Duke Power
A Duke Energy Company

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April 19, 2004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Corporation
Catawba Nuclear Station, Unit 2
Docket Number 50-414
Request for Relief Number 04-CN-002
Limited Weld Examinations During End-of-Cycle 12
Refueling Outage

Pursuant to 10 CFR 50.55a(g)(5)(iii), please find attached Request for Relief 04-CN-002. This request for relief is associated with limited weld examination coverage during the subject outage.

The attachment to this letter contains all technical information necessary in support of this request for relief. Duke Energy Corporation is requesting NRC review and approval of this request at your earliest opportunity.

There are no regulatory commitments contained in this letter or its attachment.

If you have any questions concerning this material, please call L.J. Rudy at (803) 831-3084.

Very truly yours,

R.M. Glover /for

Dhiaa M. Jamil

LJR/s

Attachment

A047

xc (with attachment):

L.A. Reyes, Regional Administrator
U.S. Nuclear Regulatory Commission, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

E.F. Guthrie, Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

S.E. Peters, Project Manager (addressee only)
U.S. Nuclear Regulatory Commission
Mail Stop O-8 G9
Washington, D.C. 20555-0001

Proposed Relief in Accordance with 10 CFR 50.55a(g)(5)(iii)
Inservice Inspection Impracticality

Duke Energy Corporation

Catawba Nuclear Station – Unit 2 (EOC-12)
Second 10-Year Interval – Inservice Inspection Plan
Second Interval Start Date – August 19, 1996 Second Interval End Date – August 19, 2006
ASME Section XI Code – 1989 Edition with No Addenda

	I.	II. & III.	IV.	V.	VI.	VII.
Limited Area/Weld I.D. Number	System / Component for Which Relief is Requested: Area or Weld to be Examined	Code Requirement from Which Relief is Requested: 100% Exam Volume Coverage Exam Category Item No. Fig. No. Limitation Percentage	Basis for Relief	Alternate Examinations or Testing	Justification for Granting Relief	Implementation Schedule
2ASWINJF-SH-HD	Seal Water Injection Filter 2A Shell-to Head Circumferential Weld	Category C-A, Item Number C01.020.012, ASME Section XI, Appendix III, III-4420 Figure Number IWC-2500-1 (a) Volume Limitation: 50.94%	See Paragraph "A"	See Paragraph "F""	See Paragraph "H"	See Paragraph "J"
2NI72-2	NI System Elbow-to-Tee Circumferential Weld	Category C-F-1, Item Number C05.011.108, Figure Number IWC-2500-7 (a) Scanning Limitation: 75%	See Paragraph "B"	See Paragraph "F"	See Paragraph "G"	See Paragraph "J"
2NI72-3	NI System Tee-to-Reducer Circumferential Weld	Category C-F-1, Item Number C05.011.109, Figure Number IWC-2500-7 (a) Scanning Limitation: 75%	See Paragraph "C"	See Paragraph "F"	See Paragraph "G"	See Paragraph "J"
2NI88-3	NI System Tee-to-Pipe Circumferential Weld	Category C-F-1, Item Number C05.011.142, Figure Number IWC-2500-7 (a) Scanning Limitation: 75%	See Paragraph "D"	See Paragraph "F"	See Paragraph "G"	See Paragraph "J"
2CF100-60	CF System Valve 2CF168-to - Elbow Circumferential Weld	Category C-F-1, Item Number C05.011.211, Figure Number IWC-2500-7 (a) Scanning Limitation: 75%	See Paragraph "E"	See Paragraph "F""	See Paragraph "I"	See Paragraph "J"

IV. Basis for Relief

Paragraph A:
During the ultrasonic examination of the Seal Water Injection Filter 2A Shell-to-Head Circumferential Weld, 100% coverage of the required examination volume could not be obtained (See Attachment A-1). ASME , Section XI, Appendix III, III-4420 requires scanning of the examination volume from two beam path directions. This requirement could not be complied with because of a sharp transition in thickness from the head to the shell. The examination coverage was limited to 50.94 %.

The percentage of coverage reported represents the aggregate coverage of all scans performed on the weld. 62% (head side) of the required volume was examined in one axial direction, 27% (shell side) was examined in the other axial direction and 57% of the required volume was examined in two circumferential directions. In addition, austenitic weld metal characteristics prevent using the second sound path leg to obtain coverage. In order to achieve more coverage, the weld would have to be re-designed to allow scanning from both sides of the weld, which is impractical. The percentage of coverage reported represents the aggregate coverage of all scans performed on the weld.
(Examination Data for Weld ID. Number 2ASWINJF-SH-HD is shown in Attachment A)
(High Pressure Filter Assembly – Attachment A-1)

Paragraph B:
During the ultrasonic examination of the NI System Elbow-to Tee Circumferential Weld 2NI72-2, coverage of the required examination volume could not be achieved from two axial and two circumferential directions. Duke Energy Corporation does not take credit for examining the far side on austenitic piping welds where the sound beam must penetrate the weld metal and access is restricted to one side of the weld. The examination coverage was limited to 75%. Because of the outside diameter taper on the tee side of the weld scanning in the axial direction from that side was not performed. In addition, austenitic weld metal characteristics prevent using the second sound path leg to obtain coverage.

The percentage of coverage reported represents the aggregate coverage of all scans performed on the weld. 100% of the examination volume was covered in one axial direction and two circumferential directions.
(Examination Data for Weld ID. Number ID. 2NI72-2 is shown in Attachment B)

Paragraph C:
During the ultrasonic examination of the NI System Tee-to-Reducer Circumferential Weld 2NI72-3, coverage of the required examination volume could not be achieved from two axial and two circumferential directions. Duke Energy Corporation does not take credit for examining the far side on austenitic piping welds where the sound beam must penetrate the weld metal and access is restricted to one side of the weld. The examination coverage was limited to 75%. Because of the outside diameter taper on the tee side of the weld scanning in the axial direction from that side was not performed. In addition, austenitic weld metal characteristics prevent using the second sound path leg to obtain coverage.

The percentage of coverage reported represents the aggregate coverage of all scans performed on the weld. 100% of the examination volume was covered in one axial direction and two circumferential directions.
In order to achieve more coverage, the weld would have to be re-designed to allow scanning from both sides of the weld, which is impractical.
(Examination Data for Weld ID. Number ID. 2NI72-3 is shown in Attachment C)

Paragraph D:
During the ultrasonic examination of the NI System Tee-to-Pipe Circumferential Weld 2NI88-3, coverage of the required examination volume could not be achieved from two axial and two circumferential directions. Duke

Energy Corporation does not take credit for examining the far side on austenitic piping welds where the sound beam must penetrate the weld metal and access is restricted to one side of the weld. The examination coverage was limited to 75%. Because of the outside diameter taper on the tee side of the weld scanning in the axial direction from that side was not performed. In addition, austenitic weld metal characteristics prevent using the second sound path leg to obtain coverage.

The percentage of coverage reported represents the aggregate coverage of all scans performed on the weld. 100% of the examination volume was covered in one axial direction and two circumferential directions. In order to achieve more coverage, the weld would have to be re-designed to allow scanning from both sides of the weld, which is impractical.
(Examination Data for Weld ID. Number ID. 2NI88-3 is shown in Attachment D)

Paragraph E:
During the ultrasonic examination of the CF System Valve 2CF168-to-Elbow Circumferential Weld 2CF100-60, coverage of the required examination volume could not be achieved from two axial and two circumferential directions. Duke Energy Corporation does not take credit for examining the far side on austenitic piping welds where the sound beam must penetrate the weld metal and access is restricted to one side of the weld. The examination coverage was limited to 75%. Because of the outside diameter taper on the valve side of the weld, scanning in the axial direction from that side was not performed. In addition, austenitic weld metal characteristics prevent using the second sound path leg to obtain coverage.

The percentage of coverage reported represents the aggregate coverage of all scans performed on the weld. 100% of the examination volume was covered in one axial direction and two circumferential directions. In order to achieve more coverage, the weld would have to be re-designed to allow scanning from both sides of the weld, which is impractical.
(Examination Data for Weld ID. Number ID. 2CF100-60 is shown in Attachment E)

V. Alternate Examinations or Testing

Paragraph F:
There are no scheduled alternative examinations or testing. However; Duke Energy proposes to use required future pressure test and VT-2 visual examinations to complement the limited ultrasonic examination coverage. Based on the coverage and results of the required volumetric and surface examinations this outage and the Code required pressure testing (VT-2) examinations, it is Duke's belief that this combination of examinations provides a reasonable assurance of component integrity.

VI. Justification for Granting Relief

Paragraph G:

Ultrasonic examinations were performed using personnel, procedures and equipment qualified in accordance with ASME Section XI, Appendix VIII, 1995 Edition through the 1996 Addenda as administered through the Performance Demonstration Initiative (PDI). Currently PDI does not issue a qualification for single sided examination of austenitic piping welds. However a best effort examination was performed on the weld metal and far side base material using refracted longitudinal waves, which is considered to be the best available technique.

The NI system welds that were identified in the relief request (2NI92-4, 2NI72-3, 2NI88-3) are on piping from the ND system to the Hot and Cold Leg injection lines. These pipes are not in an active portion of the system. The pipes are filled with FW (Refueling Water System) system water at a low pressure FWST (Refueling Water Storage Tank) static head. Since this piping is in the Containment Building, if a small leak in the weld were to occur, it is highly likely that the leak would continue for a significant amount of time before being noticed.

Since this is low energy FW water, a leak would be undetectable using the Containment Atmosphere Gaseous and Particulate Radioactivity Monitoring (EMF monitors 38 and 39). The Containment Ventilation Unit Condensate Drain Tank level would likely not increase since the water leaking through the pipe is low energy and the location of the weld in not in a hot environment. A leak would need to be significant before a decreasing trend is noticed on the FWST level.

It is likely that a leak in the identified NI system welds would only be discovered during a refueling outage, beginning with the pre-outage containment walkdown. The water in the pipe is highly borated and would likely leave a significant amount of boron accumulation on the pipe and surrounding area. This boron accumulation would most likely be noticed during the course of a refueling outage. There is also a possibility that a leak would be discovered by monitoring the Containment Floor and Equipment Sump level/inputs. However, since there is always an input to Containment Floor and Equipment Sump A, the leak would not be noticed unless it was significant. Significant leakage through the welds would likely be identified by Containment Floor and Equipment Sump level indication. There would have to be a gross failure of the welds for any significant impact to occur in the Refueling Water Storage Tank (FWST) level.

One of these welds, Elbow-to-Pipe Weld #2NI92-4, received an ultrasonic and a dye penetrant examination during the First Inspection Interval. There were no reportable conditions found.

