Duke Power

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September 8, 2005

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 05-CN-004
Limited Weld Examinations During End-of-Cycle 15
Refueling Outage

Pursuant to 10 CFR 50.55a(g)(5)(iii), please find attached Request for Relief 05-CN-004. 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,

Bill Putesa for

D.M. Jamil

LJR/s

Attachment

A047

Catawba Nuclear Station 20th Anniversary 1985-2005

xc (with attachment):

W.D. Travers, 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
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Proposed Relief in Accordance with 10 CFR50.55a(g)(5)(iii)
Inservice Inspection Impracticality

Duke Energy Corporation
Catawba Nuclear Station – Unit 1 (EOC-15)
Second 10-Year Interval – Inservice Inspection Plan
Interval Start Date - June 29, 1995 Interval End Date - June 29, 2005
ASME Section XI Code – 1989 Edition with No Addenda

	I.	II.	III.	IV. &V.	VI.	VII.	VIII.
Request Number	Limited 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	Impracticality/ Burden Caused by Code Compliance	Proposed Alternate Examinations or Testing	Implementation Schedule and Duration	Justification for Granting Relief
1	1RPV-W03	Reactor Vessel Shell-to-Lower Head Circumferential Weld	Category B-A, Item Number B01.011.001 Figure Number IWB-2500-1(b) Volume Limitation 72.76% (Attachment A)	See Paragraph "A"	See Paragraph "G"	See Paragraph "H"	See Paragraph "I"
2	1RPV-W01	Reactor Vessel Lower Head to Bottom Head Circumferential Weld	Category B-A, Item Number B01.021.001 Figure Number IWB-2500-3 Volume Limitation 87.19% (Attachment B)	See Paragraph "A"	See Paragraph "G"	See Paragraph "H"	See Paragraph "I"
3	1PZR-W1	Pressurizer Surge Nozzle to Lower Head	Category B-D, Item Number B03.110.001A Figure Number IWB-2500-7(b) Volume Limitation 77.20% (Attachment C)	See Paragraph "B"	See Paragraph "G"	See Paragraph "H"	See Paragraph "J"
4	1PZR-W4A	Pressurizer Safety Nozzle to Upper Head	Category B-D, Item Number B03.110.004A Figure Number IWB-2500-7(b) Volume Limitation 79.20% (Attachment D)	See Paragraph "B"	See Paragraph "G"	See Paragraph "H"	See Paragraph "J"
5	1PZR-W4B	Pressurizer Safety Nozzle to Upper Head	Category B-D, Item Number B03.110.005 Figure Number IWB-2500-7(b) Volume Limitation 79.20% (Attachment E)	See Paragraph "B"	See Paragraph "G"	See Paragraph "H"	See Paragraph "J"

	I.	II.	III.	IV. &V.	VI.	VII.	VIII.
Request Number	Limited 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	Impracticality/ Burden Caused by Compliance	Proposed Alternate Examinations or Testing	Implementation Schedule and Duration	Justification for Granting Relief
6	1PZR-W4C	Pressurizer Safety Nozzle to Upper Head	Category B-D, Item Number B03.110.006A Figure Number IWB-2500-7(b) Volume Limitation 79.20% (Attachment F)	See Paragraph "B"	See Paragraph "G"	See Paragraph "H"	See Paragraph "J"
7	1RPV-W18-SE 1NC23-01	Reactor Vessel Outlet Nozzle to Safe End and Safe- End to Pipe (Buttering Weld)	Category B-F, Item Number B05.010.008, B05.010.008A B05.130.005, B05.130.005A Figure Number IWB-2500-8 (c) Volume Limitation 82.45% (Attachment G)	See Paragraph "C'"	See Paragraph "G"	See Paragraph "H"	See Paragraph "I"
8	1NC286-1	NC System UHI Adapter to Pipe Cap	Category B-J, Item Number B09.011.048 Figure Number IWB-2500-8(c) Volume Limitation 37.50% (Attachment H)	See Paragraph "D"	See Paragraph "G"	See Paragraph "H"	See Paragraph "K"
9	1ND-37A	ND System Valve 1ND-37A Valve Body to Bonnet Weld	Category B-M-1, Item Number B12.040.002D Figure Number IWB-2500-17 Volume Limitation 69.30% (Attachment I)	See Paragraph "E"	See Paragraph "G"	See Paragraph "H"	See Paragraphs "L"
10	1ND39-12	ND System Valve 1ND2A-to- Pipe Circumferential Weld	Category C-F-1, Item Number C05.011.049 Figure Number IWC-2500-7(a) Volume Limitation 76.10% (Attachment J)	See Paragraph "F"	See Paragraph "G"	See Paragraph "H"	See Paragraphs "L"

IV. & V. Impracticality/Burden Caused by Code Compliance

Paragraph A:
During the ultrasonic examination of Weld ID Number 1RPV-W03, Reactor Vessel Shell to Lower Head Circumferential Weld, 100% coverage of the required examination volume could not be obtained. Scanning limitations were caused by proximity of the bottom mounted instrument tubes, which prevented scanning 100% of the weld length from four orthogonal directions. The procedure, qualified through the Performance Demonstration Initiative, requires scanning in four orthogonal directions using 45°single element shear waves, 45° single element refracted longitudinal waves (RL), and 45° dual element RL waves.

During the ultrasonic examination of Weld ID Number 1RPV-W01, Reactor Vessel Lower Head to Bottom Head Circumferential Weld, 100% coverage of the required examination volume could not be obtained. Scanning limitations were caused by the core support lugs, which prevented scanning 100% of the weld length from four orthogonal directions. The procedure, qualified through the Performance Demonstration Initiative requires scanning in four orthogonal directions using 45°single element shear waves, 45° single element refracted longitudinal waves (RL), and 45° dual element RL waves.

The percent of coverage reported represents the aggregate coverage from all scans performed on the welds. In order to scan all of the required surfaces for the inspection of the shell to lower head circumferential weld and the lower head to bottom head circumferential weld, the interferences would have to be moved to allow scanning the full length of the welds, which is impractical. These 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).

(Examination Data is shown in Attachments A and B)

Paragraph B:
During the ultrasonic examination of Weld ID Number 1PZR-W1, 100% coverage of the required examination volume could not be obtained. Scanning limitations were caused by the nozzle geometry that restricts scanning from the nozzle side. The percent coverage reported represents the aggregate coverage of all scans performed. The examination volume was scanned using 35^0 and 45^0 shear waves, and straight beam longitudinal waves in accordance with ASME Section V, Article 4, T-441.3.2.1.

The 35° beam covered 88.5% of the examination volume perpendicular to the weld from the vessel head side and 62.5% of the examination volume perpendicular to the weld from the nozzle side. Scans parallel to the weld with the 35° beam covered 79.3% of the examination volume in two opposite directions.

The 45° beam covered 81.2% of the examination volume perpendicular to the weld from the vessel head side and 59.7% of the examination volume perpendicular to the weld from the nozzle side. Scans parallel to the weld with the 45° beam covered 79.3% of the examination volume in two opposite directions.

The straight beam covered 79.3% of the examination volume. In order to achieve more coverage, the nozzle would have to be re-designed to allow scanning in four orthogonal directions. This examination was performed using procedures prepared in accordance with ASME Section V, Article 4 using personnel qualified in accordance with ASME Section XI, IWA-2300, including Appendix VII, 1995 Edition through the 1996 Addenda.

(Examination Data is shown in Attachment C)

During the ultrasonic examination of Weld ID Numbers 1PZR-W4A, 1PZR-W4B and 1PZR-W4C, 100% coverage of the required examination volume could not be obtained. Scanning limitations were caused by the nozzle geometry

that restricts scanning from the nozzle side. The percent coverage reported represents the aggregate coverage of all scans performed. The examination volume was scanned using 45°; 60° shear waves, and straight beam longitudinal waves in accordance with ASME Section V, Article 4, T-441.3.2.1.

The 45° beam covered 92.0% of the examination volume perpendicular to the weld from the vessel head side and 66.7% of the examination volume perpendicular to the weld from the nozzle side. Scans parallel to the weld with the 45° beam covered 79.6% of the examination volume in two opposite directions.

The 60° beam covered 94.2% of the examination volume perpendicular to the weld from the vessel head side and 60.5% of the examination volume perpendicular to the weld from the nozzle side. Scans parallel to the weld with the 60° beam covered 79.6% of the examination volume in two opposite directions.

The straight beam covered 79.6% of the examination volume. In order to achieve more coverage, the nozzle would have to be re-designed to allow scanning in four orthogonal directions. This examination was performed using procedures prepared in accordance with ASME Section V, Article 4 using personnel qualified in accordance with ASME Section XI, IWA-2300, including Appendix VII, 1995 Edition through the 1996 Addenda.

(Examination Data is shown in Attachments D, E and F)

Paragraph C:
During the ultrasonic examination of Weld ID Numbers 1RPV-W18-SE and 1NC23-01, 100% coverage of the required examination volume could not be obtained. Limitations were due to the ID configuration which consists of counter-bore and root protrusion. Ultrasonic detection scans for the DM welds were examined from the ID surface using 70 degree L wave transducers applied four-directionally. This exam interrogated the inner 1/3 thickness volume. Eddy Current examination was also employed to examine inner surfaces of the dissimilar metal welds and the adjacent examination volumes where ID geometry presented a limitation to the detection of axial flaws as defined in the PDQS for the qualified Appendix VIII techniques.

The percent of coverage reported represents the aggregate coverage from all scans performed on the welds. In order to scan all of the required surfaces, the counter bore and root protrusions would have to be removed, which is impractical. These 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).

(Examination Data is shown in Attachment G)

Paragraph D:
During the ultrasonic examination of Weld ID Number 1NC286-1, 100% coverage of the required examination volume could not be obtained. Single sided access caused by the proximity of the pipe cap prevented scanning from the cap side of the weld. The percent coverage reported represents the aggregate coverage of all scans performed. The examination volume was scanned using 45° and 60° shear waves.

The 45° beam covered 50% of the required volume in two opposite circumferential directions. The 60° beam covered 50% of the required volume in one axial direction from the pipe side of the weld. Because of the requirements of 10CFR50.55a(b)(2)(xv)(A)(2), coverage of the far side of the weld was not claimed.

In order to achieve more coverage, the weld would have to be re-designed to allow scanning from four orthogonal directions. This examination was performed using personnel, procedures and equipment qualified in accordance with ASME Section XI, Appendix VIII, Supplement 2, 1995 Edition through the 1996 Addenda as administered through the Performance Demonstration Initiative (PDI).

(Examination Data is shown in Attachment H)

Paragraph E:
During the ultrasonic examination of weld ID Number 1ND-37A, 100% coverage of the required examination volume could not be obtained. Single sided access caused by the valve body and bonnet geometry prevented scanning from two opposing circumferential and axial directions. The percent coverage reported represents the aggregate coverage of all scans performed. The examination volume was scanned using 45°and 60° shear waves.

The 45° beam covered 72.8% of the required volume in two opposite circumferential directions. A combination of 45° and 60° beams covered 65.81% of the required volume perpendicular to the weld.
In order to achieve more coverage, the weld would have to be re-designed to allow scanning from four orthogonal directions. This examination was performed using personnel, qualified in accordance with ASME Section XI, ASME Section XI, IWA-2300, and Appendix VII, 1995 Edition through the 1996 Addenda.

(Examination Data is shown in Attachment I)

Paragraph F
During the ultrasonic examination of Weld ID Number 1ND39-12, 100% coverage of the required examination volume could not be obtained. Single sided access caused by the valve configuration prevented scanning from the valve side of the weld. The percent coverage reported represents the aggregate coverage of all scans performed. The examination volume was scanned using 45°and 60° shear waves.

The 45° beam covered 100% of the required volume in two opposite circumferential directions. The 60° beam covered 52.9% of the required volume in one axial direction from the pipe side of the weld, and 51.4% from the valve side. A supplemental 60° longitudinal wave best effort scan covered 100% of the inside surface within the required volume in one axial direction from the pipe side of the weld but was not included in the coverage calculation because of the requirements of 10CFR50.55a(b)(2)(xv)(A)(2).

In order to achieve more coverage, the weld would have to be re-designed to allow scanning from four orthogonal directions. This examination was 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).

(Examination Data is shown in Attachment J)

VI. Proposed Alternate Examinations or Testing

Paragraph G:
The scheduled 10-year code examination was performed on the referenced welds and resulted in the noted limited coverage of the required ultrasonic volume. No alternate examinations or testing are planned for the welds during the current inspection interval which ended on 6/29/05.

VII. Implementation Schedule and Duration

Paragraph H:
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 and components during the current inspection interval which ended on 6/29/05. 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. Justification for Granting Relief

Paragraph I:

Design and fabrication of the reactor vessel is carried out in strict accordance with ASME Code, Section III, Class 1 requirements. The head flanges, nozzles, and cylindrical portions of the unit 1 vessel are manufactured as forgings. The hemispherical heads are made from dished plates. The reactor vessel parts are joined by welding, using the single or multiple wire submerged arc and the shielded metal arc processes. The non-destructive examination of the reactor vessel and its appurtenances is conducted in accordance with the ASME Code Section III requirements; also numerous examinations are performed in addition to ASME Code Section III requirements. Nondestructive examination of the reactor vessel is discussed in UFSAR Section 5.3.1.3 and the reactor vessel quality assurance program is given in UFSAR Table 5-11.

The reactor vessel materials meet the fracture toughness requirements of 10CFR 50, Appendix G, to the extent possible. A summary of the fracture toughness data is given in UFSAR Table 5-13 and 5-15. Appendix G of 10 CFR 50 requires heatup and cooldown of the reactor vessel be accomplished within established pressure-temperature limits. The heatup and cooldown rates imposed by plant operating procedures are 50°F per hour and 80°F per hour, respectively, for normal operation. The heatup and cooldown rate limits are 60 °F per hour and 100 °F per hour, respectively, for abnormal or emergency conditions. The rate of 100°F per hour is the vessel design specification as a normal condition for conservatism for both heatup and cooldown. For Catawba unit 1, the heatup and cooldown limit curves for normal operation at 34 years provides a predicted operation window that is sufficient to conduct heatup and cooldowns. In addition, cyclic loads are introduced by normal power changes, reactor trips, and startup / shutdown operations. These design base cycles are selected for fatigue evaluation and constitute a conservative design envelope for the projected plant life. Vessel analysis results in a usage factor that is less than 1.

The reactor vessel has four inlet and four outlet nozzles located in a horizontal plane just below the upper head flange, but above the top of the core. Welds 1PRV-W18-SE and 1NC23-01 are located on the reactor vessel outlet (i.e., hot leg) nozzle, which are typically covered with mirror insulation.. During each refueling outage while the primary system remains at temperature and pressure (Mode 3), all accessible areas within containment are inspected for any evidence of boric acid leaks. During this walkdown, any leakage from these welds would be recognized by a boron deposit buildup around the piping and mirror insulation.

Plant Technical Specifications dictate that a reactor coolant system water inventory balance be performed on a regular basis (i.e. at least once every three days). The normal operating practice is to perform this computer based program on a daily frequency and/or whenever the operators suspect any abnormal changes to other leakage detection systems. A Plant Technical Specification requires system leakage from "unidentified" sources be maintained below 1 gpm; however, plant operation procedure (PT/1(2)/A/4150/001D, NC System Leakage Calculation) establish an administrative limit of 0.15 gpm above which the source of leakage will be investigated. Leakage as a result of a failed weld discussed in this section would show up as unidentified leakage and subject to the 0.15 gpm administrative limit. The water inventory balance provides repeatable results less than the 0.15 gpm administrative limit; however, an evaluation of sensitivity below this leak rate level has not been performed. No analysis has been done to quantify the flaw size in the reactor vessel which would be detectable by the leakage detection system.

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

- Containment Atmosphere Particulate Radioactivity (EMF 38) Monitoring System which would detect airborne radiological activity;

- Containment Ventilation Unit Condensate Drain Tank Level Monitoring which collects and measures as unidentified leakage the moisture removed from the containment atmosphere.

The above leakage detection methods are dependant upon the Lower Containment Ventilation System, which provides for forced circulation of cooling air across the reactor vessel and for subsequent air return to lower containment. This provides the motive force for transporting moisture and radioactivity from any through wall leak in the reactor vessel to the above described leakage detection monitors.

Paragraph J:

100% bare metal visual (BMV) examinations were performed on all Alloy 600 / Alloy 82/182 weld locations on the pressurizer during 1EOC15; Reference Duke's Response to NRC Bulletin 2004-01, dated June 14, 2005, (See Attachment K) and W/O 98683639-01. The inspection scope included the surge line nozzle to lower head location and the three (3) pressurizer safety valve nozzle to upper head locations (i.e., including welds 1PZR-W1, 1PZR-W4A, 1PZR-W4B, and 1PZR-W4C). No evidence of leakage or boric acid deposits was observed at any of these locations. There was no wastage identified on the external surface of the pressurizer vessel head.

Plant Technical Specifications dictate that a reactor coolant system water inventory balance be performed on a regular basis (i.e. at least once every three days). The normal operating practice is to perform this computer based program on a daily frequency and/or whenever the operators suspect any abnormal changes to other leakage detection systems. A Plant Technical Specification requires system leakage from "unidentified" sources be maintained below 1 gpm; however, plant operation procedure (PT/1(2)/A/4150/001D, NC System Leakage Calculation) establish an administrative limit of 0.15 gpm above which the source of leakage will be investigated. Leakage as a result of a failed weld discussed in this section would show up as unidentified leakage and subject to the 0.15 gpm administrative limit. The water inventory balance provides repeatable results less than the 0.15 gpm administrative limit; however, an evaluation of sensitivity below this leak rate level has not been performed.

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

- Containment Atmosphere Particulate Radioactivity (EMF 38) Monitoring System which would detect airborne radiological activity;

- Containment Ventilation Unit Condensate Drain Tank Level Monitoring Subsystem which collects and measures as unidentified leakage the moisture removed from the containment atmosphere;

- Containment Floor and Equipment Sump Level and Flow Monitoring Subsystem where unidentified accumulated water on the containment floor would be monitored and evaluated as sump level changes.

Paragraph K:

The reactor pressure vessel upper head originally had four connections for the Upper Head Injection (UHI) system. Three of the four UHI penetrations are capped off. The other one serves as the Alternate Reactor Vessel Head Vent penetration. Weld 1NC286-1 is located at the pipe cap on a capped-off UHI nozzle at Catawba Unit 1. To meet the requirements of NRC Order EA-03-009, Catawba has established periodic inspection of the reactor vessel head area (Ref. SLC 16.5-8-2). This includes visual inspections performed each refueling outage to identify boric acid leaks for pressure-retaining components above the reactor vessel head. Any boric acid leakage from capped-off UHI nozzles would be identified during this inspection.

Plant Technical Specifications dictate that a reactor coolant system water inventory balance be performed on a regular basis (i.e. at least once every three days). The normal operating practice is to perform this computer based program on a daily frequency and/or whenever the operators suspect any abnormal changes to other leakage detection systems. A Plant Technical Specification requires system leakage from "unidentified" sources

be maintained below 1 gpm; however, plant operation procedure (PT/1(2)/A/4150/001D, NC System Leakage Calculation) establish an administrative limit of 0.15 gpm above which the source of leakage will be investigated. Leakage as a result of a failed weld discussed in this section would show up as unidentified leakage and subject to the 0.15 gpm administrative limit. The water inventory balance provides repeatable results less than the 0.15 gpm administrative limit; however, an evaluation of sensitivity below this leak rate level has not been performed.

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

- Containment Atmosphere Particulate Radioactivity (EMF 38) Monitoring System which would detect airborne radiological activity;

- Containment Ventilation Unit Condensate Drain Tank Level Monitoring which collects and measures as unidentified leakage the moisture removed from the containment atmosphere.

The above leakage detection methods are dependant upon the Lower Containment Ventilation System, which provides for forced circulation of cooling air across the reactor vessel and for subsequent air return to lower containment. This provides the motive force for transporting moisture and radioactivity from any through wall leak in the reactor vessel to the above described leakage detection monitors.

Paragraph L:

The 1ND37A Body-to-Bonnet (1ND-37A) and 1ND2A Body-to-Pipe (1ND39-12) welds are located within the reactor building. These valves are second boundary isolation which remains normally closed to isolate the low pressure residual heat removal system from the high pressure reactor coolant system (i.e., Reactor Coolant Pressure Isolation Valves). These valves are opened to provide core cooling during plant shutdown. This piping and these welds are normally covered by mirror insulation. During each refueling outage while the primary system remains at temperature and pressure (Mode 3), all accessible areas within containment are inspected for any evidence of boric acid leaks. During this walkdown, any leakage from these welds would be recognized by a boron deposit buildup around the piping and mirror insulation.

In addition, any leakage at welds 1ND-37A or 1ND39-12 would be detected via other leakage detection systems available to the operator. These systems identified with plant technical specifications include:

- Containment Atmosphere Particulate Radioactivity (EMF 38) Monitoring System which would detect airborne radiological activity;

- Containment Ventilation Unit Condensate Drain Tank Level Monitoring Subsystem which collects and measures as unidentified leakage the moisture removed from the containment atmosphere;

- Containment Floor and Equipment Sump Level and Flow Monitoring Subsystem where unidentified accumulated water on the containment floor would be monitored and evaluated as sump level changes.

IX. Other Information

The following individuals contributed to the development of this relief request:

- Jim McArdle (Principle NDE Level III Inspector) provided UT related information for Sections III through VI
- Steve Mays (Mechanical Engineer) and Bill Callaway (Civil Engineer) provided information for Section VIII
- Andy Hogge (Sponsor) compiled the remaining sections

Sponsored By: A. J. Hogge, Jr. **Date** 9/7/2005

Approved By: L. Kevin Rhyne **Date** 9/7/05

Attachment A	Weld ID Number 1RPV-W03
Attachment B	Weld ID Number 1RPV-W01
Attachment C	Weld ID Number 1PZR-W1
Attachment D	Weld ID Number 1PZR-W4A
Attachment E	Weld ID Number 1PZR-W4B
Attachment F	Weld ID Number 1PZR-W4C
Attachment G	Weld ID Number 1RPV-W18-SE and 1NC23-01
Attachment H	Weld ID Number 1NC286-1
Attachment I	Weld ID Number 1ND-37A
Attachment J	Weld ID Number 1ND39-12
Attachment K	D. M. Jamil to U. S. Nuclear Regulatory Commission letter dated June 14, 2005, Duke Energy Corporation Catawba Nuclear Station Unit 1 Docket No. 50-413 Response to NRC Bulletin 2004-01 Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized - Water Reactors

WesDyne International
Reactor Vessel Weld Results Summary

CATAWBA UNIT 1

WELD NO. **W4 (1RPV-W03) (B01.011.001)**

DESCRIPTION **LOWER SHELL TO LOWER HEAD CIRC.**

LIMITATIONS NO [ ] YES [X] **COVERAGE = 72.76%**

RESULTS NI [X] RI [ ]

NO. OF INDICATIONS **0**

STATUS **N/A**

EXAM DOCUMENTATION	INDICATION DOCUMENTATION
[X] ANALYSIS LOG	[ ] ASSESSMENT SHEET
[X] ACQUISITION LOG	[ ] PARAGON HARD COPY
[X] SCAN PRINTOUT	[ ] OTHER (specify)
[X] COVERAGE BREAKDOWN	

WESDYNE ANALYST

ATTACHMENT A
CR #05-CN-004
6.1 of 5

CATAWBA UNIT 1

RPV COVERAGE ESTIMATE BREAKDOWNS

DIRECTION / ORIENTATION

PARALLEL SCANS CCW/CW

PERP. SCANS UP/DN

WELD DESCRIPTION **LOWER SHELL TO LOWER HEAD CIRC.**

WELD NO. **W4 (1RPV-W03)**

BEAM ANGLES

BEAM DIRECTION	45° L Dual		45° L Single		45° Shear					
	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME
CCW	63.67	22.0	100	80.02	100	80.02				
CW	63.67	22.0	100	80.02	100	80.02				
UP	63.67	63.67	63.67	63.67	81.83	100				
DOWN	63.67	63.67	63.67	63.67	63.67	100				
Combined Average = 72.76%	LIMITATION DUE TO CORE SUPPORT LUGS.									

ANALYST 

WesDyne International
Reactor Vessel Weld Results Summary

CATAWBA UNIT 1

WELD NO. **W5 (1RPV-W01) (B01.021.001)**

DESCRIPTION **LOWER HEAD TO BOTTOM HEAD CIRC.**

LIMITATIONS NO [ ] YES [X] **COVERAGE = 87.19%**

RESULTS

NI	RI
[ ]	[X]

NO. OF INDICATIONS **3**

STATUS **CODE ALLOWABLE**

EXAM DOCUMENTATION	INDICATION DOCUMENTATION
[X] ANALYSIS LOG	[X] ASSESSMENT SHEET
[X] ACQUISITION LOG	[X] PARAGON HARD COPY
[X] SCAN PRINTOUT	[ ] OTHER (specify)
[X] COVERAGE BREAKDOWN	

WESDYNE ANALYST

RFO #05-CN-004 ATTACHMENT B

Pg. 1 of 5

CATAWBA UNIT 1

RPV COVERAGE ESTIMATE BREAKDOWNS

DIRECTION / ORIENTATION

PARALLEL SCANS CCW/CW

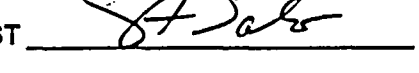
PERP. SCANS UP/DN

WELD DESCRIPTION **LOWER HEAD TO BOTTOM HEAD CIRC.**

WELD NO. **W5 (1RPV-W01)**

BEAM ANGLES

BEAM DIRECTION	45° L Dual		45° L Single		45° Shear					
	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME
CCW	86.6	87.5	100	93	100	93				
CW	86.6	87.5	100	93	100	93				
UP	85.97	81.65	81.29	78.43	78.77	79.07				
DOWN	85.97	77.93	81.29	80.95	78.77	82.37				
Combined Average = 87.19%	LIMITATION DUE TO PROXIMITY OF PERIPHERAL BMI TUBES.									

