Duke Power®
A Duke Energy Company

GARY R. PETERSON
Vice President
Catawba Nuclear Station

Duke Power
CN01VP / 4800 Concord Rd
York, SC 29745

803 831 4251
803 831 3221 fax
grpeters@duke-energy com

August 15, 2002

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

Subject: Duke Energy Corporation
Catawba Nuclear Station, Unit 1
Docket Number 50-413
Request for Relief Number 02-002
Limited Weld Examinations for End of Cycle 13
Refueling Outage

Pursuant to 10 CFR 50.55a(g)(5)(iii), please find attached Request for Relief 02-002. This request for relief is associated with limited weld examinations for 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,

Gary R. Peterson

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

D.J. Roberts, Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

C.P. Patel, Senior Project Manager (addressee only)
U.S. Nuclear Regulatory Commission
Mail Stop O8-H12
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 1 (EOC-13)
Second 10-Year Interval – Inservice Inspection Plan
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
1PZR-W1	RC System Pressurizer Surge Nozzle to Lower Head Weld	Exam Category B-D Item No. B03.110 001 IWB-2500-7 (b) 40 61% Volume Coverage	See Paragraph "A"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W4A	RC System Pressurizer Safety Nozzle to Upper Head Weld	Exam Category B-D Item No B03 110 004 IWB-2500-7 (b) 69 20% Volume Coverage	See Paragraph "B"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W4C	RC System Pressurizer Safety Nozzle to Upper Head Weld	Exam Category B-D Item No B03 110 006 IWB-2500-7 (b) 69 20% Volume Coverage	See Paragraph "B"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W1	RC System Pressurizer Surge Nozzle to Lower Head Inside Radius Section	Exam Category B-D Item No B03 120 001 IWB-2500-7 (b) 72 10% Volume Coverage	See Paragraph "C"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W4A	RC System Pressurizer Safety Nozzle to Upper Head Inside Radius Section	Exam Category B-D Item No B03 120 004 IWB-2500-7 (b) 72 60% Volume Coverage	See Paragraph "D"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W4C	RC System Pressurizer Safety Nozzle to Upper Head Inside Radius Section	Exam Category B-D Item No. B03.120 006 IWB-2500-7 (b) 72.60% Volume Coverage	See Paragraph "D"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"

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
1PZR-W4ASE	RC System Pressurizer Safety Nozzle-to-Safe End Butt Weld	Exam Category B-F Item No B05 040 004 IWB-2500-8(c) 77 28% Volume Coverage	See Paragraph "E"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W4BSE	RC System Pressurizer Safety Nozzle-to-Safe End Butt Weld	Exam Category B-F Item No B05 040 005 IWB-2500-8(c) 86% Volume Coverage	See Paragraph "E"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1PZR-W4CSE	RC System Pressurizer Safety Nozzle-to-Safe End Butt Weld	Exam Category B-F Item No B05 040 006 IWB-2500-8(c) 82 03% Volume Coverage	See Paragraph "E"	See Paragraph "H"	See Paragraph "I"	See Paragraph "L"
1ND38-1	ND System Valve 1ND002A to Pipe Circumferential Weld	Exam Category B-J Item No B09 011.104 IWB-2500-8(c) 61 23% Volume Coverage	See Paragraph "F"	See Paragraph "H"	See Paragraph "J"	See Paragraph "L"
1BRHRHX-5-9	ND System RHR Heat Exchanger Shell-to-Flange Circumferential Weld	Exam Category C-A Item No C01 010 002 IWC-2500-1(a) 55.90% Volume Coverage	See Paragraph "G"	See Paragraph "H"	See Paragraph "K"	See Paragraph "L"

IV. Basis for Relief

Paragraph A:
During the ultrasonic examination of the Pressurizer Surge Nozzle to Lower Head Weld, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 40.61%. Limitations were caused by the nozzle configuration. The percentage of coverage reported represents the aggregate coverage. In order to achieve more coverage, the nozzle would have to be re-designed to allow scanning from both sides of the weld, which is impractical.
(Examination data for ID. 1PZR-W1 is shown in Attachment A)

Paragraph B:
During the ultrasonic examination of the Pressurizer Safety Nozzle to Upper Head Welds, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 69.20%. Limitations were caused by the nozzle configuration. The percentage of coverage reported represents the aggregate coverage. In order to achieve more coverage, the nozzles would have to be re-designed to allow scanning from both sides of the weld, which is impractical.
(Examination data for ID. 1PZR-W4A is shown in Attachment B)
(Examination data for ID. 1PZR-W4C is shown in Attachment C)

Paragraph C:
During the ultrasonic examination of the Pressurizer Surge Nozzle to Lower Head Inside Radius Section, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 72.10%. Limitations were caused by the ratio of the nozzle O.D. to the vessel thickness. When the nozzle O.D. is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Conducting examinations from nozzle boss and OD blend radius using compound angles, determining which angles to use, metal paths to calibrate and area of coverage are not accurate with manual calculations. Duke Energy is investigating the use of computer modeling to solve the limitation problems.
(Examination data for ID. 1PZR-W1 is shown in Attachment D)

Paragraph D:
During the ultrasonic examination of the Pressurizer Safety Nozzle to Upper Head Inside Radius Sections, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 72.60%. Limitations were caused by the ratio of the nozzle O.D. to the vessel thickness. When the nozzle O.D. is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Conducting examinations from nozzle boss and OD blend radius using compound angles, determining which angles to use, metal paths to calibrate and area of coverage are not accurate with manual calculations. Duke Energy is investigating the use of computer modeling to solve the limitation problems.
(Examination data for ID. 1PZR-W4A is shown in Attachment E)
(Examination data for ID. 1PZR-W4C is shown in Attachment F)

Paragraph E:
During the ultrasonic examination of the Pressurizer Safety Nozzle-to-Safe End Welds, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 77.28%, 86%, and 82.03% respectively. Austenitic weld metal characteristics and single sided access caused by the component geometry prevents two-beam path direction coverage of the examination volume.

The most effective ultrasonic technique for the examination of dissimilar metal welds uses refracted longitudinal waves. The longitudinal wave is preferred as the austenitic weld metal and buttering create highly attenuative barriers to shear wave ultrasound. The longitudinal wave is less affected by these difficulties. However, the longitudinal wave is affected by mode conversion when it strikes the inside surface of the safe end or pipe at any angle other than a right angle to the surface.

The calculations below show that a 45^0 refracted longitudinal wave striking the inside surface of a pipe will produce a 22.9^0 refracted shear wave in addition to the normally expected 45^0 reflected longitudinal wave.

$$\sin^{-1} = (\sin 45^0 \times V_s) \div V_L$$

$$= (0.707 \times 0.123) \div 0.223$$

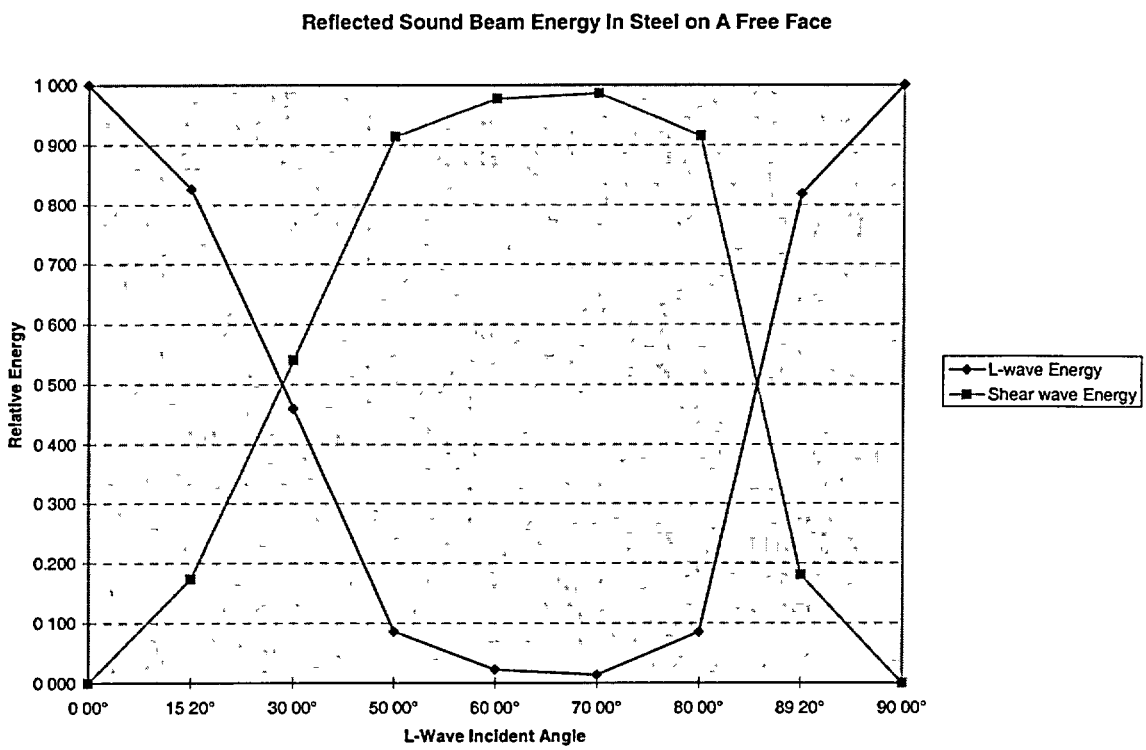
Where; $\sin^{-1}$ is the shear wave angle

V_s is the shear wave velocity of the stainless steel safe end material in inches / msec.

V_L is the longitudinal wave velocity of the stainless steel safe end material in inches/msec.

As shown in the graph below, the mode conversion process creates two sound beams of differing intensities reflecting off the inside surface[1]. At incident angles greater than 30 degrees, the shear wave is attenuated and scattered by the austenitic weld metal and the layer of buttering. The examination sensitivity is degraded to such an extent that any examination using the second sound path leg is meaningless. Therefore, the two-beam path direction coverage requirement is impractical.

In order to obtain the required two-beam path direction coverage, welds would have to be re-designed to allow scanning from both sides



[1]Firestone, F.A : Tricks with the Supersonic Reflectoscope, J. Soc. Nondestructive Testing, vol. 7, no. 2, Fall 1948.

(Examination data for ID. 1PZR-W4ASE is shown in Attachment G)
(Examination data for ID. 1PZR-W4BSE is shown in Attachment H)
(Examination data for ID. 1PZR-W4CSE is shown in Attachment I)

Paragraph F:
During the ultrasonic examination of Valve 1ND002A to Pipe Weld 1ND38-1, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 61.23%. Limitations were caused by the single sided access due to the valve configuration. In order to achieve more coverage, the valve configuration would have to be re-designed to allow scanning from both sides of the weld, which is impractical.
(Examination data for ID. 1ND38-1 is shown in Attachment J)

Paragraph G:
During the radiographic examination of Residual Heat Removal Heat Exchanger Shell to Flange Weld 1BRHRHX-5-9, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 55.90%. Limitations were caused by the heat exchanger's shell-to-flange configuration. In order to achieve more coverage, the heat exchange would have to be disassembled at the flange connection and the upper and lower sections of the vessel separated allowing access for the placement of the radiographic film on the inside surface of the weld, which is impractical. Ultrasonic examination of this weld and adjacent base metal would also require the disassembly of the flange connection; which is impractical.
(Examination data for ID. 1BRHRHX-5-9 is shown in Attachment K)

V. Alternate Examinations or Testing

Paragraph H:
Duke Energy proposes to use the pressure test and VT-2 visual examination to compliment the limited examination coverage. The Code requires (reference Table IWB-2500-1, Item Numbers B15.20, B15.40 and B15.50) that a system leakage test be performed after each refueling outage. Additionally a system hydrostatic test (reference Table IWB-2500-1, Item Numbers B15.21, B15.41 and B15.51) is required once during each 10-year inspection interval. These tests require a VT-2 visual examination for evidence of leakage. This testing will provide adequate assurance of pressure boundary integrity.

VI. Justification for Granting Relief

Paragraph I:
These Pressurizer nozzle-to- head welds/inside radius sections/ nozzle-to-safe end butt welds are located inside containment and are part of the reactor coolant system pressure boundary. General Design Criterion 30, "Quality of Reactor Coolant Pressure Boundary," of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," mandates that means be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage. If a leak were to develop at these weld locations, 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 these aforementioned locations, the only corrective action would be shutdown and depressurize the reactor coolant system, since the components are non-isolable.

Plant Technical Specifications dictate that a reactor coolant system water inventory balance be performed on a regular basis. A normal operating practice is to perform this computer based mass balance on a daily frequency and/or whenever the operators suspect any abnormal changes to other leakage detection systems. Plant Technical Specification requires that if the leak rate cannot be reduced below 1 gpm unidentified that the plant be put in hot standby within 6 hours and in cold shutdown within the following 30 hours. Leakage as a result of a failed weld discussed in this section would show up as unidentified leakage and subject to the 1 gpm limit.

Other leakage detection systems available to the operator and dictated per plant technical specifications are:

- Containment Atmosphere Gaseous and Particulate Radioactivity Monitoring System (EMF monitors 38 & 39) which would detect airborne radiological activity;
- Containment Floor and Equipment Sump Level Monitoring Subsystem where unidentified accumulated water on the containment floor would be monitored and evaluated as sump level changes;
- Containment Ventilation Unit Condensate Drain Tank Level Monitoring Subsystem which collects and measures as unidentified leakage the moisture removed from the containment atmosphere.

Additionally, other indicators are also available to the operator that a leak exists or may be developing:

- Containment Atmosphere Iodine Monitor (EMF 40)
- Charging / Letdown system mismatches;
- Containment humidity indications;
- Pre-Cycle walkdowns performed each outage while system is at operating temperature and pressure prior to criticality;
- Post-Cycle walkdowns performed at operating temperature and pressure performed during unit shutdown.

Paragraph J:
ND system Valve 1ND002A to pipe weld 1ND38-1 is located inside containment. If a leak were to develop at this weld location discussed in this relief request, 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 probable corrective action would be shutdown and depressurize the steam generators, since the weld is non-isolable.

Other leakage detection systems available to the operator and dictated per plant technical specifications are:

- Containment Atmosphere Gaseous and Particulate Radioactivity Monitoring System (EMF monitors 38 & 39) which would detect airborne radiological activity;
- Containment Floor and Equipment Sump Level Monitoring Subsystem where unidentified accumulated water on the containment floor would be monitored and evaluated as sump level changes;
- Containment Ventilation Unit Condensate Drain Tank Level Monitoring Subsystem which collects and measures as unidentified leakage the moisture removed from the containment atmosphere.

Additionally, other indicators are also available to the operator that a leak exists or may be developing:

- Containment humidity indications;
- Low FWST Level annunciator;
- Pre-Cycle walkdowns performed each outage while system is at operating temperature and pressure prior to criticality;
- Post-Cycle walkdowns performed at operating temperature and pressure performed during unit shutdown.

Paragraph K:
Weld 1BRHRHX-5-9 on the ND Heat Exchanger is used to cool the water from the reactor coolant system (RCS) in Residual Heat Removal (RHR) mode or the Containment Sump in Containment Sump Recirculation. The ND System is normally in standby during power operations. When the RCS is less than 350° F, the ND system is aligned to RHR mode and the ND Heat Exchanger is used to remove decay heat during shutdown operations. In emergency core cooling mode, the Heat Exchanger is used to remove the heat energy from containment prior to the ND system returning the water back to containment.

The area that contains this Heat Exchanger to flange weld is surveyed twice a day by Operations during their routine rounds. One of the items that must be checked off is the general condition of the room containing the Heat Exchanger. It is reasonable for the operator making these rounds to detect any external leaks from this weld.

This same area is also surveyed once a week by a periodic test that is used to specifically look for radioactive leaks outside containment. This area must be surveyed and signed off. If a leak were encountered, it would be written up in a work request and Problem Investigation Process form filled out. The Fluid Leak Management Process then examines the leak. The leak is either repaired or set up for periodic monitoring. A leak in the ND system would also have to be entered into the Emergency Core Cooling System Leakage Program.

VII. Implementation Schedule

Paragraph L:
The scheduled second 10-year interval plan code examination was performed on the referenced welds and inside radius sections resulting in limited volumetric coverage. No additional examinations are planned for the welds or inside radius sections during the current inspection interval. The same welds or inside radius sections 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 V
Tim Tucker (NDE Level III Inspector) provided RT related information for Sections II through V
David Goforth (CNS Systems Engineer) provided Section VI
Andy Hogge (Sponsor) compiled the remaining sections

Sponsored By: A. J. Hogge, Jr. **Date** 7-30-2002

Approved By: R. Kevin Rhyne **Date** 7/30/02

Form N. 520
Revision 0

DUKE POWER COMPANY

ULTRASONIC DATA SHEET FOR PLANER REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: CNS	Unit: I	Component/Weld ID: 1PZR-W1	Date: 5/01/02

Weld Length (in): 77.0	Surface Condition: As ground	Lo 9.2.1	Exam Start: 1010	Exam Finish: 1018

Procedure No: PDI-UT-6	Scans	Configuration		Calibration Sheet No:
Revision: E	60° 68 dB Zone I 60° 68 dB Zone II	CIRC. WELD	Surface Temp. 91 °F	0201028
FC N/A	60° ____ dB Zone III Axial	Scan Surface: OD	Pyrometer s/n: MCNDE27228	0201029
	60° ____ dB Zone III Circ.		Cal. Due Date: 07/03/02	

Indication #	∠	MP max	% FSH	L max	W max	SU LOCATION	BEAM DIRECTION	SCAN ⊥ =	REMARKS
NRI	60								

> 90% Coverage obtained: yes ☐ no ☒ (see NDE-UT-4) Limitation report is required

Item No: B03.110.001

Examiner: David K. Zimmerman Level III 5/01/02 Examiner: Winfred C. Leeper Level II Date: 5/01/02

Reviewed by: ME Houser Level: III Date: 5/15/02 Authorized Inspector: Robert McGill Date: 5-22-02

Page 1 of 8

REQUEST FOR RELIEF #02-002 ATTACHMENT A

ASH 6/5/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W1 | Item No. B03.110.001 | Remarks.