In summary, it is possible for a small leak to develop in welds 2NI72-2, 2NI72-3, and 2NI88-3 and remain unnoticed for several months. This is mainly due to the pipe being filled with low energy FW system water. The systems and processes established to detect leaks inside containment mainly focus on pipes containing high energy water or water with high amounts of radiological activity. However, with 75% scanning coverage for Weld ID's 2NI72-2, 2NI72-3 and 2NI88-3 obtained, and with the fact no indications were found during the surface examinations on these welds, reasonable assurance of weld integrity is provided.

Paragraph H:

Ultrasonic examinations were performed in accordance with ASME Section XI, Appendix III. The examination performed on the weld metal and far side base material used refracted longitudinal waves, which is considered to be the best available technique.

Seal Water Injection Filter 2A Shell-to-Head Circumferential Weld 2ASWINJF-SH-HD is located outside containment. If a leak were to develop at this weld location, the instrumentation available to the operators for detection and monitoring of leakage would provide prompt and qualitative information necessary to permit them to take immediate corrective action. If a leak should develop in this aforementioned location, the corrective action would be to isolate the leak and place the other seal water injection filter in service. This corrective action is governed by approved procedures.

Additionally, other indicators are also available to the operator that a leak exists:

Charging / Letdown system mismatches. Inspection for leakage around the "filter casing head" whenever the filters are changed. Procedure OP/1/A/6200/001, Chemical and Volume Control System, has a step to "verify no leakage from around the filter casing head".

Paragraph I:

Ultrasonic examinations were performed using personnel, procedures and equipment qualified in accordance with ASME Section XI, Appendix VIII, 1995 Edition through the 1996 Addenda as administered through the Performance Demonstration Initiative (PDI). Currently PDI does not issue a qualification for single sided examination of austenitic piping welds. However, a best effort examination was performed on the weld metal and far side base material using refracted longitudinal waves, which is considered to be the best available technique.

The CF system weld identified in the relief request is on Unit 2 feedwater piping that maintains a constant tempering flow to the auxiliary feedwater nozzle on the "C" Steam Generator. Fluid within the piping is at steam generator feedwater temperature and pressure conditions during normal operations. The piping is rated Class B.

The piping is routed through a floor penetration on the 594' elevation of the Unit 2 Interior Doghouse. The subject weld is located several feet from the handrail for the observation platform for this elevation. The weld area is at eye level and a direct line of sight to the weld area is maintained along normal travel paths on this platform.

The operations staff conducts weekly inspections of the Interior Doghouse with specific instructions to identify steam or secondary side water leaks. If a leak were to develop at the weld location discussed in the relief request, some of the high temperature fluid would immediately flash to steam. Blanket insulation is installed on the piping downstream of the weld area. However, there is a gap in the insulation coverage in the area of the weld at the transition from valve 2CF168 to the downstream piping. This insulation configuration ensures that weld leakage would be readily apparent to personnel traveling through the area.

In addition to the periodic room inspections, safety-grade level switches are installed on the foundation floors of the Doghouse rooms. These switches are designed to protect safety-related components in the room from a pipe leak and subsequent room flooding. A safety-related feedwater isolation signal for the "B" and "C" Steam Generators would be generated if leakage from the weld accumulated on the floor below the weld area.

If a leak were discovered, a work request would be written and the leak would be evaluated under the Fluid Leak Management process. Since the piping is rated Class B, the criteria of Selected Licensee Commitments (SLC) 16.5-5 "Structural Integrity" would be applicable. Weld repairs would require a unit downpower as the weld area can not be isolated from the main feedwater piping.

VII. Implementation Schedule

Paragraph J:
The scheduled second 10-year interval plan code examination was performed on the referenced welds resulting in limited volumetric coverage. No additional examinations are planned for the welds during the current inspection interval. The same welds may be examined again as part of the next (third) 10-year interval plan, depending on the applicable code year edition and addenda requirements adopted in the future.

VIII. Other Information

The following individuals contributed to the development of this RFR:

Jim McArdle (NDE Level III Inspector) provided UT related information for Sections II through VI
Ari Tuckman and Charles Mohr (CNS Systems Engineers) provided a portion of Section VI
Andy Hogge (Sponsor) compiled the remaining sections.

Sponsored By: A. J. Hogge, Jr. **Date** 4/6/04

Approved By: L. Kevin Rhyne **Date** 4/7/04

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1320		NDE-UT-3A
Exam Finish: 1325		Revision 2

Station: CNS	Unit: 2	Component/Weld ID: 2ASWINJF-SH-HD	Date: 10/30/2001
Nominal Material Thickness (in): 0.674		Weld Length (in.): 14.1	Surface Temperature: 87° Deg F
Measured Material Thickness (in): .398		Lo: 9.2.2	Pyrometer S/N: MCNDE 27008
Surface Condition. AS GROUND		Calibration Sheet No: 0102062	Cal Due: 2/14/2002
Examiner: David Zimmerman Level: III			Configuration: Shell to Head
Examiner: Winfred C. Leeper Level: II			S2 Flow S1
Procedure: NDE-640 Rev: 1 FC: *			SHELL to HEAD

IND NO.	∠	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
NRI	0°													

Remarks: *FC 95-18, 95-19

Limitations: see NDE-UT-4 ☐ None: ☒ Sheet 1 of 8

Reviewed By: Larry Mauldin Level: III Date: 10-30-01

Authorized Inspector: Robert McGill Date: 10-31-01

Item No: C01.020.012

AJH 4/21/03

P

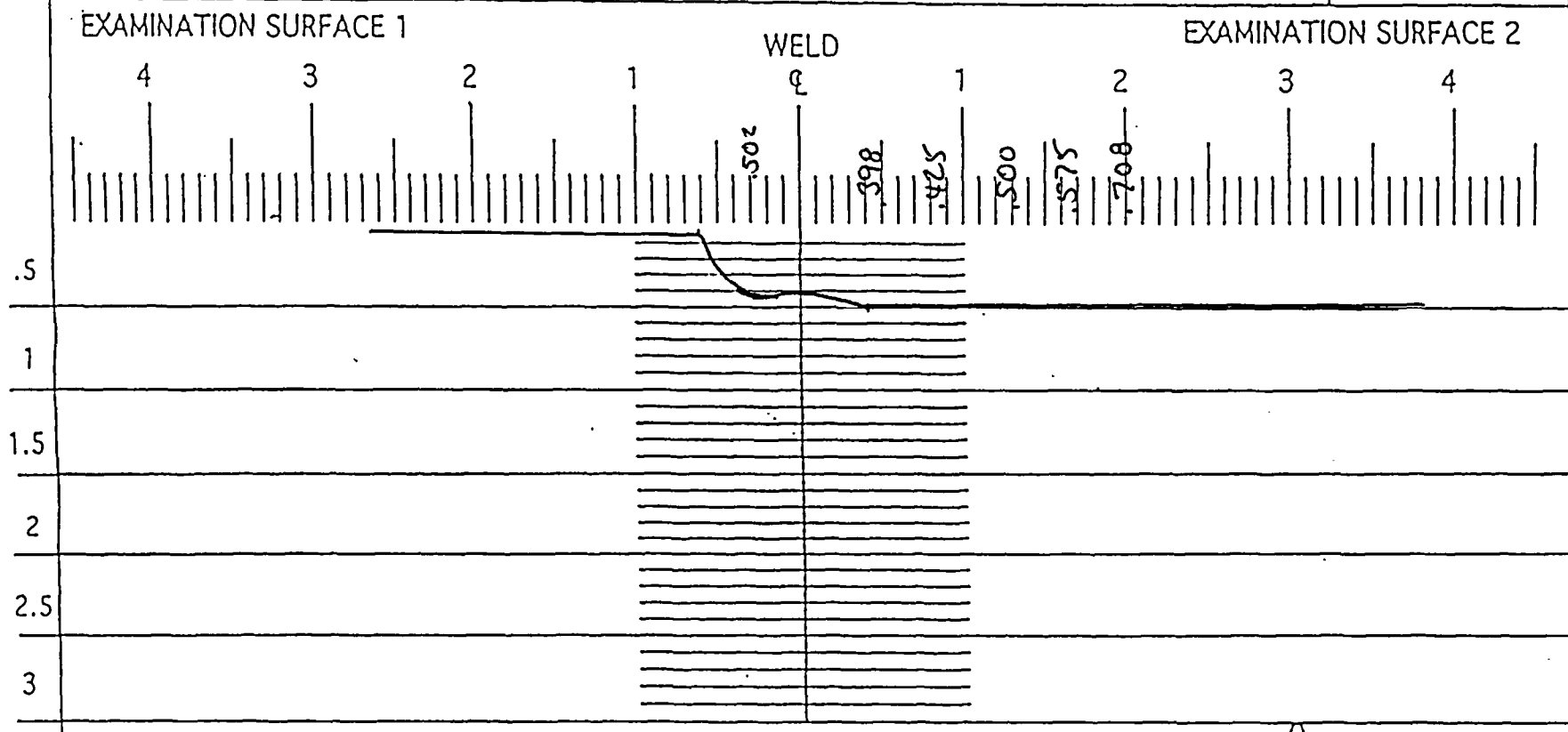
REQUEST FOR RELIEF #04-CN-002 ATTACHMENT A

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



Component ID/Weld No. 2ASWINJF-SH-HD

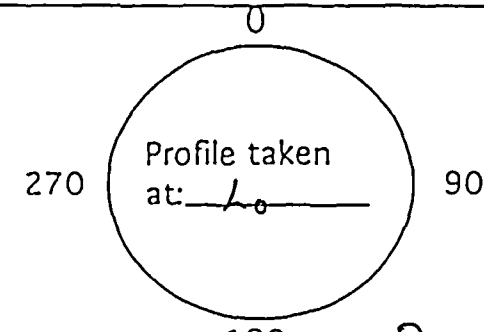
Remarks:

Item No: C01.020.012

Examiner: [signature] Level: III Date: 10/30/01

Reviewed By: [signature] Level: III Date: 10-30-01

Authorized Inspector: [signature] Date: 10-31-01



Sheet 2 of 8

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1337 | Form NDE-UT-2A

Exam Finish: 1401 | Revision 4

Station: CNS | Unit: 2 | Component/Weld ID: 2ASWINJF-SH-HD | Date: 10/30/2001

Weld Length (in.): 14.1 | Surface Condition: AS GROUND | Lo: 9.2.2

Surface Temperature: 87 ° F

Examiner: David Zimmerman Level: III

Examiner: Winfred C. Leeper Level: II

Pyrometer S/N: MCNDE 27008

Cal Due: 2/14/2002

Procedure: NDE-630 Rev: 2 | FC: 99-02

Calibration Sheet No: 0102063, 0102064, 0102065

Scans:

45 ☒ 47 dB 70 ☐ ____ dB

45T ☒ 55.5 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: 45L @ 62.5 dB

Configuration: Shell to Head

HEAD Flow SHELL

S1 to S2

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: N/A

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
		DO NOT WRITE IN THIS SPACE				20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	DO NOT WRITE IN THIS SPACE			
NRI	45°														

Remarks:

Limitations: (see NDE-UT-4) ☒ 90% or greater coverage obtained: yes ☐ no ☒

Sheet 3 of 8

Reviewed By: Larry Maulden Level: III Date: 10.30.01

Authorized Inspector: Robert McGill Date: 10/31/01

Item No: C01.020.012

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2ASWINJF-SH-HD | Item No: C01.020.012 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw

FROM L N/A . to L N/A
INCHES FROM WO .3" . to BEYOND
ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other _____
FROM 0 DEG to 360 DEG

Remarks: DUE TO SHELL TO HEAD CONFIGURATION.