ANALYST 

Duke Energy.

UT Vessel Examination

Site/Unit: Catawba / 1 | Procedure: NDE-640 | Outage No.: CNS1EOC15

Summary No.: B03.110.001A | Procedure Rev.: 3 | Report No.: UT-05-154

Workscope: ISI | Work Order No.: 98688944 | Page: 1 of 1

Code: Asme Section XI 1989 | Cat./Item: B-D- /B3.110.1A | Location: N/A

Drawing No.: CNM 1201.01-175/1 | Description: PZR Surge Nozzle to Lower Head

System ID: NC

Component ID: B03.110.001A/1PZR-W1 | Size/Length: N/A | Thickness/Diameter: 2.55" / 24.5"

Limitations: Yes-See Attached Limitation Report | Start Time: 1330 | Finish Time: 1338

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: 9.2.3 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 03125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32798 | Surface Temp.: 82 °F

Cal. Report No.: CAL-05-169

Angle Used	0	45	45T	60	60T	
Scanning dB	31.5					

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☑ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐ | *** - See Report No. UT-05-155 for actual percentage of coverage

Percent Of Coverage Obtained > 90%: Yes-*** 77.2% | Reviewed Previous Data: Yes

Examiner Level II Resor, James H.	Signature James H Resor	Date 5/17/2005	Reviewer M E Howell	Signature	Date 5.21.05
Examiner Level II Leeper, Winfred C.	Signature Winfred C. Leeper	Date 5/17/2005	Site Review N/A	Signature	Date
Other Level N/A N/A	Signature	Date	ANII Review	Signature Nancy C Ritchie Slaughter	Date 5/24/05

RFR#05-CN-004 ATTACHMENT C PG 1 OF 12

Duke Energy

UT Vessel Examination

Site/Unit: Catawba / 1 | Procedure: NDE-820 | Outage No.: CNS1EOC15

Summary No.: B03.110.001A | Procedure Rev.: 2 | Report No.: UT-05-155

Workscope: ISI | Work Order No.: 98688944 | Page: 1 of 2

Code: Asme Section XI 1989 | Cat./Item: B-D- /B3.110.1A | Location: N/A

Drawing No.: CNM 1201.01-175/1 | Description: PZR Surge Nozzle to Lower Head

System ID: NC

Component ID: B03.110.001A/1PZR-W1 | Size/Length: N/A | Thickness/Diameter: 2.55" / 24.5"

Limitations: Yes-See Attached Limitation Report | Start Time: 1350 | Finish Time: 1410

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: 9.2.3 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 03125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32798 | Surface Temp.: 82 °F

Cal. Report No.: CAL-05-170, CAL-05-171

Angle Used	0	45	45T	60	60T	35
Scanning dB		67.2	67.2			62.8

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☑ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: Yes - 77.2% | Reviewed Previous Data: Yes

Examiner Level III Eaton, Jay A.	Signature [signature]	Date 5/17/2005	Reviewer DE Howser	Signature	Date 5.21.05
Examiner Level II Jones, Russel	Signature [signature]	Date 5/17/2005	Site Review N/A	Signature	Date
Other Level II-N Keene, Douglas L.	Signature [signature]	Date 5/17/2005	ANII Review Nancy C Ritchel Slaughter	Signature	Date 5/24/05

PS 2of12

Duke Energy.

Determination of Percent Coverage for UT Examinations - Vessels

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.001A	Procedure Rev.:	2	Report No.:	UT-05-155
Workscope:	ISI	Work Order No.:	98688944	Page:	2 of 2

0 deg Planar

Scan 100.000 % Length X 79.300 % volume of length / 100 = 79.300 % total for 0 deg

45 deg

Scan 1 100.000 % Length X 81.200 % volume of length / 100 = 81.200 % total for Scan 1

Scan 2 100.000 % Length X 59.700 % volume of length / 100 = 59.700 % total for Scan 2

Scan 3 100.000 % Length X 79.300 % volume of length / 100 = 79.300 % total for Scan 3

Scan 4 100.000 % Length X 79.300 % volume of length / 100 = 79.300 % total for Scan 4

Add totals and divide by # scans = 74.875 % total for 45 deg

Other deg 35

Scan 1 100.000 % Length X 88.500 % volume of length / 100 = 88.500 % total for Scan 1

Scan 2 100.000 % Length X 62.500 % volume of length / 100 = 62.500 % total for Scan 2

Scan 3 100.000 % Length X 79.300 % volume of length / 100 = 79.300 % total for Scan 3

Scan 4 100.000 % Length X 79.300 % volume of length / 100 = 79.300 % total for Scan 4

Add totals and divide by # scans = 77.400 % total for 35 deg

Percent complete coverage

Add totals for each angle and scan required and divide by # of angles to determine;

77.192 **% Total for complete exam**

Note:

Supplemental coverage may be achieved by use of other angles / methods. When used, the coverage for volume not obtained with angles as noted above shall be calculated and added to the total to provide the percent total for the complete examination.

Site Field Supervisor: David K. Zimmerman III Date: 5/17/2005

CNS UNIT I PZR SURGE NOZZLE/LOWER
ITEM NO. B03.110.001A
I.D. NO. 1PZR-W1

ANGLE	SCAN	BASE METAL%	WELD METAL%	AGGREGATE%
0	0	58.6	100.0	79.3
35	1	70.7	91.6	81.2
35	2	70.7	48.7	59.7
35	3	58.6	100.0	79.3
35	4	58.6	100.0	79.3
45	1	81.7	95.2	88.5
45	2	81.7	43.2	62.5
45	3	58.6	100.0	79.3
45	4	58.6	100.0	79.3

UT-05-155

Attachment 1 of 9

David K. Bruce III 05/17/05

pg 4 of 12

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1PZR-W1 **Item No:** B03.110.001A **remarks:**

☐ NO SCAN SURFACE BEAM DIRECTION Nozzle Configuration

☒ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☐ cw ☐ ccw

FROM L N/A to L N/ INCHES FROM W0 1.15 to Beyond

ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION Nozzle Configuration

☒ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 1.25 to Beyond

ANGLE: ☐ 0 ☐ 45 ☐ 60 other 35 FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION Nozzle Configuration

☒ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 0.85 to Beyond

ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION Nozzle Configuration

☒ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 0.75 to Beyond

ANGLE: ☐ 0 ☐ 45 ☐ 60 other 35 FROM 0 DEG to 360 DEG

Sketch(s) attached ☒ yes ☐ No

Prepared By: David Zimmerman Level: III Date: 05/17/05 Sheet 2 of 9 UT-05-155

Reviewed By: Date: 5-21-05 Authorized Inspector: Date: 5/24/05

PS 5 OF 12

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1PZR-W1 **Item No:** B03.110.001A

remarks: Nozzle Configuration

☒ NO SCAN — SURFACE — BEAM DIRECTION
☐ LIMITED SCAN — ☐ 1 ☒ 2 — ☐ 1 ☐ 2 ☒ cw ☒ ccw
FROM L N/A to L N/ — INCHES FROM W0 1.3 to Beyond
ANGLE: ☒ 0 ☒ 45 ☐ 60 other 35 — FROM 0 DEG to 360 DEG

☐ NO SCAN — SURFACE — BEAM DIRECTION
☐ LIMITED SCAN — ☐ 1 ☐ 2 — ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L ______ to L ______ — INCHES FROM W0 ______ to ______
ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____ — FROM ____ DEG to ____ DEG

☐ NO SCAN — SURFACE — BEAM DIRECTION
☐ LIMITED SCAN — ☐ 1 ☐ 2 — ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L ______ to L ______ — INCHES FROM W0 ______ to ______
ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____ — FROM ____ DEG to ____ DEG

☐ NO SCAN — SURFACE — BEAM DIRECTION
☐ LIMITED SCAN — ☐ 1 ☐ 2 — ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L ______ to L ______ — INCHES FROM W0 ______ to ______
ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____ — FROM ____ DEG to ____ DEG

Sketch(s) attached ☒ yes ☐ No

Prepared By: David Zimmerman [signature] Level: III Date: 05/17/05 Sheet 3 of 9 UT-05-155

Reviewed By: DE Houser Date: 5·21·05 Authorized Inspector: Nancy C Ritchie Slaughter Date: 5/24/05

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CNS-I PZR SURGE NOZZLE / LOWER HEAD

SURGE NOZZLE S2

TOTAL AREA - BASE METAL

ABCD: $1.65in\left(\frac{1.25in + 1.7in}{2}\right) = 2.43in^2$

CDEF: $0.9in\left(\frac{1.7in + 1.85in}{2}\right) = 1.60in^2$

GHIJ: $0.9in\left(\frac{1.8in + 1.9in}{2}\right) = 1.67in^2$

GIKL: $1.65in\left(\frac{1.25in + 1.8in}{2}\right) = 2.52in^2$

KLM: $\frac{0.8in \times 0.35in}{2} = 0.14in^2$

TOTAL BASE = $8.36in^2$

TOTAL AREA - WELD METAL

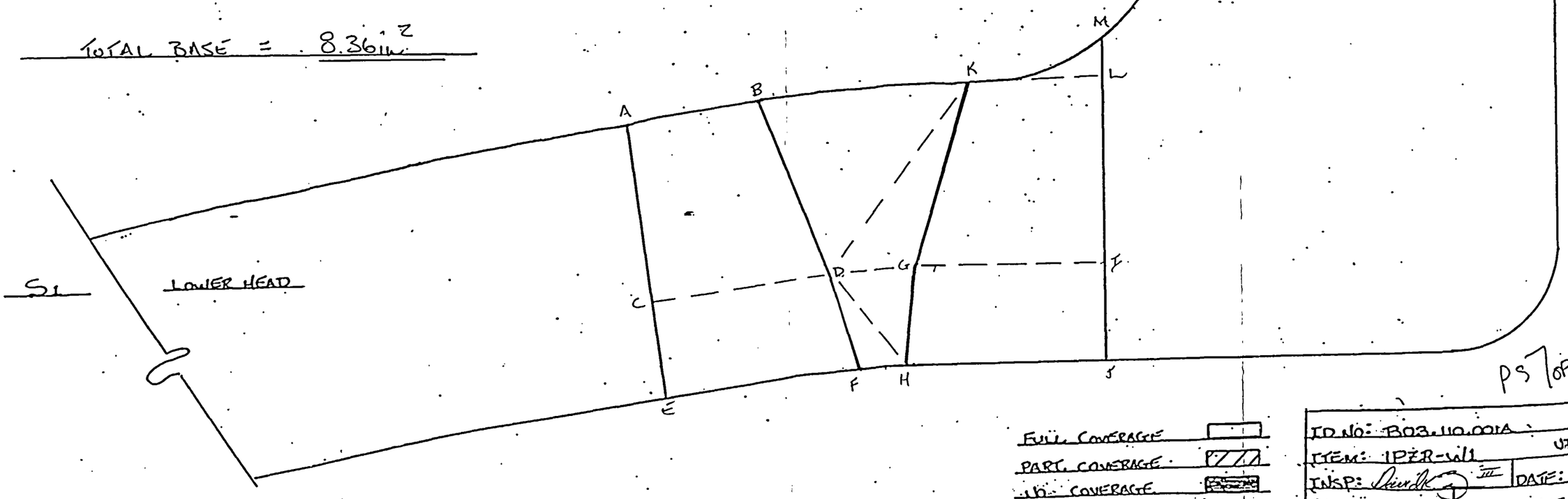
BDK: $\frac{1.8in \times 2.0in}{2} = 1.8in^2$

DGK: $\frac{0.8in \times 1.8in}{2} = 0.72in^2$

DFH: $\frac{0.45in \times 0.95in}{2} = 0.43in^2$

DGH: $\frac{0.95in \times 0.8in}{2} = 0.38in^2$

TOTAL WELD = $3.33in^2$



FULL COVERAGE

PART. COVERAGE

NO COVERAGE

ID NO: B03.110.001A

ITEM: 1PZR-W11 UT-05-155

INSP: [signature] III DATE: 05/17/05

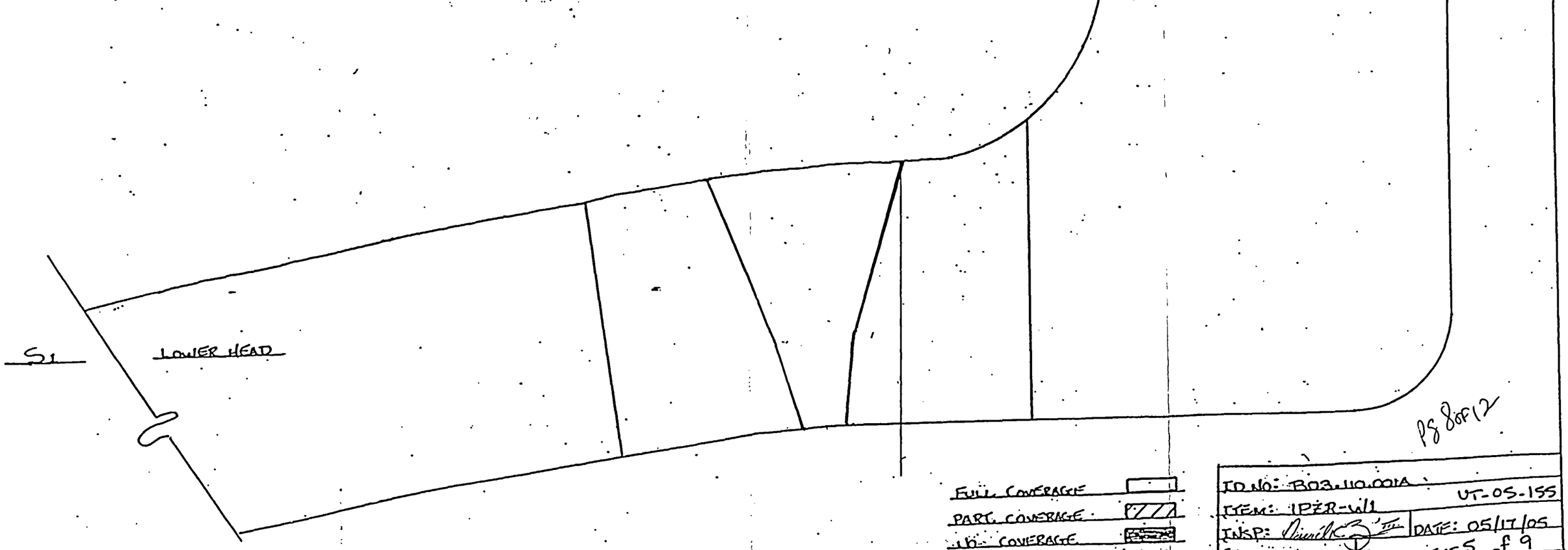
SCALE: FULL ATTACHMENT 4 of 9

PS 7 of 12

CNS-1 PZR SURGE NOZZLE / LOWER HEAD

0° SCAN / 35° & 45° CIRC SCAN (WELD)

100% COVERAGE



FULL COVERAGE
PART. COVERAGE
UT COVERAGE

ID NO: B03.110.001A
ITEM: 1PZR-W11 UT-05-155
INSP: [signature] DATE: 05/17/05
SCALE: FULL ATTACHMENT 5 of 9

CNS-I PZR SURGE NOZZLE / LOWER HEAD

SURGE NOZZLE S2

SCAN 1,2- 35° & 45° AXIAL (BASE)

35°

BCD: $\frac{0.8in \times 0.35in}{2} = 0.14in^2$

ADGH: $0.7in\left(\frac{1.3in+1.5in}{2}\right) = 0.95in^2$

GHJ: $\frac{1.5in \times 1.85in}{2} = 1.39in^2$

TOTAL LOSS = 2.48in

$8.46in^2 - 2.48in^2 = 5.98in^2$

TOTAL COVERAGE(%) = $5.98in^2/8.46in^2(100) = 70.7\%$

45°

BCD: $\frac{0.8in \times 0.35in}{2} = 0.14in^2$

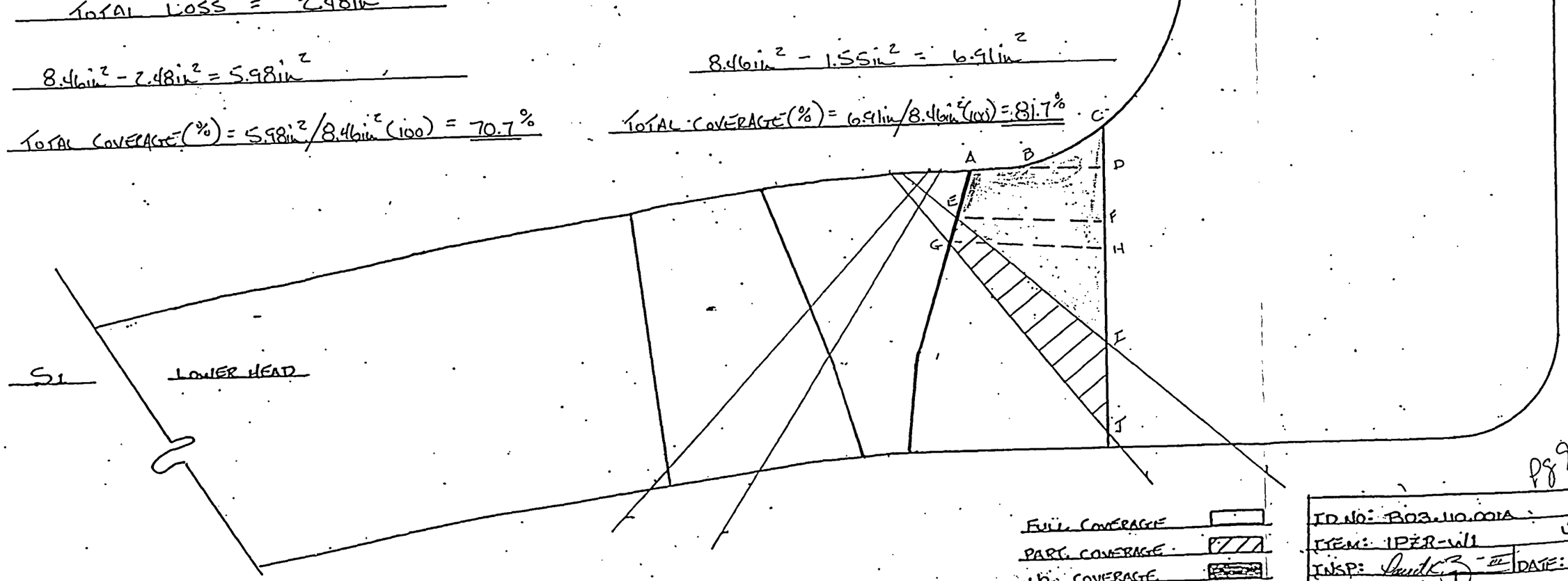
AEDF: $0.45in\left(\frac{1.25in+1.9in}{2}\right) = 0.60in^2$

EFJ: $\frac{1.15in \times 1.9in}{2} = 0.81in^2$

TOTAL LOSS = $1.55in^2$

$8.46in^2 - 1.55in^2 = 6.91in^2$

TOTAL COVERAGE(%) = $6.91in/8.46in^2(100) = 81.7\%$



FULL COVERAGE

PART. COVERAGE

NO COVERAGE

pg 8 of 12

ID NO: B03.110.001A
ITEM: 1PZR-W11 UQ05-155
INSP: [signature] DATE: 05/17/05
SCALE: FULL

CNS-1 PZR SURGE NOZZLE / LOWER HEAD

SURGE NOZZLE S2

0° SCAN / SCAN 3,4 - 35° & 45° CIRC (BASE)

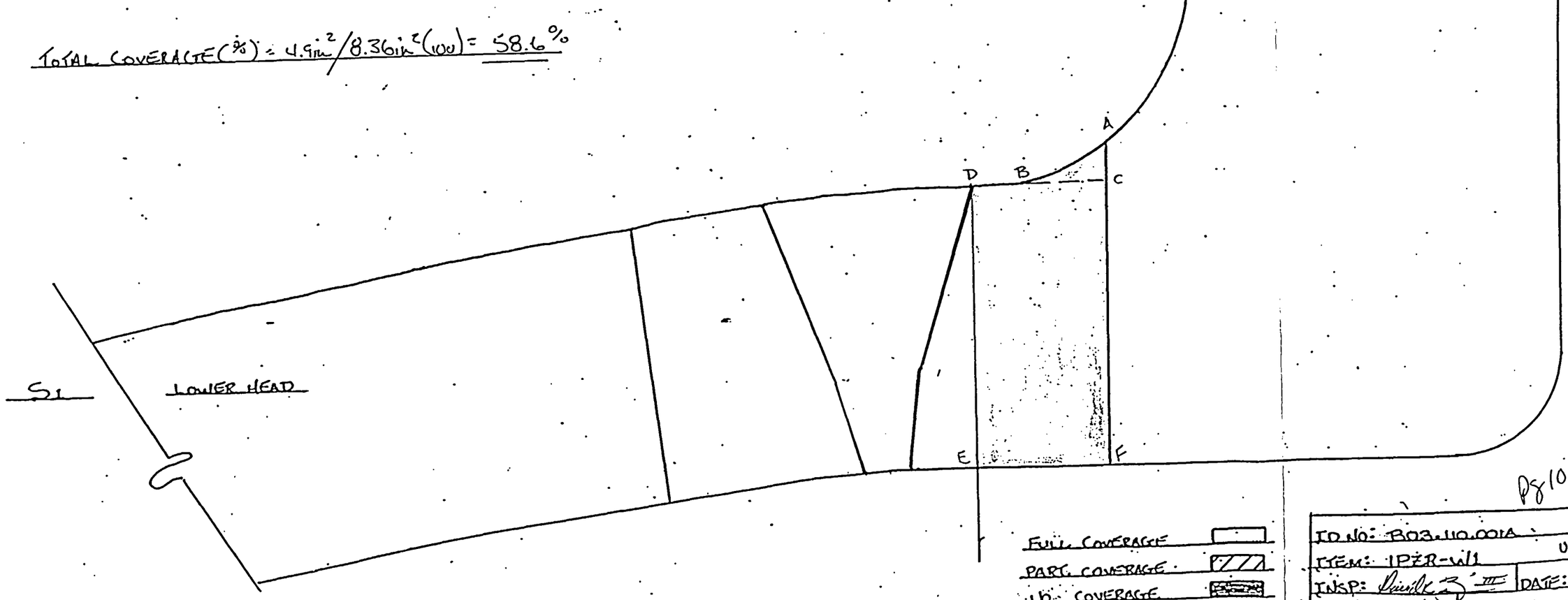
ABC: $\frac{0.8in \times 0.35in}{2} = 0.14in^2$

CDEF: $1.3in \times 2.55in = 3.32in^2$

TOTAL LOSS $= 3.46in^2$

$8.36in^2 - 3.46in^2 = 4.9in^2$

TOTAL COVERAGE(%) $= 4.9in^2 / 8.36in^2 (100) = 58.6\%$



FULL COVERAGE
PART. COVERAGE
NO COVERAGE

Pg 10 of 12

ID NO: B03.110.001A
ITEM: 1PZR-W1 UT-05-155
INSP: [signature] DATE: 05/17/05
SCALE: FULL ATTACHMENT 7 of 9

CNS-1 PZR SURGE NOZZLE / LOWER HEAD

SURGE NOZZLE S2

SCAN 1 - 35° & 45° AXIAL - (WELD)

45°

BCD: $\frac{0.65in \times 0.5in}{2} = 0.16in^2$

$3.33in^2 - 0.16in^2 = 3.17in^2$

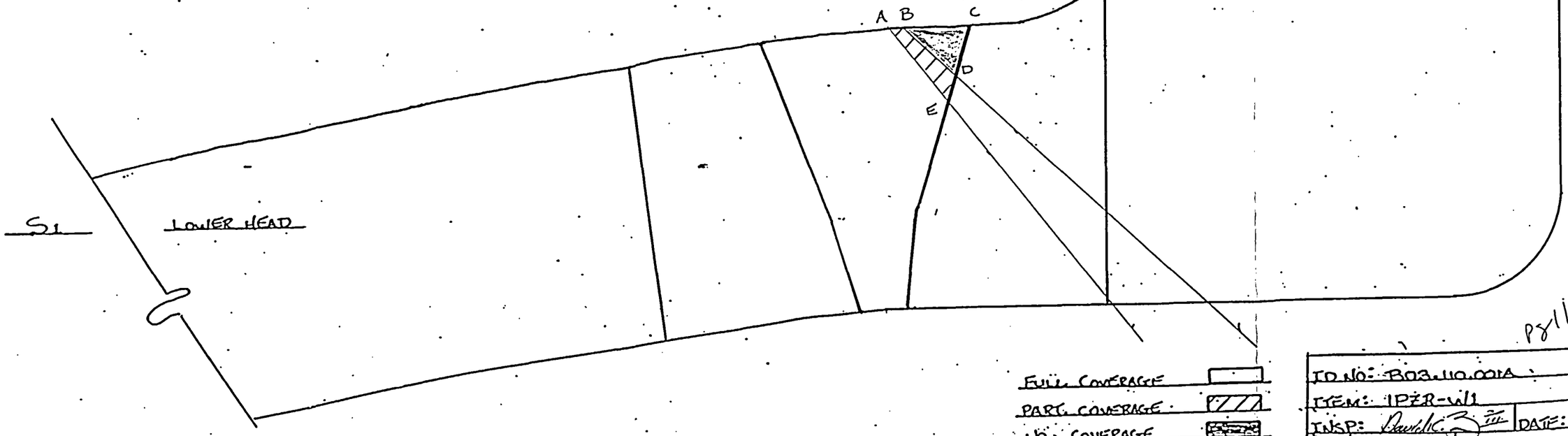
TOTAL COVERAGE(%) = $3.17in^2/3.33in^2(100) = 95.2\%$

