [signature] **LEVEL:** III **DATE:** 4/10/07	**ANII:** [signature] **DATE:** 5/2/07 **PG.** 7 **OF** 10

000383

TENNESSEE VALLEY AUTHORITY	ULTRASONIC PIPING EXAMINATION DATA SHEET	REPORT NUMBER: R171

PROJECT: BFN UNIT: 2 CYCLE: 14	EXAMINATION DATE: 04/01/2007
PROCEDURE: N-UT-82 REV:2 TC:N/A	START TIME: 1430 END TIME: 1600
SYSTEM: CRD ISI DWG. NO:	EXAM SURFACE ☐ ID ☒ OD
COMPONENT ID: CRD-2-005-003	MATL. TYPE: ☐ CS ☒ SS ☐ CSCL ☐ CCSS
CONFIGURATION: VALVE TO PIPE; FLOW →	SURFACE TEMP.: 83 °F PYRO. NO.: 562774
	CAL DUE DATE: 12/12/07
W0 REFERENCE: C/L OF WELD	EXAM ANGLE: 45/60/70 shear; 45/60/70 RL
L0 REFERENCE: TDC	CIRC. SCAN SENSITIVITY (DB): 40/NA/NA; 53.5/NA/NA
	AXIAL SCAN SENSITIVITY (DB): 40/45/50; NA/50/64

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	
							%	4	70	X	
							%	5	45RL	X	CIRC CONTOUR
							%	6	45RL	X	CIRC CONTOUR
							%	4	60RL	X	AXIAL CONTOUR
							%	4	70RL	X	AXIAL CONTOUR
							%				
							%				
							%				
							%				
							%				

REMARKS / LIMITATIONS: ID / Root Geometry were noted during the exam below recordable levels.

EXAMINER: [signature]	LEVEL: II	ANII: [signature]
EXAMINER: N/A	LEVEL:	DATE: 5/2/07
REVIEWER: [signature] LEVEL: III DATE: 4/16/07		PAGE 8 OF 10

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TVA

WALL THICKNESS PROFILE SHEET

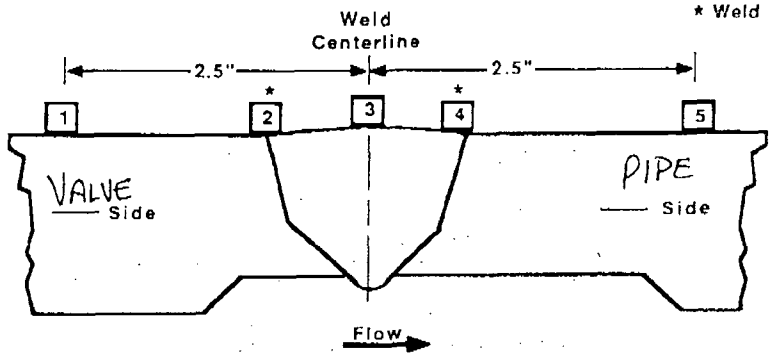
REPORT NO: R171

PROJECT: BFN
UNIT: 2 CYCLE 14

WELD NO: CRD-2-005-003
SYSTEM: CRD

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

Position	0°	90°	180°	270°
1	1.15	.79	.78	.76
2	.80	.69	.65	.60
3	.60	.51	.51	.51
4	.399	.399	.395	.395
5	.51	.51	.51	.511

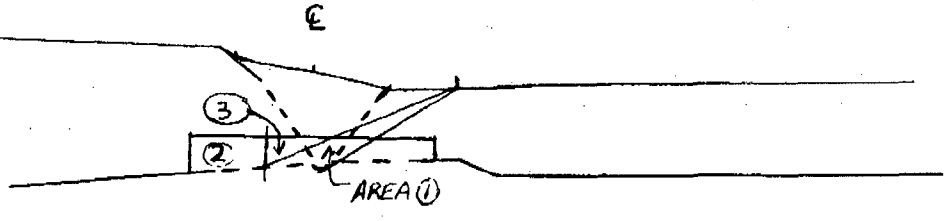


CROWN HEIGHT: =K .15
CROWN WIDTH: .85
DIAMETER: 4"
WELD LENGTH: 14.9"

AREA ① .133 + .233 ÷ 2 = .183 x 1.35 = .247 x 14.9 = 3.681 in³
② .233 + 183 ÷ 2 = .208 x .4 = .083
③ .183 x .35 ÷ 2 = .032
} .115 x 14.9 = 1.713 = 46.5% NOT COVERED @ 90/180/270

53.5% COVERAGE @ 90/180/270

90°/180°/270°

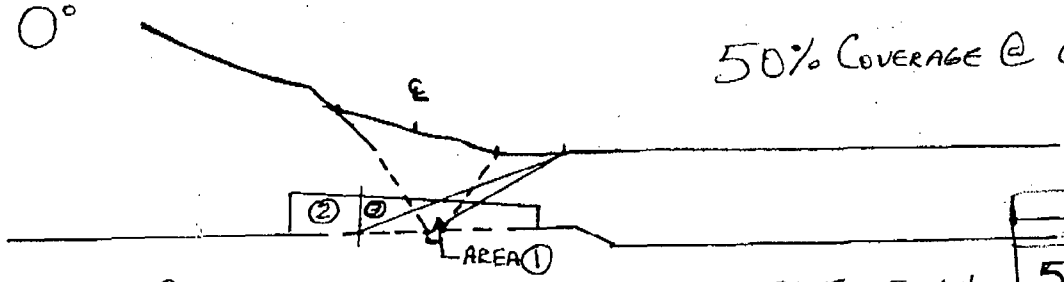


VALVE PIPE

AREA ① .133 + .266 ÷ 2 = .200 x 1.35" = .27 x 14.9 = 4.023
② .266 + .208 ÷ 2 = .237 x .4 = .094
③ .208 x .4 ÷ 2 = .041
} .135 x 14.9 = 2.011 = 50% NOT COVERED @ 0°