☐ NO SCAN
☒ LIMITED SCAN
SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM WO 3.0" to BEYOND
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM N/A DEG to N/A DEG

* There are 20(.75" dia) Heater Tubes.
60° L loss - 3.2" @ 64.0 in.

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

NOZZLE 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

Prepared By: Daniel K [illegible] Level: III Date: 5/01/02 | Sketch(s) attached ☐ yes ☐ no | Sheet 2 of 8

Reviewed By: N E Hansen Date: 5/15/02 | Authorized Inspector: Robert McGill Date: 5-22-02

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 ATTACHED DRWGS - 16.48 SQ. IN.	77.0 IN. X 16.48 SQ. IN. = 1268.96 CU. IN.

Coverage Calculations

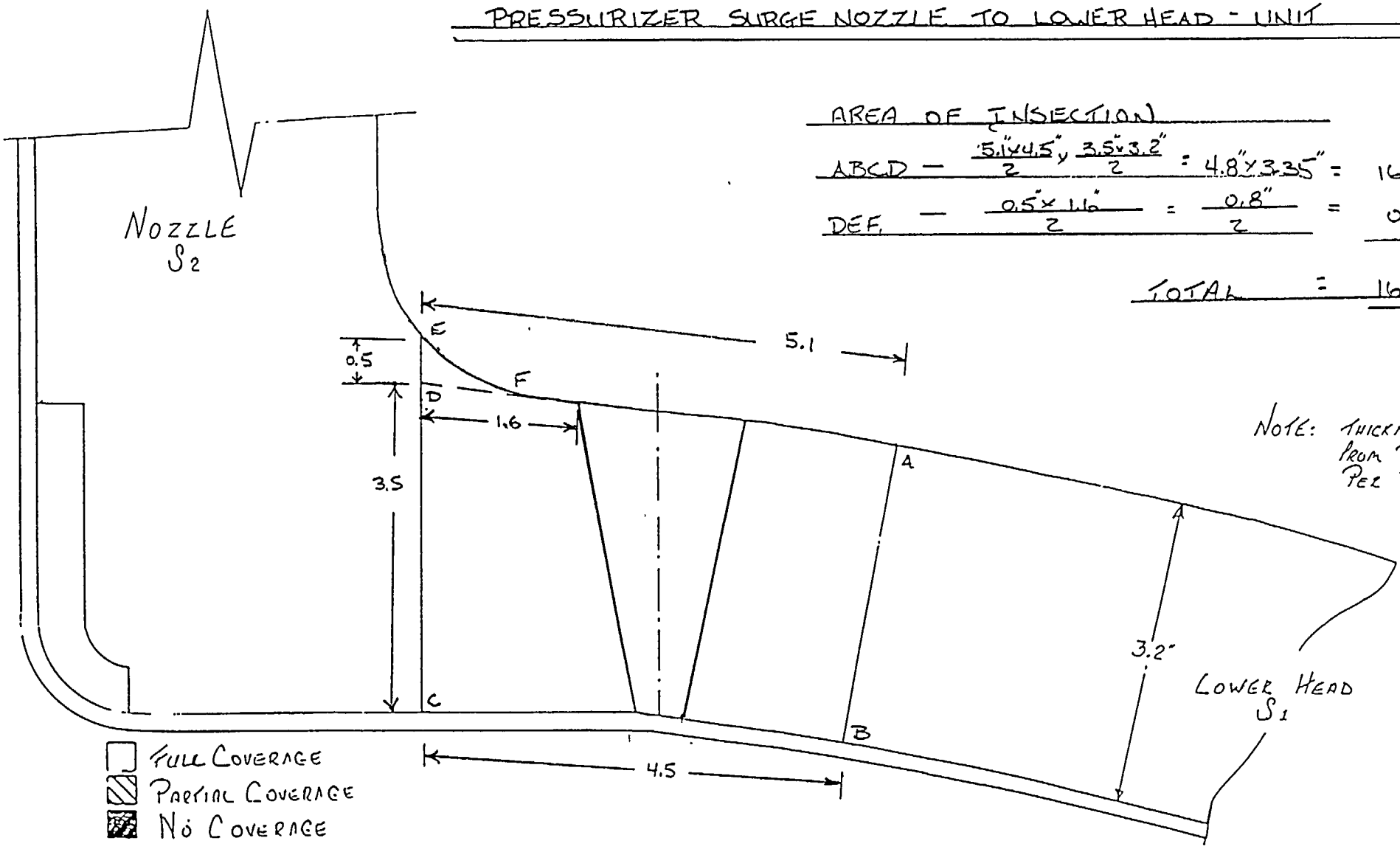
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°	CW	9.28	77.0	714.56	1268.96	
2	60°	CCW	9.28	77.0	714.56	1268.96	
3	60°	S1	2.52	77.0	194.04	1268.96	
4	60°	S2	3.85	64.0	246.4	1054.72	
4	60°	S2	14.75	13.0	191.75	214.24	
					2061.31	5075.84	40.61

Item No: B03.110.001

Prepared By: David K. [illegible] Level: III Date: 5/01/02

Reviewed By: M.E. Hausen Level: III Date: 5/15/02

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT



AREA OF INSPECTION

ABCD — $\frac{5.1" \times 4.5"}{2}$, $\frac{3.5" \times 3.2"}{2}$ = 4.8" x 3.35" = 16.08"

DEF — $\frac{0.5" \times 1.6"}{2}$ = $\frac{0.8"}{2}$ = 0.40"

TOTAL = 16.48 in²

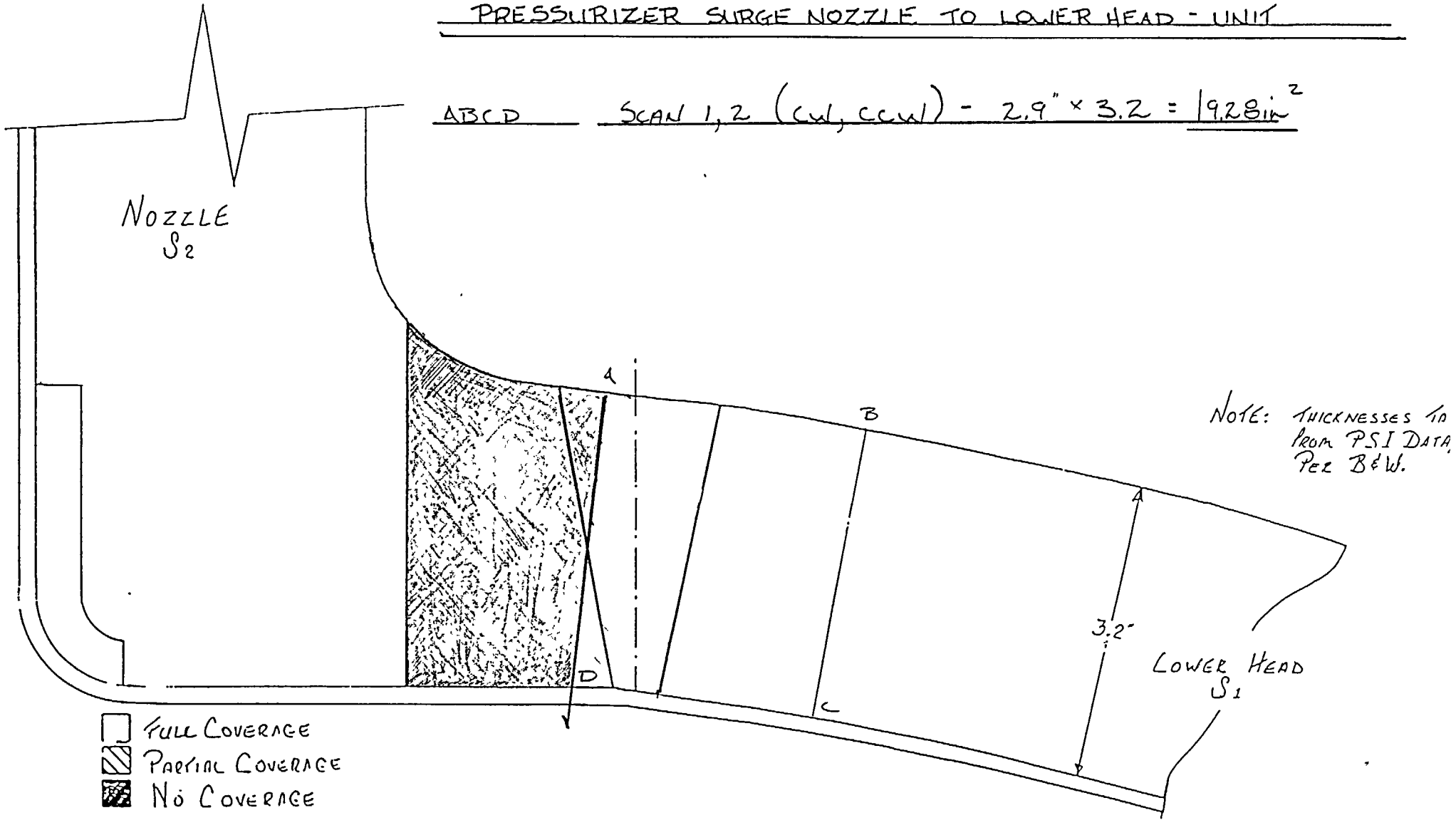
NOTE: THICKNESSES FROM PSI DA PER B&W.

PS 4 of 8

ITEM No.	B03.110.001
I.D. No	1PER-W1
DATE	5/01/02
TIED	[illegible]

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT

ABCD SCAN 1, 2 (CW, CCW) - 2.9" × 3.2 = 9.28 in²



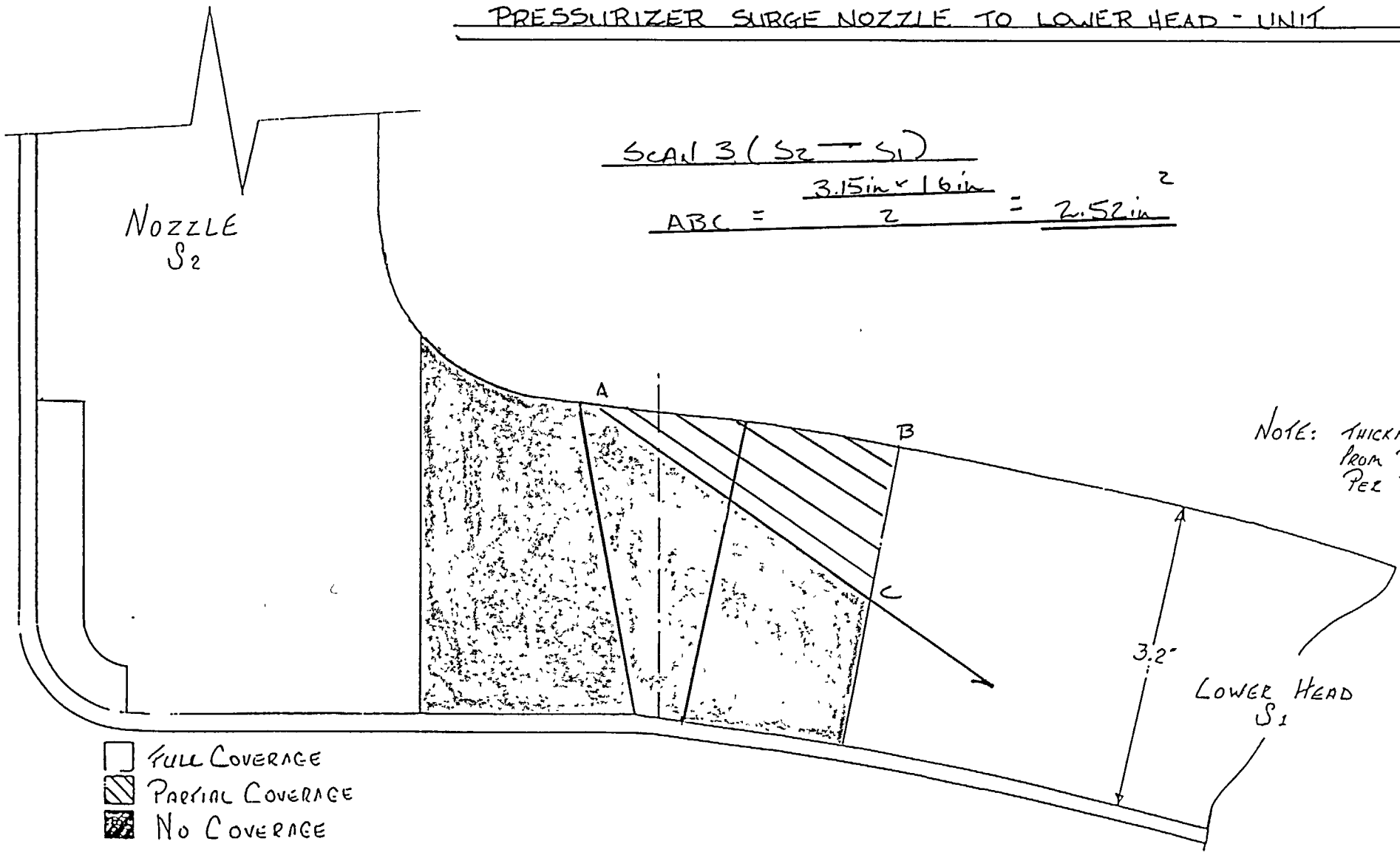
PS5 OF 8

ITEM No.	B03.110.001
I.D. No	1PZR-W11
DATE	5/01/02
INSP	David K. [illegible] II

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT

SCAN 3 (S_2 — S_1)

$$ABC = \frac{3.15in \times 1.6in}{2} = 2.52in^2$$



NOTE: THICKNESSES TAKEN FROM PSI DATA, PER B&W.

PS 6 OF 8

ITEM No.	B03.110.001
I.D. No	IPZR - W1
DATE	5/01/02
TIED	David K. [illegible] III

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT

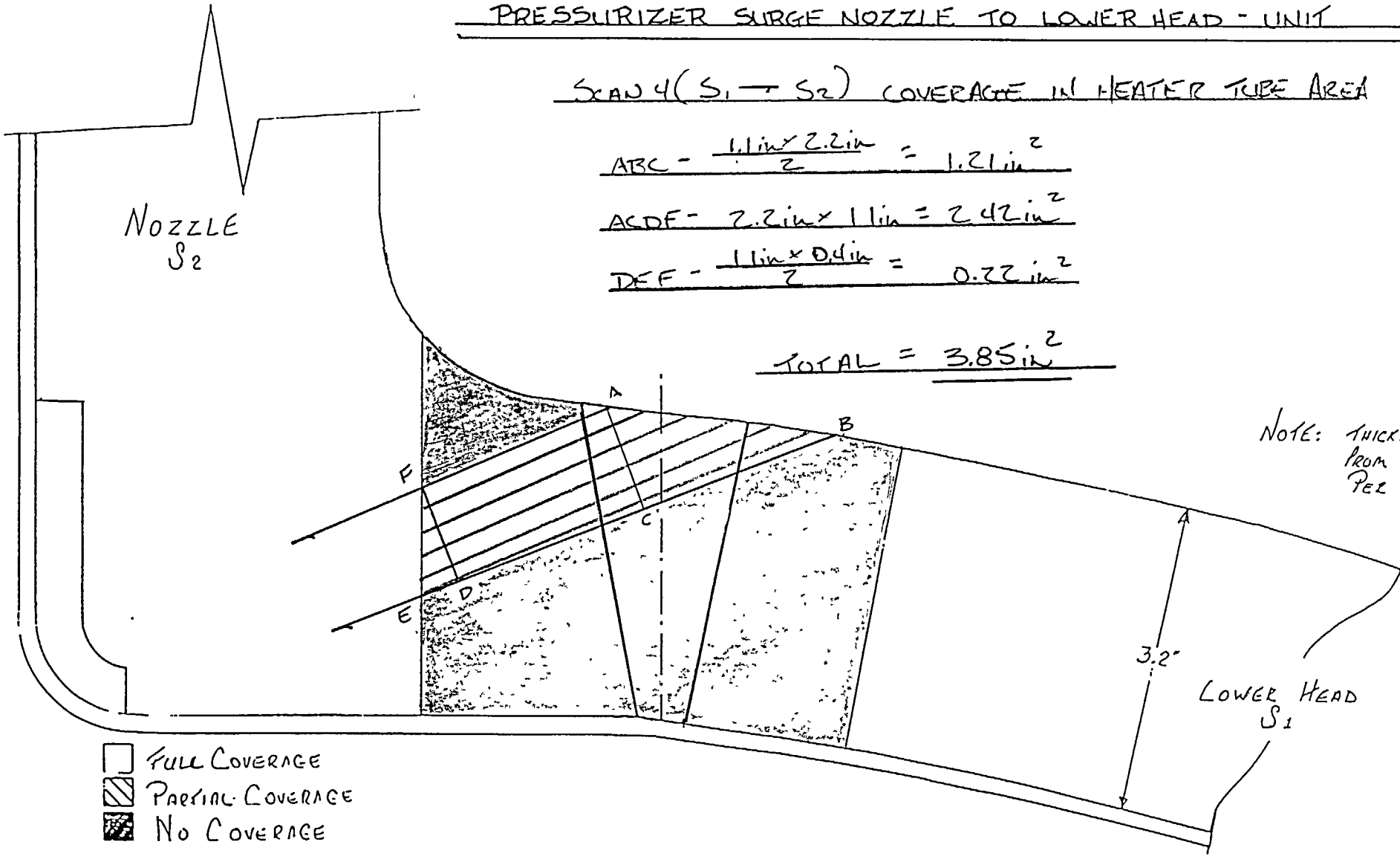
SCAN 4 ($S_1 - S_2$) COVERAGE IN HEATER TUBE AREA

$ABC = \frac{1.1in \times 2.2in}{2} = 1.21 in^2$

$ACDF = 2.2in \times 1.1in = 2.42 in^2$

$DEF = \frac{1.1in \times 0.4in}{2} = 0.22 in^2$

$TOTAL = 3.85 in^2$



NOTE: THICKNESSES TAKEN FROM PSI DATA, PER B&W.