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ . to L _____
INCHES FROM WO _____ . to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ . to L _____
INCHES FROM WO _____ . to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ . to L _____
INCHES FROM WO _____ . to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

Prepared By: David K. B. | Level: III | Date: 10/30/01 | Sketch(s) attached ☒ yes ☐ no | Sheet 4 of 8

Reviewed By: Larry Thaulder | Date: 10-30-01 | Authorized Inspector: Robert McGill | Date: 10/31/01

DUKE POWER COMPANY Limited Examination Coverage Worksheet	NDE-91-1 Revision 0

Examination Volume/Area Defined

☒ Base Metal ☒ Weld ☐ Near Surface ☐ Bolting ☐ Inner Radius

Area Calculation	Volume Calculation
SEE DRWGS. FOR CALCULATIONS 0.77 SQ.IN.	0.77 SQ.IN. X 14.1 IN. = 10.86 CU.IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	S2	0.21	14.1	2.96	10.86	
2	45	S1	0.48	14.1	6.77	10.86	
3	45	CW	0.44	14.1	6.2	10.86	
4	45	CCW	0.44	14.1	6.2	10.86	
					22.13	43.44	50.94

Item No: C01.020.012		
Prepared By: David Zimmerman	Level: III	Date: 10/30/2001
Reviewed By: Larry Mauldin	Level: III	Date: 10.30.01

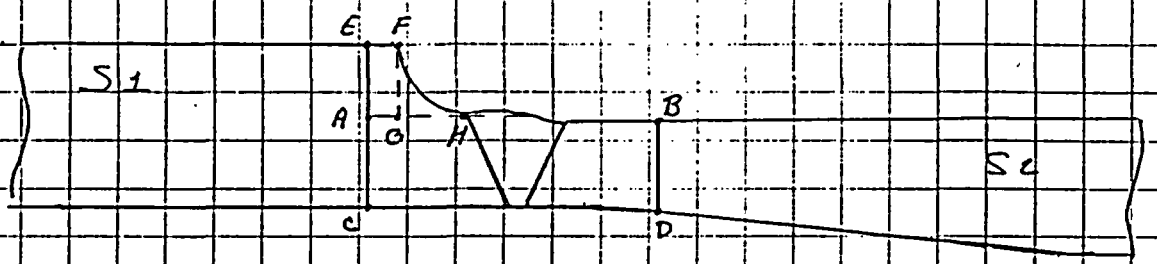
PS 5 of 8

Station CATAWBA Unit ____ Rev. ____ File No. ____ Sheet ____ Of ____

Subject 2ASWINJF-SH-HD

By David K. Barnett II Date 10/30/01

Prob No. C01.020.012 Checked By Larry Baulderi Date 10-30-01



INSPECTION AREA

ABCD + EFAG + EGH

1.5" X .425" + .12" X .4" + $\frac{.3" X .4"}{2}$ =

.6375" + .048" + .06 = .7655" = .77 sq. in.

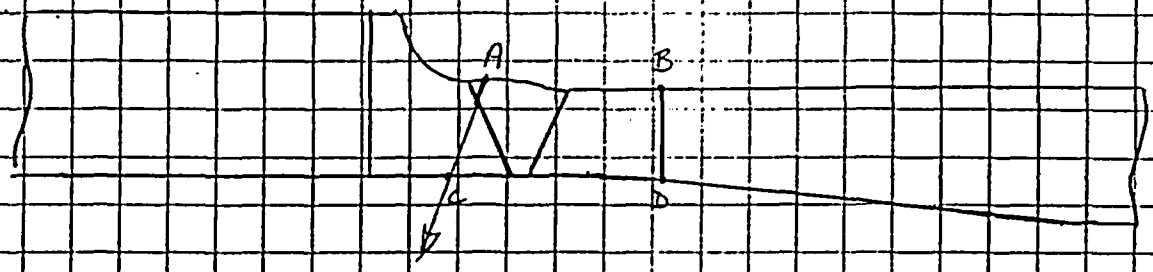
Pg 6 of 8

Station CATAWBA Unit ____ Rev. ____ File No. ____ Sheet ____ Of ____

Subject 2ASWINJF-SH-HD

By David K. Zi III Date 10/30/01

Prob No. C.01.020.012 Checked By Larry Moulden Date 10-30-01



45° CW & CCW DIRECTIONS WITH 20° OSCILLATION

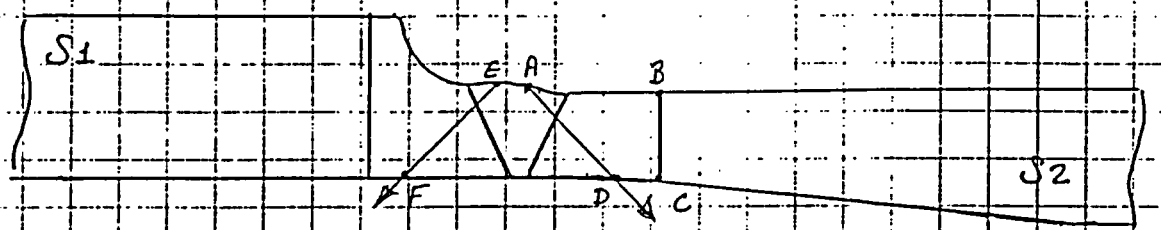
$ABCD = \frac{.425'}{2} \times (.95'' + 1.1'') = .4356 = .44 \text{ sq. in.}$

Station CATAWBA Unit ____ Rev. ____ File No. ____ Sheet ____ Of ____

Subject 2ASWINJF-SH-HD

By [illegible] III Date 10/30/01

Prob No. C01.020.012 Checked By Larry Rawlins Date 10-30-01

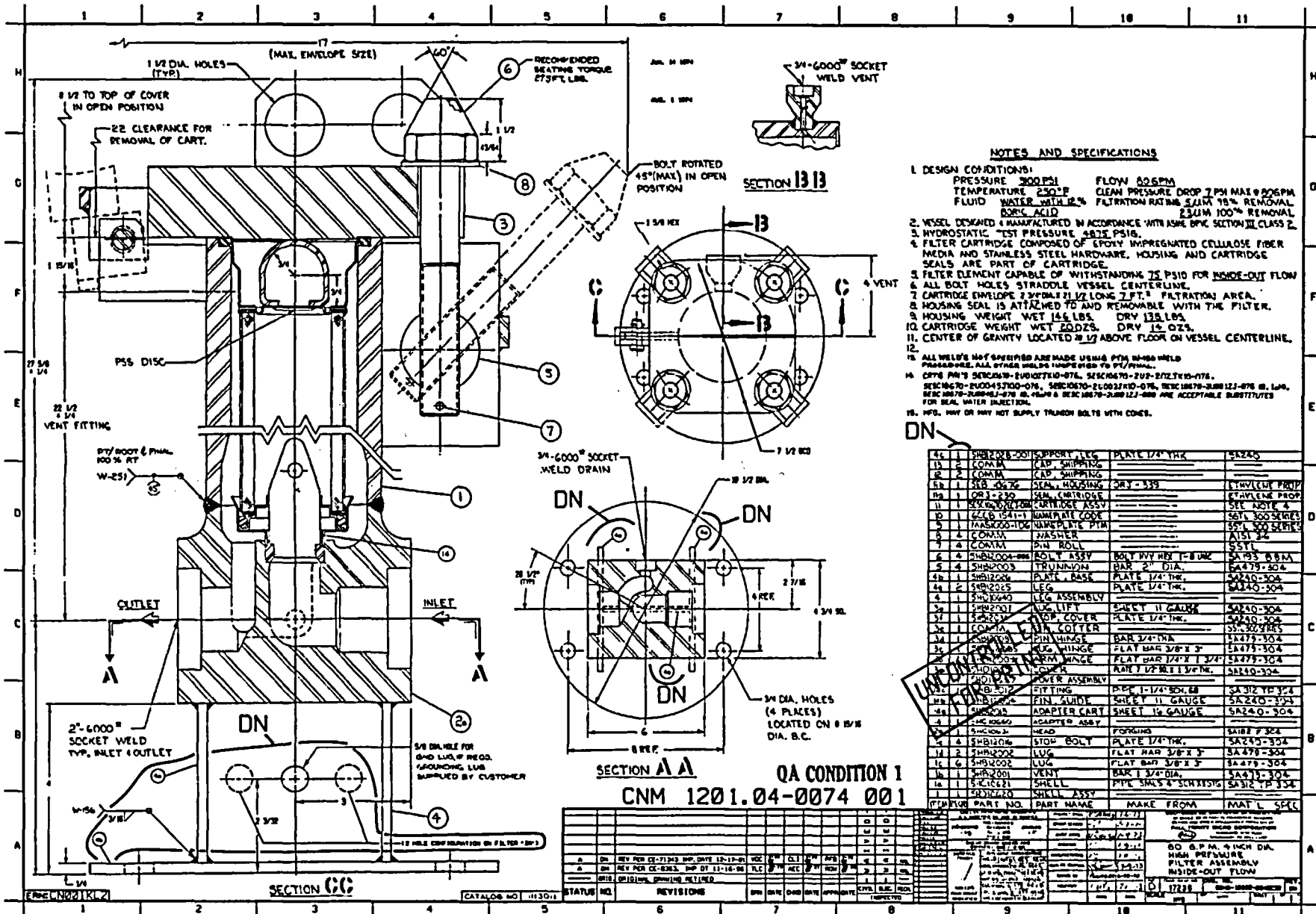


45° S1 to S2 COVERAGE

$ABCD = \frac{.425"}{2} \times (.7" + .3") = .2125 = .21$ sq. in.

S2 to S1 COVERAGE

$BCEF = \frac{.425"}{2} \times (.9" + 1.35") = .4781 = .48$ sq. in.