0°

50% COVERAGE @ 0°



AXIAL COVERAGE

COMBINED COVERAGE AXIALLY 53.5 + 53.5 + 53.5 + 50 ÷ 4 = 52.6%

EXAMINER: [signature]
LEVEL: II
DATE: 4/10/07

REVIEWED BY: [signature]
LEVEL: III DATE: 4/10/07

ANII: [signature]
DATE: 5/2/07

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TVA 19668 (NP-5-89)

1-103 999-44

000385

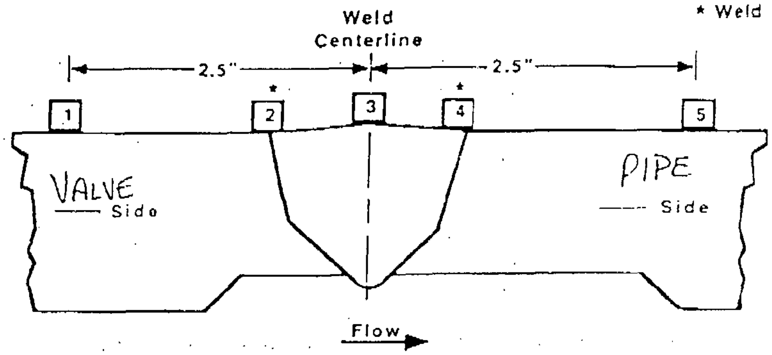
TVA	WALL THICKNESS PROFILE SHEET	REPORT NO: R171

PROJECT: BFN
UNIT: 2 CYCLE 14

WELD NO: CRD-2-005-003
SYSTEM: CRD

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

Position	0°	90°	180°	270°
1	1.15	.79	.78	.76
2	.80	.69	.65	.60
3	.60	.51	.51	.51
4	.399	.399	.395	.395
5	.51	.51	.51	.511

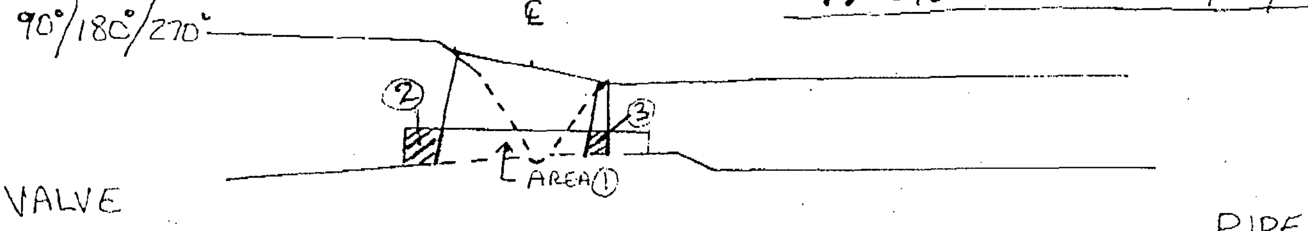


CROWN HEIGHT: =/< .15
CROWN WIDTH: .85

DIAMETER: 4"
WELD LENGTH: 14.9"

AREA ① .133 + .233 ÷ 2 = .183 × 1.35 = .247 × 14.9 = 3.681
② .206 + .233 ÷ 2 = .220 × 0.175" = .038
③ .133 + .141 ÷ 2 = .137 × .145 = .020
.058 × 14.9" = .864"³ = 22.4% Not Covered @ 90/180/270

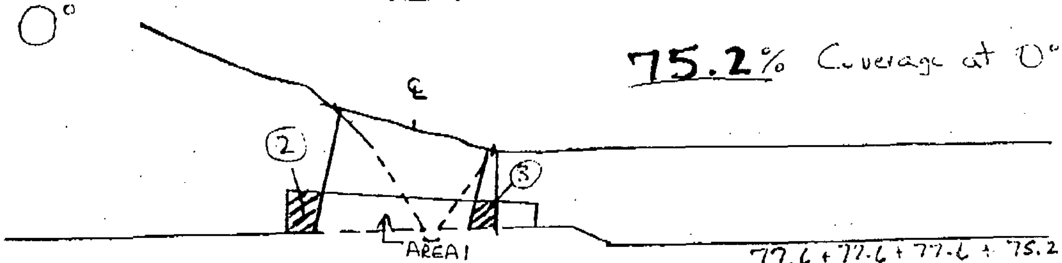
77.6% COVERAGE @ 90/180/270



AREA ① .133 + .266 ÷ 2 = .200 × 1.35 = .27 × 14.9 = 4.023"³
② .266 + .233 ÷ 2 = .250 × .185 = .046
③ .15 + .133 ÷ 2 = .142 × .145 = .021
} .067 × 14.9 = .998 = 24.8% Not covered @ 0°

0°

75.2% Coverage at 0°



77.6 + 77.6 + 77.6 + 75.2 ÷ 4 = 77%

COMBINED COVERAGE CIRC. **77%**

EXAMINER: [signature]	REVIEWED BY: [signature]	ANII: [signature]
LEVEL: II	LEVEL: III DATE: 4/10/07	DATE: 5/2/07
DATE: 04/01/07		PAGE 10 OF 10