35°

ACE: $\frac{0.75in \times 0.75in}{2} = 0.28in^2$

$3.33in^2 - 0.28in^2 = 3.05in^2$

TOTAL COVERAGE(%) = $3.05in^2/3.33in^2(100) = 91.6\%$



FULL COVERAGE

PART. COVERAGE

NO COVERAGE

ID NO: B03.110.001A

ITEM: 1PZR-W1 UT-05-155

INSP: [signature] DATE: 05/17/05

SCALE: FULL ATTACHMENT B of 9

CNS-I PZR SURGE NOZZLE / LOWER HEAD

SURGE NOZZLE S2

SCAN 2 - 35° & 45° AXIAL (WELD)

35°

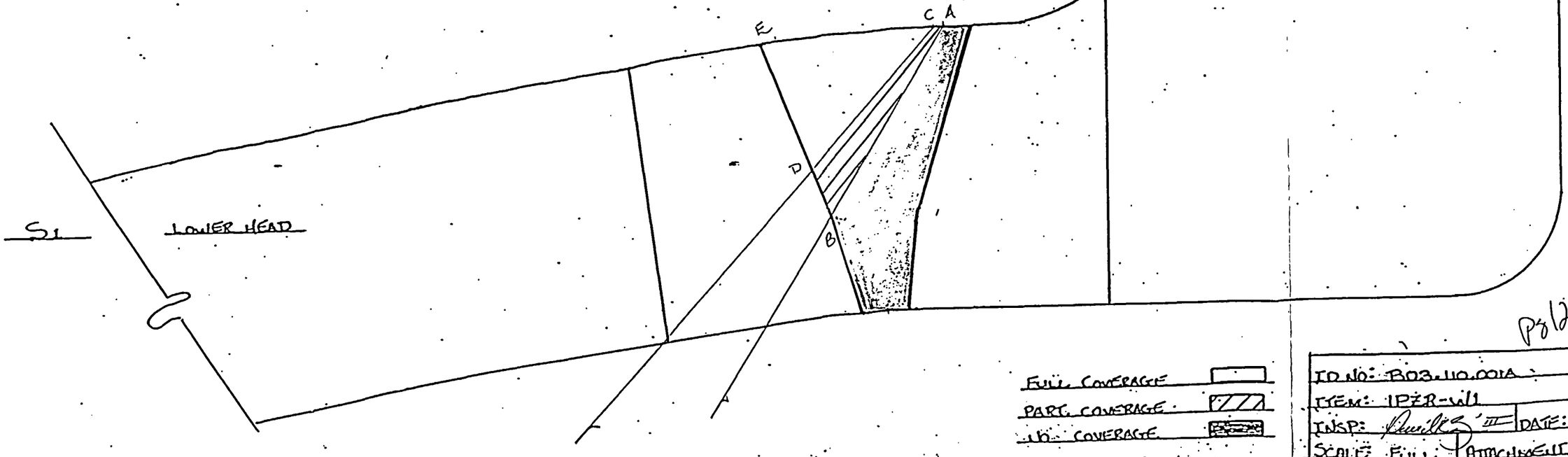
ABE: $\frac{1.75in \times 1.85in}{2} = 1.62in^2$

TOTAL COVERAGE(%) = $1.62in^2/3.33in^2(100) = 48.7\%$

45°

CDE: $\frac{1.65in^2 \times 1.75in^2}{2} = 1.44in^2$

TOTAL COVERAGE(%) = $1.44in^2/3.33in^2(100) = 43.2\%$



P8/28/12

ID NO: B03.110.001A ; UT-05-155
ITEM: 1PZR-W11
INSP: [illegible] DATE: 05/11/05
SCALE: FULL ATTACHMENT 9 of 9

Duke Energy

UT Vessel Examination

Site/Unit:	Catawba / 1	Procedure:	NDE-640	Outage No.:	CNS1EOC15
Summary No.:	B03.110.004A	Procedure Rev.:	3	Report No.:	UT-05-215
Workscope:	ISI	Work Order No.:	98688945	Page:	1 of 1

Code: Asme Section XI 1989 Cat./Item: B-D- /B3.110.4A Location: N/A

Drawing No.: CNM 1201.01-175/1 Description: PZR Safety Nozzle to Upper Head

System ID: NC

Component ID: B03.110.004A/1PZR-W4A Size/Length: N/A Thickness/Diameter: 1.9" / 15.0"

Limitations: Yes - See Limitation Report for 820 Exam Start Time: 1249 Finish Time: 1253

Examination Surface: Inside ☐ Outside ☑ Surface Condition: AS GROUND

Lo Location: 9.2.3 Wo Location: Centerline of Weld Couplant: ULTRAGEL II Batch No.: 05125

Temp. Tool Mfg.: D.A.S Serial No.: MCNDE32798 Surface Temp.: 69 °F

Cal. Report No.: CAL-05-228

Angle Used	0	45	45T	60	60T	
Scanning dB	31.5					

Indication(s): Yes ☐ No ☑ Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 79.2% Reviewed Previous Data: Yes

Examiner Level II Leeper, Winfred C.	Signature Winfred C. Leeper	Date 5/26/2005	Reviewer DE Hauser	Signature	Date 5-29-05
Examiner Level II-N Keene, Douglas L.	Signature Douglas L. Keene	Date 5/26/2005	Site Review N/A	Signature	Date
Other Level II-N Ransom, Greg	Signature Greg Ransom	Date 5/26/2005	ANII Review	Signature Robert McGill	Date 6-8-05

LER#05-CN-004 ATTACHMENT D

Pg 1 OF 13

Duke Energy

UT Vessel Examination

Site/Unit: Catawba / 1 | Procedure: NDE-820 | Outage No.: CNS1EOC15

Summary No.: B03.110.004A | Procedure Rev.: 2 | Report No.: UT-05-218

Workscope: ISI | Work Order No.: 98688945 | Page: 1 of 3

Code: Asme Section XI 1989 | Cat./Item: B-D- /B3.110.4A | Location: N/A

Drawing No.: CNM 1201.01-175/1 | Description: PZR Safety Nozzle to Upper Head

System ID: NC

Component ID: B03.110.004A/1PZR-W4A | Size/Length: N/A | Thickness/Diameter: 1.9" / 15.0"

Limitations: Yes - See Attached Limitation Report | Start Time: 1227 | Finish Time: 1244

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: 9.2.3 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 05125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32798 | Surface Temp.: 69 °F

Cal. Report No.: CAL-05-229, CAL-05-230

Angle Used	0	45	45T	60	60T	
Scanning dB		53		67.4		

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 79.2 % | Reviewed Previous Data: Yes

Examiner Level II Leeper, Winfred C.	Signature Winfred C. Leeper	Date 5/26/2005	Reviewer	Signature DE Howard	Date 5.29.05
Examiner Level II-N Keene, Douglas L.	Signature Douglas Keene	Date 5/26/2005	Site Review N/A	Signature	Date
Other Level II-N Ransom, Greg	Signature Greg Ransom	Date 5/26/2005	ANII Review	Signature Robert McGill	Date 6.8.05

Duke Energy

Determination of Percent Coverage for UT Examinations - Vessels

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.004A	Procedure Rev.:	2	Report No.:	UT-05-218
Workscope:	ISI	Work Order No.:	98688945	Page:	2 of 3

0 deg Planar

Scan 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for 0 deg

45 deg

Scan 1 100.000 % Length X 92.000 % volume of length / 100 = 92.000 % total for Scan 1

Scan 2 100.000 % Length X 66.710 % volume of length / 100 = 66.710 % total for Scan 2

Scan 3 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 3

Scan 4 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 4

Add totals and divide by # scans = 79.493 % total for 45 deg

Other deg 60

Scan 1 100.000 % Length X 94.230 % volume of length / 100 = 94.230 % total for Scan 1

Scan 2 100.000 % Length X 60.520 % volume of length / 100 = 60.520 % total for Scan 2

Scan 3 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 3

Scan 4 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 4

Add totals and divide by # scans = 78.503 % total for 60 deg

Percent complete coverage

Add totals for each angle and scan required and divide by # of angles to determine;

79.208 **% Total for complete exam**

Note:

Supplemental coverage may be achieved by use of other angles / methods. When used, the coverage for volume not obtained with angles as noted above shall be calculated and added to the total to provide the percent total for the complete examination.

Site Field Supervisor: David K. [illegible] III Date: 05/26/05

Pg 3 of 13

Duke Energy.

Limitation Record

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.004A	Procedure Rev.:	2	Report No.:	UT-05-218
Workscope:	ISI	Work Order No.:	98688945	Page:	3 of 3

Description of Limitation:

See Attachement for Limitation Calculations. **Aggregate %**
Coverage

Sketch of Limitation:

Δ	Scan	Weld %	Base %	Aggregate
45°	1	100.00	84.00	92.00
	2	49.41	84.00	66.71
	3	100.00	59.26	79.63
	4	100.00	59.26	79.63
60°	1	100.00	88.45	94.23
	2	37.04	84.00	60.52
	3	100.00	59.26	79.63
	4	100.00	59.26	79.63
0°		100.00	59.26	79.63

Limitations removal requirements:

Radiation field:

Examiner	Level II	Signature	Date	Reviewer		Signature	Date
Leeper, Winfred C.		Winfred C. Leeper	5/26/2005	M E Hower			5.29.05
Examiner	Level II-N	Signature	Date	Site Review		Signature	Date
Keene, Douglas L.		Douglas Keene	5/26/2005	N/A			
Other	Level II-N	Signature	Date	ANII Review		Signature	Date
Ransom, Greg		Greg Ransom	5/26/2005	Robert McGill			6-8-05

P840 F13

UNIT 1 PZR - NOZZLE HEAD WELD

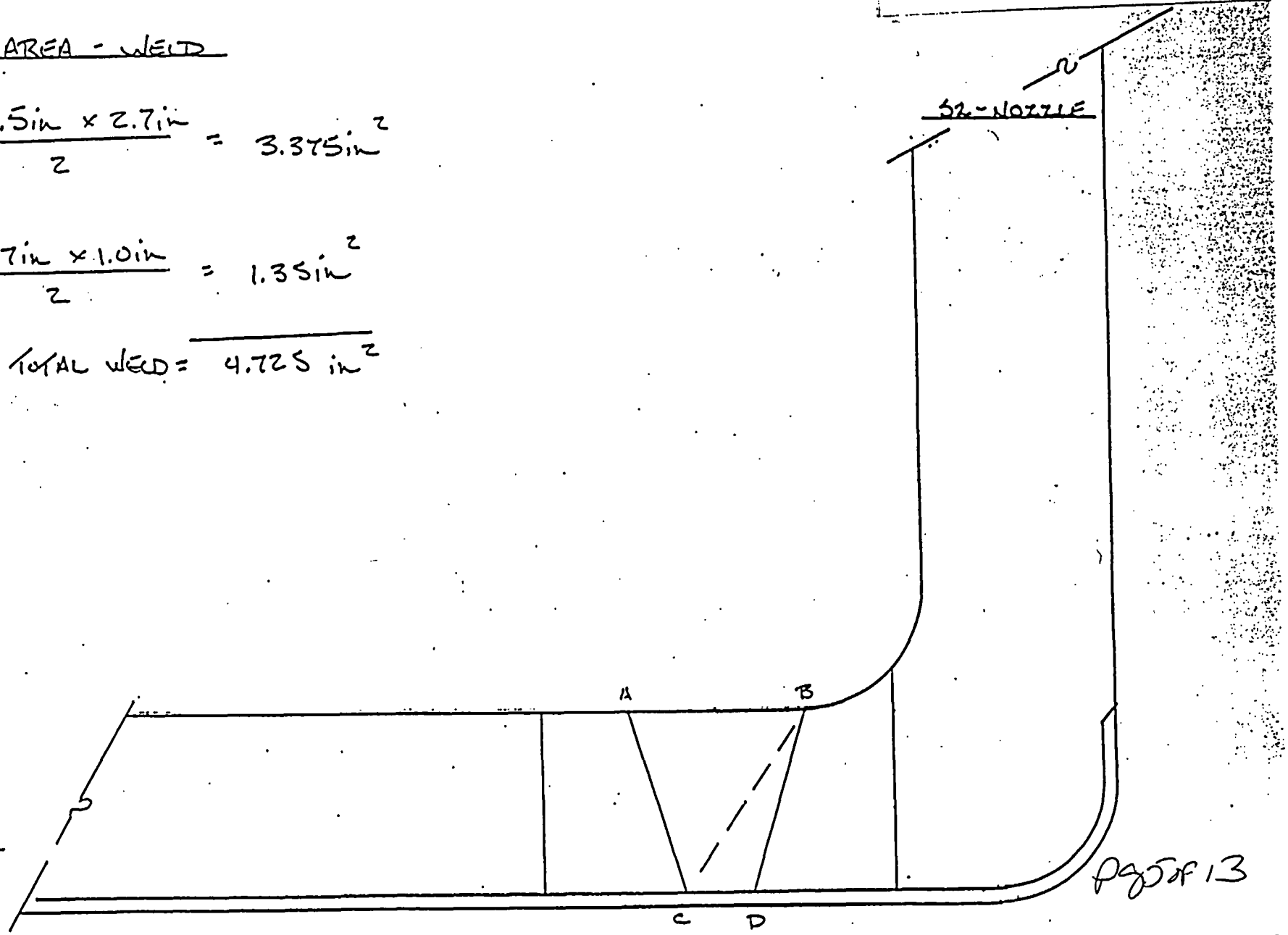
ITEM NO. B03.110.004A
I.D. NO.: 1PZR-004A
INSP. [illegible]
DATE 5/5/26 TO 5

TOTAL AREA - WELD

ABC : $\frac{2.5in \times 2.7in}{2} = 3.375in^2$

BCD : $\frac{2.7in \times 1.0in}{2} = 1.35in^2$

TOTAL WELD = $4.725\ in^2$



Pg 5 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

Attachment 1 of 9

UNIT 1 PZR - NOZZLE 4 END WELD

ITEM NO. B03.110.004A
I.D. NO. 1PZR-W4A
INSP Numark 3 - III
DATE 05/26/05

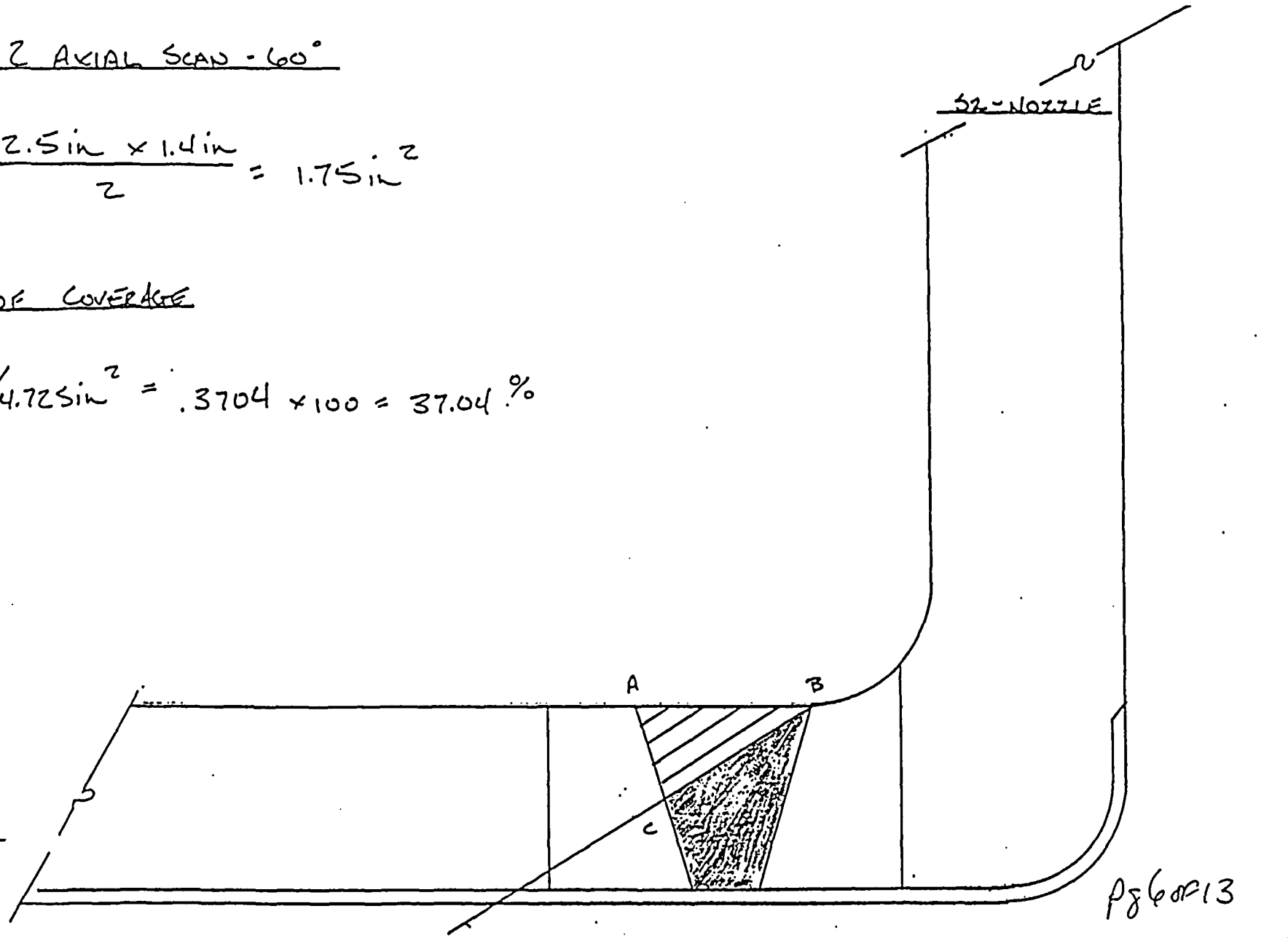
WELD

SCAN 2 AXIAL SCAN - 60°

ABC: $\frac{2.5in \times 1.4in}{2} = 1.75in^2$

PERCENT OF COVERAGE

$1.75in^2 / 4.725in^2 = .3704 \times 100 = 37.04\%$



Pg 6 of 13

SCALE: ½" = 1.0" NOTE: All dimensions taken directly from drwg.

UNIT 1 PZR - NOZZLE / HD WELD

ITEM NO. B03.110.0044
I.D. NO. 1PZR-W4A
INSP Rwelk 3 - III
DATE 05/26/05

WELD

SCAN 2 AXIAL SCAN - 45°

ABC : $\frac{2.8\text{in} \times 0.6\text{in}}{2} = 0.84\text{in}^2$

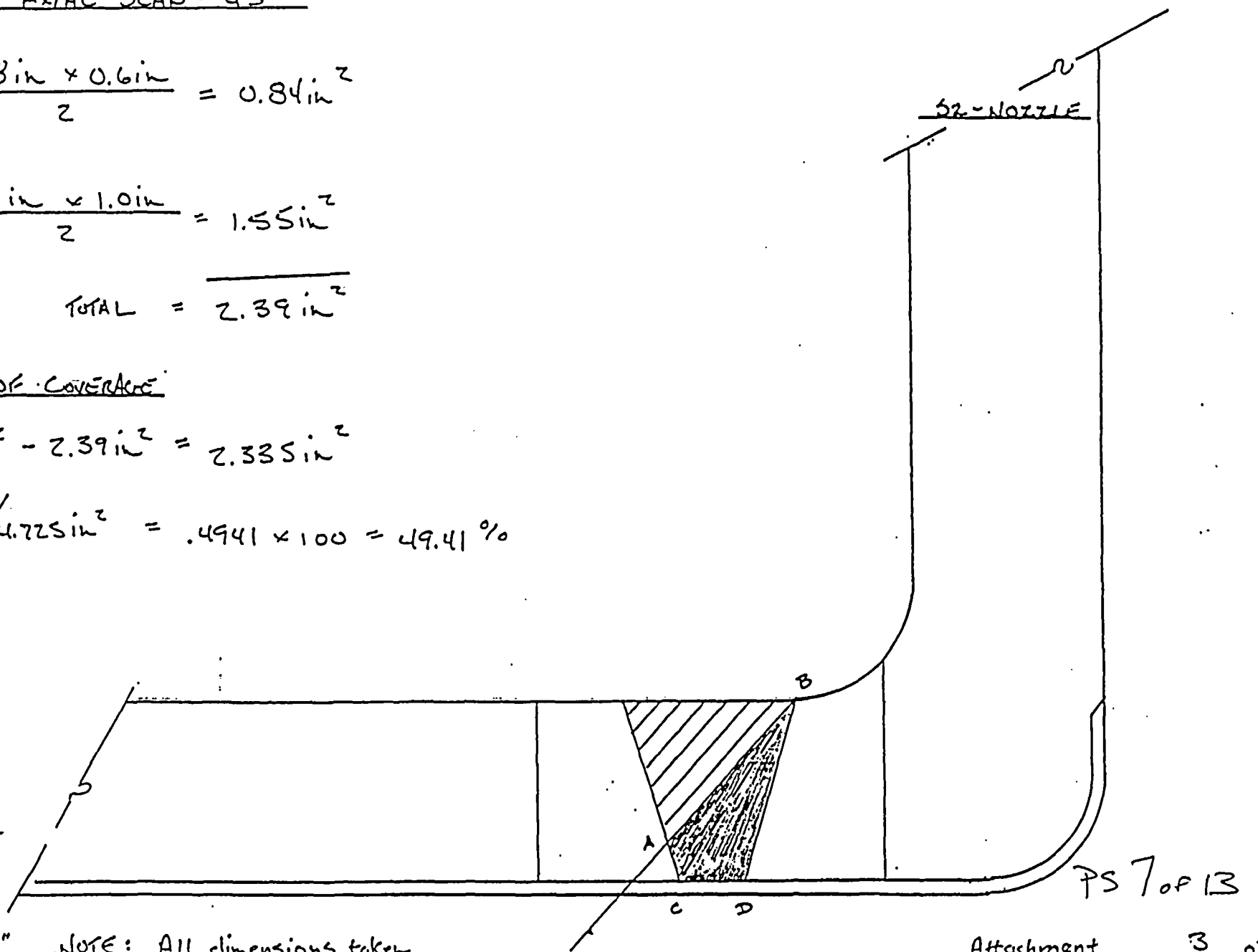
BCD : $\frac{3.1\text{in} \times 1.0\text{in}}{2} = 1.55\text{in}^2$