REQUEST FOR RELIEF #04-CN-002 ATTACHMENT A-1

Catawba Unit 2
EOC 12

No Recordable Indications

Calibration Sheet # 0302055

Component I.D. 2N172-2

Item # C05.011.108

AJH 4/22/03

Pg 1 of 4 Sets 3.2003

REQUEST FOR RELIEF #04-CN-002 ATTACHMENT B

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 0939		NDE-UT-3A
Exam Finish: 0943		Revision 2

Station: Catawba	Unit: 2	Component/Weld ID: 2NI72-2	Date: 3/13/2003
Nominal Material Thickness (in): 0.906		Weld Length (in.): 27.1	Surface Temperature: 70 Deg F
Measured Material Thickness (in): 0.956		Lo: 9.1.1.1	Pyrometer S/N: MCNDE 27227
Surface Condition: GROUND		Calibration Sheet No: 0302054	Cal Due: 5/11/2003
Examiner: Jay A. Eaton	Level: III		Configuration: CIRC. WELD
Examiner: Winfred C. Leeper	Level: II		S2 Flow S1
Procedure: NDE-640	Rev: 1 FC: *		ELBOW to TEE

IND NO.	4	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
NRI	0°													

Remarks: * FC 95-19, 02-29, 03-02, 03-04, 03-08

Limitations: see NDE-UT-4 ☐ None: ☒

Sheet 2 of 45

Reviewed By: DE Hauser	Level: III	Date: 3.14.03	Authorized Inspector: Robert McGill	Date: 3-18-03

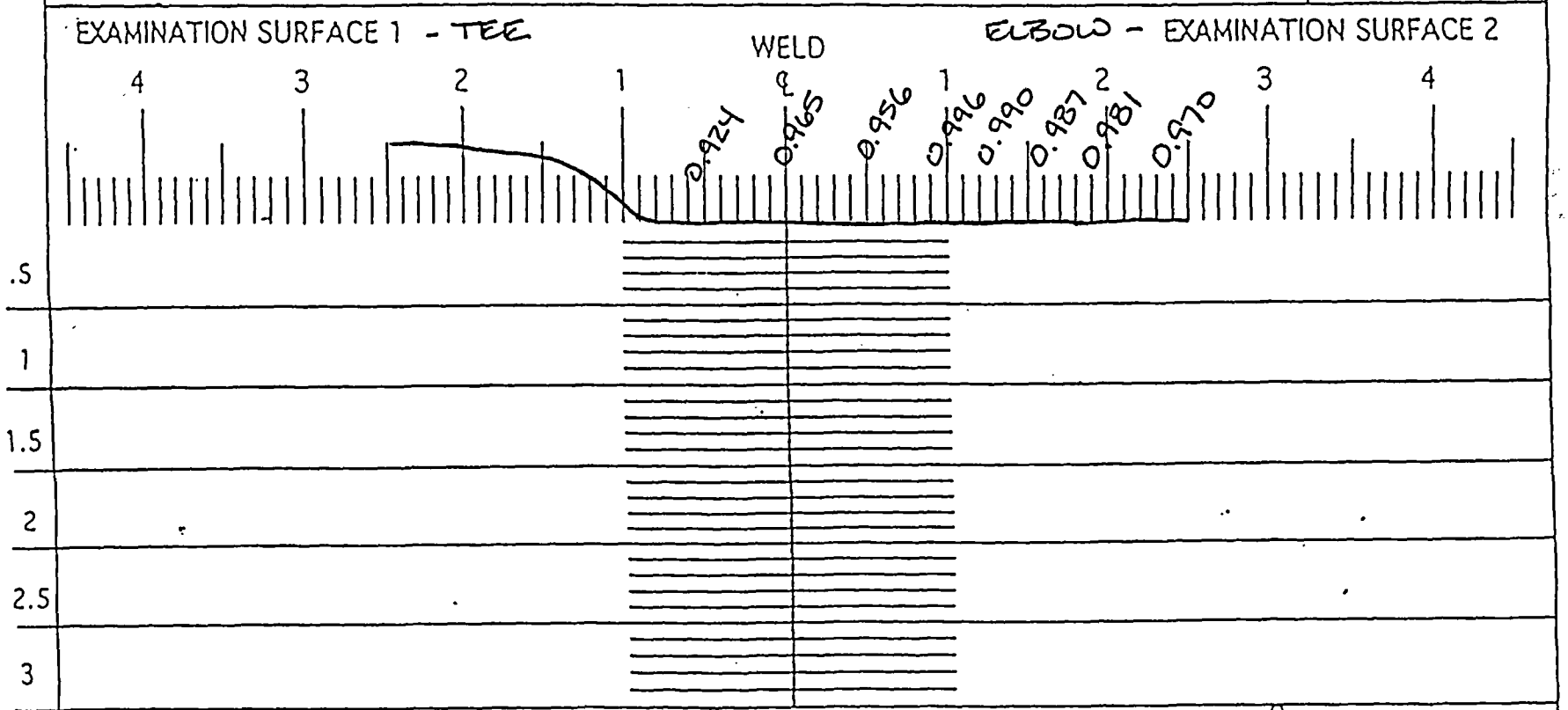
Item No: C05.011.108

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



Component ID/Weld No. 2NI72-2

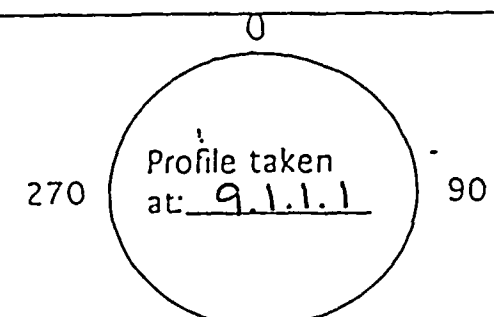
Remarks:

Item No: C05.011.108

Examiner: [signature] Level: III Date: 3/13/03

Reviewed By: DE Hollaar Level: III Date: 3.14.03

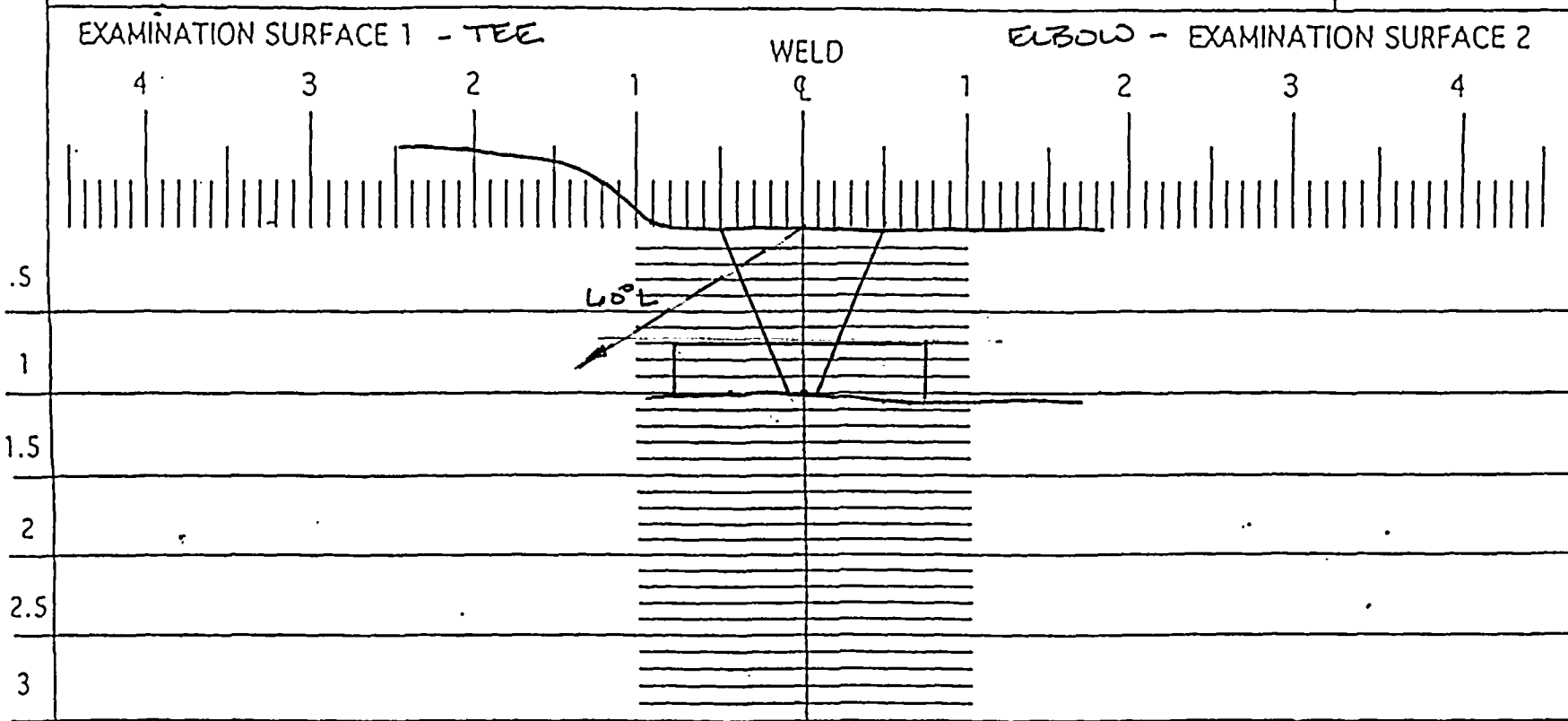
Authorized Inspector: Robert McNeil Date: 3.18.03



Sheet 3 of 85

DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5
Revision 1



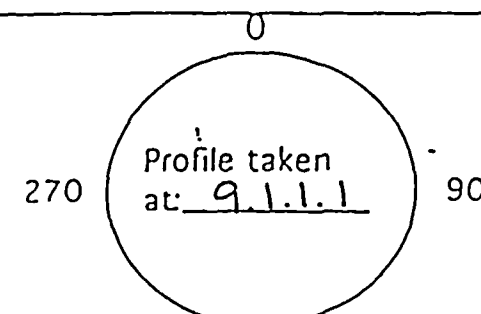
Component ID/Weld No. 2NI72-2

: Remarks:

100% COVERAGE PER NDE-91

Item No: C05.011.108

Examiner:	Level: III	Date: 3/13/03
Reviewed By: DE Hollins	Level: III	Date: 3.14.03
Authorized Inspector: Robert McGill		Date: 3-18-03



Sheet 4 of 5

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2NI72-2 | Item No: C05.011.108 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw

FROM L _____ to L _____
INCHES FROM WO C/L to Beyond
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other _____
FROM 0 DEG to 360 DEG

Valve Configuration - 100% scan coverage obtained per NDE-91.