PS 7 OF 8

ITEM No.	B03.110.001
I.D. No	1PZR-W1
DATE	5/01/02
[illegible]	[illegible]

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT

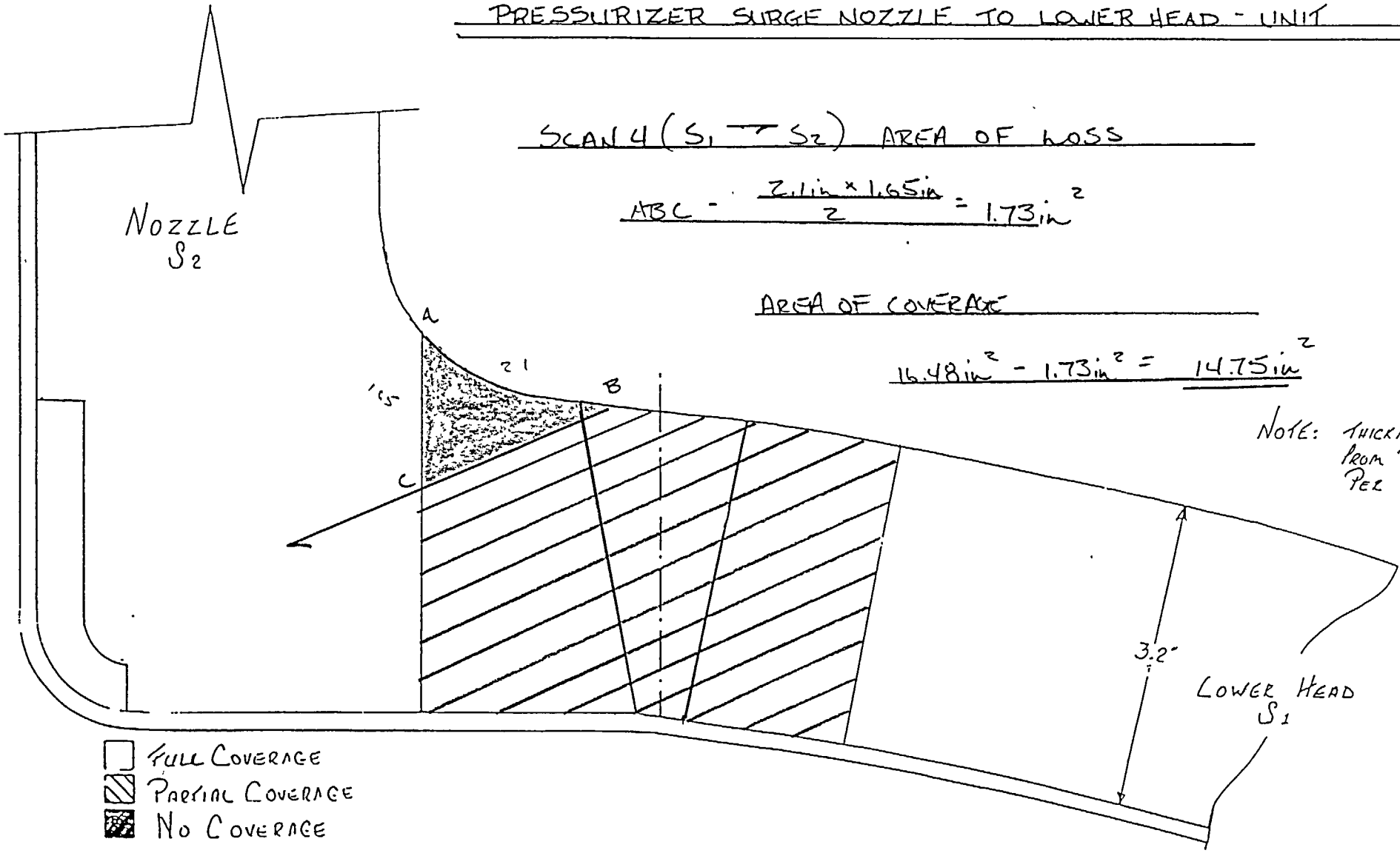
SCAN 4 (S_1 — S_2) AREA OF LOSS

$$ABC = \frac{2.1in \times 1.65in}{2} = 1.73in^2$$

AREA OF COVERAGE

$$16.48in^2 - 1.73in^2 = 14.75in^2$$

NOTE: THICKNESSES TAKEN FROM PSI DATA, PER B&W.



PS 8 of 8

ITEM No.	B03.110.001
I.D. No	1PZR-W11
DATE	5/01/02
[illegible]	[illegible]

Form N' 620
Rev...on 0

DUKE POWER COMPANY
ULTRASONIC DATA SHEET FOR PLANER REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: CNS	Unit: 1	Component/Weld ID: 1PZR-W4A	Date: 4/29/02

Weld Length (in): 47.1	Surface Condition: As ground	Lo Top of Nozzle	Exam Start: 0400	Exam Finish: 0410

Procedure No: PDI-UT-6	Scans	Configuration		Calibration Sheet No.
Revision: E	60° 67.5 dB Zone I 60° 67 5 dB Zone II	CIRC. WELD	Surface Temp. 81 °F	0201041
FC N/A	60° dB Zone III Axial	Scan Surface: OD	Pyrometer s/n: MCNDE27228	0201042
	60° dB Zone III Circ.		Cal. Due Date: 07/03/02	

Indication #	∠	MP max	% FSH	L max	W max	SU LOCATION	BEAM DIRECTION	SCAN ⊥ =	REMARKS
NRI	60								

> 90% Coverage obtained: yes ☐ no Ξ (see NDE-UT-4) Limitation report is required

Item No: B03.110.004

Examiner: David K. Zimmerman Level III 4/29/02 Examiner: Winfred C. Leeper Level II Date: 4/29/02

Reviewed by: DE Hansen Level: III Date: 5/15/02 Authorized Inspector: Robert Mellit Date: 5-22-02

Page 1 of 7

REQUEST FOR RELIEF #02-002 ATTACHMENT B

AJH 6/5/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4A | Item No: B03.110.004 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L _____. to L _____ INCHES FROM WO 1.5. to BEYOND

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

NOZZLE 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 ____

Prepared By: David [illegible] Level: III Date: 4/29/02 | Sketch(s) attached ☐ yes ☐ no | Sheet 2 of 7

Reviewed By: DE Hansen III Date: 5/15/02 | Authorized Inspector: Robert McGee Date: 5-22-02

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
15.5 SQ. IN. SEE ATTACHED DRWG	

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°	CW	11.78	50 3	592 5	779.7	
2	60°	CCW	11.78	50 3	592 5	779 7	
3	60°	S2	15.15	50 3	762	779.7	
4	60°	S1	4 2	50 3	211.3	779 7	
					2158.3	3118.8	69 20

Item No. B03.110.004

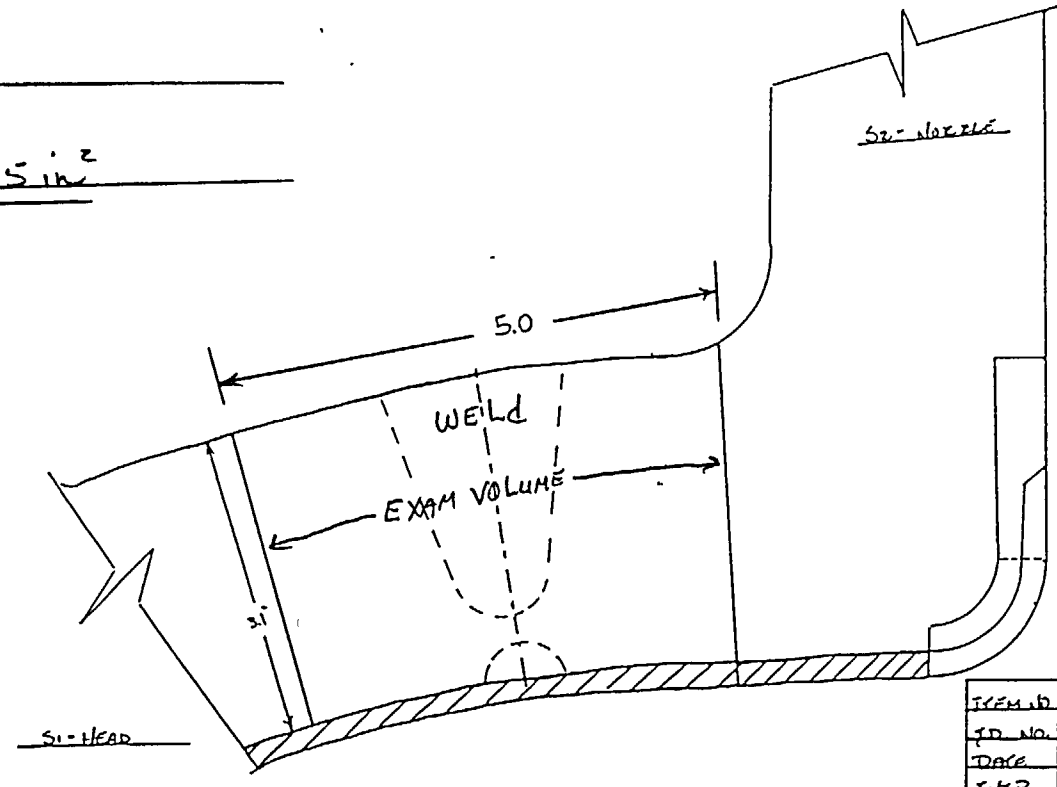
Prepared By: David K. [illegible] Level III Date. 4/29/02

Reviewed By: N E Hansen Level III Date: 5/15/02

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

FULL AREA OF INSPECTION

3.1in × 5.0in = 15.5 in²



ITEM NO	B03.110.001
ID NO.	1PZR-W4A
DATE	4/29/02
INSP	[illegible]

FULL COVERAGE

PARTIAL COVERAGE

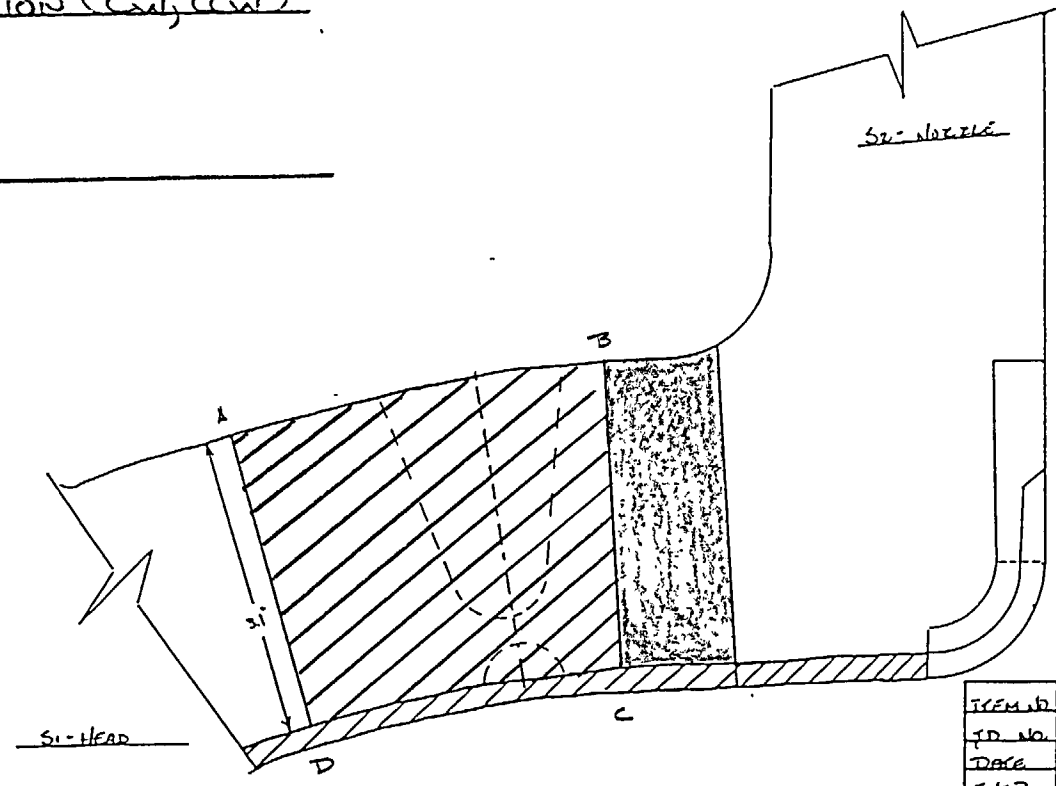
NO COVERAGE

SCALE: 1/2" = 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

SCAN 1,2 COVERAGE CALCULATION (CW, CCW)

ABCD - 3.8in × 3.1in = 11.78in²



ITEM NO	B03.110.004
ID NO.	1PZR-WHA
DATE	4/29/02
INSP	David K.

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

PS 5 OF 7

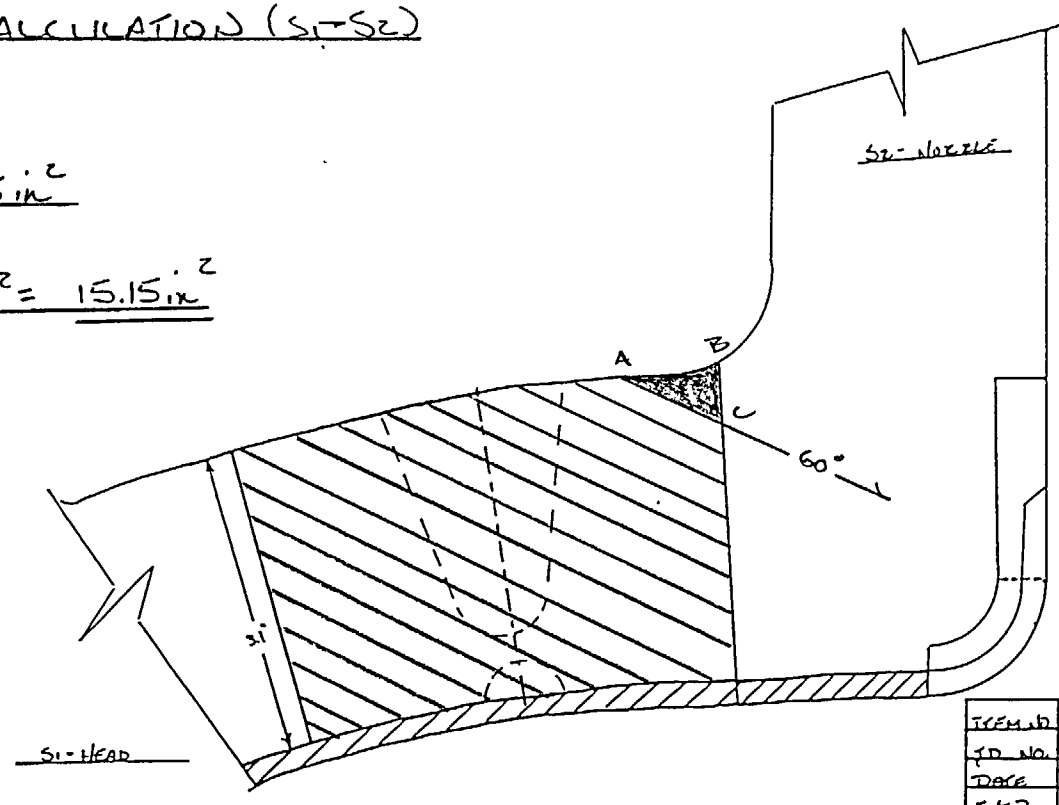
SCALE: ½" = 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

SCAN 3 - COVERAGE CALCULATION (S1-S2)

ABC - $\frac{1.0\,in \times 0.7\,in}{2} = 0.35\,in^2$

TOTAL AREA @ $15.5\,in^2 - 0.35\,in^2 = 15.15\,in^2$



ITEM ID	B03.110.004
ID NO.	1PER-W4A
DATE	4/29/03
INSP	Donald K. [illegible]