TOTAL = 2.39in^2

PERCENT OF COVERAGE

$4.725\text{in}^2 - 2.39\text{in}^2 = 2.335\text{in}^2$

$2.335\text{in}^2 / 4.725\text{in}^2 = .4941 \times 100 = 49.41\ \%$



PS 7 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

UNIT 1 PZR - NOZZLE / HEAD WELD

ITEM NO. B03.110.004M
I.D. NO. 1PZR-W4M
INSP Rev K.3 III
DATE 05/26/05

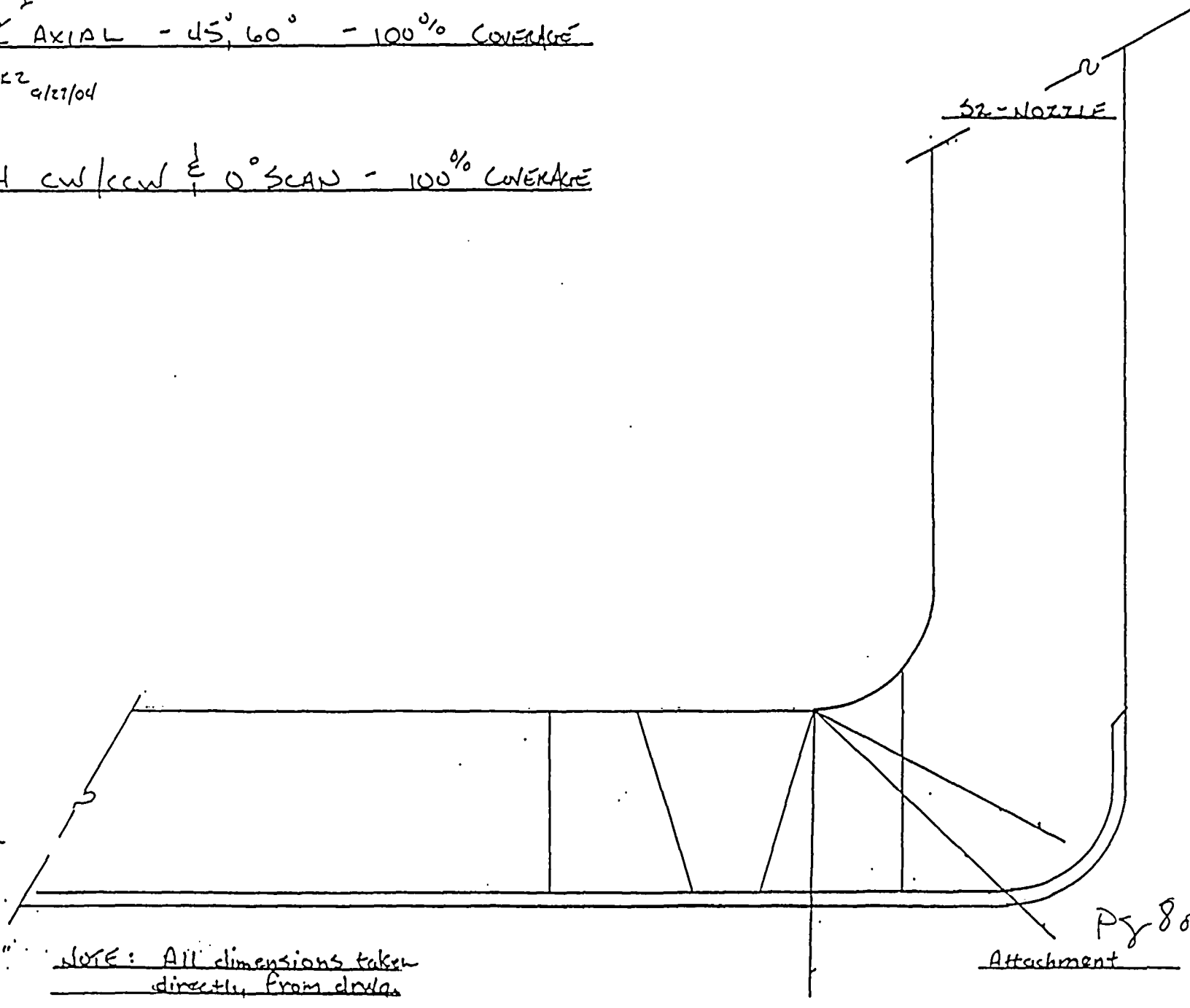
WELD

1

SCAN Σ AXIAL - 45°, 60° - 100% COVERAGE

DKZ 9/27/04

SCAN 3,4 CW/CCW & 0° SCAN - 100% COVERAGE



SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

UNIT 1 PZR - NOZZLE 4 END WELD

ITEM NO. B03.110.004A
I.D. NO. 1PZR-W4M
INSP Mandk. 3 - III
DATE 05/26/05

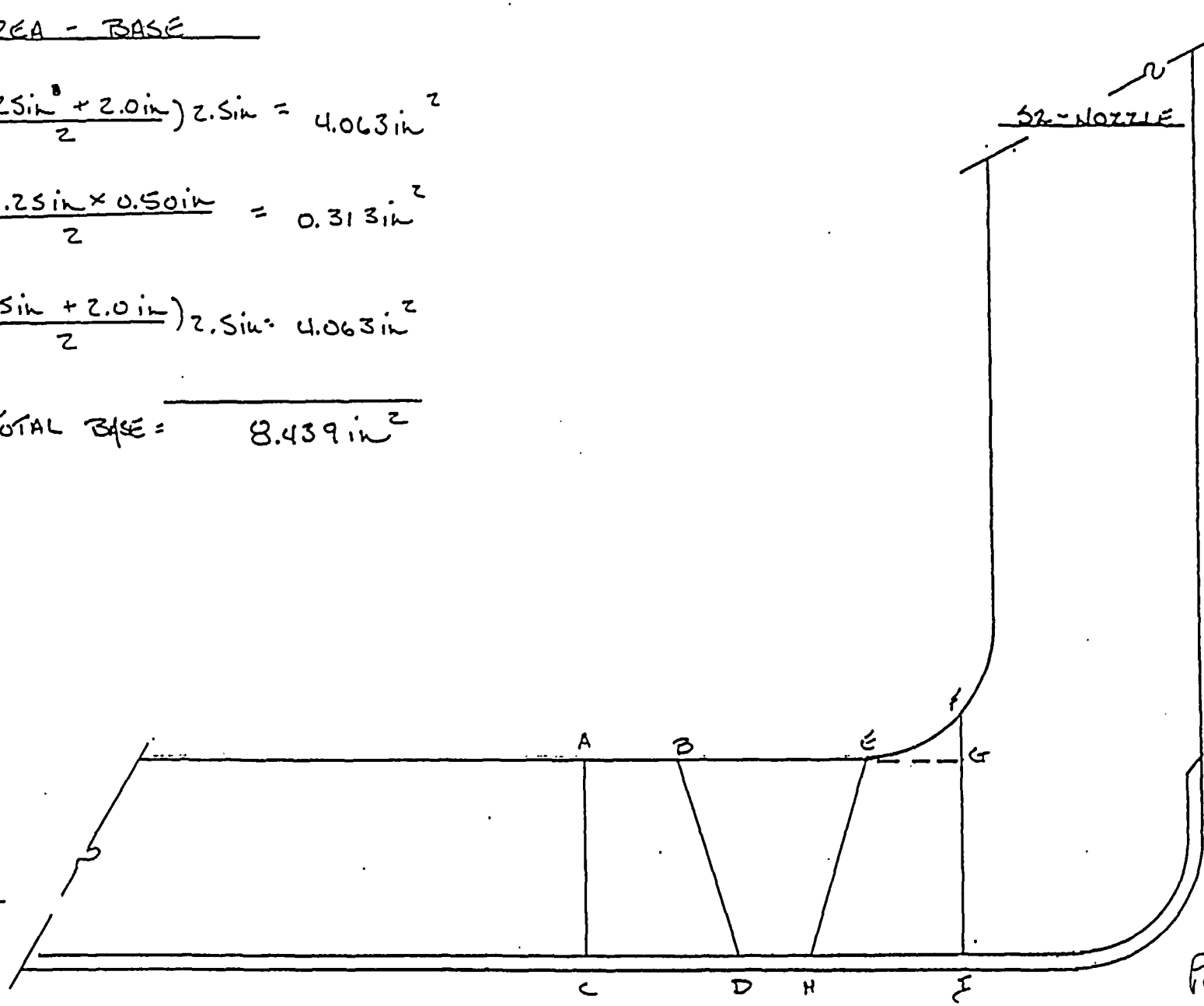
TOTAL AREA - BASE

ABCD: $\left(\frac{1.25\text{in}^{B} + 2.0\text{in}}{2}\right) 2.5\text{in} = 4.063\text{in}^2$

EFG: $\frac{1.25\text{in} \times 0.50\text{in}}{2} = 0.313\text{in}^2$

EGHI: $\left(\frac{1.25\text{in} + 2.0\text{in}}{2}\right) 2.5\text{in} = 4.063\text{in}^2$

TOTAL BASE = 8.439in^2



SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

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Attachment 5 of 9

UNIT 1 PZR - NOZZLE / HEAD WELD

ITEM NO. 03.110.0041
I.D. NO. 1PZR-W4A
INSP Rawl K3 III
DATE 05/26/05

BASE METAL AXIAL SCAN 1 - (45°, 60°)

60° ABC : $\frac{1.5in \times 1.3in}{2} = 0.975in^2$

60° PERCENT OF COVERAGE

$8.439in^2 - 0.975in^2 = 7.464in^2$

$7.464in^2 / 8.439in^2 = .8845 \times 100 = 88.45\ \%$

45°

ABC: $\frac{1.5in \times 1.3in}{2} = 0.975in^2$

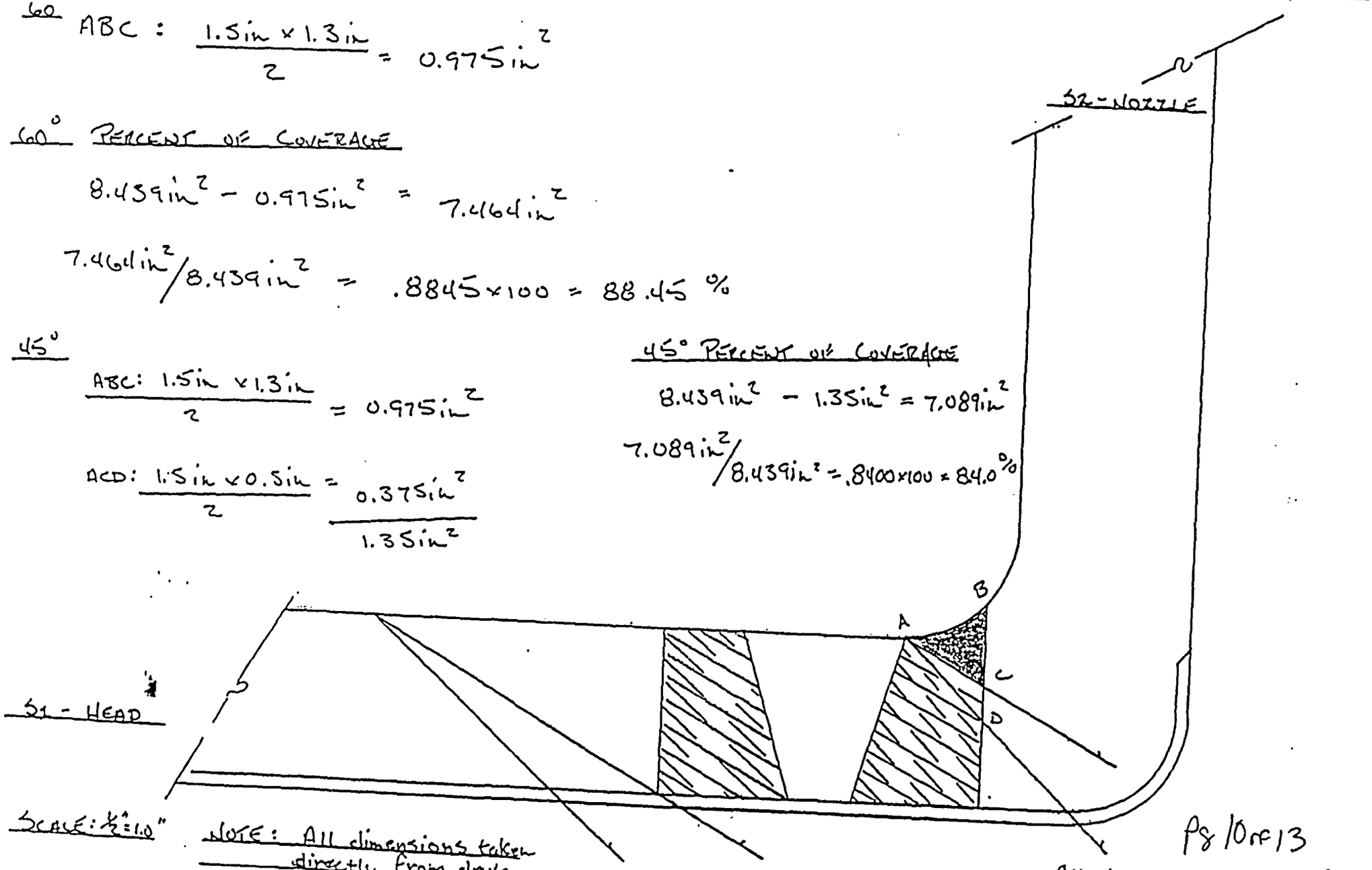
ACD: $\frac{1.5in \times 0.5in}{2} = 0.375in^2$

$1.35in^2$

45° PERCENT OF COVERAGE

$8.439in^2 - 1.35in^2 = 7.089in^2$

$7.089in^2 / 8.439in^2 = .8400 \times 100 = 84.0\ \%$



SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

UNIT 1 PZR - NOZZLE HEAD WELD

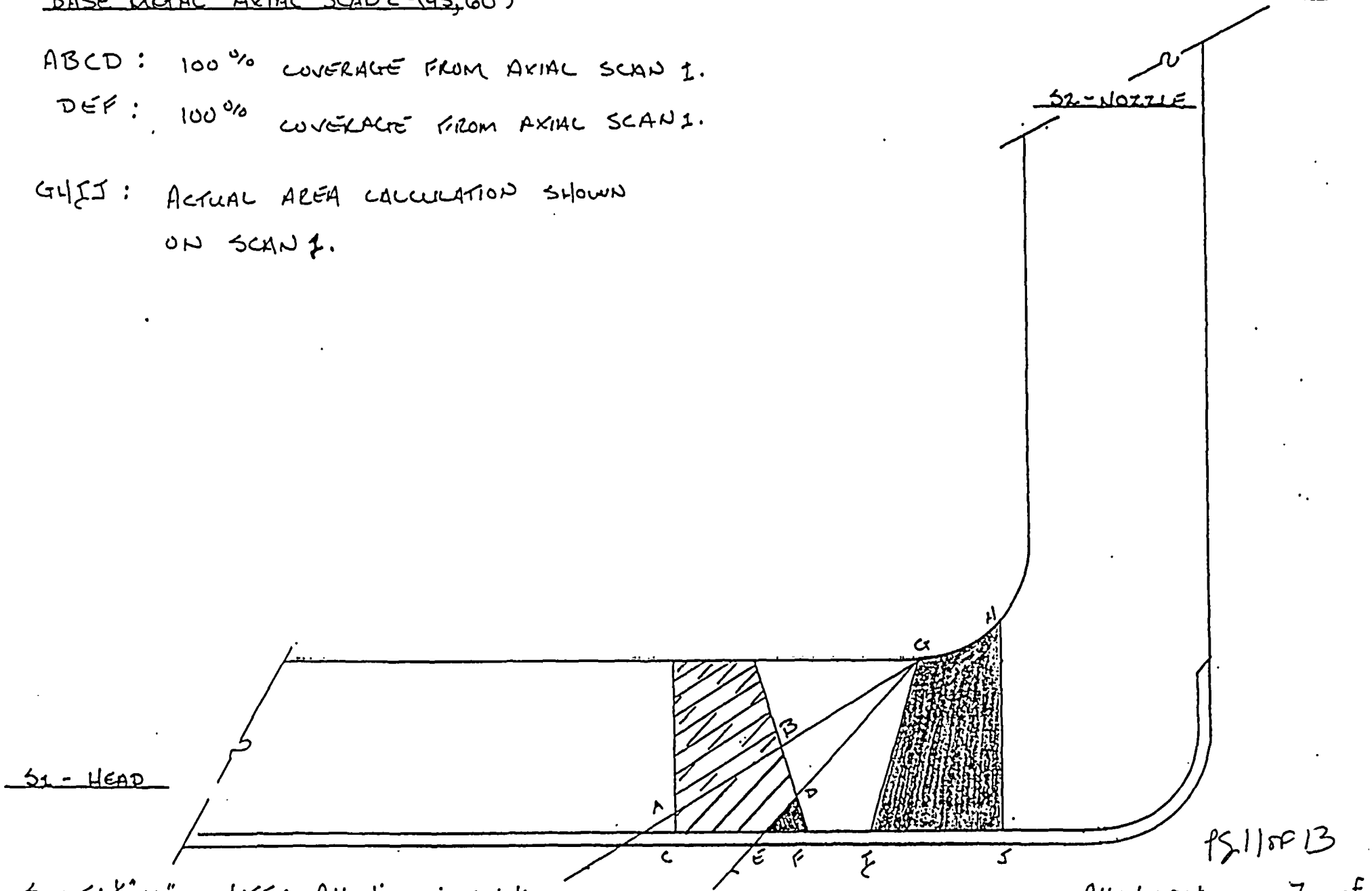
ITEM NO. B03.110.004A
I.D. NO. 1PZR-W4A
INSP David K. Bell III
DATE 05/26/05

BASE METAL AXIAL SCAN 2 - (45°, 60°)

ABCD : 100 % COVERAGE FROM AXIAL SCAN 1.

DEF : 100 % COVERAGE FROM AXIAL SCAN 1.

GHIJ : ACTUAL AREA CALCULATION SHOWN ON SCAN 1.



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SCALE: 1/2" = 1.0"

NOTE: All dimensions taken directly from drawing

Attachment 7 of.

UNIT 1 PZR. NOZZLE / HEAD WELD

ITEM NO. B03.110.004A
I.D. NO. 1PZR-W4A
INSP: [illegible]
DATE: 05/26/05

BASE - 0° & CW/CCW SCAN (45°, 60°)

ABC : $\frac{1.25in \times 0.50in}{2} = 0.513in^2$

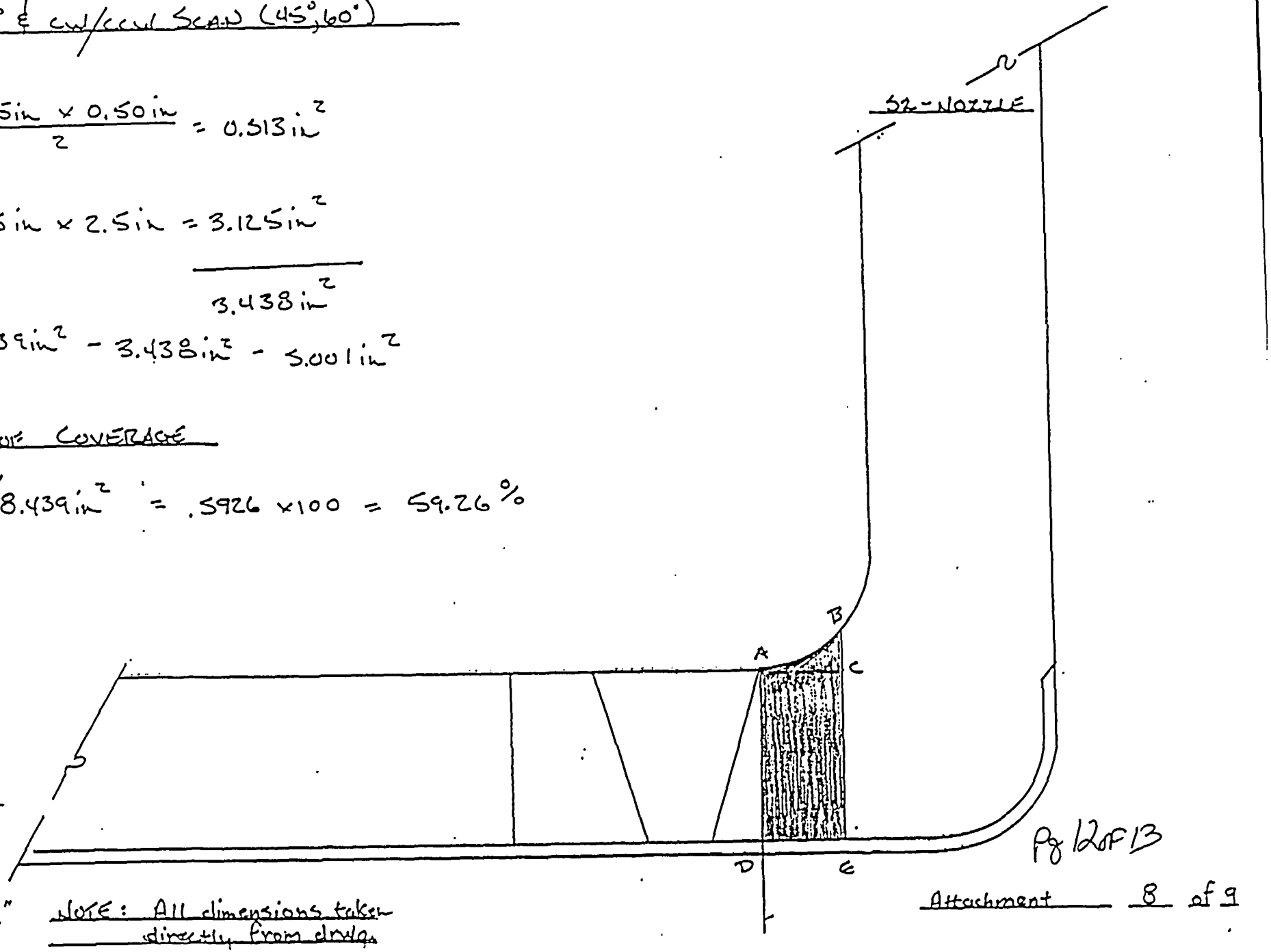
ACDE : $1.25in \times 2.5in = 3.125in^2$

$3.438in^2$

$8.439in^2 - 3.438in^2 - 5.001in^2$

PERCENT OF COVERAGE

$5.001in^2 / 8.439in^2 = .5926 \times 100 = 59.26\%$



Pg 12 of 13

SCALE: ½" : 1.0"

NOTE: All dimensions taken directly from drwg.

Attachment 8 of 9

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1PZR-W4A **Item No:** B03.110.004A

remarks:

☒ NO SCAN SURFACE BEAM DIRECTION — Nozzle Configuration
☐ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☒ cw ☒ ccw
FROM L _____ to L _____ INCHES FROM W0 C/L+ to Beyond
ANGLE: ☒ 0 ☒ 45 ☒ 60 other _____ FROM 0 DEG to 360 DEG

☒ NO SCAN SURFACE BEAM DIRECTION — Nozzle Configuration
☐ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM W0 C/L+ to Beyond
ANGLE: ☐ 0 ☒ 45 ☒ 60 other _____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION
☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM W0 _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other _____ FROM _____ DEG to _____ DEG

☐ NO SCAN SURFACE BEAM DIRECTION
☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM W0 _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other _____ FROM _____ DEG to _____ DEG

Sketch(s) attached
☒ yes ☐ No

Prepared By: David Zimmerman Level: III Date: 05262005 Attachment Sheet 9 of 9

Reviewed By: Date: 5-29-05 Authorized Inspector: Date: 6-8-05

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Duke Energy

UT Vessel Examination

Site/Unit:	Catawba / 1	Procedure:	NDE-640	Outage No.:	CNS1EOC15
Summary No.:	B03.110.005	Procedure Rev.:	3	Report No.:	UT-05-216
Workscope:	ISI	Work Order No.:	98688945	Page:	1 of 1

Code: Asme Section XI 1989 Cat./Item: B-D- /B3.110.5 Location: N/A

Drawing No.: CNM 1201.01-175/1 Description: PZR Safety Nozzle to Upper Head

System ID: NC

Component ID: B03.110.005 /1PZR-W4B Size/Length: N/A Thickness/Diameter: 1.9" / 15.0"

Limitations: Yes - See Limitation Report for 820 Exam Start Time: 1245 Finish Time: 1249

Examination Surface: Inside ☐ Outside ☑ Surface Condition: AS GROUND

Lo Location: 9.2.3 Wo Location: Centerline of Weld Couplant: ULTRAGEL II Batch No.: 05125

Temp. Tool Mfg.: D.A.S Serial No.: MCNDE32798 Surface Temp.: 69 °F

Cal. Report No.: CAL-05-228

Angle Used	0	45	45T	60	60T	
Scanning dB	31.5					

Indication(s): Yes ☐ No ☑ Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 79.2% Reviewed Previous Data: Yes

Examiner Level II Leeper, Winfred C.	Signature Winfred P. Leeper	Date 5/26/2005	Reviewer DE Hansen	Signature	Date 5-29-05
Examiner Level II-N Keene, Douglas L.	Signature Doug Keene	Date 5/26/2005	Site Review N/A	Signature	Date
Other Level II-N Ransom, Greg	Signature Greg Ransom	Date 5/26/2005	ANII Review	Signature Robert M Gill	Date 6.8.05

LER#05-CN-004 ATTACHMENT E

Pg 1 of 13

Duke Energy

UT Vessel Examination

Site/Unit: Catawba / 1 | Procedure: NDE-820 | Outage No.: CNS1EOC15

Summary No.: B03.110.005 | Procedure Rev.: 2 | Report No.: UT-05-219

Workscope: ISI | Work Order No.: 98688945 | Page: 1 of 3

Code: Asme Section XI 1989 | Cat./Item: B-D- /B3.110.5 | Location: N/A

Drawing No.: CNM 1201.01-175/1 | Description: PZR Safety Nozzle to Upper Head

System ID: NC

Component ID: B03.110.005 /1PZR-W4B | Size/Length: N/A | Thickness/Diameter: 1.9" / 15.0"

Limitations: Yes-See Attached Limitation Report | Start Time: 1212 | Finish Time: 1235

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: 9.2.3 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 05125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32798 | Surface Temp.: 69 °F

Cal. Report No.: CAL-05-229, CAL-05-230

Angle Used	0	45	45T	60	60T	
Scanning dB		53		67.4		

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No- 79.2% | Reviewed Previous Data: Yes

Examiner Level II Leeper, Winfred C.	Signature Winfred C. Leeper	Date 5/26/2005	Reviewer M E Howen	Signature	Date 5-27-05
Examiner Level II-N Keene, Douglas L.	Signature Douglas Keene	Date 5/26/2005	Site Review N/A	Signature	Date
Other Level II-N Ransom, Greg	Signature Greg Ransom	Date 5/26/2005	ANII Review	Signature Robert Mullett	Date 6-8-05

Ps 2 of 13

Duke Energy

Determination of Percent Coverage for UT Examinations - Vessels

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.005	Procedure Rev.:	2	Report No.:	UT-05-219
Workscope:	ISI	Work Order No.:	98688945	Page:	2 of 3

0 deg Planar

Scan 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for 0 deg

45 deg

Scan 1 100.000 % Length X 92.000 % volume of length / 100 = 92.000 % total for Scan 1

Scan 2 100.000 % Length X 66.710 % volume of length / 100 = 66.710 % total for Scan 2

Scan 3 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 3

Scan 4 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 4

Add totals and divide by # scans = 79.493 **% total for 45 deg**

Other deg 60

Scan 1 100.000 % Length X 94.230 % volume of length / 100 = 94.230 % total for Scan 1

Scan 2 100.000 % Length X 60.520 % volume of length / 100 = 60.520 % total for Scan 2

Scan 3 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 3

Scan 4 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 4

Add totals and divide by # scans = 78.503 **% total for** 60 **deg**

Percent complete coverage

Add totals for each angle and scan required and divide by # of angles to determine;

79.208 **% Total for complete exam**

Note:

Supplemental coverage may be achieved by use of other angles / methods. When used, the coverage for volume not obtained with angles as noted above shall be calculated and added to the total to provide the percent total for the complete examination.