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____
INCHES FROM WO _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____
INCHES FROM WO _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____
INCHES FROM WO _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____

Prepared By: Jay Eaton | Level: III | Date: 3/13/2003 | **Sketch(s) attached** ☒ yes ☐ no | Sheet 5 of 5

Reviewed By: [signature] | Date: 3.14.03 | Authorized Inspector: [signature] | Date: 3-18-03

Catawba Unit 2
EOC 12

No Recordable Indications

Calibration Sheet # 6302055

Component I.D. 2NI 72-3

Item # C05.011.109

AJH 4/22/03

REQUEST FOR RELIEF #04-CN-002 ATTACHMENT C

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2NI72-3 | Item No: C05.011.109 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

SURFACE: ☒ 1 ☑ 2 (JE 3/14/03)
BEAM DIRECTION: ☑ 1 ☒ 2 ☐ cw ☐ ccw (JE 3/14/03)

FROM L _____ to L _____ INCHES FROM WO C/L to Beyond

ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other _____ FROM 0 DEG to 360 DEG

Valve Configuration - 100% scan coverage obtained per NDE-91.

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM _____ DEG to _____

Prepared By: Jay Eaton | Level: III | Date: 3/13/2003 | Sketch(s) attached ☒ yes ☐ no | Sheet 2 of 3

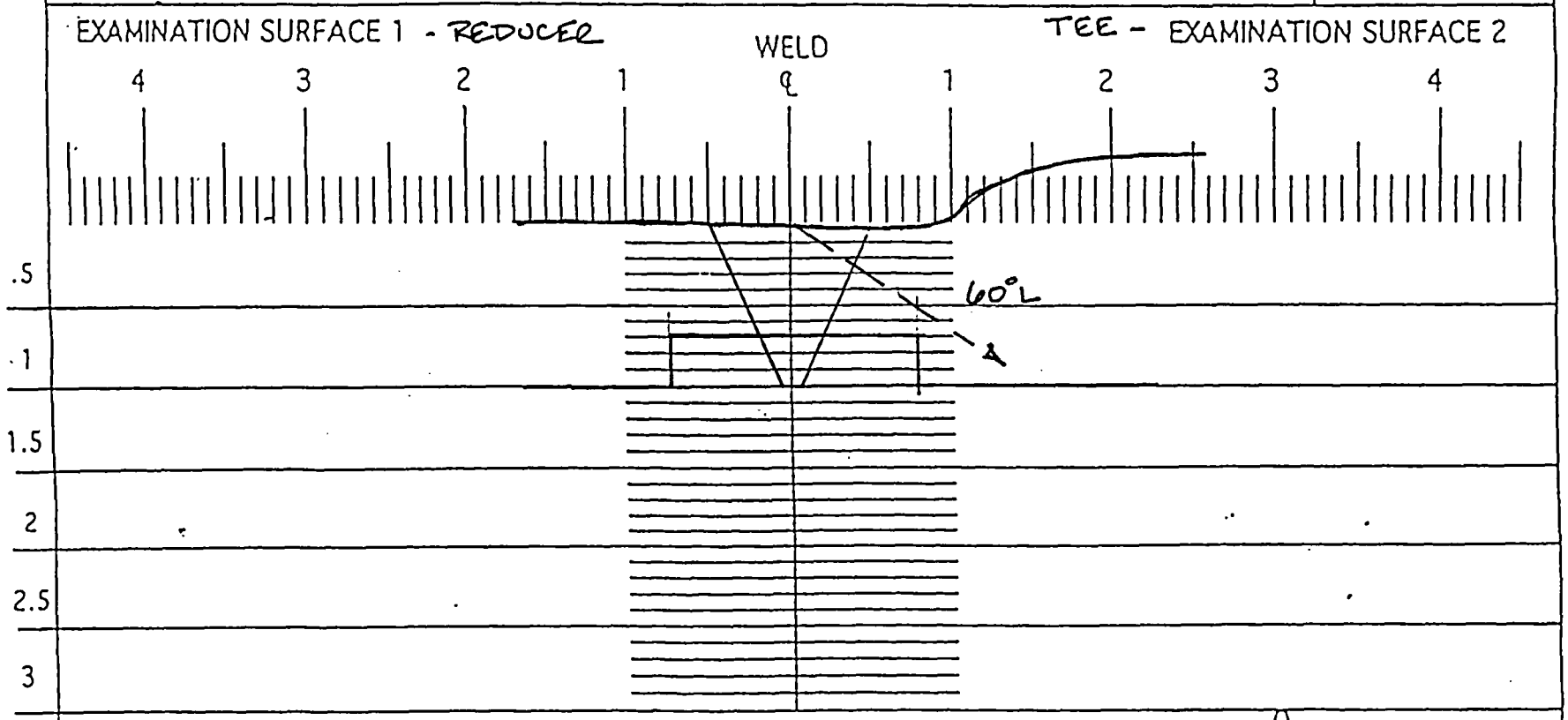
Reviewed By: DE Lowe | Date: 3.14.03 | Authorized Inspector: Robert McGill | Date: 3-18-03

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

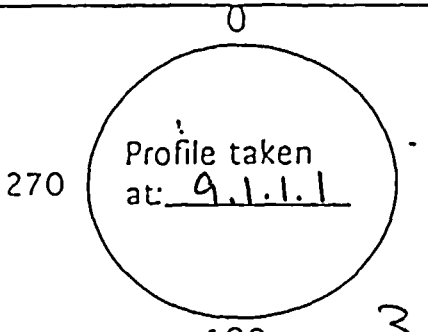
NDE-UT-5

Revision 1



Component ID/Weld No. 2NI72-3

Remarks:



Item No: C05.011.109

Examiner:	Level: III	Date: 3/13/03
Reviewed By: DE Hooper	Level: III	Date: 3.14.03
Authorized Inspector: Robert McGriff		Date: 3.18.03

Sheet 3 of 3

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1151	NDE-UT-3A
Exam Finish: 1155	Revision 2

Station: Catawba	Unit: 2	Component/Weld ID: 2NI88-3	Date: 3/11/2003
Nominal Material Thickness (in): 0.906		Weld Length (in.): 27.3	Surface Temperature: 75° Deg F
Measured Material Thickness (in): .893		Lo: 9.1.1.2	Pyrometer S/N: MCNDE 27227
Surface Condition: AS GROUND		Calibration Sheet No: 0302040	Cal Due: 5/11/2003
Examiner: Gary J. Moss Gary J Moss	Level: II		Configuration: CIRC.
Examiner: James L. Panel James L Panel	Level: II		S2 Flow S1
Procedure: NDE-640	Rev: 1 FC: *		PIPE to TEE

IND NO.	4	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
NRI	0°													

Remarks: * FC 95-19, 02-29, 03-02, 03-04, 03-08

Limitations: see NDE-UT-4 ☐ None: ☒

Sheet 1 of 7

Reviewed By: M E Hansen Level: III Date: 3.12.03

Authorized Inspector: Robert McGill Date: 3-18-03

Item No: C05.011.142

AJH 4/22/03

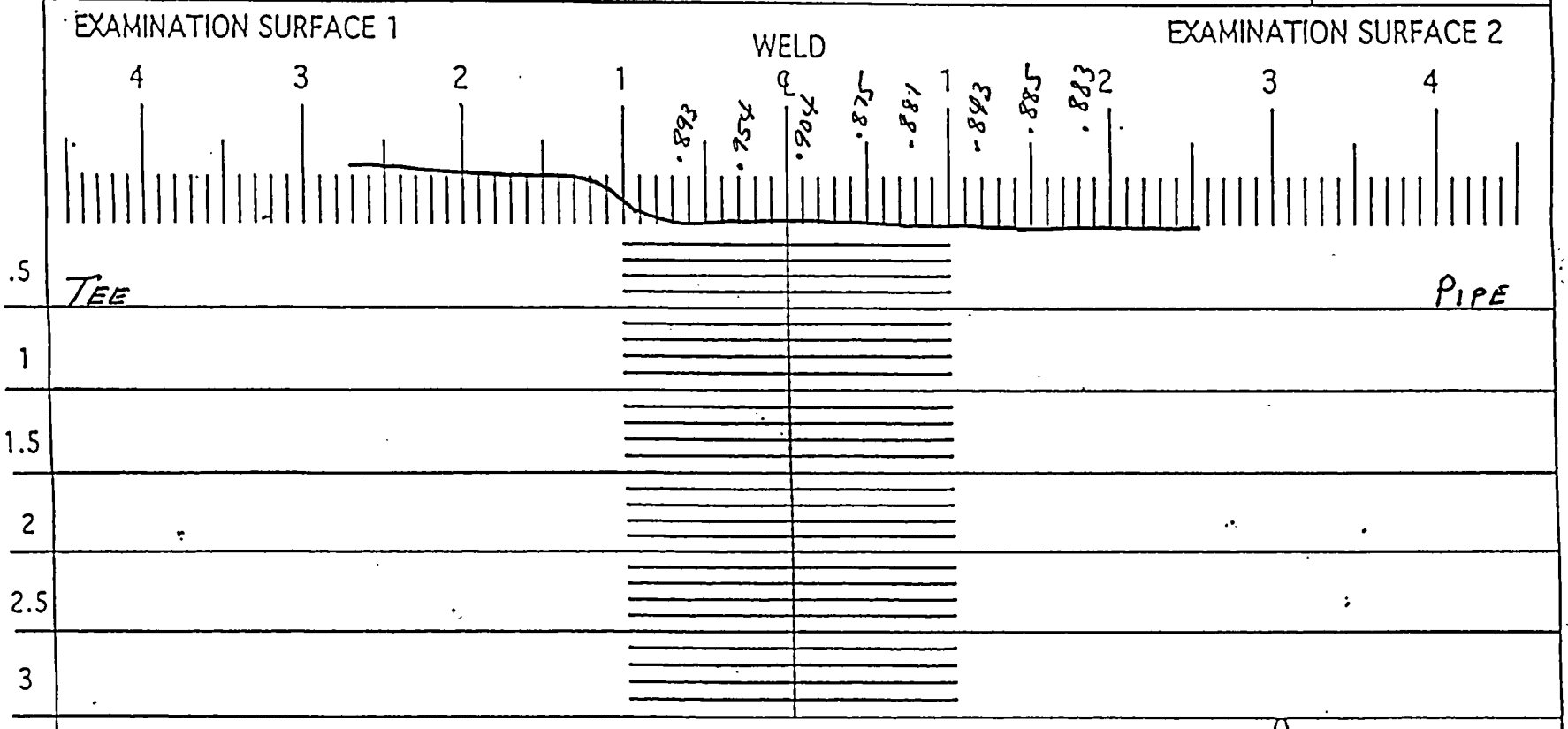
REQUEST FOR RELIEF #04-CN-002 ATTACHMENT D