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

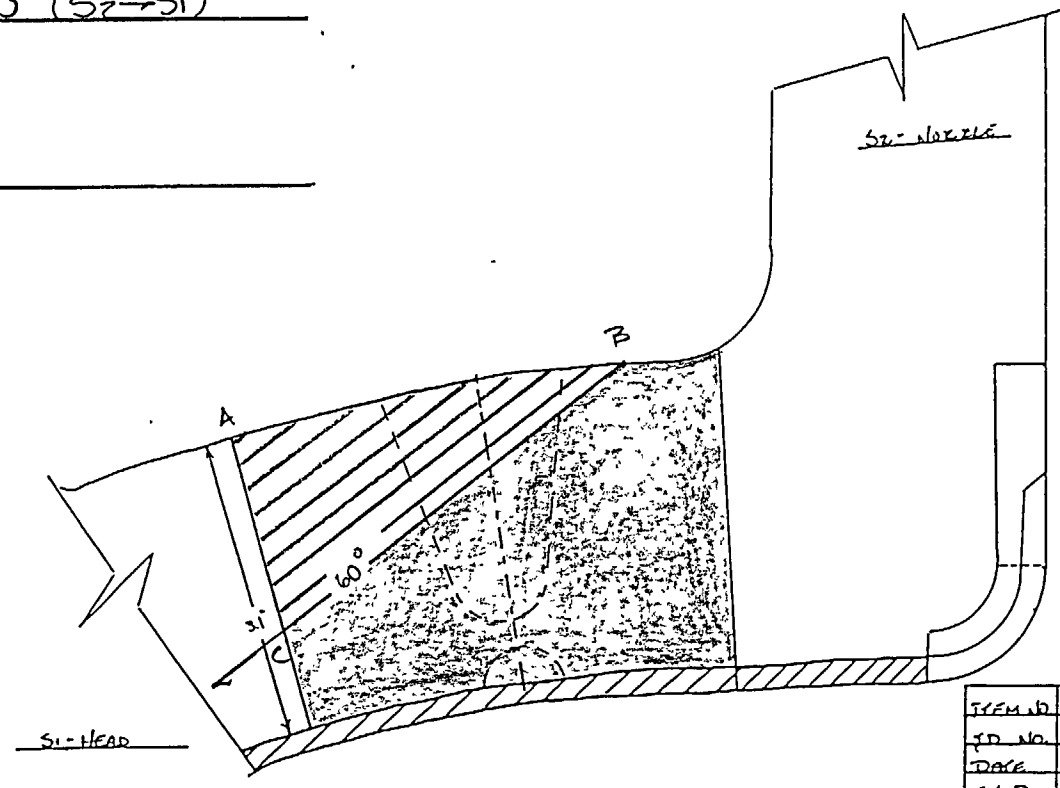
PS6 of 7

SCALE: 1/2" = 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

SCAN 4 COVERAGE CALCULATION (S2→S1)

$$ADC = \frac{2.1in \times 4.0in}{2} = 4.2in^2$$



ITEM NO	B03.110.004
ID NO.	1PZR-W4A
DATE	4/29/02
INSP	Daniel K. [illegible]

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

PS 7 of 7

SCALE: 1/2" = 1"

Form N 620
Re..sion 0

DUKE POWER COMPANY

ULTRASONIC DATA SHEET FOR PLANER REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: CNS	Unit: 1	Component/Weld ID: 1PZR-W4C	Date: 4/29/02

Weld Length (in): 47.1	Surface Condition: As ground	Lo Top of Nozzle	Exam Start: 0410	Exam Finish: 0420

Procedure No: PDI-UT-6	Scans	Configuration		Calibration Sheet No:
	60° 67.5 dB Zone I 60° 67 5 dB Zone II		Surface Temp. 81 °F	0201041
Revision: E	60° dB Zone III Axial	CIRC. WELD	Pyrometer s/n: MCNDE27228	0201042
FC N/A	60° dB Zone III Circ	Scan Surface: OD	Cal. Due Date: 07/03/02	

Indication #	∠	MP max	% FSH	L max	W max	SU LOCATION	BEAM DIRECTION	SCAN ⊥ =	REMARKS
NRI	60								

> 90% Coverage obtained: yes ☐ no Ξ (see NDE-UT-4) Limitation report is required

Item No: B03.110.006

Examiner: David K. Zimmerman Level III 4/29/02 Examiner: Winfred C. Leeper Level II Date: 4/29/02

Reviewed by: DE Hansen Level: III Date: 5/15/02 Authorized Inspector: Robert McKee Date: 5-22-02

Page 1 of 7

REQUEST FOR RELIEF #02-002 ATTACHMENT C

AJH 6/5/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4C | Item No: B03.110.006 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L _____ to L _____ INCHES FROM WO 1.5 to BEYOND

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

NOZZLE 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. [illegible] Level: III Date: 4/29/2002 | Sketch(s) attached ☐ yes ☐ no | Sheet 2 of 7

Reviewed By: D E Houser III Date: 5/15/02 | Authorized Inspector: Robert McKee Date: 5-22-02

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
15 5 SQ. IN. SEE ATTACHED DRWG	

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in)	Length Examined (in.)	Volume Examined (cu.in)	Volume Required (cu in)	Percent Coverage
1	60°	CW	11.78	50 3	592 5	779.7	
2	60°	CCW	11.78	50 3	592.5	779.7	
3	60°	S2	15.15	50 3	762	779.7	
4	60°	S1	4.2	50 3	211.3	779.7	
					2158 3	3118 8	69.20

Item No: B03.110.006

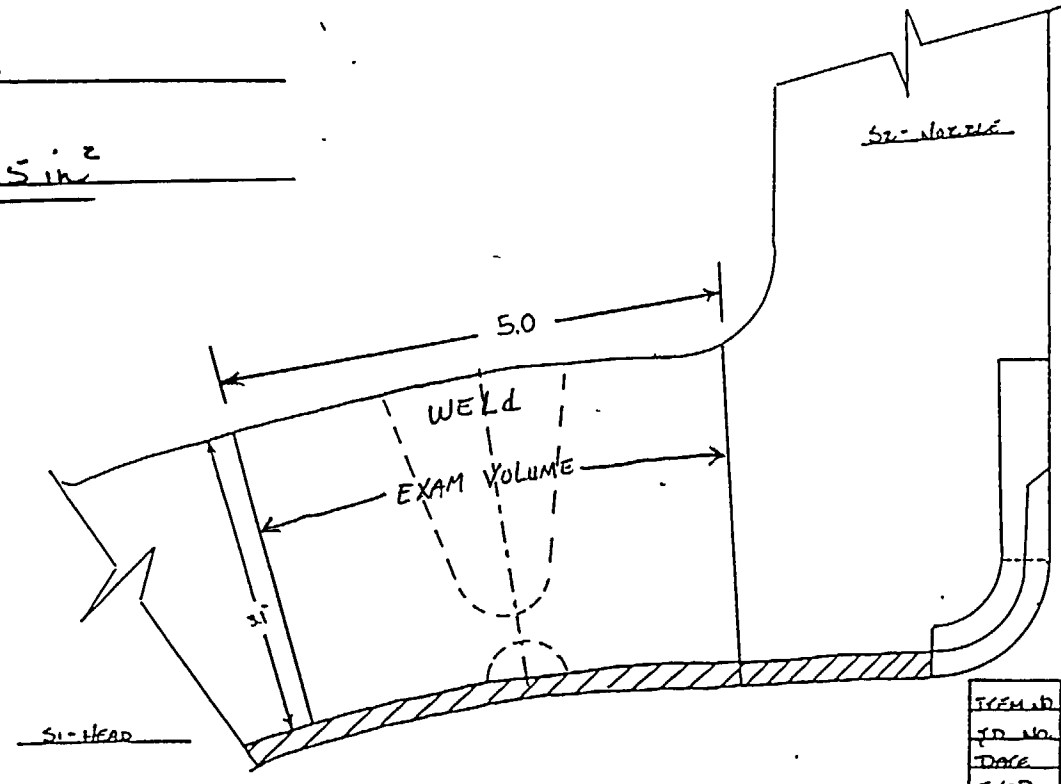
Prepared By: David K. [illegible] Level: III Date: 4/29/02

Reviewed By: D E Hausen Level III Date: 5/15/02

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

FULL AREA OF INSPECTION

3.1in × 5.0in = 15.5 in²



ITEM ID	B03.110.006
ID NO.	1PZR-W4C
DATE	4/29/02
INSP	Daniel K. [illegible]

Pg 4 of 7

FULL COVERAGE

PARTIAL COVERAGE

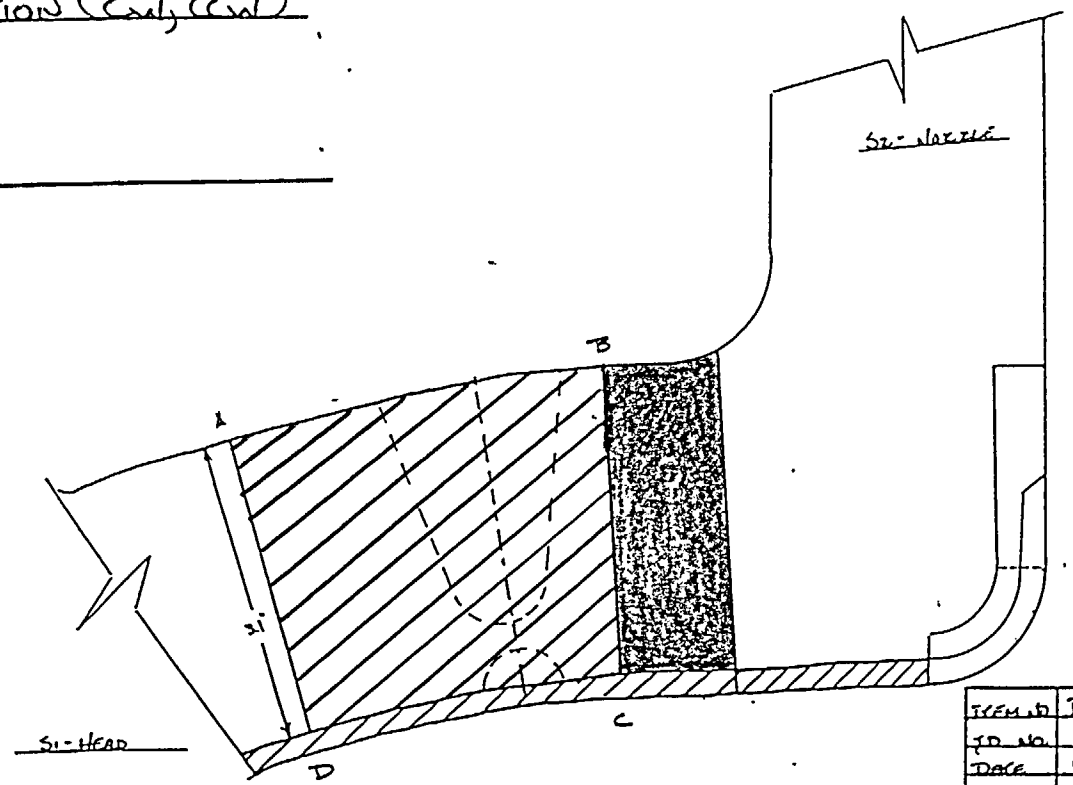
NO COVERAGE

SCALE: 1/2" = 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

SCAN 1,2 COVERAGE CALCULATION (Only Cov)

ABCD - 3.8in x 3.1in = 11.78in²



ITEM ID	R03.110.006
ID NO.	1PZR-WHC
DATE	4/29/02
INSP	David K. [illegible]

PG 5 of 7

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

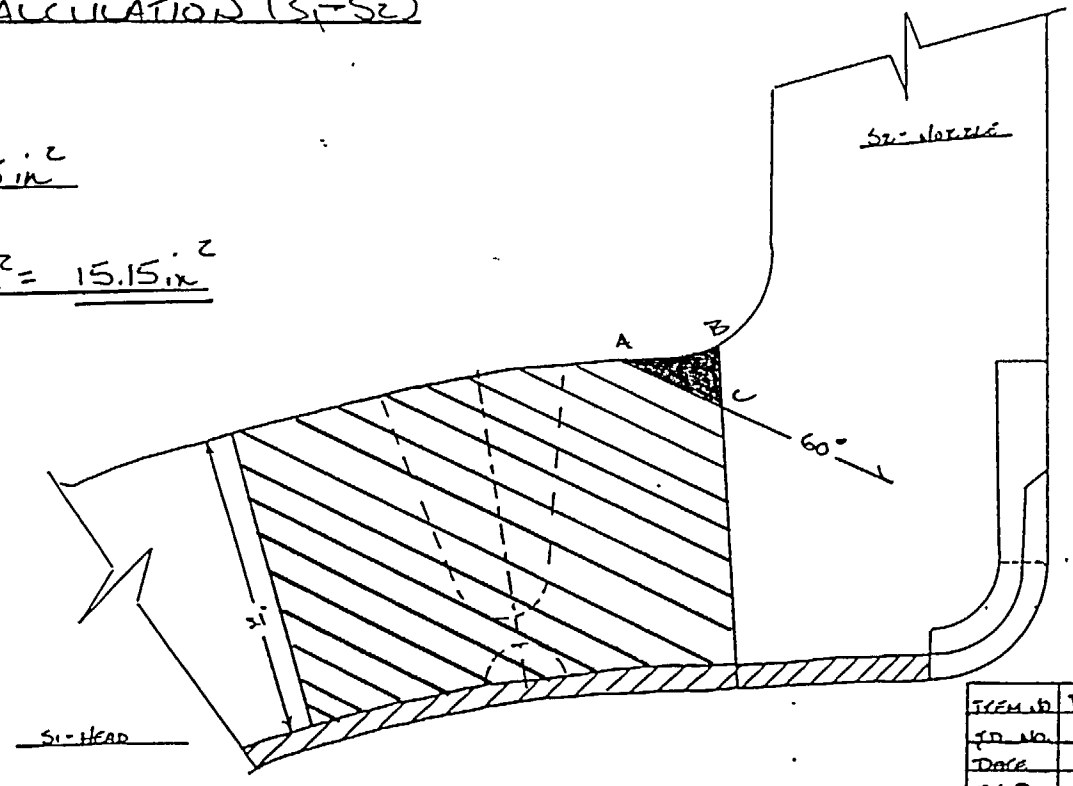
SCALE - 1/2" = 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

SCAN 3 - COVERAGE CALCULATION (S1-S2)

$ABC = \frac{1.0in \times 0.7in}{2} = 0.35 in^2$

TOTAL AREA @ $15.5 in^2 - 0.35 in^2 = 15.15 in^2$



ITEM NO	B03.110.006
ID NO.	1PZR-W4C
DATE	4/29/02
INSP	David K. B

PS 6 of 7

FULL COVERAGE

PARTIAL COVERAGE

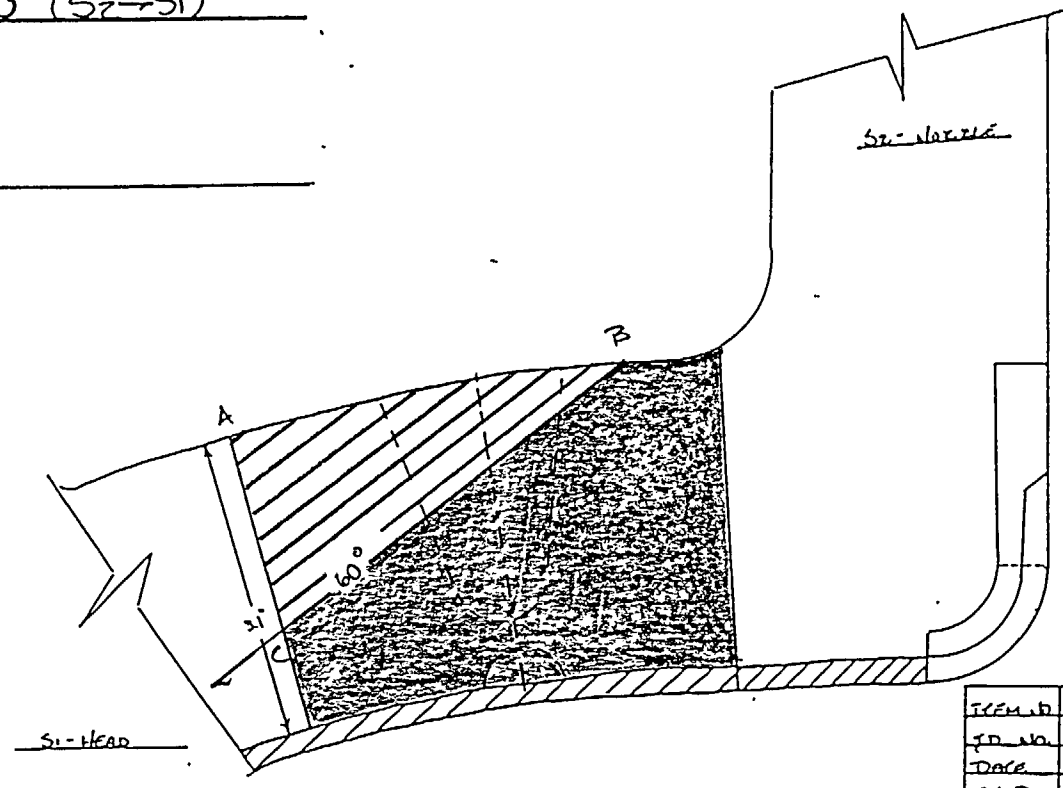
NO COVERAGE

SCALE - 1/2" = 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

SCAN 4 COVERAGE CALCULATION (S2→S1)

$$ADC = \frac{2.1in \times 4.0in}{2} = 4.2in^2$$



ITEM ID	B03.110.006
ID NO.	1PZR-W4C
DATE	4/29/02
INSP	Daniel K. [illegible]

PS 7 OF 7

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

SCALE - 1/2" = 1"

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1024	Form NDE-UT-2A	
Exam Finish: 1045	Revision 4	

Station: Catawba	Unit: 1	Component/Weld ID: 1PZR-W1	Date: 5/1/1902
Weld Length (in.): N/A	Surface Condition: AS GROUND	Lo: 9.2.3	Surface Temperature: 91 ° F

Examiner: David Zimmerman Level: III

Examiner: Winfred C. Leeper Level: II

Procedure: NDE-680 Rev: 2 FC: 02-03

Calibration Sheet No: 0201030, 0201031

Scans:

45 ☐ _____ dB 70 ☐ 68.0 dB

45T ☐ _____ dB 70T ☐ _____ dB

60 ☐ 68.0 dB

60T ☐ _____ dB

Other: _____ dB

Pyrometer S/N: MCNDE 27228

Cal Due: 7/3/2002

Configuration: INNER RADIUS

N/A Flow N/A

_____ to _____

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: *

IND #	4	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	60/70														

Remarks: * 60° @ 14° - 70° @ 11°

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

Sheet 1 of 6

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
DE Hansen	III	5/15/02	Robert McLeod	5-22-02	B03.120.001

REQUEST FOR RELIEF # 02-002 ATTACHMENT A

RJH 6/5/02

60°

$a^2 = R_2^2 + R_1^2 - 2R_2R_1 \cos[\sin^{-1}(R_2/R_1 \times \sin B) - B]$

$a^2 = (45.55)^2 + (43)^2 - 2(45.55)(43) \cos[\sin^{-1}(45.55/43 \times \sin 60) - 60]$

$a^2 = 2074.80 + 1849 - 3917.3 \times .993479845$

$a^2 = 2074.80 + 1849 - 3891.76$

$a^2 = 32.04$

$a = \sqrt{32.04}$

$a = 5.66''$ SOUND PATH TO COMPONENT I.D. 60° ANGLE

70°

$a^2 = 2074.8 + 1849 - 3917.3(.968089079)$

$a^2 = 2074.3 + 1849 - 3792.3$

$a^2 = 131.5$

$a = \sqrt{131.5}$

$a = 11.46$ SOUND PATH TO COMPONENT I.D. 70° ANGLE

PRESSURIZER SURGE NOZZLE

ITEM # B03.120.001

WELD # 1 PZR-W1

a = SOUND PATH DISTANCE

$R_2 = 45.55$ = OUTSIDE RADIUS

R_1 $R_2 - t = 45.55 - 2.55 = 43$ = INSIDE RADIUS

$t = 2.55$ COMPONENT THICKNESS

III 4/25/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W1 | Item No: B03.120.001 | Remarks:

NOZZLE CONFIGURATION

☑ NO SCAN
☐ LIMITED SCAN

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

FROM L _____. to L _____ INCHES FROM WO __TAPER__. to __BEYOND__

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other 70 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

☐ 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. [illegible] Level: III Date: 5/1/2002 | Sketch(s) attached ☐ yes ☐ no | Sheet 3 of 6

Reviewed By: W E Hauser III Date: 5/15/02 | Authorized Inspector: Robert McGill Date: 5-22-02

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 ATTACHED SKETCH 1.79 SQ. IN	N/A

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60/70	CW	1.29/1.79				0.00
2	60/70	CCW	1.29/1.79				0.00
							72.10

Item No:	B03.120.001

Prepared By: David K. [illegible]	Level: III	Date: 5/01/02
Reviewed By: D E Hauser	Level: III	Date: 5/15/02

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT

'5>

INNER RADIUS AREA CALCULATION

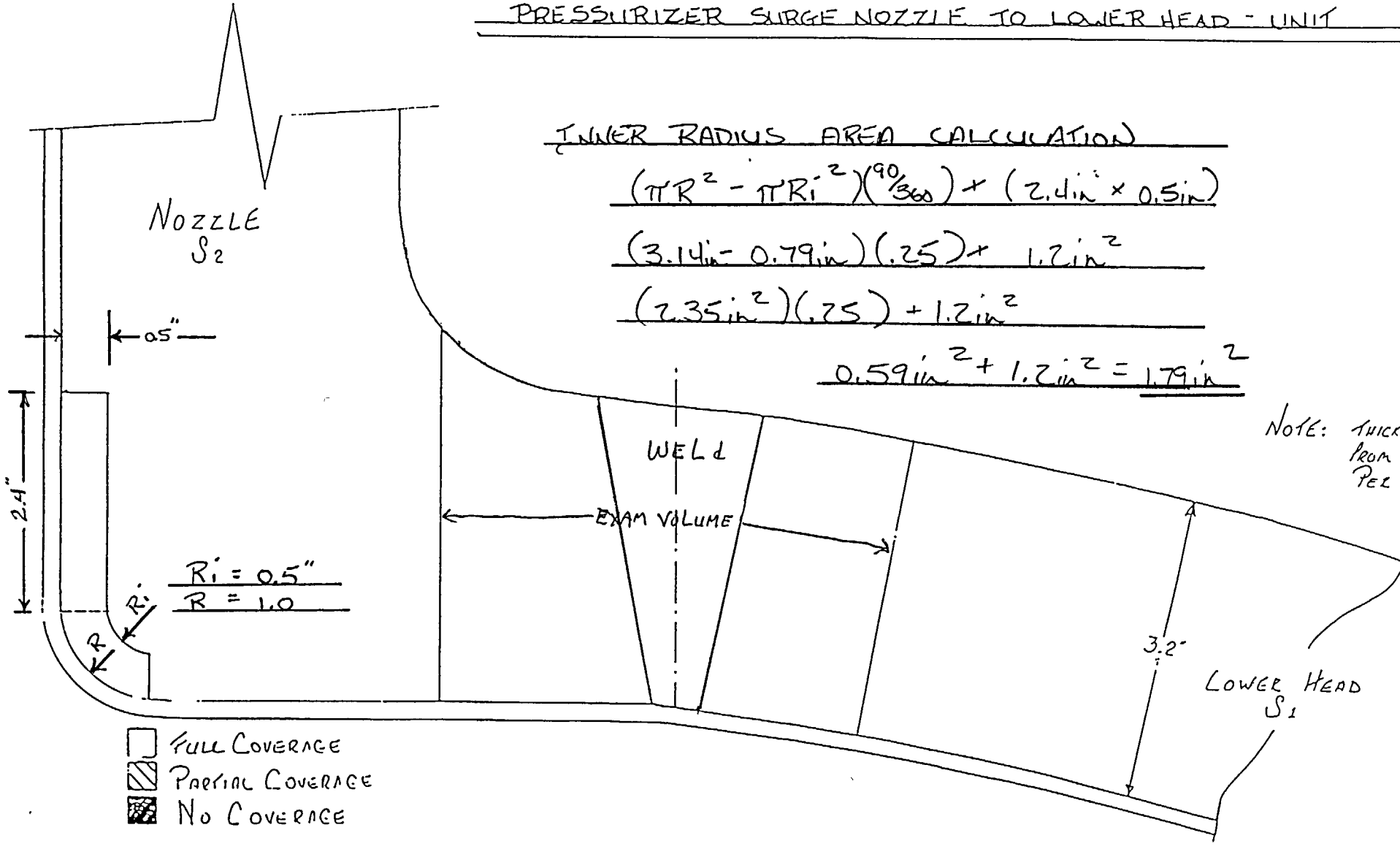
$(\pi R^2 - \pi R_i^2)(90/360) + (2.4in \times 0.5in)$

$(3.14in - 0.79in)(.25) + 1.2in^2$

$(2.35in^2)(.25) + 1.2in^2$

$0.59in^2 + 1.2in^2 = \underline{1.79in^2}$

NOTE: THICKNESSES TAKEN FROM PSI DATA, PER B&W.



PS 5 of 6

ITEM No.	B03.120.001
I.D. No	1PZR-W11
DATE	5/01/02
[illegible]	[illegible] III

PRESSURIZER SURGE NOZZLE TO LOWER HEAD - UNIT

LOSS OF AREA - ABCD = $\frac{1.05'' + 0.95''}{2} \times 0.5''$

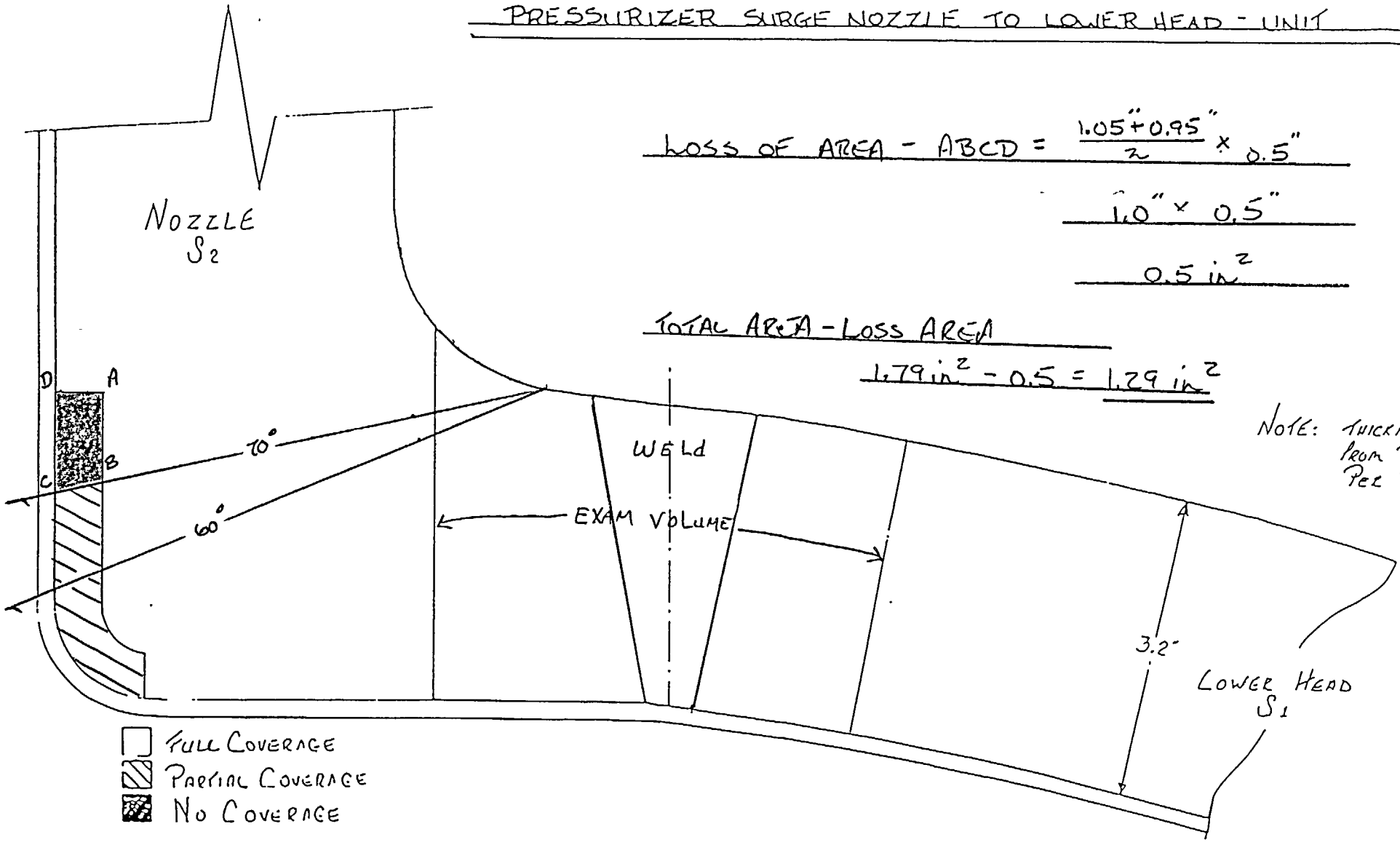
$1.0'' \times 0.5''$

$0.5\ in^2$

TOTAL AREA - LOSS AREA

$1.79\ in^2 - 0.5 = 1.29\ in^2$

NOTE: THICKNESSES IN. FROM PSI DATA PER B&W.



PS 6 OF 6

ITEM No.	B03.120.001
I.D. No	1PZR-W1
DATE	5/01/02
TIER	Number 3 - III

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0422 | Form NDE-UT-2A

Exam Finish: 0502 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1PZR-W4A | Date: 4/29/2002

Weld Length (in.): N/A | Surface Condition: AS GROUND | Lo: Top Noz: | Surface Temperature: 81 ° F

Examiner: David Zimmerman Level: III

Examiner: Gary J. Moss Level: II

Procedure: NDE-680 Rev: 2

FC: 02-03, 02-08

Calibration Sheet No: 0201043, 0201044

Scans:

45 ☐ ____ dB 70 ☐ 68 dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☐ 68 dB

60T ☐ ____ dB

Other: ____ dB

Pyrometer S/N: MCNDE 27228

Cal Due: 7/3/2002

Configuration: Inner Radius

N/A Flow N/A

N/A to N/A

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: *

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															

Remarks: * 60° @ 14°, 70° @ 11°

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

Sheet 1 of 7

Reviewed By: DE Hansen Level: III Date: 5/15/02

Authorized Inspector: Robert McKell Date: 5-22-02

Item No: B03.120.004

REQUEST FOR RELIEF #02-002 ATTACHMENT E

ASH 6/11/02

$$a^2 = R_2^2 + R_1^2 - 2R_2R_1 \cos[\sin^{-1}(R_2/R_1 \times \sin B) - B]$$

$$a^2 = (45.8)^2 + (43.0)^2 - 2(45.8)(43.0) \cos[\sin^{-1}(45.8/43.0 \times \sin 60) - 60]$$

$$a^2 = (2097.64) + 1849 - 3938.8\ (.991934001)$$

$$a^2 = 3946.64 - 3907.03$$

$$a^2 = 39.61$$

$$a = \sqrt{39.61}$$

$a = 6.29''$ = SOUND PATH TO COMPONENT I.D.
60° ANGLE

PRESSURIZER SAFETY/RELIEF NOZZLE

ITEM # B03.120.004

WELD # 1-PZR-W4A

III 4/25/02

a = SOUND PATH DISTANCE

R_2 = 45.8" (OUTSIDE RADIUS)

R_1 = $R_2 - t$ = 43.0" (INSIDE RADIUS)

t = 2.8" (COMPONENT THICKNESS)

$$a^2 = R_2^2 + R_1^2 - 2R_2R_1 \cos\left[\sin^{-1}\left(R_2/R_1 \times \sin B\right) - B\right]$$

$$a^2 = (45.8)^2 + (43.0)^2 - 2(45.8)(43.0) \cos\left[\sin^{-1}\left(45.8/43.0 \times \sin 70^\circ\right) - 70\right]$$

$$a^2 = 2097.64 + 1849 - 3938.8 \text{ (ERROR)}$$

70° WILL NOT WORK IN THIS FORMULA. SO 70° WILL NOT STRIKE THE I.D. @ THIS RADIUS. USE FOR UPPER PORTION OF THE INSPECTION AREA NOT COVERED BY THE 60° ANGLE.

PRESSURIZER SAFETY / RELIEF NOZZLE

ITEM # B03.120.004

WELD # 1-PER-W4A

III 4/25/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4A | Item No: B03 120.004 | Remarks:

☑ NO SCAN
☐ LIMITED SCAN

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

FROM L _____ to L _____ INCHES FROM WO 1.5 to BEYOND

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other 70 FROM 0 DEG to 360 DEG

NOZZLE 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 ____

Prepared By: [signature] Level: III Date: 4/29/02 | Sketch(s) attached ☐ yes ☐ no | Sheet 4 of 7

Reviewed By: DE Hansen III Date: 5/15/02 | Authorized Inspector: Robert McLeod Date: 5-22-02

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
1.64 SQ. IN SEE ATTACHED DRWG.	