Site Field Supervisor: David K [illegible] III Date: 05/26/05

Pg 3 of 13

Duke Energy

Limitation Record

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.005	Procedure Rev.:	2	Report No.:	UT-05-219
Workscope:	ISI	Work Order No.:	98688945	Page:	3 of 3

Description of Limitation:

See Attachment for Limitation Calculations.
Coverage

Aggregate %

Sketch of Limitation:

Δ	Scan	Weld %	Base %	Aggregate
45°	1	100.00	84.00	92.00
	2	49.41	84.00	66.71
	3	100.00	59.26	79.63
	4	100.00	59.26	79.63
60°	1	100.00	88.45	94.23
	2	37.04	84.00	60.52
	3	100.00	59.26	79.63
	4	100.00	59.26	79.63
0°		100.00	59.26	79.63

Limitations removal requirements:

Radiation field:

Examiner Leeper, Winfred C.	Level II	Signature Winfred C. Leeper	Date 5/26/2005	Reviewer		Signature M E Hansen	Date 5.29.05
Examiner Keene, Douglas L.	Level II-N	Signature Douglas L. Keene	Date 5/26/2005	Site Review N/A		Signature	Date
Other Ransom, Greg	Level II-N	Signature Greg Ransom	Date 5/26/2005	ANII Review		Signature Robert McGill	Date 6.8.05

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UNIT 1 PZR - NOZZLE LEAD WELD

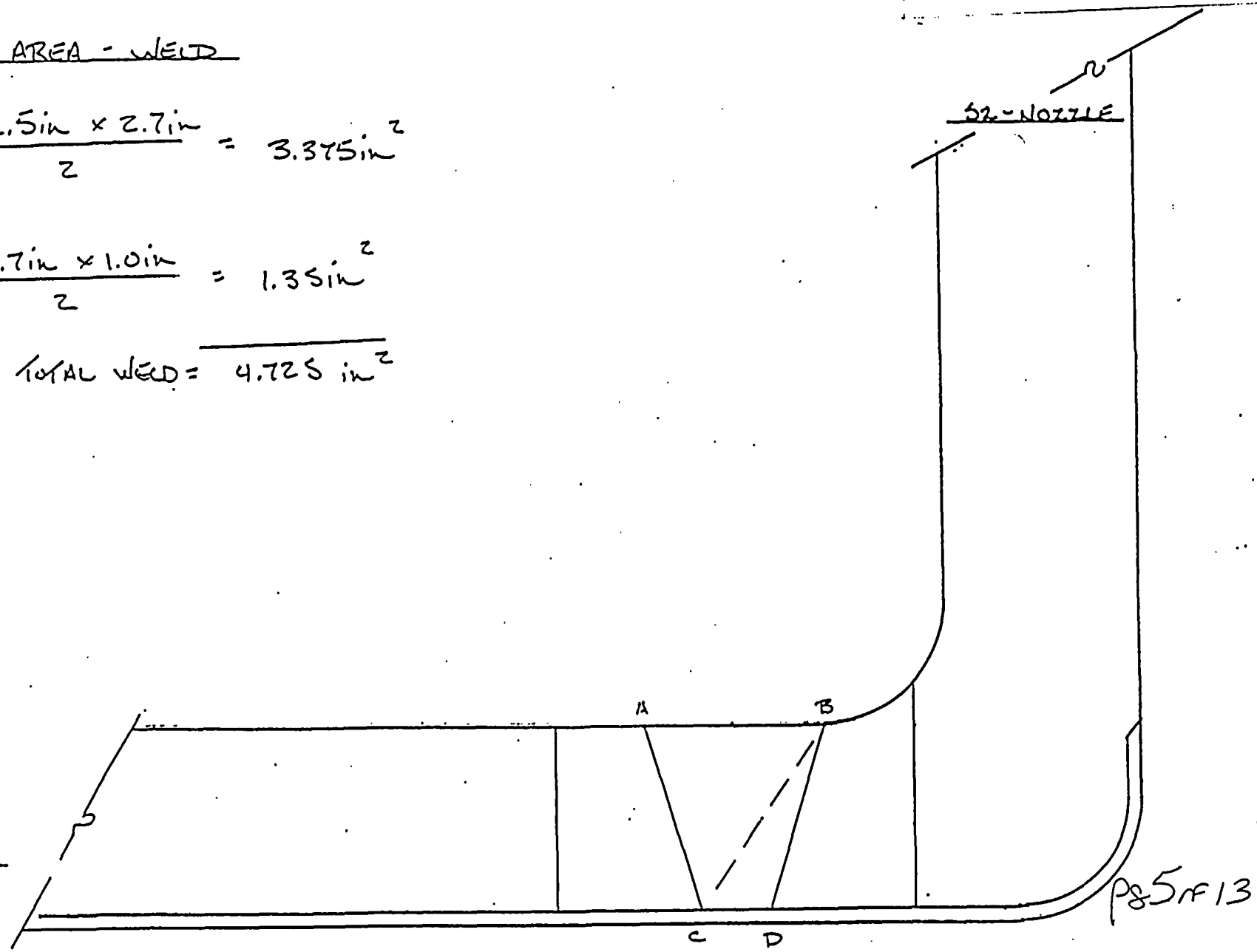
ITEM NO. B03.110.005
I.D. NO. 1PZR-W4B
INSP David K. B[illegible]
DATE 05/26/05

TOTAL AREA - WELD

ABC : $\frac{2.5in \times 2.7in}{2} = 3.375in^2$

BCD : $\frac{2.7in \times 1.0in}{2} = 1.35in^2$

TOTAL WELD = $4.725\ in^2$



Pg 5 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

Attachment - 1 of 9

UNIT 1 PZR - NOZZLE 1 HEAD WELD

ITEM NO. B03.110.005
I.D. NO. 1PZR-W4B
INSP David K Bay III
DATE 05/26/05

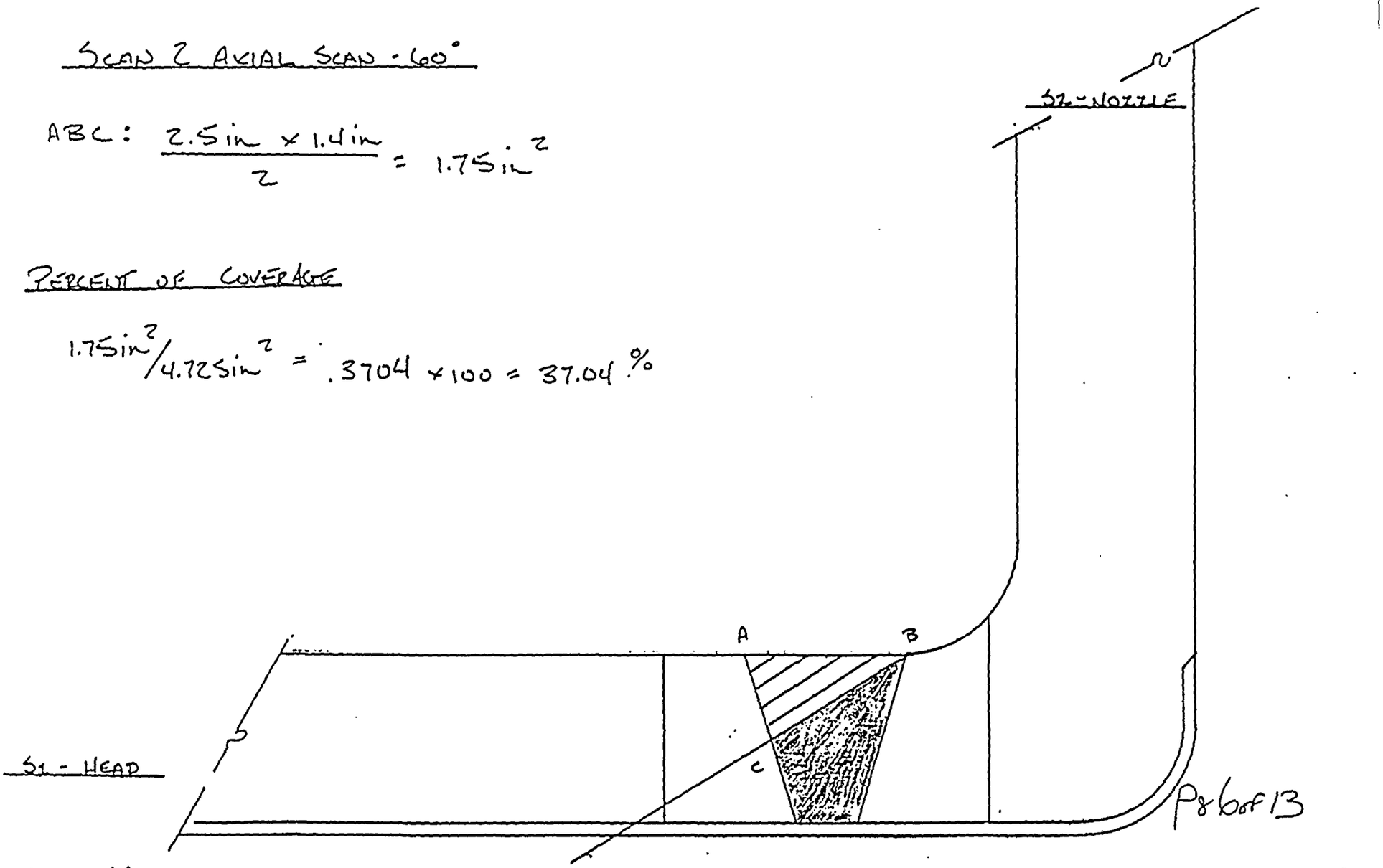
WELD

SCAN 2 AXIAL SCAN - 60°

ABC: $\frac{2.5in \times 1.4in}{2} = 1.75in^2$

PERCENT OF COVERAGE

$1.75in^2 / 4.725in^2 = .3704 \times 100 = 37.04\%$



P8 6 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

UNIT 1 PZR - NOZZLE / 1" AD WELD

ITEM NO. 03.110.005
I.D. NO. PZR-W4B
INSP David K. Z - III
DATE 05/26/05

WELD

SCAN 2 AXIAL SCAN - 45°

ABC : $\frac{2.8\text{in} \times 0.6\text{in}}{2} = 0.84\text{in}^2$

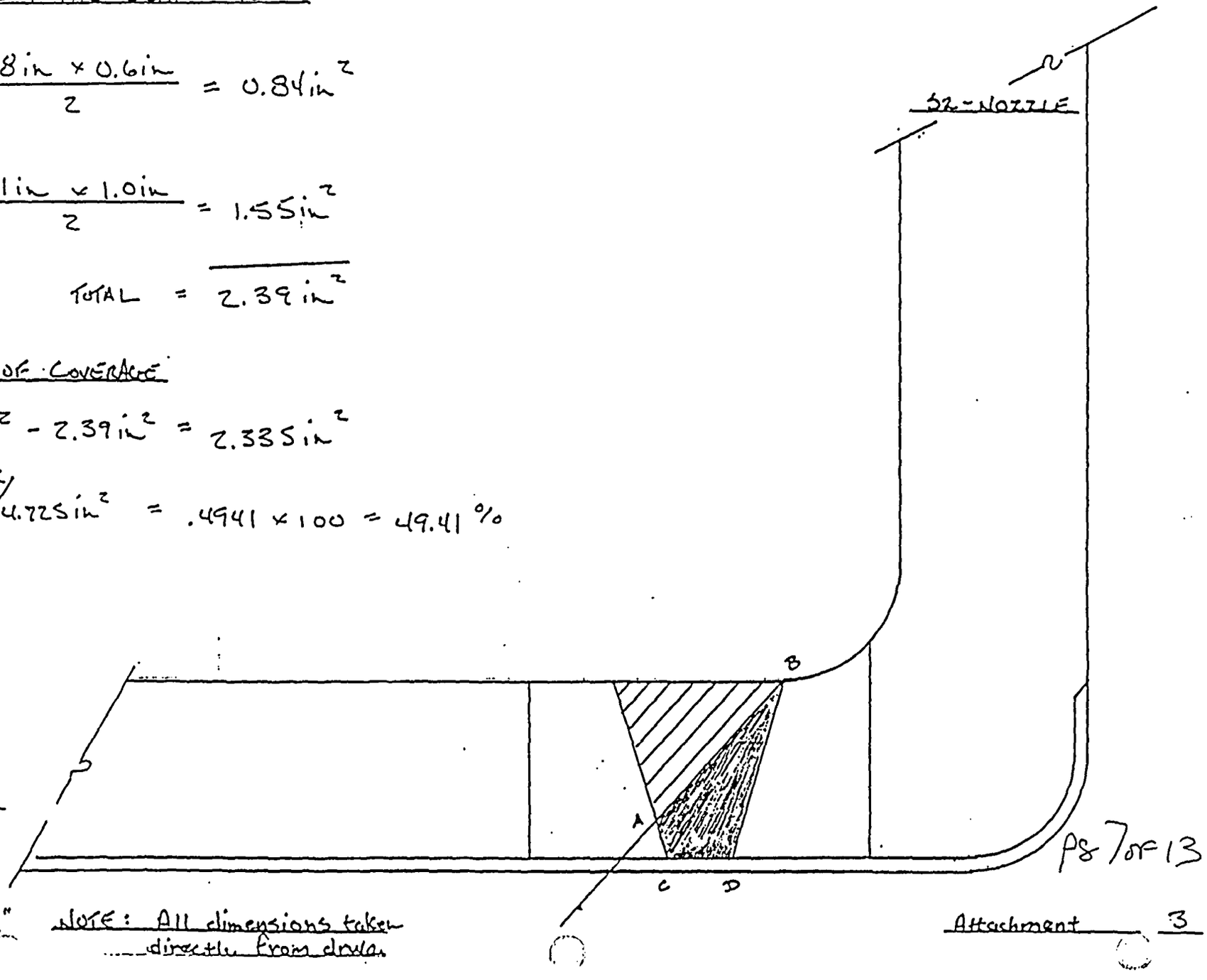
BCD : $\frac{3.1\text{in} \times 1.0\text{in}}{2} = 1.55\text{in}^2$

TOTAL = 2.39in^2

PERCENT OF COVERAGE

$4.725\text{in}^2 - 2.39\text{in}^2 = 2.335\text{in}^2$

$2.335\text{in}^2 / 4.725\text{in}^2 = .4941 \times 100 = 49.41\ \%$



P8 7 of 13

SCALE: ½" = 1.0" NOTE: All dimensions taken directly from drawing

Attachment 3 of 9

WELD 1 PZR - NOZZLE / HEAD WELD

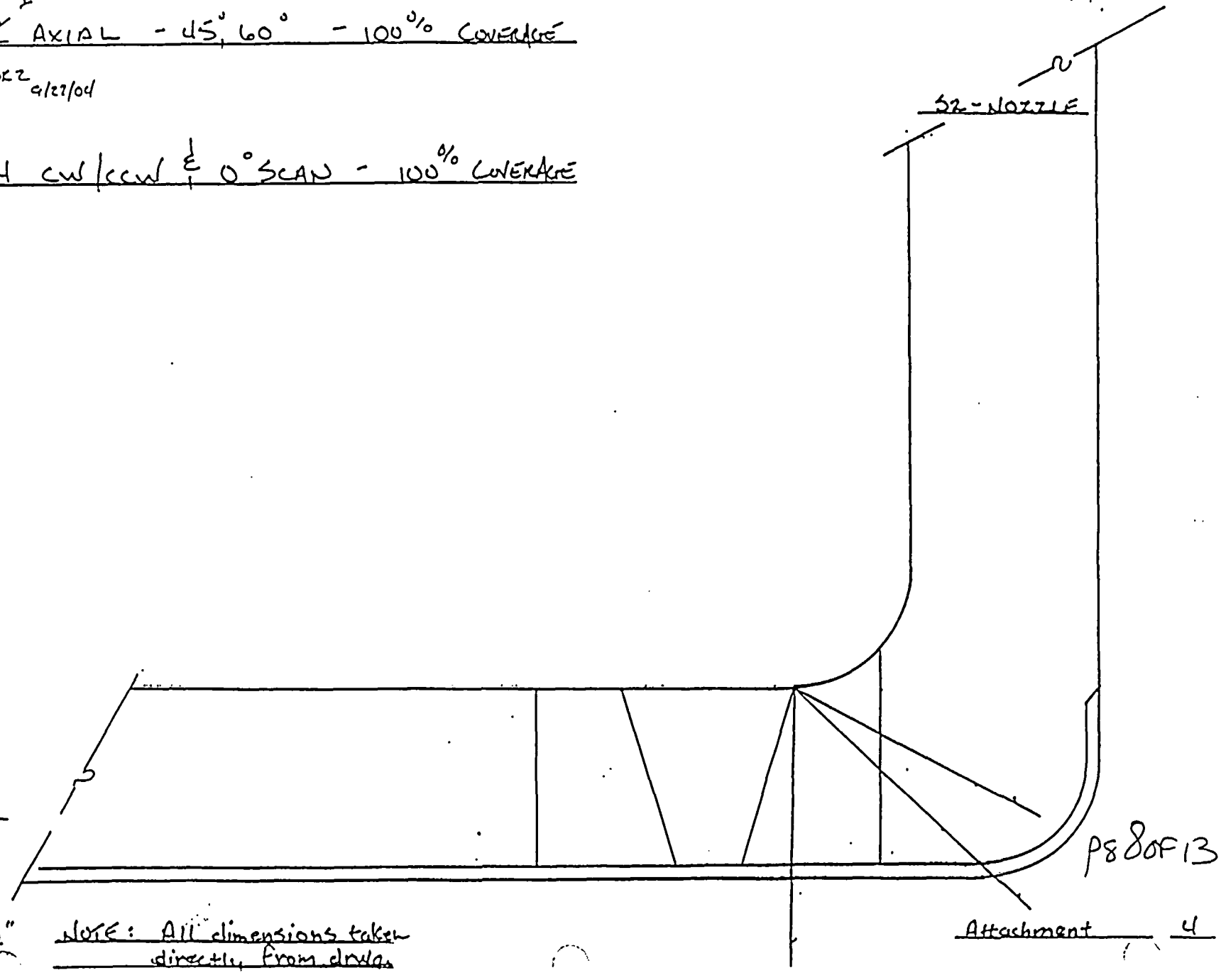
ITEM NO. B03.110.005
I.D. NO. 1PZR-W4B
INSP Dwelk. 3 - III
DATE 05/26/05

WELD

SCAN ℄ AXIAL - 45°, 60° - 100% COVERAGE

DKZ 6/27/04

SCAN 3, 4 CW/CCW & 0° SCAN - 100% COVERAGE



P8 8 OF 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwgs.

Attachment 4 of 9

UNIT 1 PZR - NOZZLE / PAD WELD

ITEM NO. B3.110.005
I.D. NO. 1PZR-W4B
INSP Vessel 3 - III
DATE 05/26/05

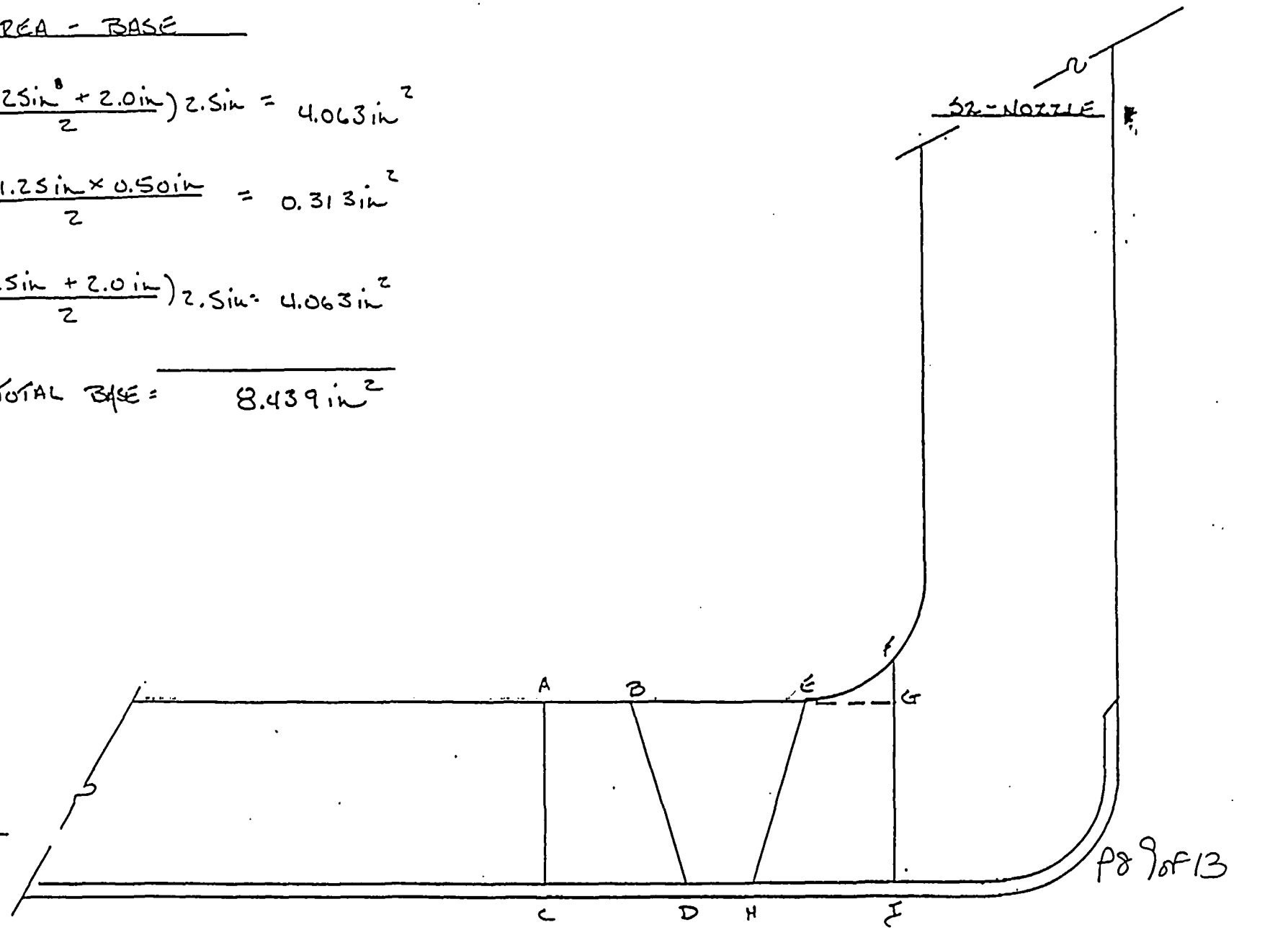
TOTAL AREA - BASE

ABCD: $\left(\frac{1.25in + 2.0in}{2}\right) 2.5in = 4.063in^2$

EFG: $\frac{1.25in \times 0.50in}{2} = 0.313in^2$

EGHI: $\left(\frac{1.25in + 2.0in}{2}\right) 2.5in = 4.063in^2$

TOTAL BASE = $8.439in^2$



Pg 9 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

Attachment 5 of 9

UNIT 1 PZR - NOZZLE / HEAD WELD

ITEM NO. B03.110.005
I.D. NO. 1PZR-NOZ4R
INSP Daulk3 - III
DATE 05/26/05

BASE METAL AXIAL SCAN 1 - (45°, 60°)