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

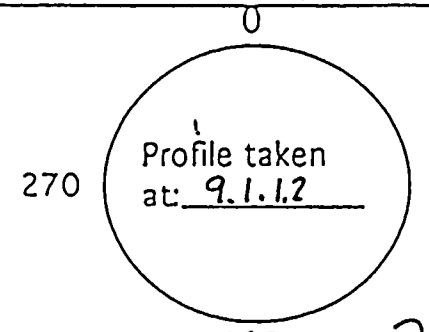
NDE-UT-5

Revision 1



Component ID/Weld No. 2NI88-3

: Remarks:



Item No: C05.011.142

Examiner: Gary A Mapes	Level: II	Date: 3.11.03
Reviewed By: DE Hoagen	Level: III	Date: 3.12.03
Authorized Inspector: Robert McGill		Date: 3-18-03

Sheet 2 of 7

DUKE POWER COMPANY
ULTRASONIC INDICATION RECORD FOR PIPING

FORM NDE-UT-10
Revision 0

Station: Catawba	Unit: 2	Component/Weld ID: 2NI88-3	Date: 3/11/2003
Surface Condition: AS GROUND		Item No: C05.011.142	
Examiner: Gary J. Moss Gary J Moss	Level: II	Procedure: NDE-600 Rev: 14	FC: 03-15 03-16
Examiner: James L. Panel James L Panel	Level: II	Lo: 9.1.1.2 Configuration: CIRC.	
Calibration Sheet No: 0302042, 0302043		PIPE to TEE	Scan Surface: OD

IND #	∠	% FSH	Mp Max	W Max	L Max	L1 20 % FSH	L2 20 % FSH	Beam Dir.	Exam Surf.	Scan	Damps	Remarks
1	60°	80	1.6	1.1	360	INT.		1	2	AXIAL	NO	
2	60°L	85	1.6	1.1	360	INT.		1	2	AXIAL	NO	

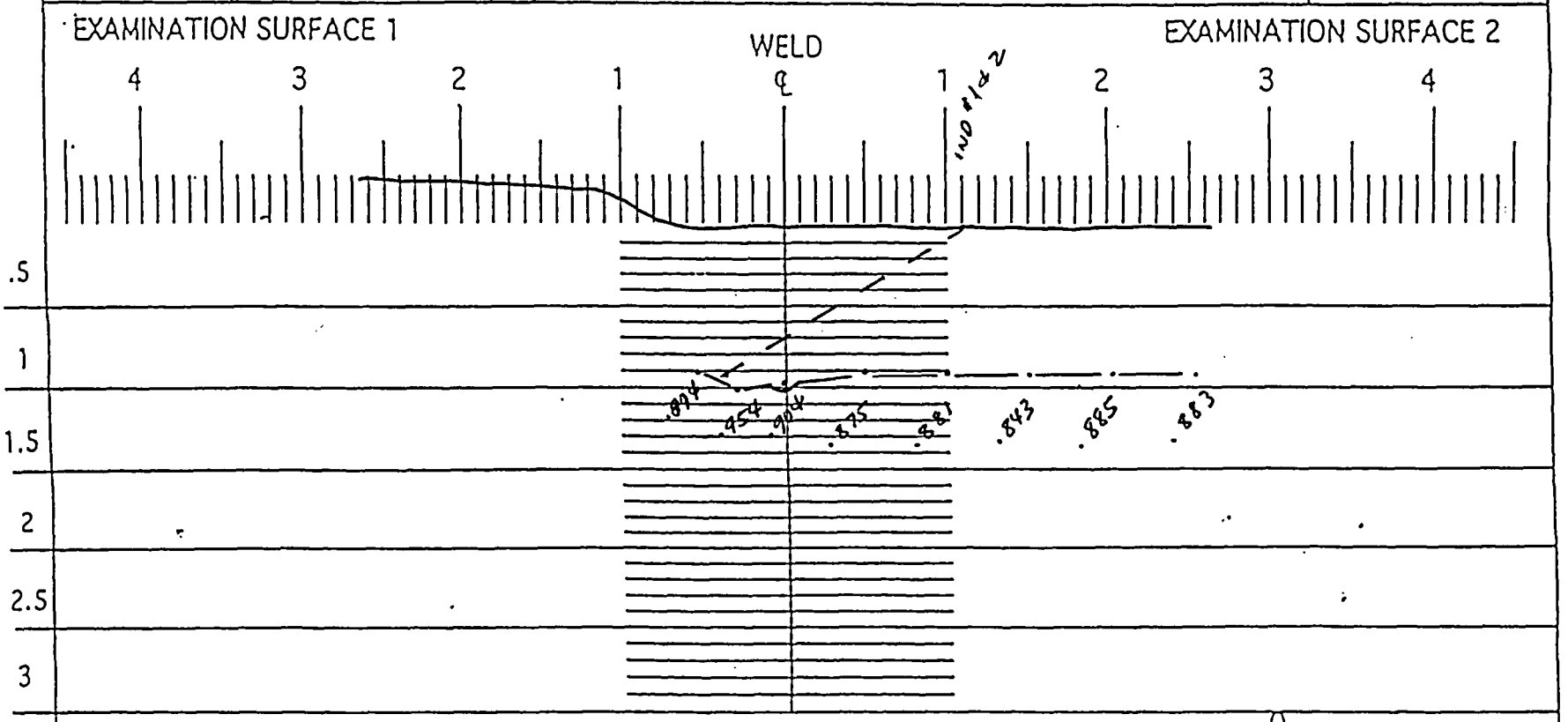
Reviewed By: DE Hansen	Level: III	Date: 3-12-03	Authorized Inspector: Robert McGill	Date: 3-18-03	Sheet 3 of 7

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



Component ID/Weld No. 2 N1-88-3

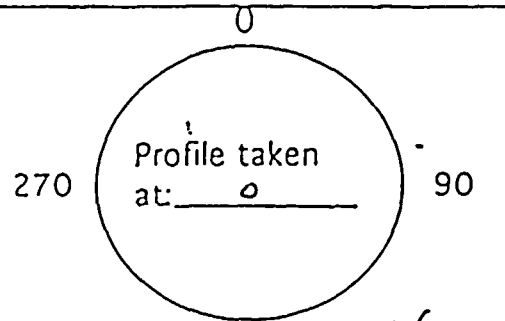
Remarks:

Item No: C05.011.142

Examiner: James P Lamb Level: II Date: 3/11/03

Reviewed By: DE Hougey Level: III Date: 3.12.03

Authorized Inspector: Robert McGill Date: 3-18-03



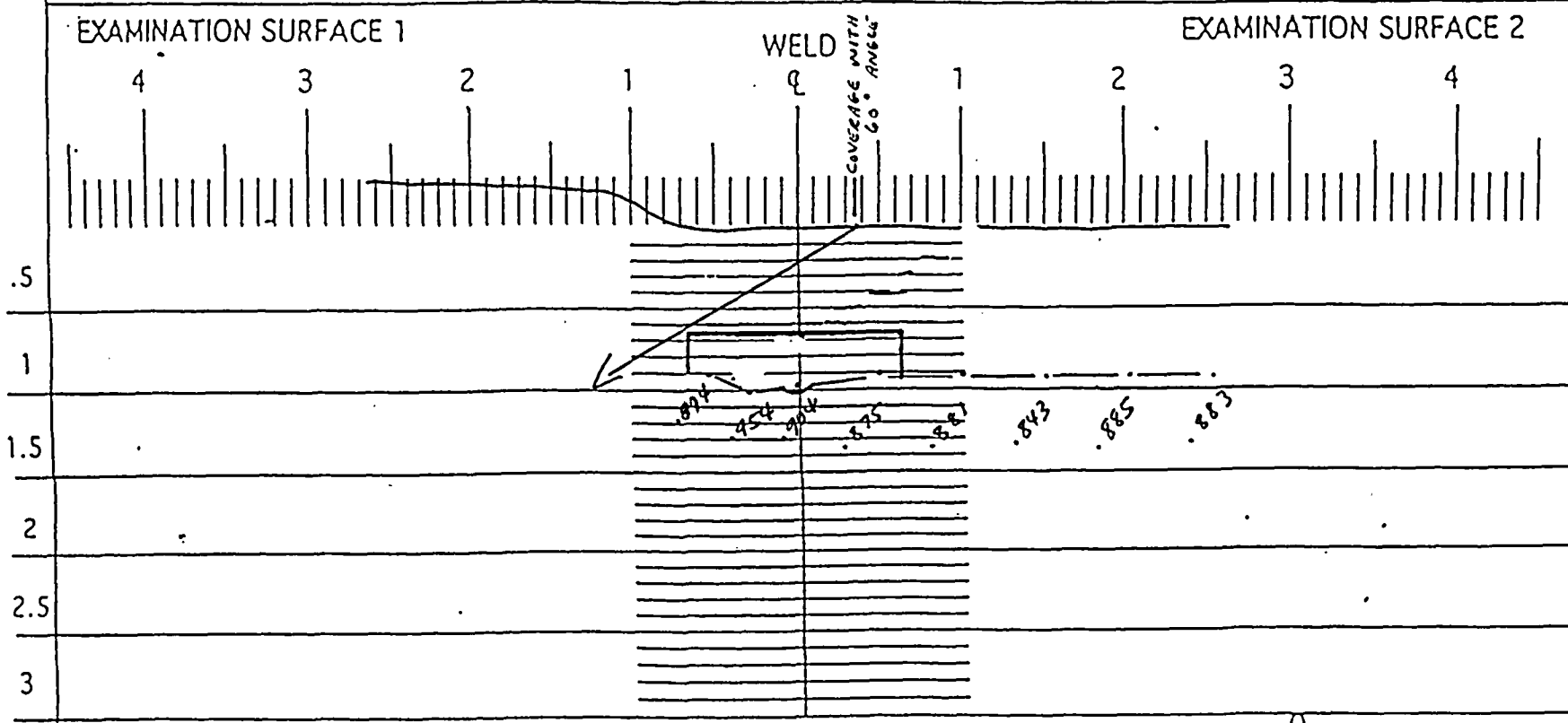
Sheet 4 of 7

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

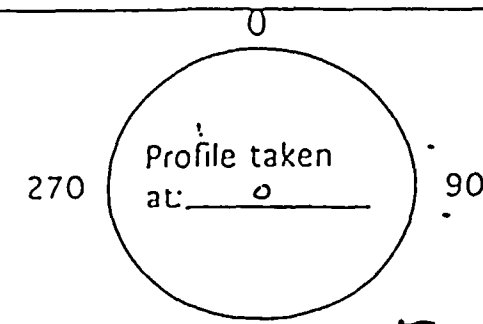
NDE-UT-5

Revision 1



Component ID/Weld No. 2 NI-88-3

Remarks: 100% COVERAGE PER NDE91



Item No: C05.011.142

Examiner: James E Ramer	Level: II	Date: 3/11/03
Reviewed By: DE Howser	Level: III	Date: 3.12.03
Authorized Inspector: Robert McGill		Date: 3-18-03

Sheet 5 of 7

DUKE POWER COMPANY	Form NDE-UT-8
ULTRASONIC INDICATION RESOLUTION SHEET	Revision 1

Acceptance Standard:

IND. #1 & #2 ARE GEOMETRIC REFLECTOR OFF ID COUNTERBORE. CONFIRMED PER USE OF 70° WEDGE ON 60° DUCER AND USE OF WSY-70.