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq in.)	Length Examined (in)	Volume Examined (cu in.)	Volume Required (cu in)	Percent Coverage
1	60/70	CW	1.19/1.64				0.00
2	60/70	CCW	1 19/1.64				0 00
							72 60

Item No	B03.120.004

Prepared By:	David K. [illegible]	Level	III	Date 4/29/02
Reviewed By:	M E Hansen	Level	III	Date 5/15/02

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

FULL AREA OF INSPECTION - INNER RADIUS :

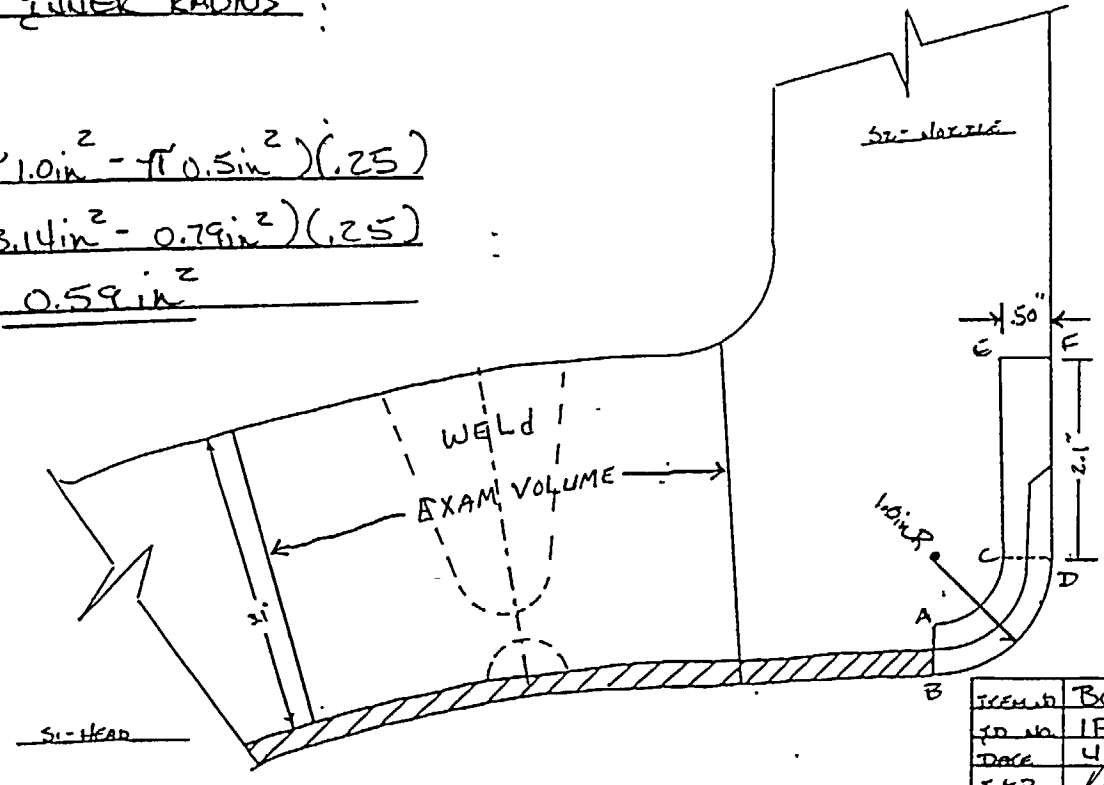
$$ABCD = (\pi R^2 - \pi R_i^2)\left(\frac{90}{360}\right) = (\pi\, 1.0in^2 - \pi\, 0.5in^2)(.25)$$

$$(3.14in^2 - 0.79in^2)(.25)$$

$$0.59\,in^2$$

$$CDEF = 2.1in \times 0.5in = 1.05\,in^2$$

$$TOTAL\ AREA = 1.64\,in^2$$



ITEM NO	B03.120.004
ID NO	1PZR-W4A
DATE	4/29/02
INSP	[illegible]

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

PS 6 of 7

SCALE: ½" 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

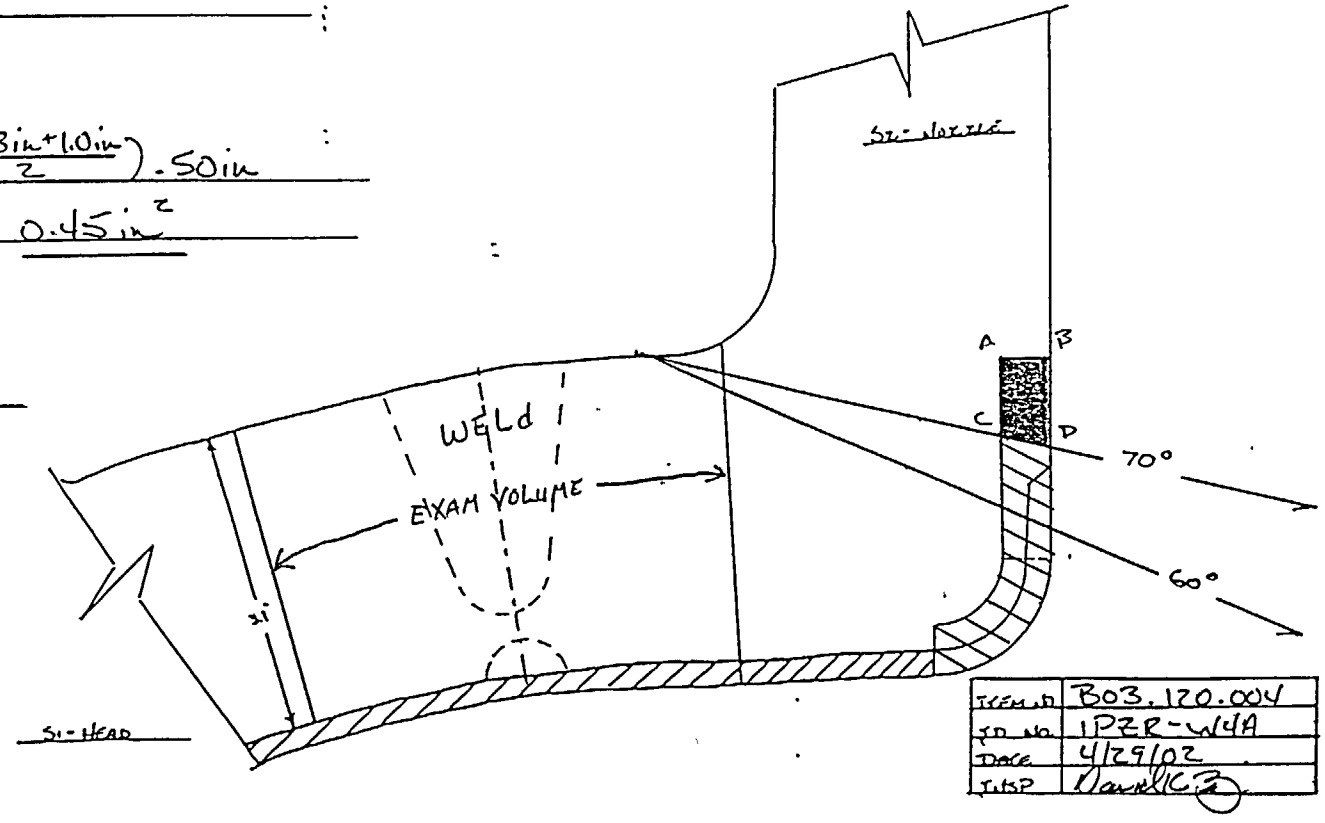
COVERAGE CALCULATION:

ABCD - (AREA OF LOSS) $\left(\frac{0.8in + 1.0in}{2}\right) .50in$

$0.45 in^2$

TOTAL AREA - LOSS AREA

$1.64 in^2 - 0.45 in^2 = 1.19 in^2$



ITEM ID	B03.120.004
ID NO.	1PZR-W4A
DATE	4/29/02
INSP	[illegible]

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

PS 7 of 7

SCALE - 1/2" = 1"

DUKE POWER COMPANY ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS	Exam Start: 0433 Exam Finish: 0452	Form NDE-UT-2A Revision 4

Station: Catawba	Unit: 1	Component/Weld ID: 1PZR-W4C	Date: 4/29/2002
Weld Length (in.): N/A	Surface Condition: AS GROUND	Lo: Top Noz:	Surface Temperature: 81 ° F

Examiner: Winfred C. Leeper Level: II

Examiner: Marion T. Weaver Level: II

Procedure: NDE-680 Rev: 2

FC: 02-03, 02-08

Calibration Sheet No: 0201043, 0201044

Scans:

45 ☐ ____ dB 70 ☐ 68 dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☐ 68 dB

60T ☐ ____ dB

Other: ____ dB

Pyrometer S/N: MCNDE 27228

Cal Due: 7/3/2002

Configuration: Inner Radius

N/A Flow N/A

N/A to N/A

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: *

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															

Remarks: * 60° @ 14°, 70° @ 11°

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

Sheet 1 of 7

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
DE Houser	III	5-15-02	Robert Mullett	5-22-02	B03.120.006

REQUEST FOR RELIEF #02-002 ATTACHMENT F

AJH 6/11/02

$$a^2 = R_2^2 + R_1^2 - 2R_2R_1 \cos[\sin^{-1}(R_2/R_1 \times \sin B) - B]$$

$$a^2 = (45.8)^2 + (43.0)^2 - 2(45.8)(43.0) \cos[\sin^{-1}(45.8/43.0 \times \sin 60) - 60]$$

$$a^2 = (2097.64) + 1849 - 3938.8\ (.991934001)$$

$$a^2 = 3946.64 - 3907.03$$

$$a^2 = 39.61$$

$$a = \sqrt{39.61}$$

$a = 6.29''$ = SOUND PATH TO COMPONENT I.D.
60° ANGLE

PRESSURIZER SAFETY/RELIEF NOZZLE

ITEM # B03.120.006

WELD # 1-PZR-W4C

III 4/25/02

a = SOUND PATH DISTANCE

R_2 = 45.8" (OUTSIDE RADIUS)

R_1 = $R_2 - t$ = 43.0" (INSIDE RADIUS)

t = 2.8" (COMPONENT THICKNESS)

$$a^2 = R_2^2 + R_1^2 - 2R_2R_1 \cos\left[\sin^{-1}\left(R_2/R_1 \times \sin B\right) - B\right]$$

$$a^2 = (45.8)^2 + (43.0)^2 - 2(45.8)(43.0) \cos\left[\sin^{-1}\left(45.8/43.0 \times \sin 70^\circ\right) - 70\right]$$

$$a^2 = 2097.64 + 1849 - 3938.8 \text{ (ERROR)}$$

70° WILL NOT WORK IN THIS FORMULA. SO 70° WILL NOT STRIKE THE I.D. @ THIS RADIUS. USE FOR UPPER PORTION OF THE INSPECTION AREA NOT COVERED BY THE 60° ANGLE.

PRESSURIZER SAFETY / RELIEF NOZZLE

ITEM # B03.120.006

WELD # 1-PZR-W4C

III 4/25/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4C | Item No: B03.120.006 | Remarks:

☑ NO SCAN
☐ LIMITED SCAN

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

FROM L _____ to L _____ INCHES FROM WO 1.5 to BEYOND

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other 70 FROM 0 DEG to 360 DEG

NOZZLE 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 ____

Prepared By: David K B Level: III Date 4/29/02 | Sketch(s) attached ☐ yes ☐ no | Sheet 4 of 7

Reviewed By: DE Howard III Date: 5/15/02 | Authorized Inspector: Robert McGuire Date: 5-22-02

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
1 64 SQ IN SEE ATTACHED DRWG.	

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu in)	Volume Required (cu.in)	Percent Coverage
1	60/70	CW	1.19/1.64				0.00
2	60/70	CCW	1 19/1.64				0.00
							72 60

Item No	B03 120.006

Prepared By	David K. [illegible]	Level	III	Date	4/29/02
Reviewed By:	DE Hansen	Level	III	Date	5/15/02

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

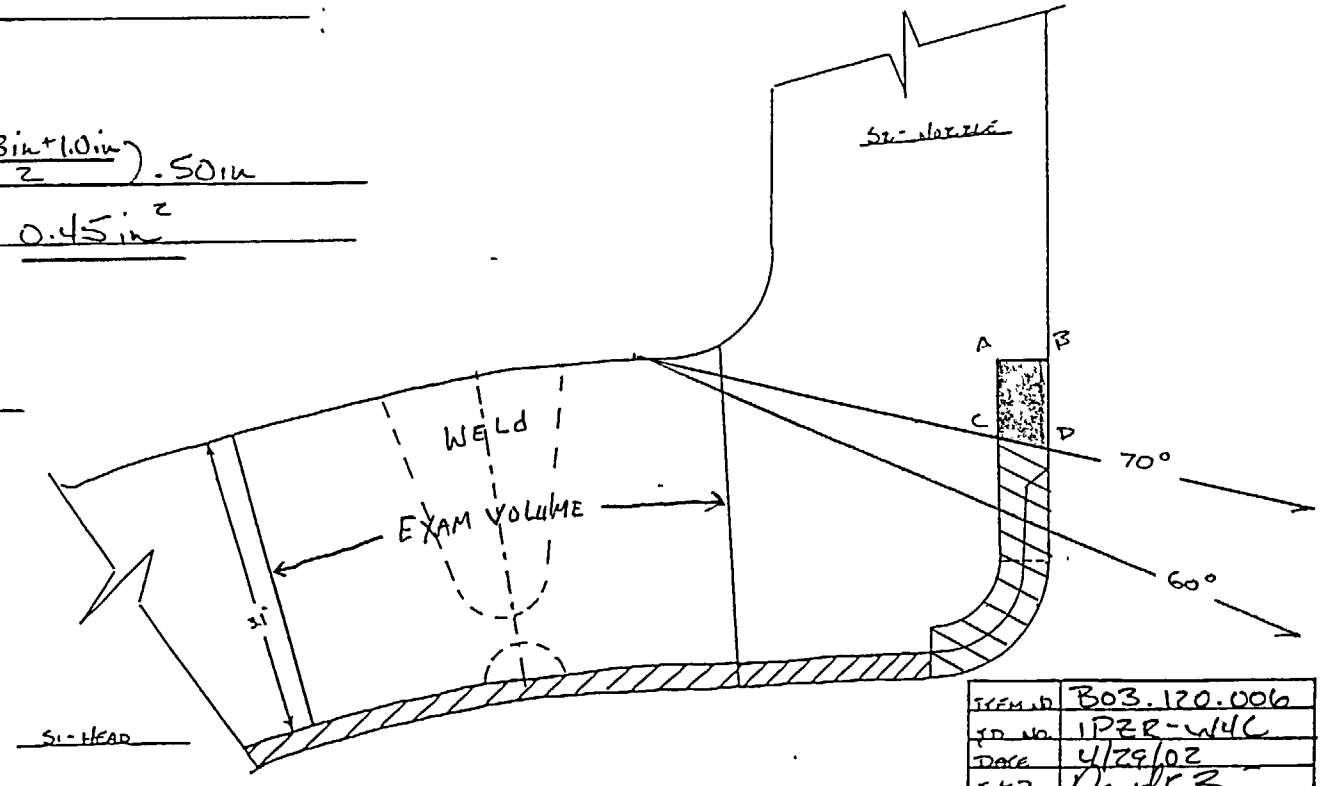
COVERAGE CALCULATION:

ABCD - (AREA OF LOSS) $\left(\frac{0.8in + 1.0in}{2}\right) .50in$

$0.45 in^2$

TOTAL AREA - LOSS AREA

$1.64 in^2 - 0.45 in^2 = 1.19 in^2$



ITEM ID	B03.120.006
ID NO.	1PZR-W4C
DATE	4/29/02
INSP	David K. B

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

PS 6 of 7

SCALE - ½" : 1"

PRESSURIZER - UPPER HEAD TO SAFETY & RELIEF NOZZLE

FULL AREA OF INSPECTION - INNER RADIUS :

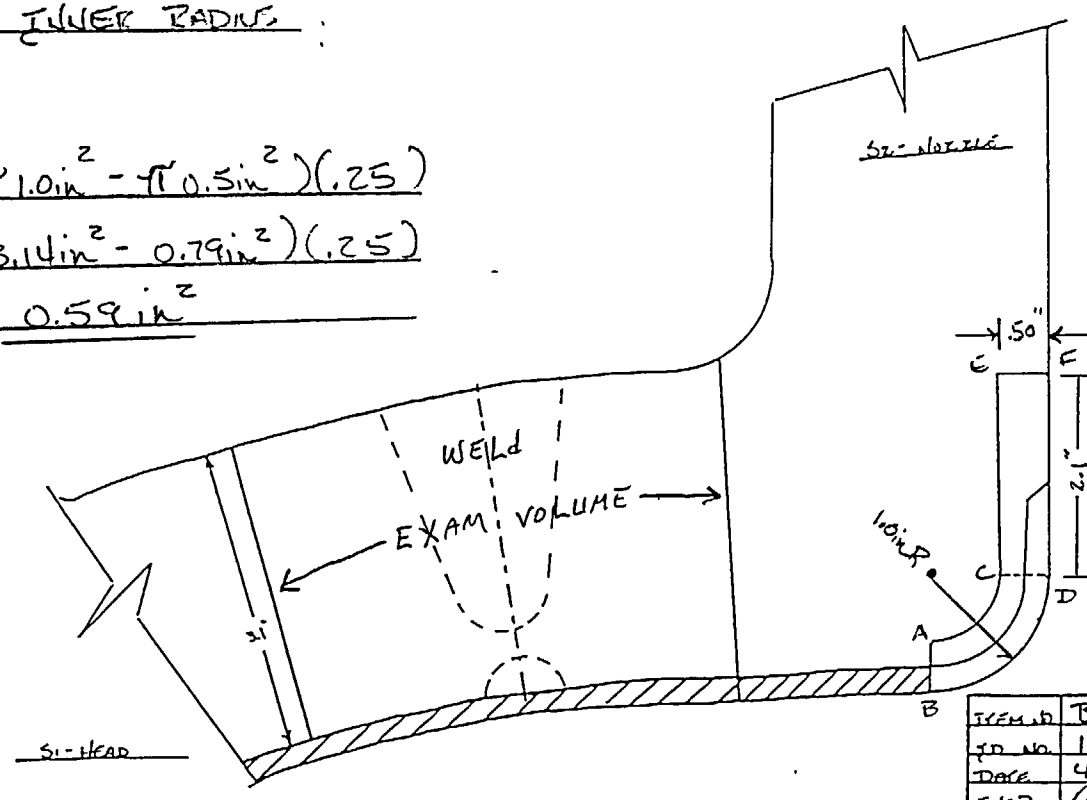
ABCD - $(\pi R^2 - \pi R_i^2)(\frac{90}{360}) = (\pi 1.0in^2 - \pi 0.5in^2)(.25)$

$(3.14in^2 - 0.79in^2)(.25)$

$0.59 in^2$

CDEF - $2.1in \times 0.5in = 1.05 in^2$

TOTAL AREA = $1.64 in^2$



ITEM ID	B03.120.006
ID NO.	1PZR-W4C
DATE	4/29/02
INSP	David Kr[illegible]

FULL COVERAGE

PARTIAL COVERAGE

NO COVERAGE

PS 7 of 7

SCALE - ½" 1"

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0505	Form NDE-UT-2A	
Exam Finish: 0532	Revision 4	

Station: Catawba	Unit: 1	Component/Weld ID: 1PZR-W4ASE	Date: 4/29/2002
Weld Length (in.): 20.8	Surface Condition: AS GROUND	Lo: 9.1.1.4	Surface Temperature: 81 ° F

Examiner: David Zimmerman Level: III

Examiner: Gary J. Moss Level: II

Procedure: NDE-610 Rev: 4

FC: *

Calibration Sheet No: 0201046, 0201047

Scans:

45 ☐ 72** dB 70 ☐ _____ dB

45T ☐ 62 dB 70T ☐ _____ dB

60 ☐ _____ dB

60T ☐ _____ dB

Other: _____ dB

Pyrometer S/N: MCNDE 27228

Cal Due: 7/3/2002

Configuration: CIRC WELD

S2 Flow S1

NOZZLE to SAFE-END

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: *FC 02-10, 01-03, 98-20, 97-01. **Scanned at 72dBdue to signal/noise ratio.