60° ABC : $\frac{1.5in \times 1.3in}{2} = 0.975in^2$

60° PERCENT OF COVERAGE

$8.439in^2 - 0.975in^2 = 7.464in^2$

$7.464in^2 / 8.439in^2 = .8845 \times 100 = 88.45\ \%$

45° ABC: $\frac{1.5in \times 1.3in}{2} = 0.975in^2$

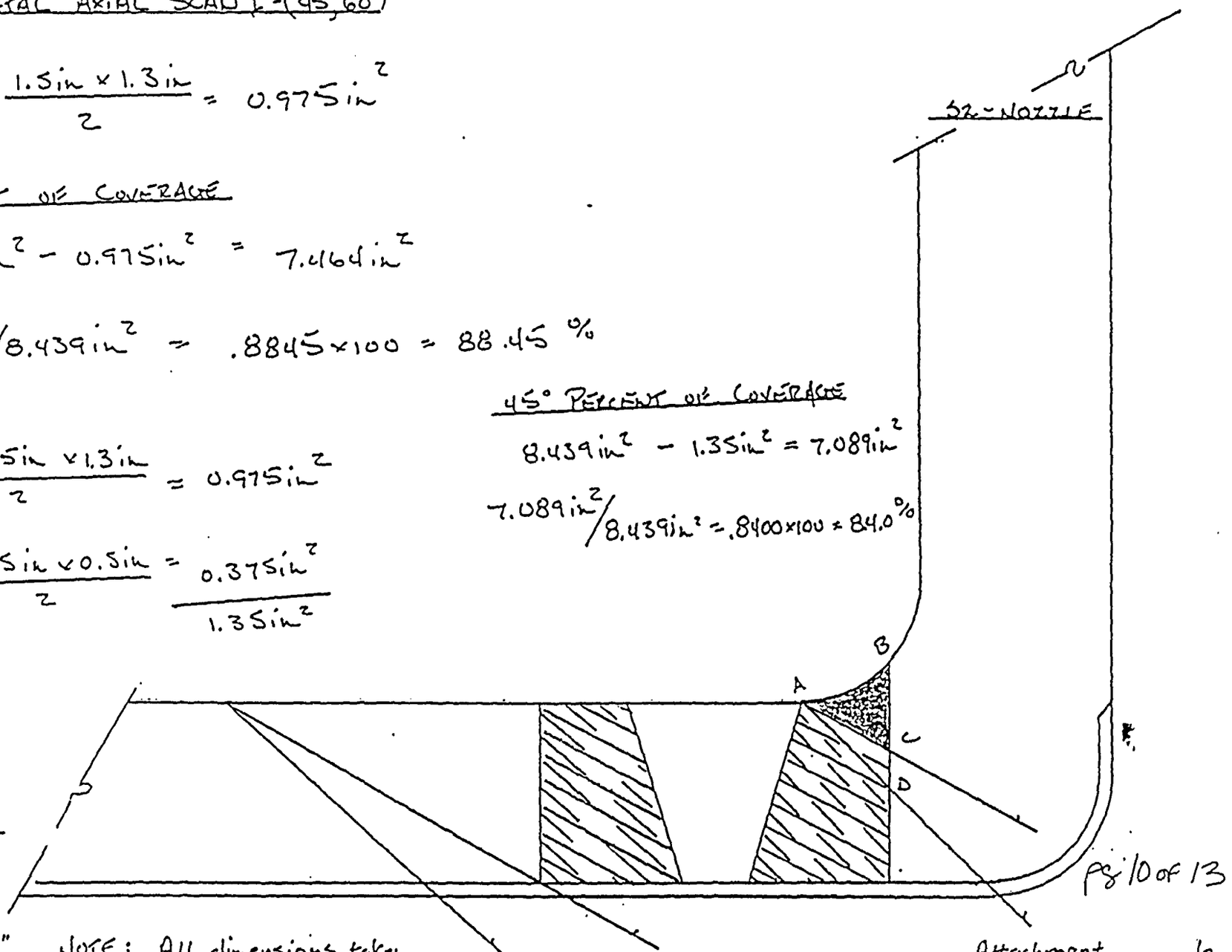
ACD: $\frac{1.5in \times 0.5in}{2} = 0.375in^2$

$\frac{}{1.35in^2}$

45° PERCENT OF COVERAGE

$8.439in^2 - 1.35in^2 = 7.089in^2$

$7.089in^2 / 8.439in^2 = .8400 \times 100 = 84.0\ \%$



SCALE: ½" = 1.0" NOTE: All dimensions taken

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Attachment 6e of 9

UNIT 1 PZR - NOZZLE / HEAD WELD

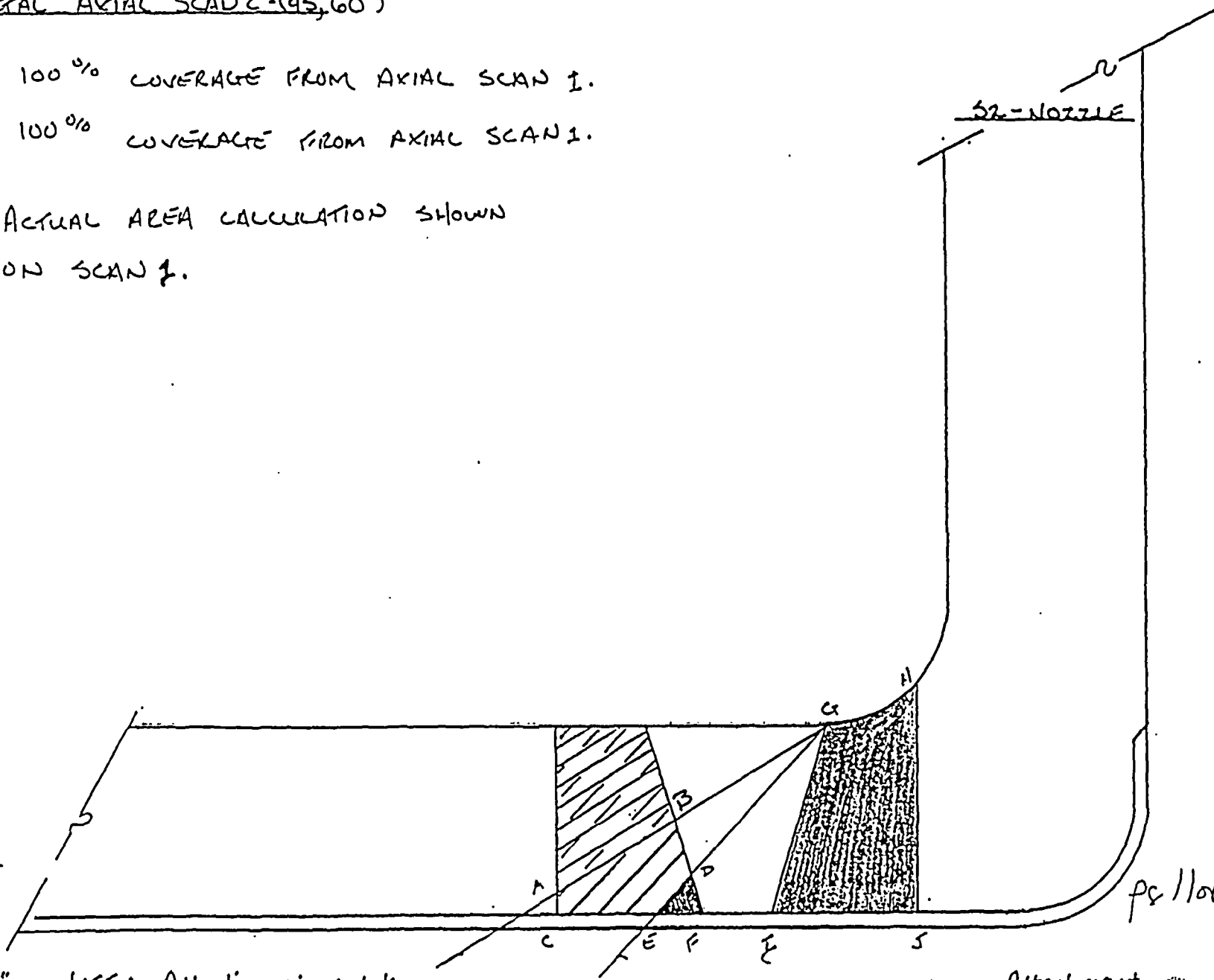
ITEM # B03.110.005
I.D. NO. 1PZR-W4B
INSP Daniel K[illegible] II
DATE 05/26/05

BASE METAL AXIAL SCAN 2 - (45°, 60°)

ABCD : 100 % COVERAGE FROM AXIAL SCAN 1.

DEF : 100 % COVERAGE FROM AXIAL SCAN 1.

GHIJ : ACTUAL AREA CALCULATION SHOWN ON SCAN 1.



pg 11 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

Attachment 7 of 9

UNIT 1 PZR - NOZZLE / HEAD WELD

ITEM NO. 03.110.005
I.D. NO. 1PZR-W4B
INSP: Daniel K. Jr
DATE: 05/26/05

BASE - 0° & CW/CCW SCAN (45°, 60°)

ABC : $\frac{1.25in \times 0.50in}{2} = 0.313in^2$

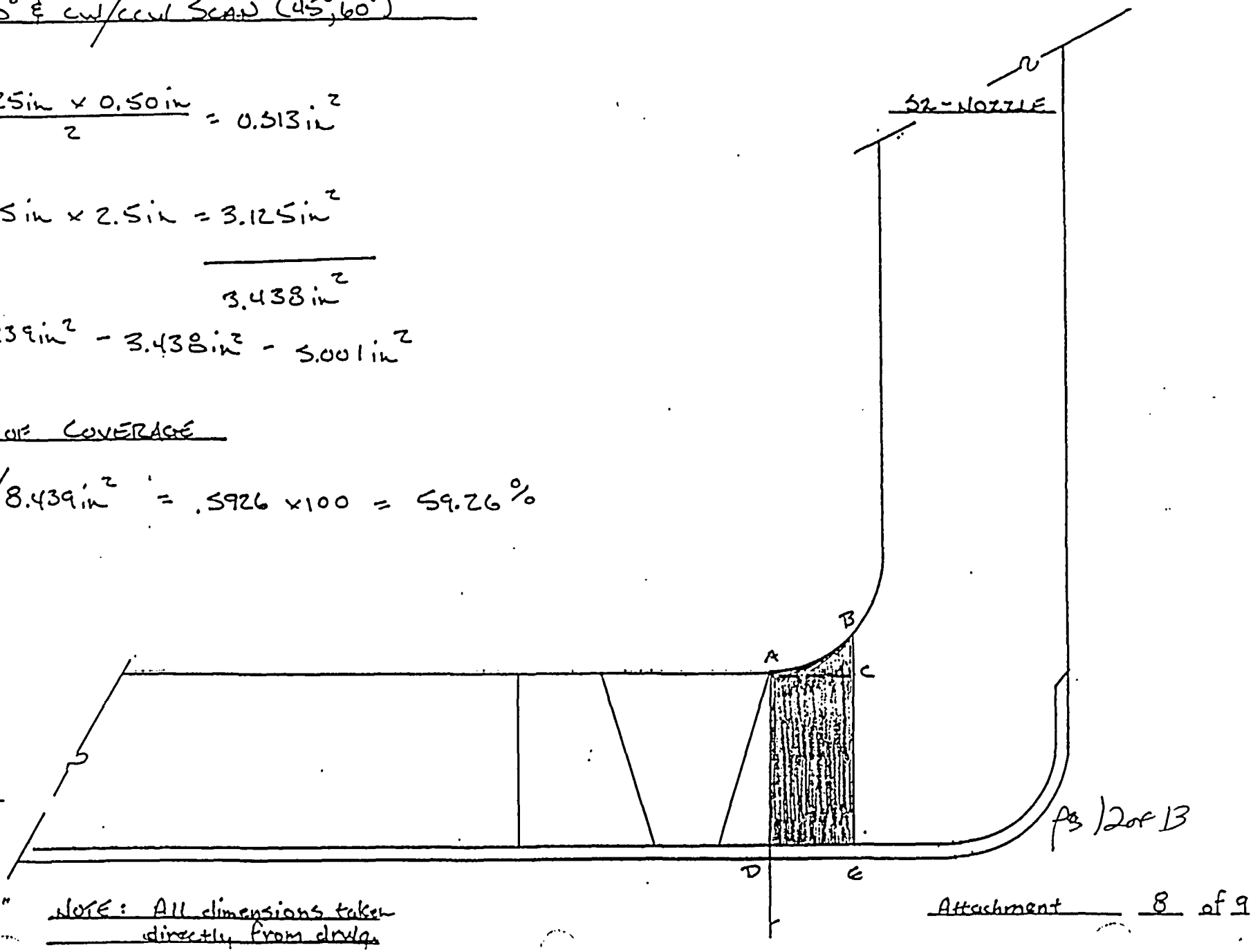
ACDE : $1.25in \times 2.5in = 3.125in^2$

$3.438in^2$

$8.439in^2 - 3.438in^2 - 5.001in^2$

PERCENT OF COVERAGE

$5.001in^2 / 8.439in^2 = .5926 \times 100 = 59.26\%$



pg 12 of 13

SCALE: ½" = 1.0" NOTE: All dimensions taken directly from drwgs.

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1PZR-W4B **Item No:** B03.110.005 **remarks:**

☒ NO SCAN SURFACE BEAM DIRECTION — Nozzle Configuration
☐ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☒ cw ☒ ccw
FROM L _____ to L _____ INCHES FROM W0 C/L+ to Beyond
ANGLE: ☒ 0 ☒ 45 ☒ 60 other _____ FROM 0 DEG to 360 DEG

☒ NO SCAN SURFACE BEAM DIRECTION — Nozzle Configuration
☐ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM W0 C/L+ to Beyond
ANGLE: ☐ 0 ☒ 45 ☒ 60 other _____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION
☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM W0 _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other _____ FROM _____ DEG to _____ DEG

☐ NO SCAN SURFACE BEAM DIRECTION
☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw
FROM L _____ to L _____ INCHES FROM W0 _____ to _____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other _____ FROM _____ DEG to _____ DEG

Sketch(s) attached
☒ yes ☐ No

Prepared By: David Zimmerman Level: III Date: 05262005 Attachment Sheet 9 of 9

Reviewed By: DE Howser Date: 5-29-05 Authorized Inspector: Robert M Gill Date: 6-8-05

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Duke Energy

UT Vessel Examination

Site/Unit: Catawba / 1 | Procedure: NDE-640 | Outage No.: CNS1EOC15

Summary No.: B03.110.006A | Procedure Rev.: 3 | Report No.: UT-05-217

Workscope: ISI | Work Order No.: 98688945 | Page: 1 of 1

Code: Asme Section XI 1989 | Cat./Item: B-D- /B3.110.6A | Location: N/A

Drawing No.: CNM 1201.01-175/1 | Description: PZR Safety Nozzle to Upper Head

System ID: NC

Component ID: B03.110.006A/1PZR-W4C | Size/Length: N/A | Thickness/Diameter: 1.9" / 15.0"

Limitations: Yes- See Limitation Report for 820 Exam | Start Time: 1211 | Finish Time: 1216

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: 9.2.3 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 05125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32798 | Surface Temp.: 69 °F

Cal. Report No.: CAL-05-228

Angle Used	0	45	45T	60	60T	
Scanning dB	31.5					

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 79.2% | Reviewed Previous Data: Yes

Examiner Leeper, Winfred C.	Level II	Signature: Winfred C. Leeper	Date: 5/26/2005	Reviewer: J E Howen	Signature	Date: 5.29.05
Examiner Keene, Douglas L.	Level II-N	Signature: Douglas L. Keene	Date: 5/26/2005	Site Review: N/A	Signature	Date
Other Ransom, Greg	Level II-N	Signature: Greg Ransom	Date: 5/26/2005	ANII Review	Signature: Robert M. Bell	Date: 6.8.05

RFR # 05-CN-004 ATTACHMENT F

Duke Energy

UT Vessel Examination

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.006A	Procedure Rev.:	2	Report No.:	UT-05-220
Workscope:	ISI	Work Order No.:	98688945	Page:	1 of 3

Code: Asme Section XI 1989 Cat./Item: B-D- /B3.110.6A Location: N/A

Drawing No.: CNM 1201.01-175/1 Description: PZR Safety Nozzle to Upper Head

System ID: NC

Component ID: B03.110.006A/1PZR-W4C Size/Length: N/A Thickness/Diameter: 1.9" / 15.0"

Limitations: Yes-See Attached Limitation Report Start Time: 1217 Finish Time: 1236

Examination Surface: Inside ☐ Outside ☑ Surface Condition: AS GROUND

Lo Location: 9.2.3 Wo Location: Centerline of Weld Couplant: ULTRAGEL II Batch No.: 05125

Temp. Tool Mfg.: D.A.S Serial No.: MCNDE32798 Surface Temp.: 69 °F

Cal. Report No.: CAL-05-229, CAL-05-230

Angle Used	0	45	45T	60	60T	
Scanning dB		53		67.4		

Indication(s): Yes ☐ No ☑ Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 79.2% Reviewed Previous Data: Yes

Examiner Level II Leeper, Winfred C.	Signature Winfred L. Leeper	Date 5/26/2005	Reviewer JE Howell	Signature	Date 5-25-05
Examiner Level II-N Keene, Douglas L.	Signature D Cayl Keene	Date 5/26/2005	Site Review N/A	Signature	Date
Other Level II-N Ransom, Greg	Signature Greg Ransom	Date 5/26/2005	ANII Review	Signature Robert Mytel	Date 6-8-05

PS 2 of 13

Duke Energy

Determination of Percent Coverage for UT Examinations - Vessels

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.006A	Procedure Rev.:	2	Report No.:	UT-05-220
Workscope:	ISI	Work Order No.:	98688945	Page:	2 of 3

0 deg Planar

Scan 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for 0 deg

45 deg

Scan 1 100.000 % Length X 92.000 % volume of length / 100 = 92.000 % total for Scan 1

Scan 2 100.000 % Length X 66.710 % volume of length / 100 = 66.710 % total for Scan 2

Scan 3 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 3

Scan 4 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 4

Add totals and divide by # scans = 79.493 % total for 45 deg

Other deg 60

Scan 1 100.000 % Length X 94.230 % volume of length / 100 = 94.230 % total for Scan 1

Scan 2 100.000 % Length X 60.520 % volume of length / 100 = 60.520 % total for Scan 2

Scan 3 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 3

Scan 4 100.000 % Length X 79.630 % volume of length / 100 = 79.630 % total for Scan 4

Add totals and divide by # scans = 78.503 % total for 60 deg

Percent complete coverage

Add totals for each angle and scan required and divide by # of angles to determine;

79.208 % Total for complete exam

Note:

Supplemental coverage may be achieved by use of other angles / methods. When used, the coverage for volume not obtained with angles as noted above shall be calculated and added to the total to provide the percent total for the complete examination.

Site Field Supervisor: David C. [illegible] III Date: 05/26/05

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Duke Energy

Limitation Record

Site/Unit:	Catawba / 1	Procedure:	NDE-820	Outage No.:	CNS1EOC15
Summary No.:	B03.110.006A	Procedure Rev.:	2	Report No.:	UT-05-220
Workscope:	ISI	Work Order No.:	98688945	Page:	3 of 3

Description of Limitation:

See Attachment for Limitation Calculations.
Coverage **Aggregate %**

Sketch of Limitation:

Δ	Scan	Weld %	Base %	Aggregate
45°	1	100.00	84.00	92.00
	2	49.41	84.00	66.71
	3	100.00	59.26	79.63
	4	100.00	59.26	79.63
60°	1	100.00	88.45	94.23
	2	37.04	84.00	60.52
	3	100.00	59.26	79.63
	4	100.00	59.26	79.63
0°		100.00	59.26	79.63

Limitations removal requirements:

Radiation field:

Examiner	Level II	Signature	Date	Reviewer		Signature	Date
Leeper, Winfred C.		Winfred C. Leeper	5/26/2005	AE Howen			5-29-05
Examiner	Level II-N	Signature	Date	Site Review		Signature	Date
Keene, Douglas L.		Douglas Keene	5/26/2005	N/A			
Other	Level II-N	Signature	Date	ANII Review		Signature	Date
Ransom, Greg		Greg Ransom	5/26/2005	Robert McGill			6-8-05

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UNIT 1 PZR - N077LE HEAD WELD

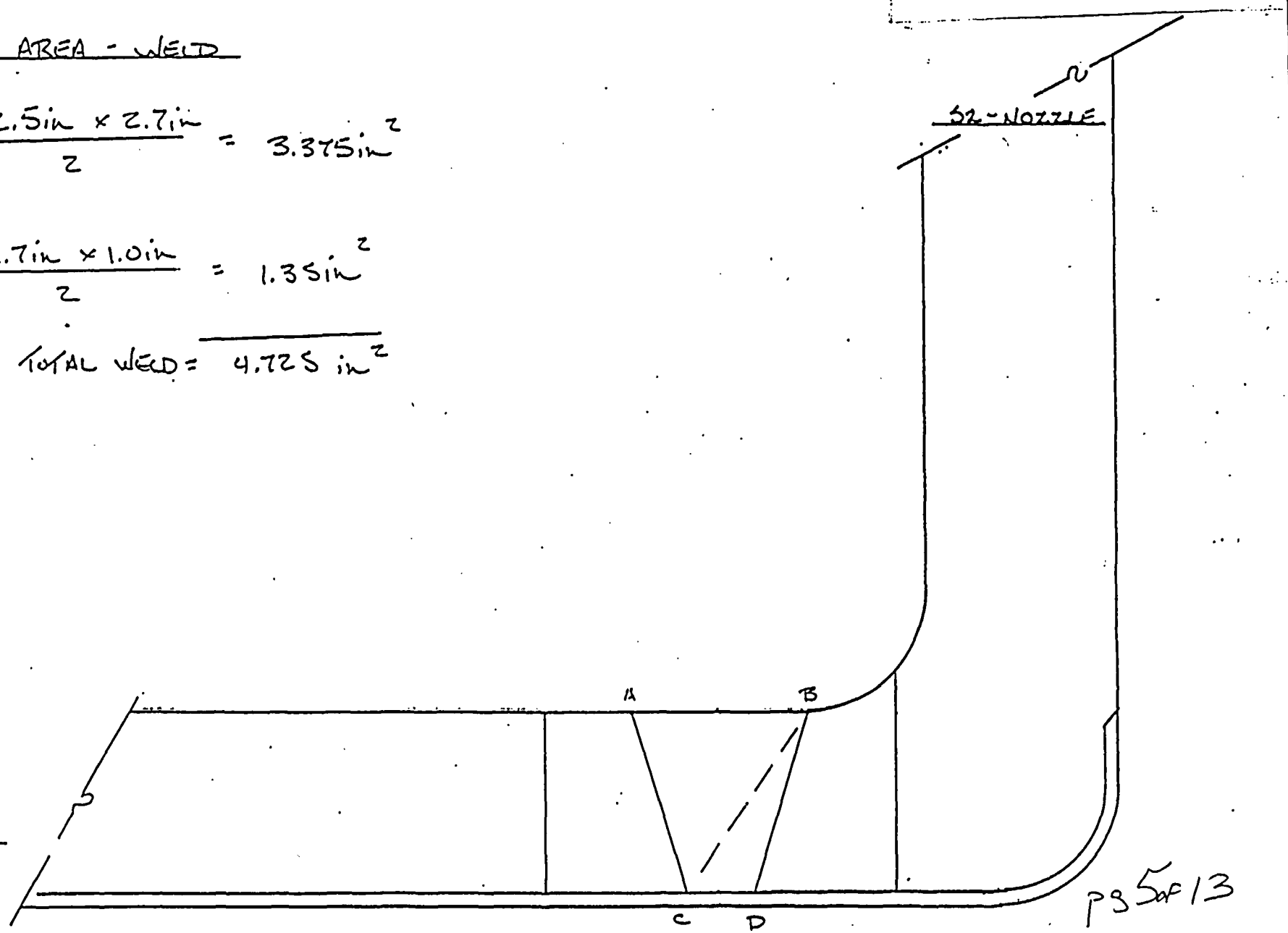
ITEM # B03.110.006A
I.D. NO. 1PZR-W4C
INSP Daniel K. Z
DATE 05/26/05

TOTAL AREA - WELD

ABC : $\frac{2.5in \times 2.7in}{2} = 3.375in^2$

BCD : $\frac{2.7in \times 1.0in}{2} = 1.35in^2$

TOTAL WELD = $4.725\ in^2$



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SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