Item No: C05.011.142

Acceptable Indications: IND. #1 & #2

Rejectable Indications: NONE

These indications have been compared with previous ultrasonic data ☐ Yes ☒ No previous data available

Examiner:	Level:	Date:		Sheet 6 of 7
Gary J. Moss Gary J Moss	II	3/11/2003	[redacted]	
Reviewer: D E Howser	Level: III	Date: 3.12.03	Authorized Inspector: Robert McGill	Date: 3-18-03

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2NI88-3 | Item No: C05.011.142 | Remarks:

☐ NO SCAN
☐ LIMITED SCAN
SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw
FROM L _____ to L _____
INCHES FROM WO CL to BEYOND
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other _____
FROM 0 DEG to 360 DEG

Remarks: DUE TO TEE CONFIGURATION 100% COVERAGE

☐ NO SCAN
☐ LIMITED SCAN
SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____
INCHES FROM WO _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN
SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____
INCHES FROM WO _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN
SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____
INCHES FROM WO _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____
FROM _____ DEG to _____

Prepared By: Gary J. Moss | Level: II | Date: 3-11-03 | Sketch(s) attached ☒ yes ☐ no | Sheet 2 of 2

Reviewed By: DE Howser | Date: 3.12.03 | Authorized Inspector: Robert McGill | Date: 3.18.03

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2CF100-60 | Item No: C05.011.211 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☒ 2
BEAM DIRECTION: ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM WO C/L to BEYOND

ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other _____ FROM 0 DEG to 360 DEG

Remarks: VALVE CONFIG. - FULL COVERAGE OBTAINED FROM OPPOSITE SIDE

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM _____ DEG to _____ DEG

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM _____ DEG to _____

Prepared By: David K. Zimmerman David K. Z Level: III Date: 3/12/2003 | Sketch(s) attached ☒ yes ☐ no | Sheet 1 of 8

Reviewed By: ME Hansen Date: 3·13·03 | Authorized Inspector: Robert McStid Date: 3·18·03

AH 4/22/03

REQUEST FOR RELIEF #04-CN-002 ATTACHMENT E

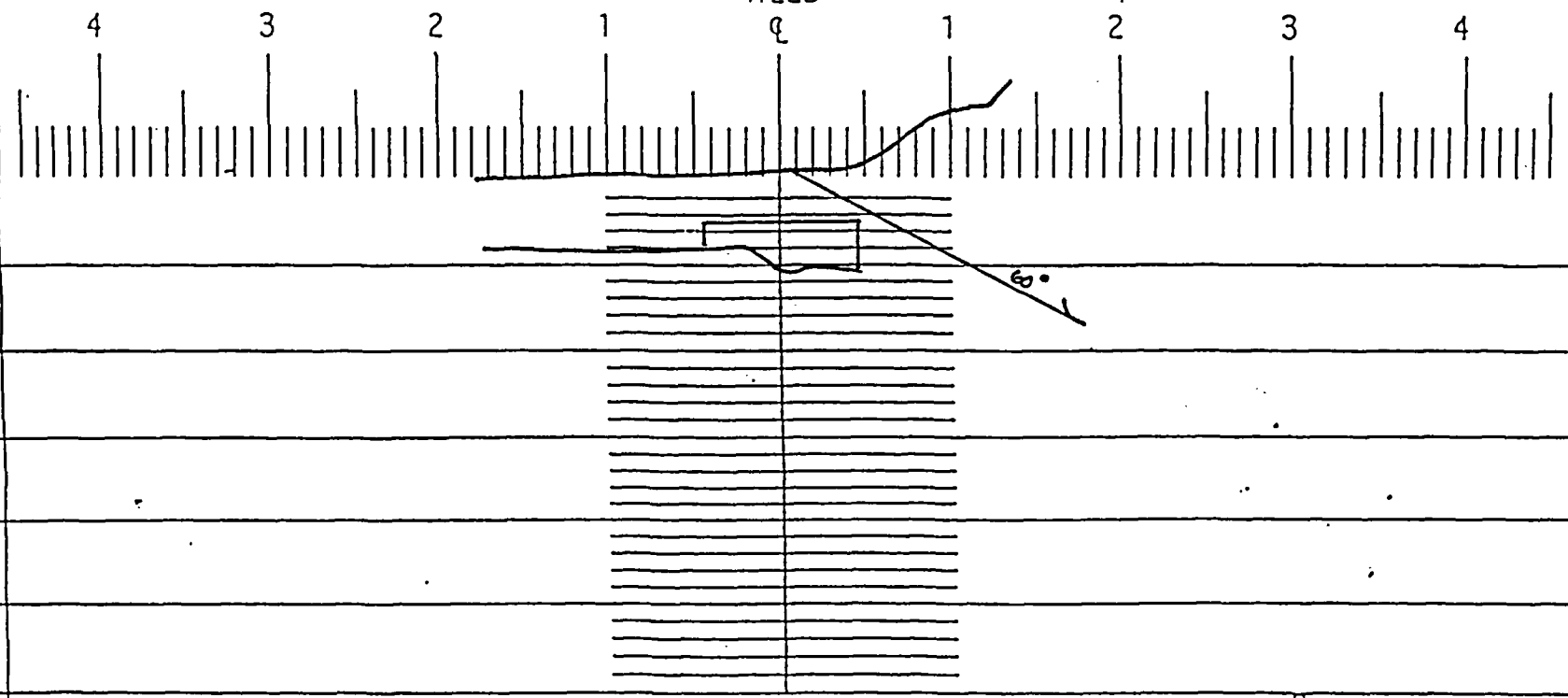
DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

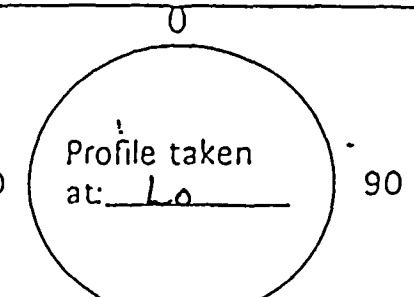
Revision 1

EXAMINATION SURFACE 1 ELBOW WELD VALVE EXAMINATION SURFACE 2



Component ID/Weld No. 2CF100-60

Remarks: 60° COVERAGE FROM SI SCAN



Item No: C05.011.211

Examiner: Daniel K. Z	Level: III	Date: 3/12/03
Reviewed By: DE Horgan	Level: III	Date: 3-13-03
Authorized Inspector: Robert McGill		Date: 3-18-03

Sheet 2 of 8

DUKE POWER COMPANY
ULTRASONIC INDICATION RECORD FOR PIPING

FORM NDE-UT-10
Revision 0

Station: Catawba	Unit: 2	Component/Weld ID: 2CF100-60	Date: 3/12/2003
Surface Condition: AS GROUND		Item No: C05.011.211	
Examiner: David Zimmerman Level: III		Procedure: NDE-600 Rev: 14	FC: 02-15, 02-16
Examiner: Winfred C. Leeper Level: II		Lo: 9.1.1.2 Configuration: CIRC. WELD	
Calibration Sheet No: 0302049, 0302050		S2-VALVE to S1-ELBOW	Scan Surface: OD

IND #	∠	% FSH	Mp Max	W Max	L Max	L1 20 % FSH	L2 20 % FSH	Beam Dir.	Exam Surf.	Scan	Damps	Remarks
1	60°	1.10	80	0.9	360°	INT.	IND.	2	1	AXIAL	NO	

Reviewed By: NE Hansen	Level: III	Date: 3·13·03	Authorized Inspector: Robert McGill	Date: 3·18·03	Sheet 3 of 8

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1047		NDE-UT-3A
Exam Finish: 1050		Revision 2

Station: Catawba	Unit: 2	Component/Weld ID: 2CF100-60	Date: 3/12/2003
Nominal Material Thickness (in): 0.432		Weld Length (in.): 20.8	Surface Temperature: 61 Deg F
Measured Material Thickness (in): 0.419		Lo: 9.1.1.2	Pyrometer S/N: MCNDE 27227
Surface Condition: AS GROUND		Calibration Sheet No: 0302048	Cal Due: 5/11/2003
Examiner: David Zimmerman Level: III			Configuration: CIRC. WELD
Examiner: Winfred C. Leeper Level: II			S2 Flow S1
Procedure: NDE-640 Rev: 1 FC: *			VALVE to ELBOW

IND NO.	4	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
NRI	0°													

Remarks: * FC 95-19, 02-29, 03-02, 03-04, 03-08

Limitations: see NDE-UT-4 ☐ None: ☒

Sheet 4 of 8

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
M E Hoover	III	3-13-03	Robert McGill	3-18-03	C05.011.211