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

Sheet 1 of 4

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
DE Hansen	III	5/15/02	Robert McGill	5-22-02	B05.040.004

REQUEST FOR RELIEF #02-002 ATTACHMENT G

RJH 6/18/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4ASE | Item No: B05.040.004 | Remarks:

NOZZLE CONFIGURATION

☐ NO SCAN
☒ LIMITED SCAN

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

FROM L _____ to L _____ INCHES FROM WO 1.0 to BEYOND

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

☐ 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: [signature] Level: III Date: 4/29/2002 | **Sketch(s) attached** ☐ yes ☐ no | Sheet 2 of 4

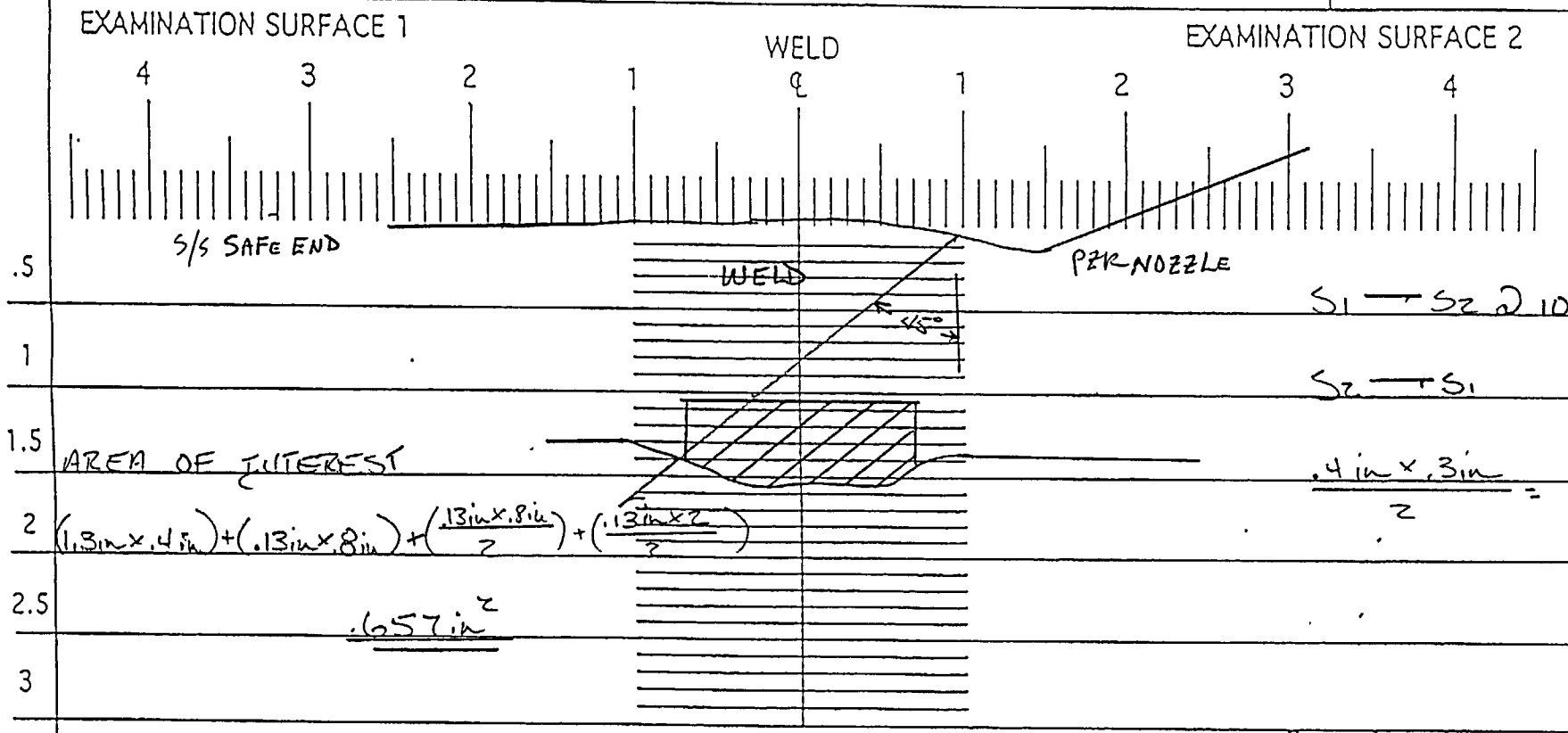
Reviewed By: [signature] Date: 5/15/02 | Authorized Inspector: [signature] Date: 5 22 02

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

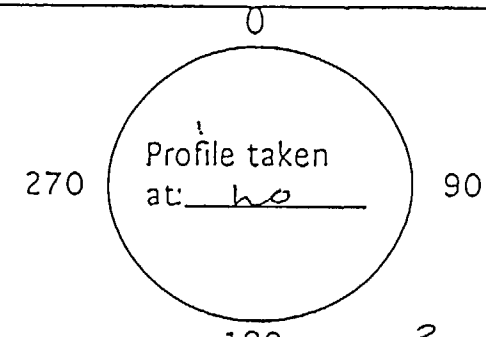
NDE-UT-5

Revision 1



Component ID/Weld No. 1PZR-W4ASE

: Remarks: PROFILE TAKEN FROM PREVIOUS DATA



Item No: B05.040.004

Examiner: David E. [illegible]	Level: II	Date: 4/29/02
Reviewed By: DE Dawson	Level: III	Date: 5/15/02
Authorized Inspector: Robert McGill		Date: 5.22.02

Sheet 3 of 4

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
.657 SQ. IN. SEE ATTACHED	

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°	CW	.657	20 8	13.7	13 7	
2	45°	CCW	.657	20 8	13.7	13 7	
3	45°	S1	.060	20 8	1.25	13 7	
4	45°	S2	.657	20 8	13 7	13 7	
					42.35	54.8	77.28

Item No: B05 040.004

Prepared By David C. [illegible] Level III Date 4/29/02

Reviewed By. D E Hansen Level III Date 5/15/02

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0508	Form NDE-UT-2A	
Exam Finish: 0527	Revision 4	

Station: Catawba	Unit: 1	Component/Weld ID: 1PZR-W4BSE	Date: 4/29/2002
Weld Length (in.): 20.8	Surface Condition: AS GROUND	Lo: 9.1.1.4	Surface Temperature: 81 ° F

Examiner: David Zimmerman *David K. Z.* Level: III

Examiner: Gary J. Moss *Gary J. Moss* Level: II

Procedure: NDE-610 Rev: 4

FC: *

Calibration Sheet No: 0201046, 0201047

Scans:

45 ☐ 72** dB 70 ☐ ____ dB

45T ☐ 62 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: ____ dB

Pyrometer S/N: MCNDE 27228

Cal Due: 7/3/2002

Configuration: CIRC. WELD

S2 Flow S1

NOZZLE to SAFE-END

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: N/A

IND #	4	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: *FC 02-10, 01-03, 98-20, 97-01. ** Scanned at 72dB due to signal/noise ratio.

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

Sheet 1 of 4

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No.
DE Hansen	III	5/15/02	*Robert McGill*	5-22-02	B05.040 005

REQUEST FOR RELIEF #02-002 ATTACHMENT H

AJH 6/18/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4BSE | Item No: B05.040.005 | Remarks:

NOZZLE CONFIGURATION

☐ NO SCAN
☒ LIMITED SCAN

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

FROM L _____ to L _____ INCHES FROM WO 1.0 to BEYOND

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

☐ 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: [signature] Level: III Date: 4/29/2002 | Sketch(s) attached ☐ yes ☐ no | Sheet 2 of 4

Reviewed By: [signature] Date. 5/15/02 | Authorized Inspector. [signature] Date. 5·22·02

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
.625 SQ. IN SEE ATTACHED	

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°	CW	.625	20.8	13	13	
2	45°	CCW	.625	20 8	13	13	
3	45°	S2	.625	20 8	13	13	
4	45°	S1	.275	20 8	13	13	
					44.72	52	86.00

Item No: B05 040 005

Prepared By David G. [illegible] Level: III Date 4/29/02

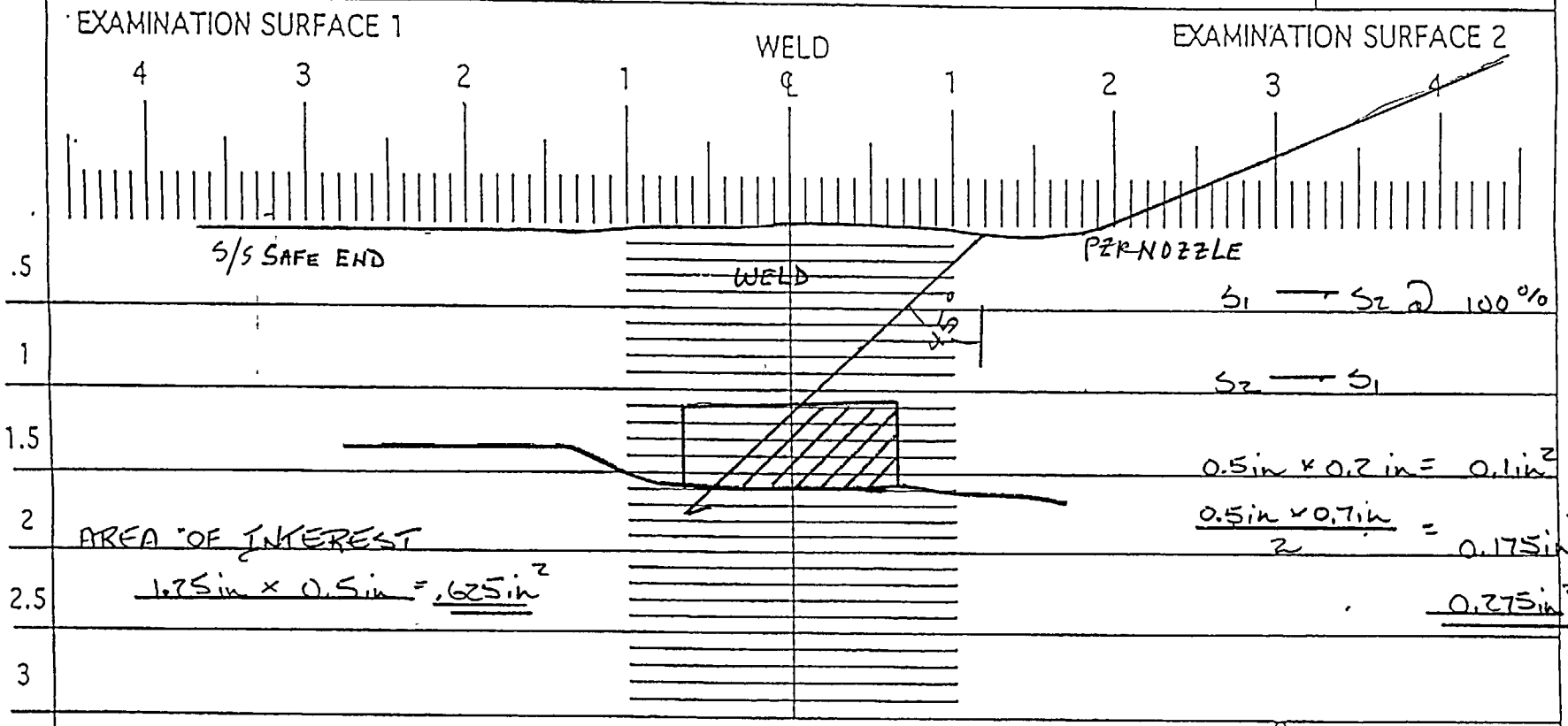
Reviewed By M.E. Hauser Level: III Date 5/15/02

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

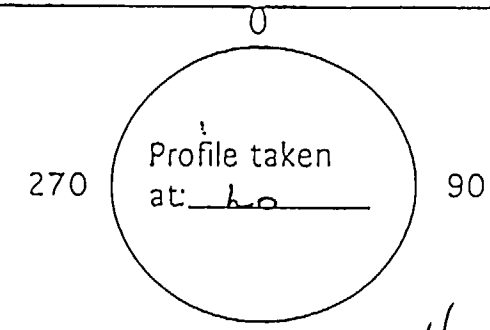
NDE-UT-5

Revision 1



Component ID/Weld No. 1PZR - W4BSE

Remarks: PROFILE TAKEN FROM PREVIOUS DATA



Item No: B05.040.005

Examiner: David K. [illegible]	Level: III	Date: 4/29/02
Reviewed By: [illegible]	Level: III	Date: 5-15-02
Authorized Inspector: Robert Mattill		Date: 5-22-02

Sheet 4 of 4

DUKE POWER COMPANY	Exam Start: 0512	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS	Exam Finish: 0522	Revision 4

Station: Catawba	Unit: 1	Component/Weld ID: 1PZR-W4CSE	Date: 4/29/2002

Weld Length (in.): 20.8	Surface Condition: AS GROUND	Lo: 9.1.1.4	Surface Temperature: 81 ° F

Examiner: Winfred C. Leeper Level: II

Examiner: Marion T. Weaver Level: II

Procedure: NDE-610 Rev: 4

FC: *

Calibration Sheet No: 0201046, 0201047

Scans:

45 ☐ 72** dB 70 ☐ _____ dB

45T ☐ 62 dB 70T ☐ _____ dB

60 ☐ _____ dB

60T ☐ _____ dB

Other: _____ dB

Pyrometer S/N: MCNDE 27228

Cal Due: 7/3/2002

Configuration: CIRC. WELD

S2 Flow S1

NOZZLE to SAFE-END

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: *FC 02-10, 01-03, 98-20, 97-01. ** Scanned at 72dB due to signal/noise ratio.

Limitations: (see NDE-UT-4) ☐ 90% or greater coverage obtained: yes ☐ no ☐ Sheet 1 of 4

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
DE Houser	III	5/15/02	Robert McGill	5-22-02	B05.040.006

REQUEST FOR RELIEF #02-002 ATTACHMENT I

RJH 6/19/02

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1PZR-W4CSE | Item No: B05.040.006 | Remarks:

NOZZLE CONFIGURATION

☐ NO SCAN
☒ LIMITED SCAN

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

FROM L _____ to L _____ INCHES FROM WO 1.0 to BEYOND

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

☐ NO SCAN
☐ LIMITED SCAN

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

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

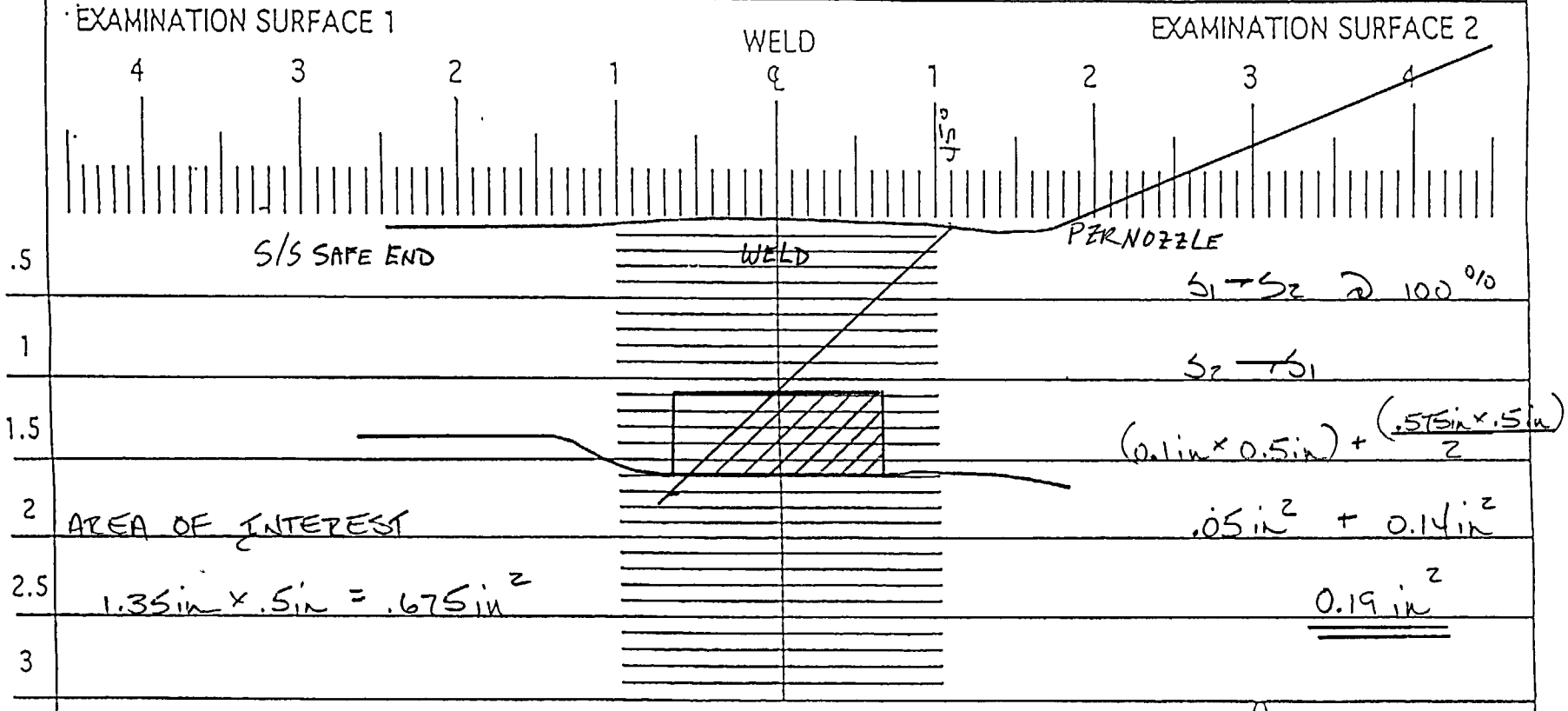
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____ FROM ____ DEG to ____