Attachment 1 of

UNIT 1 PZR - NOZZLE 1 -AD WELD

ITEM NO 303.110.00101A
I.D. NO. 1PZR-W4C
INSP Daniel K. Bee
DATE 05/26/05

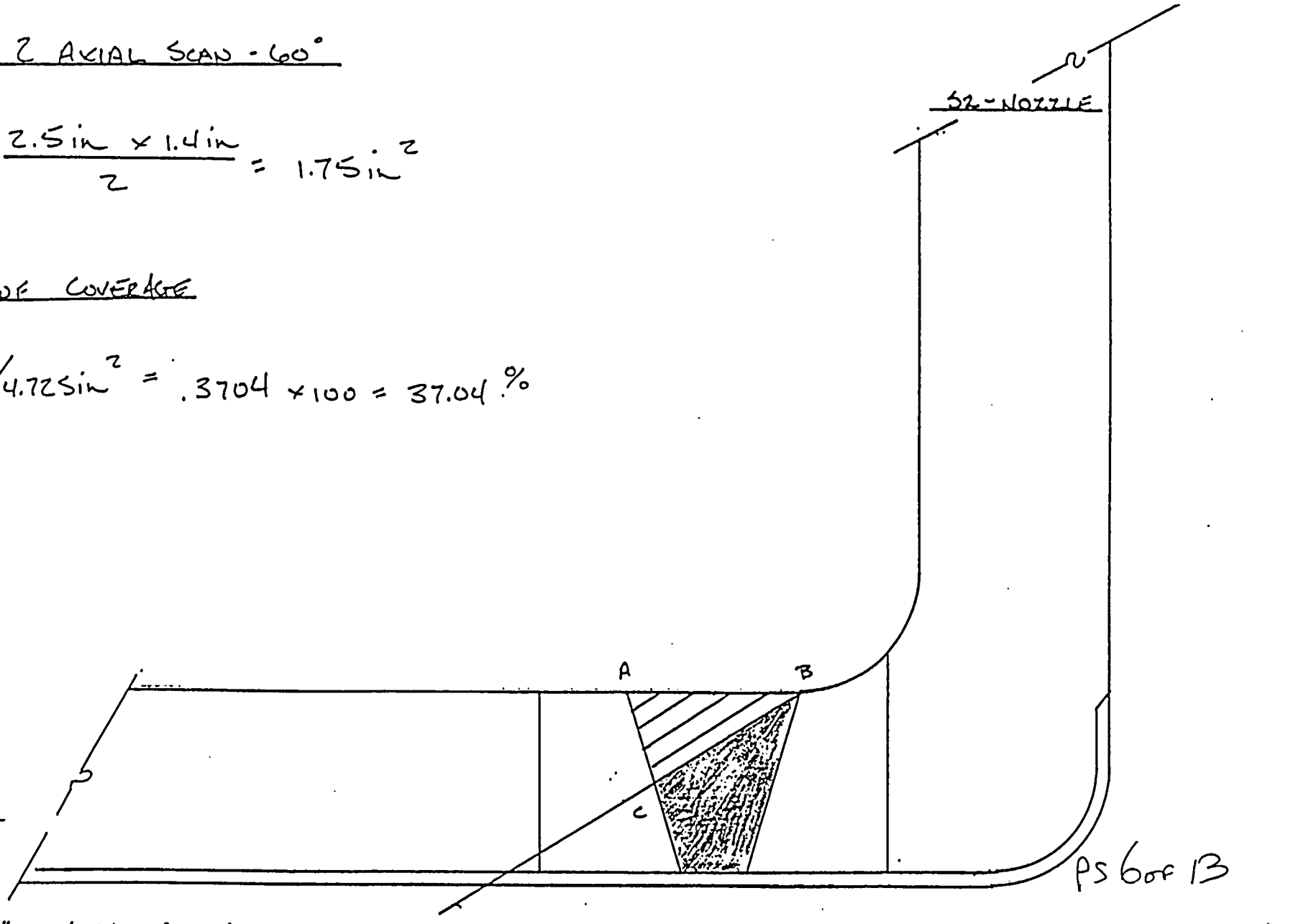
WELD

SCAN 2 AXIAL SCAN - 60°

ABC: $\frac{2.5in \times 1.4in}{2} = 1.75in^2$

PERCENT OF COVERAGE

$1.75in^2 / 4.725in^2 = .3704 \times 100 = 37.04\%$



PS 6 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

UNIT 1 PZR - NOZZLE / PAD WELD

ITEM NO. B3.110.006M
I.D. NO. PZR-W4C
INSP David K. III
DATE 05/26/05

WELD

SCAN 2 AXIAL SCAN - 45°

ABC : $\frac{2.8\text{in} \times 0.6\text{in}}{2} = 0.84\text{in}^2$

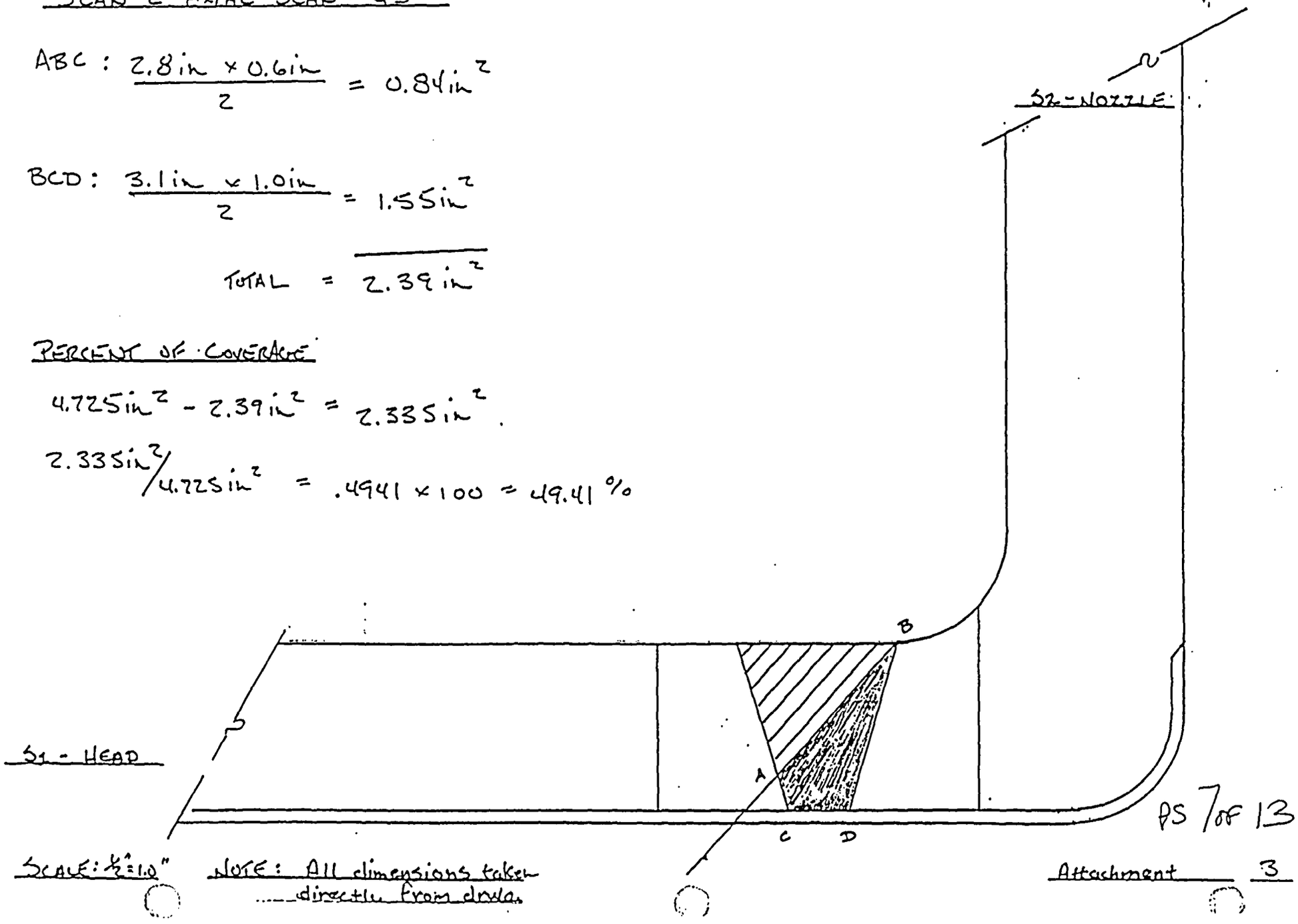
BCD : $\frac{3.1\text{in} \times 1.0\text{in}}{2} = 1.55\text{in}^2$

TOTAL = 2.39in^2

PERCENT OF COVERAGE

$4.725\text{in}^2 - 2.39\text{in}^2 = 2.335\text{in}^2$

$2.335\text{in}^2 / 4.725\text{in}^2 = .4941 \times 100 = 49.41\ \%$



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SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

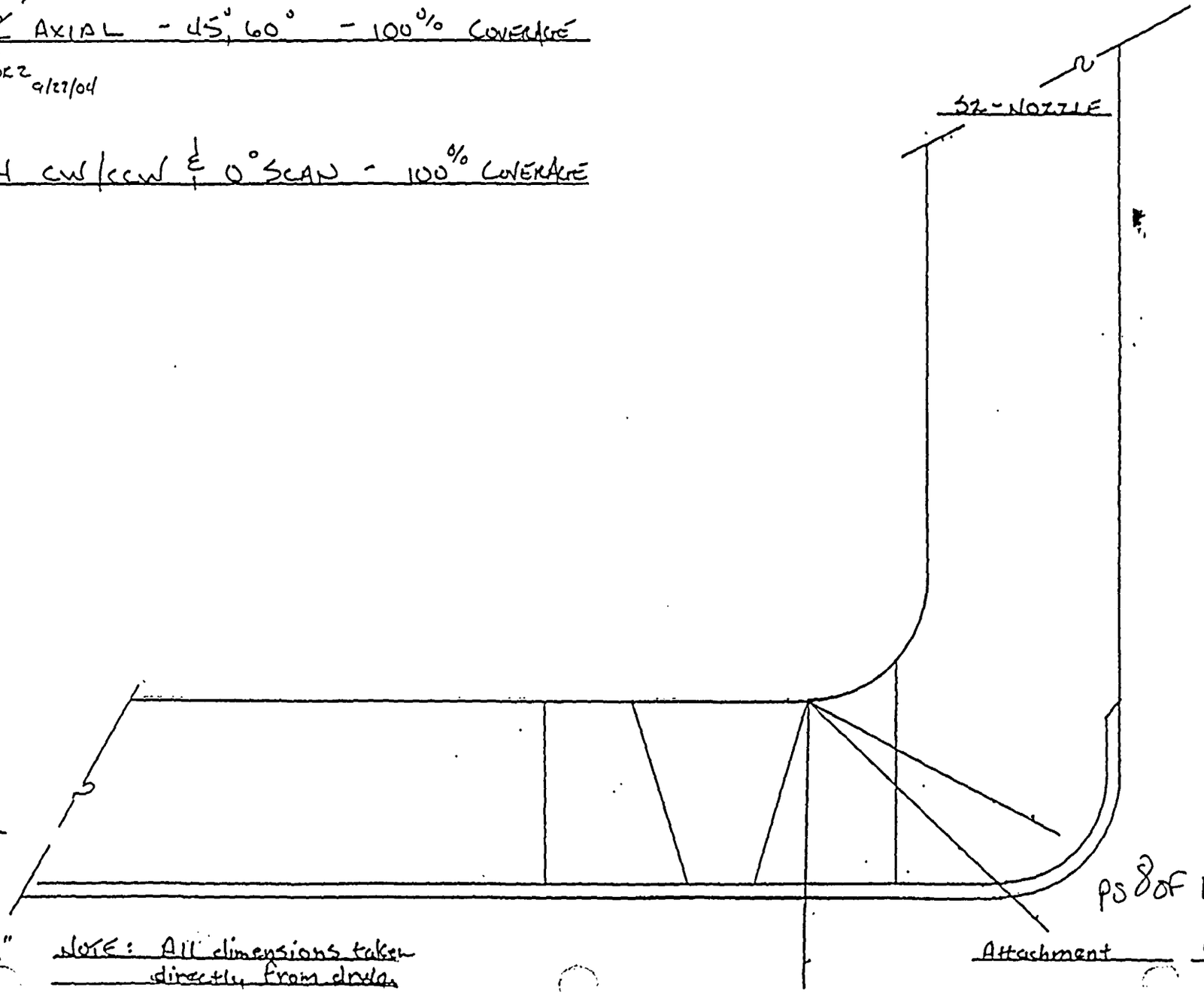
SHELL KKK - NOZZLE / HEAD WELD

ITEM NO. B03.110.006A
I.D. NO. 1PZR-W4C
INSP Daniel K. Z III
DATE 05/20/05

WELD 1

SCAN Z AXIAL - 45°, 60° - 100% COVERAGE
DKZ 9/27/04

SCAN 3,4 CW/CCW & 0° SCAN - 100% COVERAGE



SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

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Attachment 4 of 9

UNIT 1 PZR - NOZZLE / EAR WELD

ITEM NO. B03.110.0016M
I.D. NO. 1PZR-W4C
INSP Daniels B - III
DATE 05/26/05

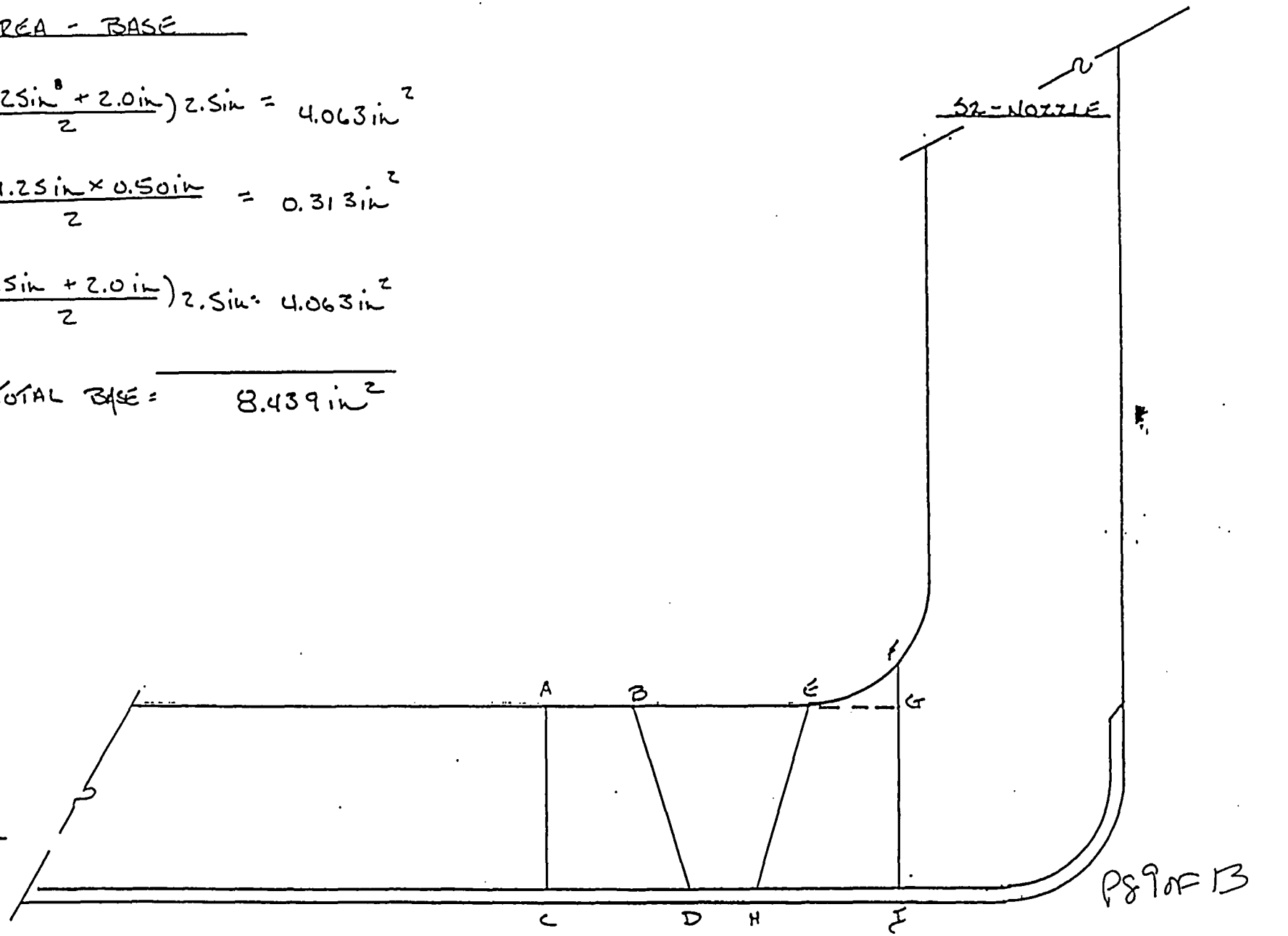
TOTAL AREA - BASE

ABCD : $\left(\frac{1.25in + 2.0in}{2}\right) 2.5in = 4.063in^2$

EFG : $\frac{1.25in \times 0.50in}{2} = 0.313in^2$

EGHI: $\left(\frac{1.25in + 2.0in}{2}\right) 2.5in = 4.063in^2$

TOTAL BASE = $8.439in^2$



SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drawing

Pg 9 of 13

Attachment 5 of 9

UNIT 1 RVB - NOZZLE / HEAD WELD

ITEM NO. B3.110.006A
I.D. NO. TPER-W4C
INSP Davis III
DATE 05/26/05

BASE METAL AXIAL SCAN 1 - (45°, 60°)

60° ABC : $\frac{1.5in \times 1.3in}{2} = 0.975in^2$

60° PERCENT OF COVERAGE

$8.439in^2 - 0.975in^2 = 7.464in^2$

$7.464in^2 / 8.439in^2 = .8845 \times 100 = 88.45\ \%$

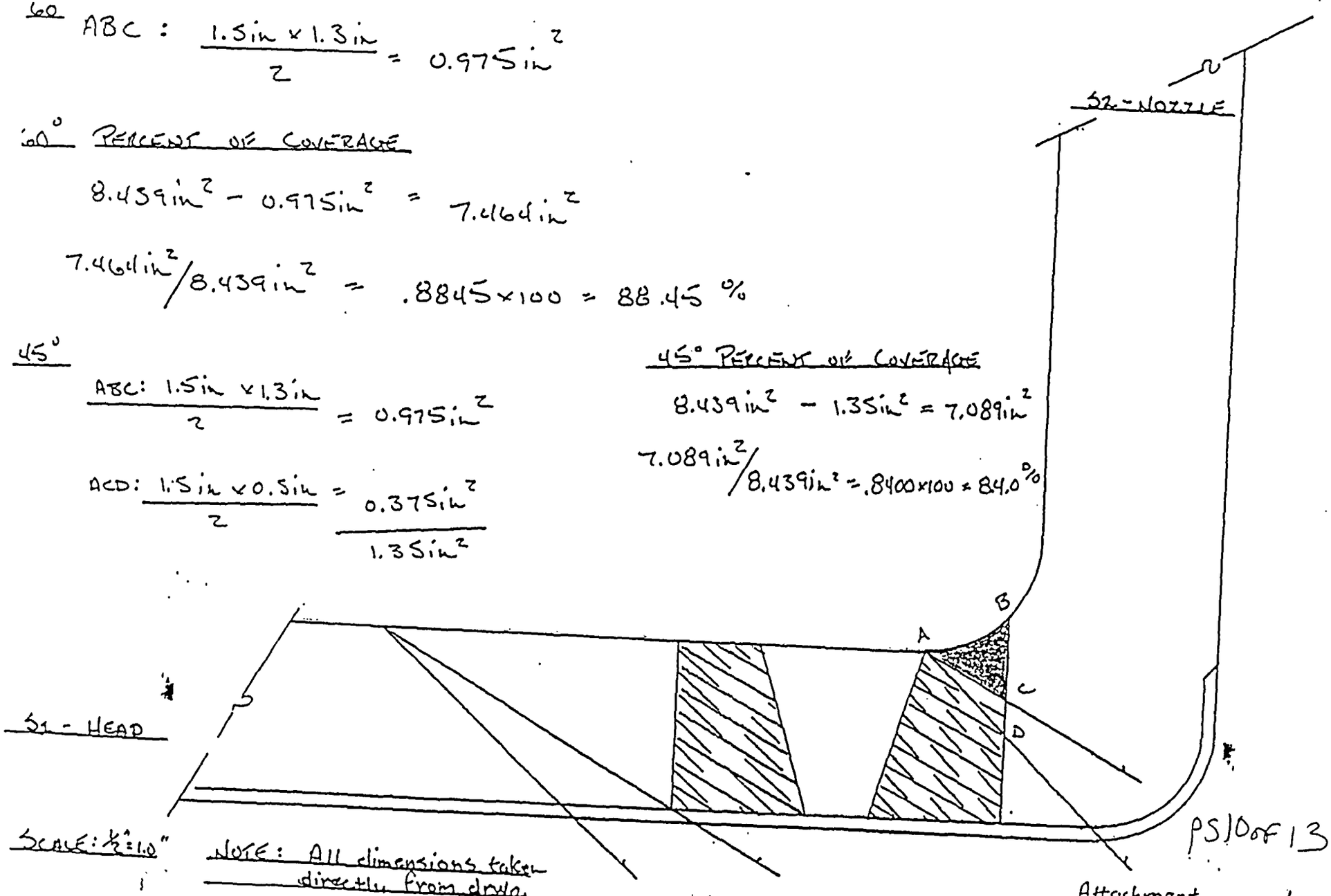
45° ABC: $\frac{1.5in \times 1.3in}{2} = 0.975in^2$

ACD: $\frac{1.5in \times 0.5in}{2} = \frac{0.375in^2}{1.35in^2}$

45° PERCENT OF COVERAGE

$8.439in^2 - 1.35in^2 = 7.089in^2$

$7.089in^2 / 8.439in^2 = .8400 \times 100 = 84.0\ \%$



SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drawing

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Attachment 6 of 9

UNIT 1 PZR - NOZZLE HEAD WELD

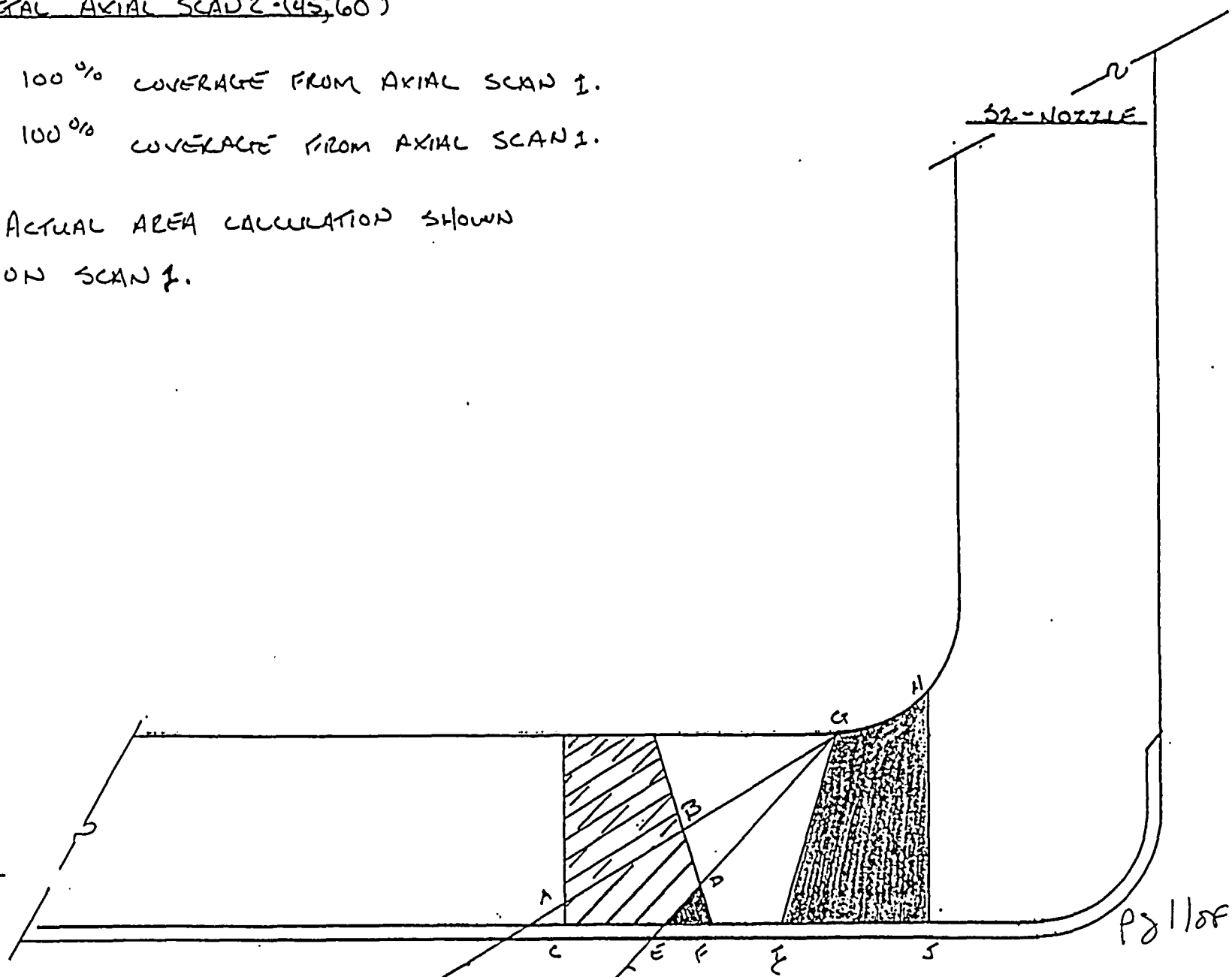
ITEM NO. B03.110.006A
I.D. NO. 1PZR-W4C
INSP David K. [illegible] III
DATE 05/26/05

BASE METAL AXIAL SCAN 2 - (45°, 60°)

ABCD : 100 % COVERAGE FROM AXIAL SCAN 1.

DEF : 100 % COVERAGE FROM AXIAL SCAN 1.