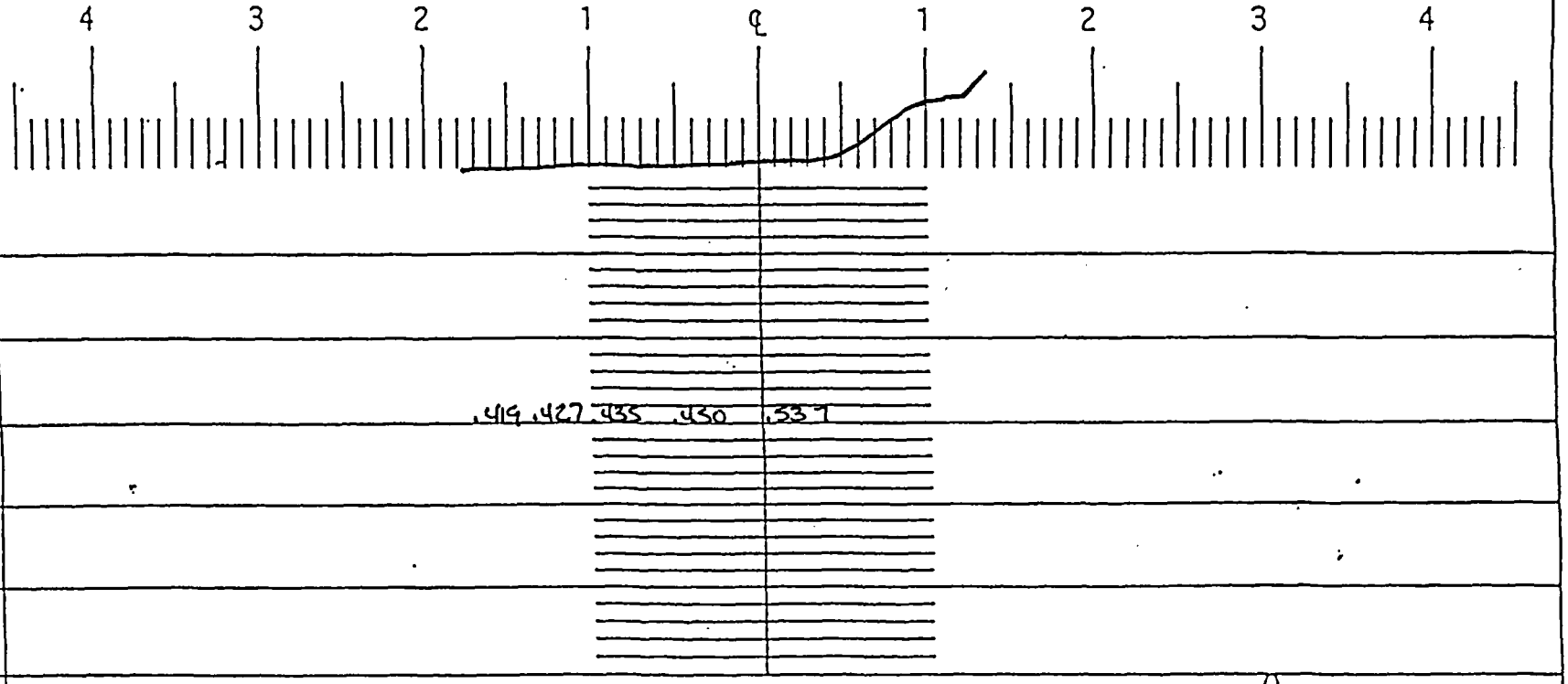
DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

EXAMINATION SURFACE 1 ELBOW WELD VALVE EXAMINATION SURFACE 2

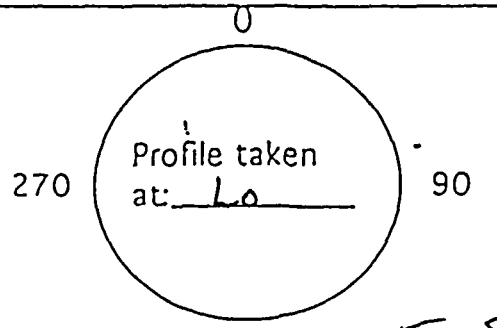


Component ID/Weld No. 2CF100-60

Remarks:

Item No: C05.011.211

Examiner: David K. [illegible]	Level: III	Date: 3/12/03
Reviewed By: D.E. Powers	Level: III	Date: 3.13.03
Authorized Inspector: Robert McGill		Date: 3.18.03



Sheet 5 of 8

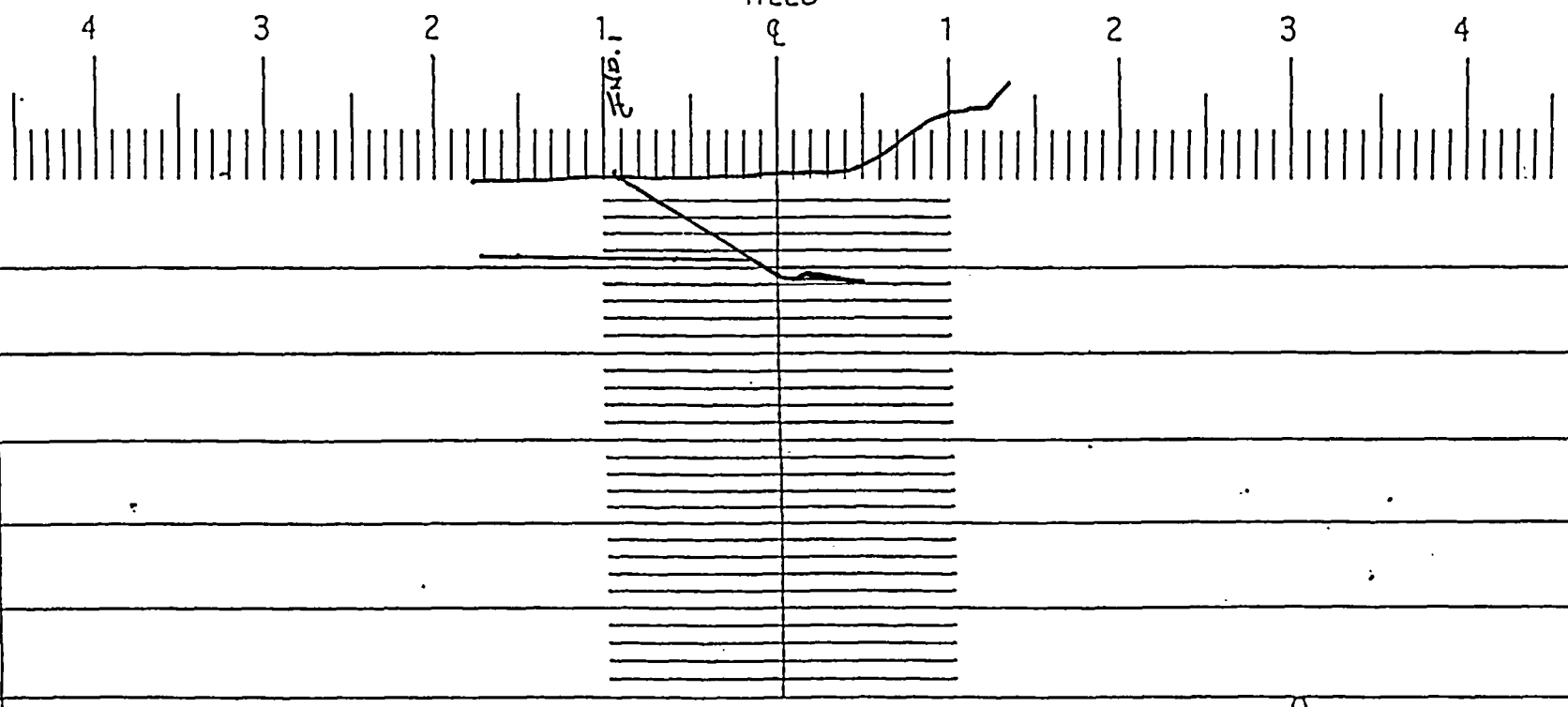
DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

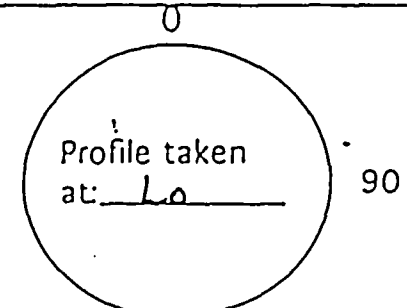
Revision 1

EXAMINATION SURFACE 1 ELBOW WELD VALVE EXAMINATION SURFACE 2



Component ID/Weld No. 2CF100-60

: Remarks:



Item No: C05.011.211

Examiner: David K Z	Level: III	Date: 3/12/03
Reviewed By: DE Boggess	Level: III	Date: 3-13-03
Authorized Inspector: Robert McGill		Date: 3-18-03

Sheet 6 of 8

DUKE POWER COMPANY	Form NDE-UT-8
ULTRASONIC INDICATION RESOLUTION SHEET	Revision 1

Acceptance Standard:

IND. 1 - Geometrical indication from weld root configuration. 70° shear produced less than 50% amplitude. Signal would not hold up to skew. Plotting and review of radiographs support this detemination.

Item No: C05.011.211

Acceptable Indications: 1

Rejectable Indications: None.

These indications have been compared with previous ultrasonic data ☐ Yes ☒ No previous data available

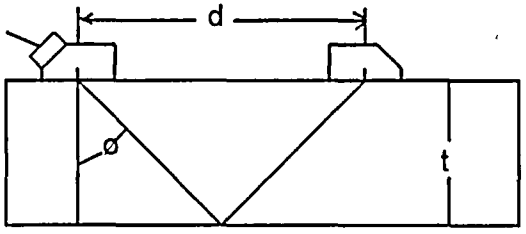
Examiner:	Level:	Date:		Sheet 7 of 8
David Zimmerman David K Z	III	3/12/2003	[redacted]	
Reviewer:	Level:	Date:	Authorized Inspector:	Date:
DE Howser	III	3.13.03	Robert McGill	3.18.03

DUKE POWER COMPANY

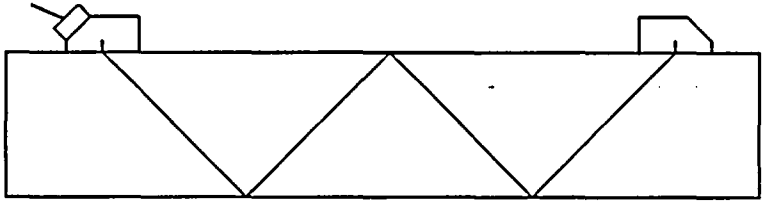
ULTRASONIC BEAM ANGLE MEASUREMENT RECORD

Form NDE-UT-9

Revision 3



$$\tan ø = \frac{(d/2)}{t}$$



For thin wall pipe use 2nd Vee path

$$\tan ø = \frac{(d/2)}{2t}$$

1. Take thickness measurements between . wedge locations.
2. Place search unit on straight turn of pipe, and peak the signal.
3. Measure distance (d) between exit points.
4. Calculate beam angle with formula as shown using measured wall thickness.
5. Use the measured beam angle to determine coverage and when plotting any indications.

Pipe Size: 6.0 IN.

Pipe Schedule: 80

Nominal 45 deg: d= 0 ; t= 0 ; measured angle= 0.00 deg

Nominal 60 deg: d= 2.9 ; t= 0.838 ; measured angle= 59.98 deg

Nominal 70 deg: d= 0 ; t= 0 ; measured angle= 0.00 deg

Item No.
C05.011.211

Examiner	Level	Date	Examiner	Level	Date
David Zimmerman David K Z	III	3/12/2003			
Reviewed By	Level	Date	Authorized Inspector		Date
DE Howard	III	3·13·03	Robert McGill		3-18-03

P8 of 8