Prepared By: [signature] Level: III Date: 4/29/2002 | Sketch(s) attached ☐ yes ☐ no | Sheet 2 of 4

Reviewed By: [signature] Date: 5/15/02 | Authorized Inspector: [signature] Date: 5-22-02

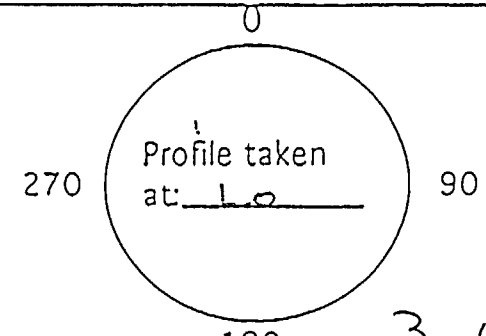
DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5
Revision 1



Component ID/Weld No. 1PZR-W4CSF

Remarks: PROFILE TAKEN FROM PREVIOUS DATA



Item No: B05.010.006

Examiner: Daniel K. [illegible]	Level: III	Date: 4/29/02
Reviewed By: D.E. Hansen	Level: III	Date: 5/15/02
Authorized Inspector: Robert McGill		Date: 5-22-02

Sheet 3 of 4

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
.675 SQ IN. SEE ATTACHED SKETCH	

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°	CW	675	20 8	14 04	14.04	
2	45°	CCW	675	20 8	14.04	14 04	
3	45°	S2	675	20 8	14 04	14 04	
4	45°	S1	.19	20 8	3.95	14 04	
					46 07	56 16	82 03

Item No: B05.040.006

Prepared By David [illegible] Level III Date: 4/29/02

Reviewed By M E Hansen Level III Date: 5/15/02

Catawba Unit #1
EOC13

Item # B09.011.104

Weld # 1N038-1

No Data Recorded. Reference Calibration Sheet #'s

0201026 45°/60°

0201027 60° L

Pg 1 of 4 ASH 6/19/02

REQUEST FOR RELIEF #02-002 ATTACHMENT J

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1ND38-1 | Item No: B09.011.104 | 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

☐ 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 A. Eaton Level: III Date: 5/2/2002 | Sketch(s) attached ☒ yes ☐ no | Sheet 2 of 4

Reviewed By: Gary Moss Date: 5-4-02 | Authorized Inspector: Robert McKell Date: 5-8-02

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

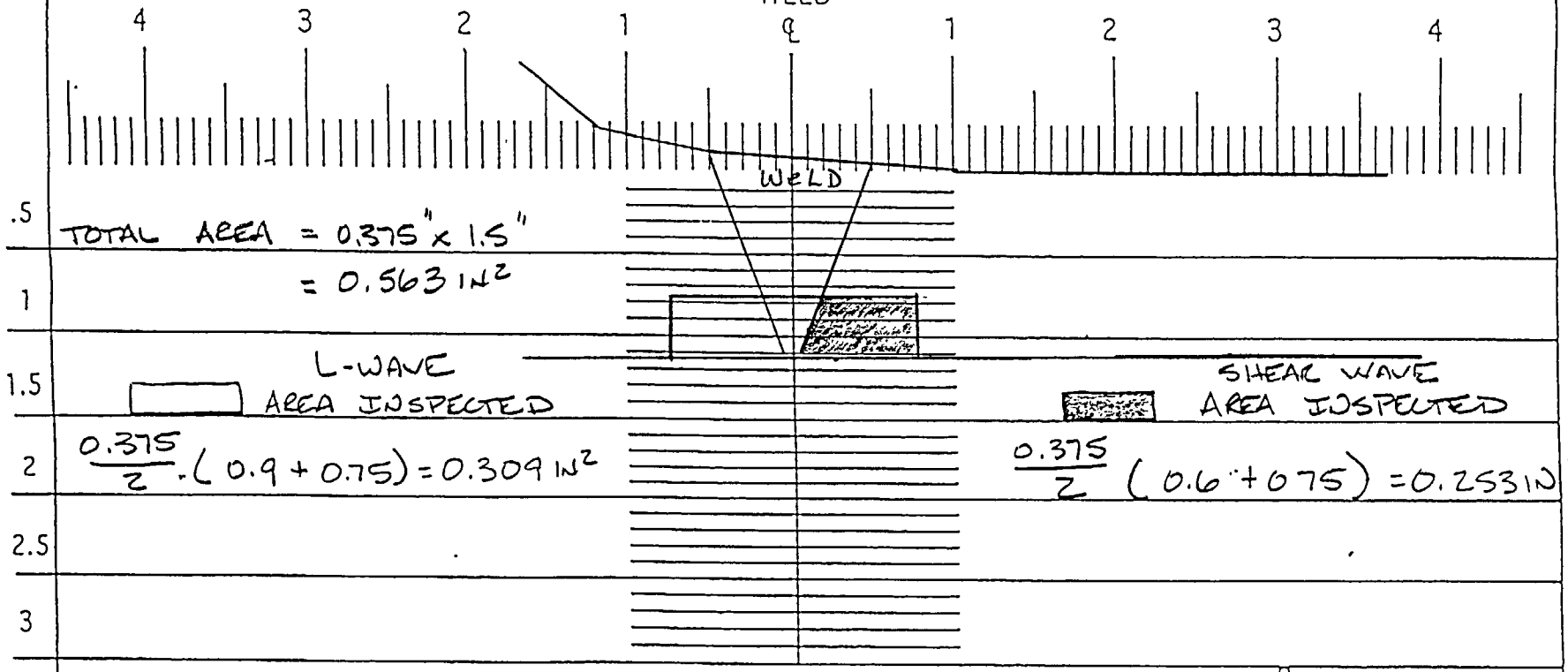
NDE-UT-5

Revision 1

EXAMINATION SURFACE 1 – S/S VALVE

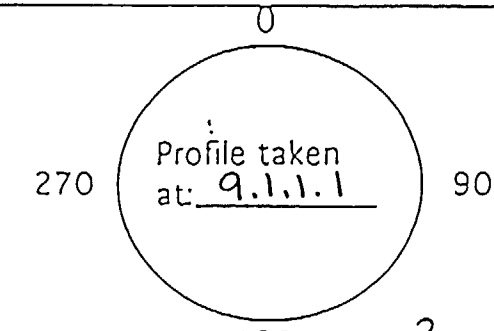
WELD

S/S PIPE – EXAMINATION SURFACE 2



Component ID/Weld No. IND38-1

Remarks:



Item No: B09.011.104

Examiner: Level: III Date: 5/1/02

Reviewed By: Level: II Date: 5-4-02

Authorized Inspector: Date: 5-8-02

Sheet 3 of 4

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
0.375" X 1.5" = 0.563 SQ. IN.	0.563 X 40.1" = 22.58 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°	CW	0.563	40.1	22.58	22.58	100.00
2	45°	CCW	0.563	40.1	22.58	22.58	100.00
3	60°	S1	0.253	40.1	10.14	22.58	44.91
4	60°	S2	0	0	0	22.58	0.00
		Total	Aggregate	Coverage	55.3	90.32	61.23
		60°L Wave	Supplement	Coverage			
3	60°L	S1	0.309	40.1	12.391	22.58	54.88

54.88% of 1 scan (25%) = 13.72% of total weld.

Item No: B09.011.104

Prepared By: Jay A. Eaton Level: III Date: 5/1/2002

Reviewed By: Gary Moss Level: II Date: 5-4-02

PS 4 of 4

FORM NDE-RT1	REVISION 5

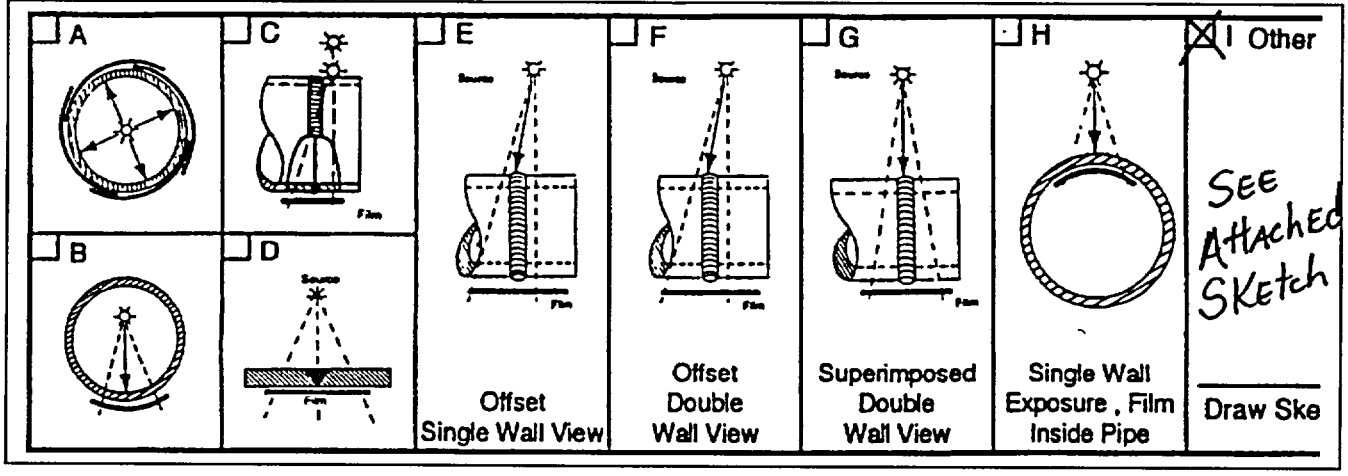
DUKE POWER COMPANY
RADIOGRAPHIC EXAMINATION REPORT / TECHNIQUE

Weld / Component ID. 1BRHRHX-5-9 Project Catawba Nuclear Station
Procedure No./Rev. NDE 12/11 Acceptance/Reporting Standards ASC

Radiographer		Level	Date	
R.L.Gantt	Roger L. Gantt	II	05-04-02	Code Reference ASME Sec. XI

Material: CS ☒ SS ☐ ☐ Diameter 43.75" Thickness .875"
Source: Ir-192 Size: .142" Curies: 91 Estimated Weld Build-Up .0625" SFD 21.937"
IQI: Film Side ☒ Source Side ☐ 20 Size(s) IQI Design: Standard Hole-Type
Film View: Single ☒ Composite ☐ Number of Film Per Cassette: 2 Film Stand Off NA
Film Brand/Type: Front Fuji 80 Center NA Back Fuji 80 Shim Size(s): NA
Screen Thickness: Front .010" Center NA Back .010" (Ug = Ft/D) Actual Ug: .006"
Exposure Time: Hrs. NA Min. *See Attached. Thicker member used as shim: ☒

TECHNIQUE SET UP



FILM REVIEW

Interval	Date	Indication	Length/Size	Reviewer	Level	Date	Accept	Reject	Report	Reshoot
0-1	05-04-02	8,12		JKT	III	05-04-02	✓			
1-2	05-04-02	8		JKT	III	05-04-02	✓			
2-3	05-04-02	8		JKT	III	05-04-02	✓			
3-4	05-04-02	8,12		JKT	III	05-04-02	✓			
4-5	05-04-02	8		JKT	III	05-04-02	✓			
5E-6	05-04-02			JKT	III	05-04-02	✓			
6-7	05-04-02	8		JKT	III	05-04-02	✓			
7-8	05-04-02			JKT	III	05-04-02	✓			
8X-9	05-04-02			JKT	III	05-04-02	✓			
9-10	05-04-02	12		JKT	III	05-04-02	✓			
10-0R	05-04-02			JKT	III	05-04-02	✓			

Indication and flaw types:					
	1. Incomp. Fusion	*4. Unconsumed Insert*	7. Undercut	10. Convexity	13. Surface
	2. Incomp. Pen.	*5. Crack*	8. Porosity	11. Concavity	14. Inclusion
	3. Excessive Pen.	6. Slag	9. Tungsten	12. Film Artifact	15.

Exam Limitations: ☒ Yes: 55.888% Examined ☐ No: (100% Examined)

Comments:

Second Review [signature] Level III Date 05-04-02
ANI/ANII Review Robert McLeod Date 5-6-02
Item No. C01.010.002

REQUEST FOR RELIEF #02-002 ATTACHMENT K

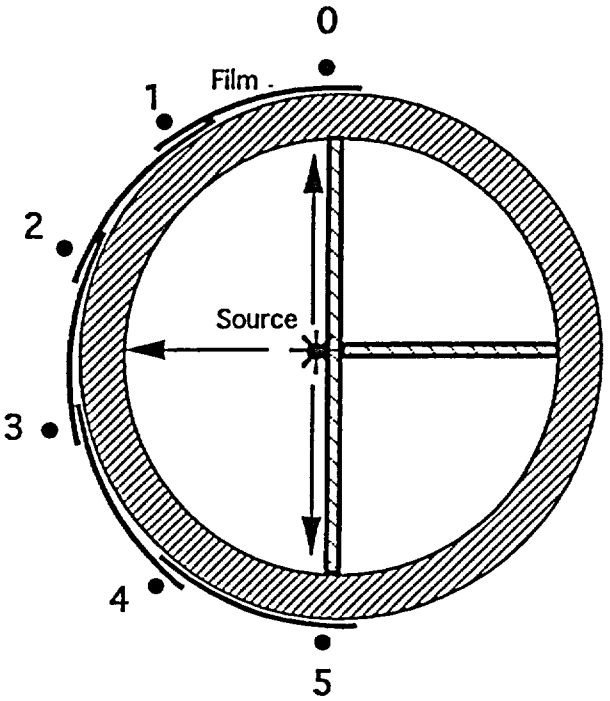
AJH 6/14/02

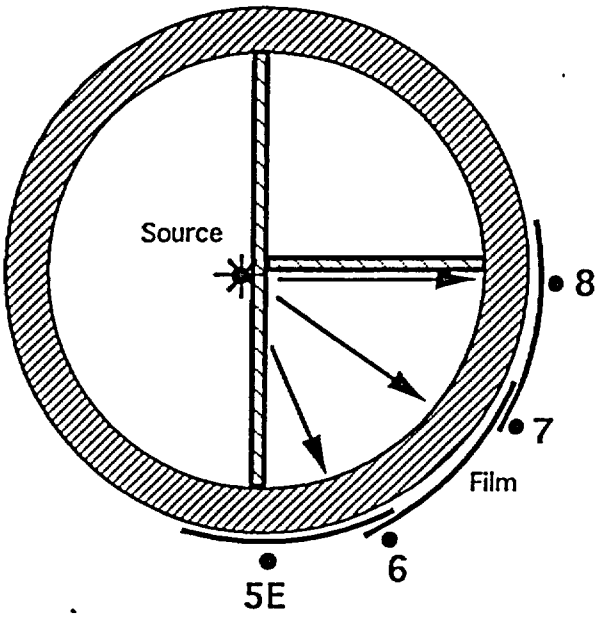
1BRHRHX-5-9
C01.010.002

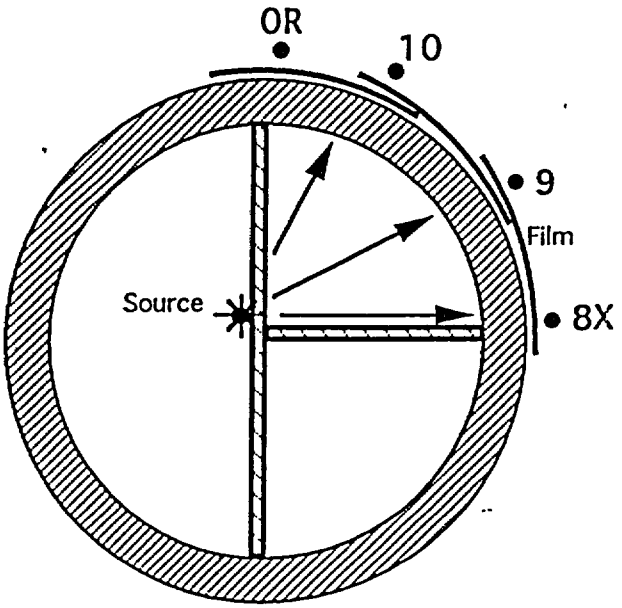
RADIOGRAPHIC TECHNIQUE I

Date: 5-4-02

Approved: TL Tucker
RT Level III







Exposure Times

0 - 1	3 MIN.
1 - 2	3 MIN.
2 - 3	3 MIN.
3 - 4	3 MIN.
4 - 5	3 MIN
5E - 6	8 MIN
6 - 7	5 MIN 50 sec.
7 - 8	5 MIN 50 sec.
8X - 9	5 MIN 50 sec.
9 - 10	5 MIN 50 sec.
10 - 0R	10 MIN 50 sec.

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

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
Required exam Area = 258.45 Area examined = 144.47 144.47 ÷ 258.45 X100 = 55.898% * See note below	

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage

* Notes

1. Required area calculation:
   weld length = 137.84"
   weld width = .875"
   Base metal = 1" (.5" each side)

   137.84 X 1.875 = 258.45 sq. in.

2. Area examined calculation:
   The area examined was determined from measurements taken on each radiographic interval

3. Limitation due to configuration.
   100% of base metal on the flange side and a portion of the weld was not examined.

Item No: C01.010.002

Prepared BY: TL Tucker Level: III Date: 5-4-02

Reviewed By: James K. Todd Level: III Date: 5-4-02