GHIJ : ACTUAL AREA CALCULATION SHOWN ON SCAN 1.



pg 11 of 13

SCALE: ½" = 1.0" NOTE: All dimensions taken [illegible]

Attachment 7 of [illegible]

UNIT 1 PZR - NOZZLE / HEAD WELD

ITEM NO. 03.110.0016A
I.D. NO. 1PZR-W24C
INSP Daniel K. [illegible]
DATE 05/26/05

BASE - 0° & CW/CCW SCAN (45°, 60°)

ABC : $\frac{1.25in \times 0.50in}{2} = 0.313in^2$

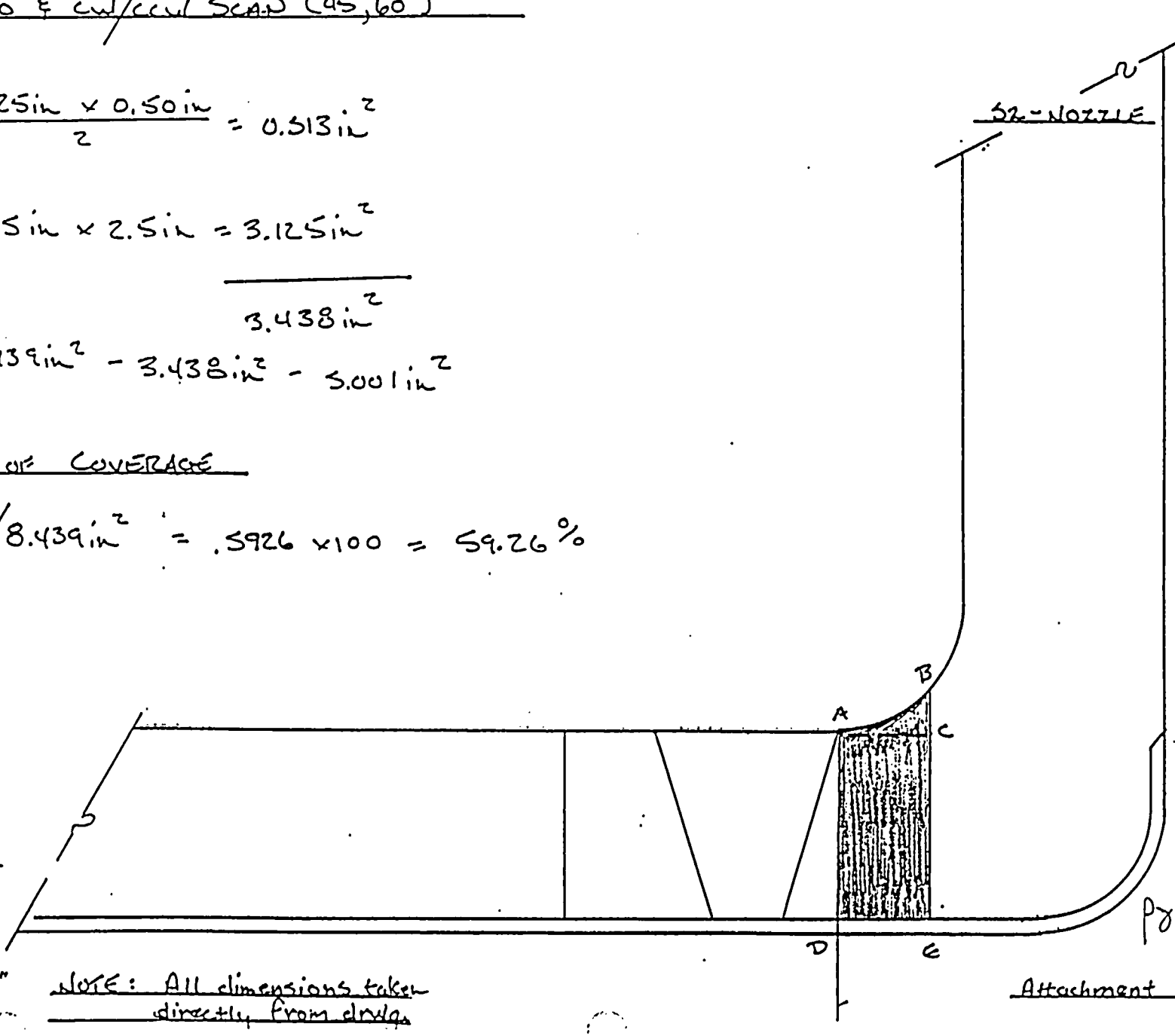
ACDE : $1.25in \times 2.5in = 3.125in^2$

$3.438in^2$

$8.439in^2 - 3.438in^2 - 5.001in^2$

PERCENT OF COVERAGE

$5.001in^2 / 8.439in^2 = .5926 \times 100 = 59.26\%$



pg 12 of 13

SCALE: ½" = 1.0"

NOTE: All dimensions taken directly from drwg.

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1PZR-W4C **Item No:** B03.110.006A

remarks:

☒ NO SCAN SURFACE BEAM DIRECTION

☐ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☒ cw ☒ ccw

FROM L _____ to L _____ INCHES FROM W0 C/L+ to Beyond

ANGLE: ☒ 0 ☒ 45 ☒ 60 other _____ FROM 0 DEG to 360 DEG

Nozzle Configuration

☒ NO SCAN SURFACE BEAM DIRECTION

☐ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM W0 C/L+ to Beyond

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

Nozzle Configuration

☐ NO SCAN SURFACE BEAM DIRECTION

☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM W0 _____ to _____

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

☐ NO SCAN SURFACE BEAM DIRECTION

☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____ INCHES FROM W0 _____ to _____

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

Sketch(s) attached

☒ yes ☐ No

Prepared By: David Zimmerman - Level: III Date: 05262005 Attachment Sheet 9 of 9

Reviewed By: DE Jansen Date: 5-25-05 Authorized Inspector: Robert McGill Date: 6-8-05

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WesDyne International
Reactor Vessel Weld Results Summary

CATAWBA UNIT 1

WELD NO. **1RPV-W18-SE AND 1NC23-01 (B05.010.008 & B05.010.008A) AND (B05.130.005 & B05.130.005A)**

DESCRIPTION **OUTLET NOZZLE DM WELD @ 338°**

LIMITATIONS NO [ ] YES [X] **COVERAGE = 82.45%**

RESULTS

NI	RI
[ ]	[X]

NO. OF INDICATIONS **5**

STATUS **4 CODE ALLOWABLE AND 1 NON-ALLOWABLE**

EXAM DOCUMENTATION	INDICATION DOCUMENTATION
[X] ANALYSIS LOG	[X] ASSESSMENT SHEET
[X] ACQUISITION LOG	[X] PARAGON HARD COPY
[X] SCAN PRINTOUT	[X] OTHER (specify) INDICATION LOCATION SKETCH
[X] COVERAGE BREAKDOWN	

WESDYNE ANALYST

ATTACHMENT 6
RFR #05-CN-004
Pg. 1 of 3

CATAWBA UNIT 1

RPV COVERAGE ESTIMATE BREAKDOWNS

DIRECTION / ORIENTATION

PARALLEL SCANS CCW/CW

PERP. SCANS UP/DN

WELD DESCRIPTION **OUTLET NOZZLE DM WELD @ 338°**

WELD NO. **1RPV-W18-SE AND 1NC23-01**

BEAM ANGLES

BEAM DIRECTION	70°L DUAL		ET							
	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME	WELD	VOLUME
CCW	* 71.1	* 58.69	* 100	* 100						
CW	* 71.1	* 58.69								
IN	100	100								
OUT	100	100								
UT Average = 82.45% COMBINED COVERAGE (UT & ET) = 100%	* CIRC SCANS LIMITED AS PER PROCEDURE PDQS DUE TO ID COUNTERBORE AND ROOT CONFIGURATION. LIMITATION AREA FROM 122.96" TO 123.40" FROM 0° TO 55°; FROM 123.56" TO 124.0" FROM 0° TO 360°; AND FROM 121.76" TO 122.5" FROM 0° TO 360°. ET USED TO SUPPLEMENT EXAM FOR FULL COVERAGE.									

ANALYST

Duke Energy.

UT Pipe Weld Examination

Site/Unit: Catawba / 1 | Procedure: NDE-600 | Outage No.: CNS1EOC15

Summary No.: B09.011.048 | Procedure Rev.: 16 | Report No.: UT-05-168

Workscope: ISI | Work Order No.: 98680794 | Page: 1 of 3

Code: Asme Section XI 1989 | Cat./Item: B-J- /B9.11.48 | Location: N/A

Drawing No.: CN-1NC-286 | Description: UHI Adapter to Pipe Cap

System ID: NC

Component ID: B09.011.048 /1NC286-1 | Size/Length: N/A | Thickness/Diameter: .864" / 6"

Limitations: Yes-See Attached Limitation Report | Start Time: 1322 | Finish Time: 1338

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: RT INT 0 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 05125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32797 | Surface Temp.: 78 °F

Cal. Report No.: CAL-05-180, CAL-05-181, CAL-05-182

Angle Used	0	45	45T	60	60L	
Scanning dB			41	42	40	

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☐ Downstream ☑ CW ☑ CCW ☑

Comments:

FC 05-08

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No-37.5% | Reviewed Previous Data: Yes

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Leeper, Winfred C.	II	Winfred C. Leeper	5/19/2005	M E Howsen	M E Howsen	5.20.05
Examiner	Level	Signature	Date	Site Review	Signature	Date
Jones, Russel	II		5/19/2005	N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			Nancy C Ritchie Sloughter	Nancy C Ritchie Sloughter	5/26/05

Pg 1 of 4

RFR #05-CN-004 ATTACHMENT H

Limitation Record

Site/Unit:	Catawba / 1	Procedure:	NDE-600	Outage No.:	CNS1EOC15
Summary No.:	B09.011.048	Procedure Rev.:	16	Report No.:	UT-05-168
Workscope:	ISI	Work Order No.:	98680794	Page:	2 of 3

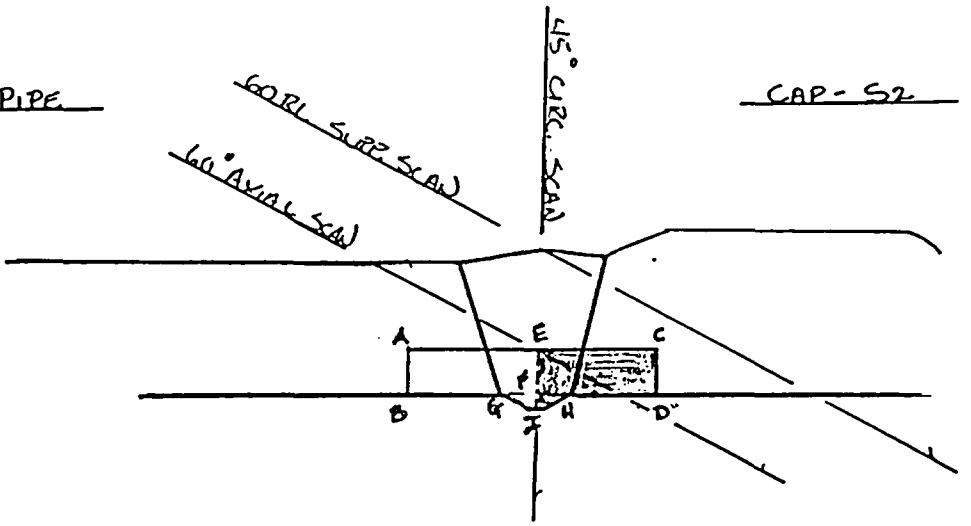
Description of Limitation:

See Attached

Sketch of Limitation:

S2 - PIPE

CAP - S2



TOTAL AREA OF INSPECTION

ABCD: $0.24in \times 1.3in = 0.312in^2$

GEF: $\frac{0.2in \times 0.1in}{2} = 0.01in^2$

HIF: $\frac{0.2in \times 0.1in}{2} = 0.01in^2$

TOTAL AREA = $0.332in^2$

SCAN 1 (60°) ABEF + GEF = $(0.24in \times 0.65in) + \left(\frac{0.2in \times 0.1in}{2}\right) = .156in^2 + .01in^2 = .166in^2 / .322in^2 (100) = 50\%$

SCAN 2 (60°) NO SCAN FROM SURFACE 2 = 0%

SCAN 3, 4 (45°) ABEF + GEF = $(0.24in \times 0.65in) + \left(\frac{0.2in \times 0.1in}{2}\right) = .156in^2 + .01in^2 = .166in^2 / .322in^2 (100) = 50\%$

60° RL SUPPLEMENT GDEF + HIF: $(.24in \times .65in) + \left(\frac{0.2in \times 0.1in}{2}\right) = .156in^2 + .01in^2 = .166in^2 / .322in^2 (100) = 50\%$

SCALE: FULL

Limitations removal requirements:

Radiation field:

Examiner Leeper, Winfred C.	Level II	Signature Winfred C. Leeper	Date 5/19/2005	Reviewer D.E. Hansen		Signature D.E. Hansen	Date 5.20.05
Examiner Jones, Russel	Level II	Signature	Date 5/19/2005	Site Review N/A		Signature	Date
Other N/A	Level N/A	Signature	Date	ANII Review Nancy C. Ritchie Shoaf		Signature Nancy C. Ritchie Shoaf	Date 5/26/05

Pg 2 of 4

Duke Energy.

Determination of Percent Coverage for UT Examinations - Pipe

Site/Unit:	Catawba / 1	Procedure:	NDE-600	Outage No.:	CNS1EOC15
Summary No.:	B09.011.048	Procedure Rev.:	16	Report No.:	UT-05-168
Workscope:	ISI	Work Order No.:	98680794	Page:	3 of 3

45 deg

Scan 1		% Length X		% volume of length / 100 =		% total for Scan 1
Scan 2		% Length X		% volume of length / 100 =		% total for Scan 2
Scan 3	100.000	% Length X	50.000	% volume of length / 100 =	50.000	% total for Scan 3
Scan 4	100.000	% Length X	50.000	% volume of length / 100 =	50.000	% total for Scan 4

Add totals and divide by # scans = 50.000 % total for 45 deg

Other deg - 60 (to be used for supplemental scans)

The data to be listed below is for coverage that was not obtained with the 45 deg scans.

Scan 1	100.000	% Length X	50.000	% volume of length / 100 =	50.000	% total for Scan 1
Scan 2	100.000	% Length X	0.000	% volume of length / 100 =	0.000	% total for Scan 2
Scan 3		% Length X		% volume of length / 100 =		% total for Scan 3
Scan 4		% Length X		% volume of length / 100 =		% total for Scan 4

Percent complete coverage

Add totals for each scan required and divide by # of scans to determine;

37.5 **% Total for complete exam**

Site Field Supervisor: David K. Bruce III Date: 05/19/05

Pg 3 of 4

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1NC286-1 **Item No:** B09.011.048 **remarks:**

☐ NO SCAN SURFACE BEAM DIRECTION Cap Conf.

☒ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 C/L to Beyond

ANGLE: ☐ 0 ☐ 45 ☒ 60 other ____ FROM 0 DEG to 360 DEG

☒ NO SCAN SURFACE BEAM DIRECTION Cap Conf.

☐ LIMITED SCAN ☐ 1 ☒ 2 ☐ 1 ☐ 2 ☒ cw ☒ ccw

FROM L N/A to L N/A INCHES FROM W0 C/L to Beyond

ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____ FROM 0 DEG to 360 DEG

☒ NO SCAN SURFACE BEAM DIRECTION Cap Conf.

☐ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L ____ to L ____ INCHES FROM W0 C/L to Beyond

ANGLE: ☐ 0 ☐ 45 ☒ 60 other ____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION

☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L ____ to L ____ INCHES FROM W0 ____ to ____

ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____ FROM ____ DEG to ____ DEG

Sketch(s) attached

☒ yes ☐ No

Prepared By: David Zimmerman Level: III Date: 05/19/05 Attachment ~~Sheet~~ 1 of 1 UT-05-168

Reviewed By: JE Howsen Date: 5-20-05 Authorized Inspector: Nancy C Ritchie Loughlin Date: 5/26/05

P8 4 of 4

Duke Energy

UT Vessel Examination

Site/Unit:	Catawba / 1	Procedure:	NDE-630	Outage No.:	CNS1EOC15
Summary No.:	B12.040.002D	Procedure Rev.:	2	Report No.:	UT-05-211
Workscope:	ISI	Work Order No.:	98688919	Page:	1 of 8

Code: Asme Section XI 1989 Cat./Item: B-M-1/B12.40.2D Location: N/A

Drawing No.: CN-1ND-037 Description: Valve Body to Bonnett

System ID: ND

Component ID: B12.040.002D/1ND-37A Size/Length: N/A Thickness/Diameter: 2.043" / 20.0"

Limitations: Yes - See Attached Limitation Report Start Time: 0900 Finish Time: 0936

Examination Surface: Inside ☐ Outside ☑ Surface Condition: AS GROUND

Lo Location: RT INT. #1 Wo Location: Centerline of Weld Couplant: ULTRAGEL II Batch No.: 03125

Temp. Tool Mfg.: D.A.S Serial No.: MCNDE32797 Surface Temp.: 74 °F

Cal. Report No.: CAL-05-220, CAL-05-221, CAL-05-222, CAL-05-223

Angle Used	0	45	45T	60	60T	•
Scanning dB		40.6	46.6	54.7		•

Indication(s): Yes ☐ No ☑ Scan Coverage: Upstream ☑ Downstream ☑ CW ☑ CCW ☑

Comments:

FC 99-02, 03-17, 03-30 * 60°L Scanning Db = 68.8, 45°L = 74.8 Db

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 69.3% Reviewed Previous Data: Yes

Examiner Level III Eaton, Jay A.	Signature	Date 5/25/2005	Reviewer	Signature	Date 5-30-05
Examiner Level III Moss, Gary J.	Signature	Date 5/25/2005	Site Review N/A	Signature	Date
Other Level N/A N/A	Signature	Date	ANII Review	Signature	Date 6-8-05

RFR #05-CN-004 ATTACHMENT I

PS 1 of 9

Duke Energy

Determination of Percent Coverage for UT Examinations - Vessels

Site/Unit:	Catawba / 1	Procedure:	NDE-630	Outage No.:	CNS1EOC15
Summary No.:	B12.040.002D	Procedure Rev.:	2	Report No.:	UT-05-211
Workscope:	ISI	Work Order No.:	98688919	Page:	2 of 8

0 deg Planar

Scan _____ % Length X _____ % volume of length / 100 = _____ % total for 0 deg

45 deg

Scan 1 _____ % Length X _____ % volume of length / 100 = _____ % total for Scan 1

Scan 2 _____ % Length X _____ % volume of length / 100 = _____ % total for Scan 2

Scan 3 _____ % Length X _____ % volume of length / 100 = _____ % total for Scan 3

Scan 4 _____ % Length X _____ % volume of length / 100 = _____ % total for Scan 4

Add totals and divide by # scans = _____ % total for 45 deg

Other deg 45°/60°*

Scan 1 100.000 % Length X 36.400 % volume of length / 100 = 36.400 % total for Scan 1

Scan 2 100.000 % Length X 95.220 % volume of length / 100 = 95.220 % total for Scan 2

Scan 3 100.000 % Length X 72.870 % volume of length / 100 = 72.870 % total for Scan 3

Scan 4 100.000 % Length X 72.870 % volume of length / 100 = 72.870 % total for Scan 4

Add totals and divide by # scans = 69.340 % total for 45°/60°* deg

Percent complete coverage

Add totals for each angle and scan required and divide by # of angles to determine;

69.340 % Total for complete exam

Note:

Supplemental coverage may be achieved by use of other angles / methods. When used, the coverage for volume not obtained with angles as noted above shall be calculated and added to the total to provide the percent total for the complete examination.

Site Field Supervisor: [signature] III Date: 05/25/05

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1ND-37A **Item No:** B12.040.002D **remarks:**

☐ NO SCAN SURFACE BEAM DIRECTION — Valve Bonnett Conf.

☒ LIMITED SCAN ☒ 1 ☐ 2 ☐ 1 ☒ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 -.75 to Beyond

ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION — Valve Body Conf.

☒ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 +1.9 to +3.4

ANGLE: ☐ 0 ☐ 45 ☒ 60 other ____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION — Valve Body Conf.

☒ LIMITED SCAN ☐ 1 ☒ 2 ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM W0 +1.9 to +3.2

ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____ FROM 0 DEG to 360 DEG

☐ NO SCAN SURFACE BEAM DIRECTION

☐ LIMITED SCAN ☐ 1 ☐ 2 ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L ____ to L ____ INCHES FROM W0 ____ to ____

ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____ FROM ____ DEG to ____ DEG

Sketch(s) attached ☒ yes ☐ No

Prepared By: David Zimmerman Level: III Date: 05/25/2005 Sheet 4 of 8

Reviewed By: Date: Authorized Inspector: Date: 6-8-05

Pg 3 of 9

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1ND-37A **Item No:** B12.040.002D

remarks: Valve Bonnett Conf.

☐ NO SCAN	SURFACE	BEAM DIRECTION	
☒ LIMITED SCAN	☒ 1 ☐ 2	☐ 1 ☐ 2 ☒ cw ☒ ccw	
FROM L N/A to L N/A		INCHES FROM W0 -.75	to Beyond
ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____		FROM 0 DEG to 360 DEG	
☐ NO SCAN	SURFACE	BEAM DIRECTION	
☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	
FROM L ____ to L ____		INCHES FROM W0 ____	to ____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____		FROM ____ DEG to ____ DEG	
☐ NO SCAN	SURFACE	BEAM DIRECTION	
☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	
FROM L ____ to L ____		INCHES FROM W0 ____	to ____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____		FROM ____ DEG to ____ DEG	
☐ NO SCAN	SURFACE	BEAM DIRECTION	
☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	
FROM L ____ to L ____		INCHES FROM W0 ____	to ____
ANGLE: ☐ 0 ☐ 45 ☐ 60 other ____		FROM ____ DEG to ____ DEG	

Sketch(s) attached ☒ yes ☐ No

Prepared By: David Zimmerman [signature] Level: III Date: 05/25/2005 Sheet 3 of 8

Reviewed By: [signature] Date: Authorized Inspector: [signature] Date: 6-8-05

pg 4 of 9

DUKE POWER COMPANY

ISI LIMITATION REPORT

Component/Weld ID: 1ND-37A **Item No:** B12.040.002D **remarks:**

	SURFACE	BEAM DIRECTION	remarks
☐ NO SCAN ☒ LIMITED SCAN	☒ 1 ☐ 2	☐ 1 ☒ 2 ☐ cw ☐ ccw	Valve Bonnett Conf.
FROM L N/A to L N/A	INCHES FROM W0 -.75 to Beyond		
ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____	FROM 0 DEG to 360 DEG		
☐ NO SCAN ☒ LIMITED SCAN	☐ 1 ☒ 2	☒ 1 ☐ 2 ☐ cw ☐ ccw	Valve Bonnett Conf.
FROM L N/A to L N/A	INCHES FROM W0 -.75 to Beyond		
ANGLE: ☐ 0 ☒ 45 ☒ 60 other ____	FROM 0 DEG to 360 DEG		
☐ NO SCAN ☒ LIMITED SCAN	☐ 1 ☒ 2	☒ 1 ☐ 2 ☐ cw ☐ ccw	Valve Body Conf.
FROM L N/A to L N/A	INCHES FROM W0 +1.9 to +3.4		
ANGLE: ☐ 0 ☐ 45 ☒ 60 other ____	FROM 0 DEG to 360 DEG		
☐ NO SCAN ☒ LIMITED SCAN	☐ 1 ☒ 2	☒ 1 ☐ 2 ☐ cw ☐ ccw	Valve Body Conf.
FROM L N/A to L N/A	INCHES FROM W0 +1.9 to +3.2		Sketch(s) attached ☒ yes ☐ No
ANGLE: ☐ 0 ☒ 45 ☐ 60 other ____	FROM 0 DEG to 360 DEG		

Prepared By: David Zimmerman Level: III Date: 05/25/2005 Sheet 4 of 8

Reviewed By: D E Hansen Date: 5-30-05 Authorized Inspector: Robert McGill Date: 6-8-05

Pg 5 of 9

S1-1 E BONNETT

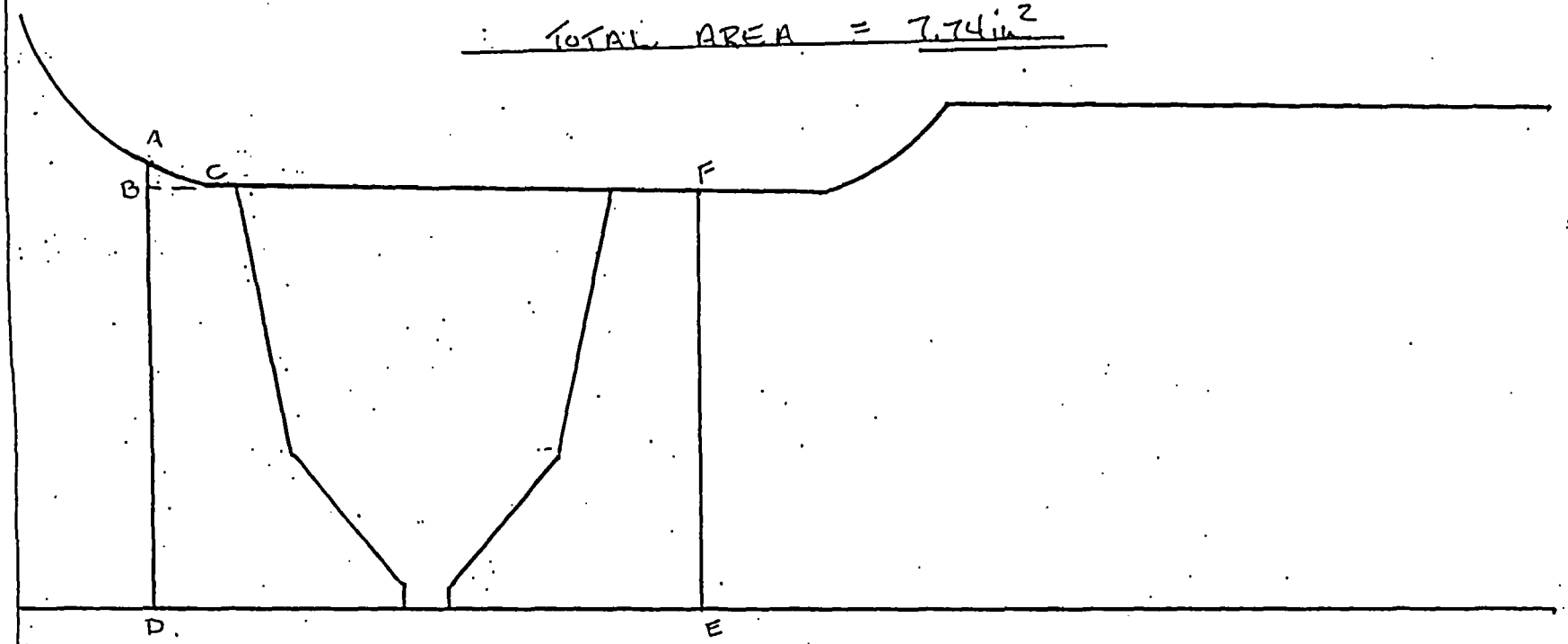
VALV BODY - S2

EXAM AREA OF INTEREST

ABC : $\frac{0.4in \times 0.15in}{2} = 0.06in^2$

BDEF : $2.4in \times 3.2in = 7.68in^2$

: TOTAL AREA = $7.74in^2$



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FULL COVERAGE
PART. COVERAGE
NO COVERAGE

ITEM NO: B12.040.002.D
ID NO: IND37A
INSP: [signature] DATE: 05/05/05
SCALE : FULL ATTACHMENT 5 of 8

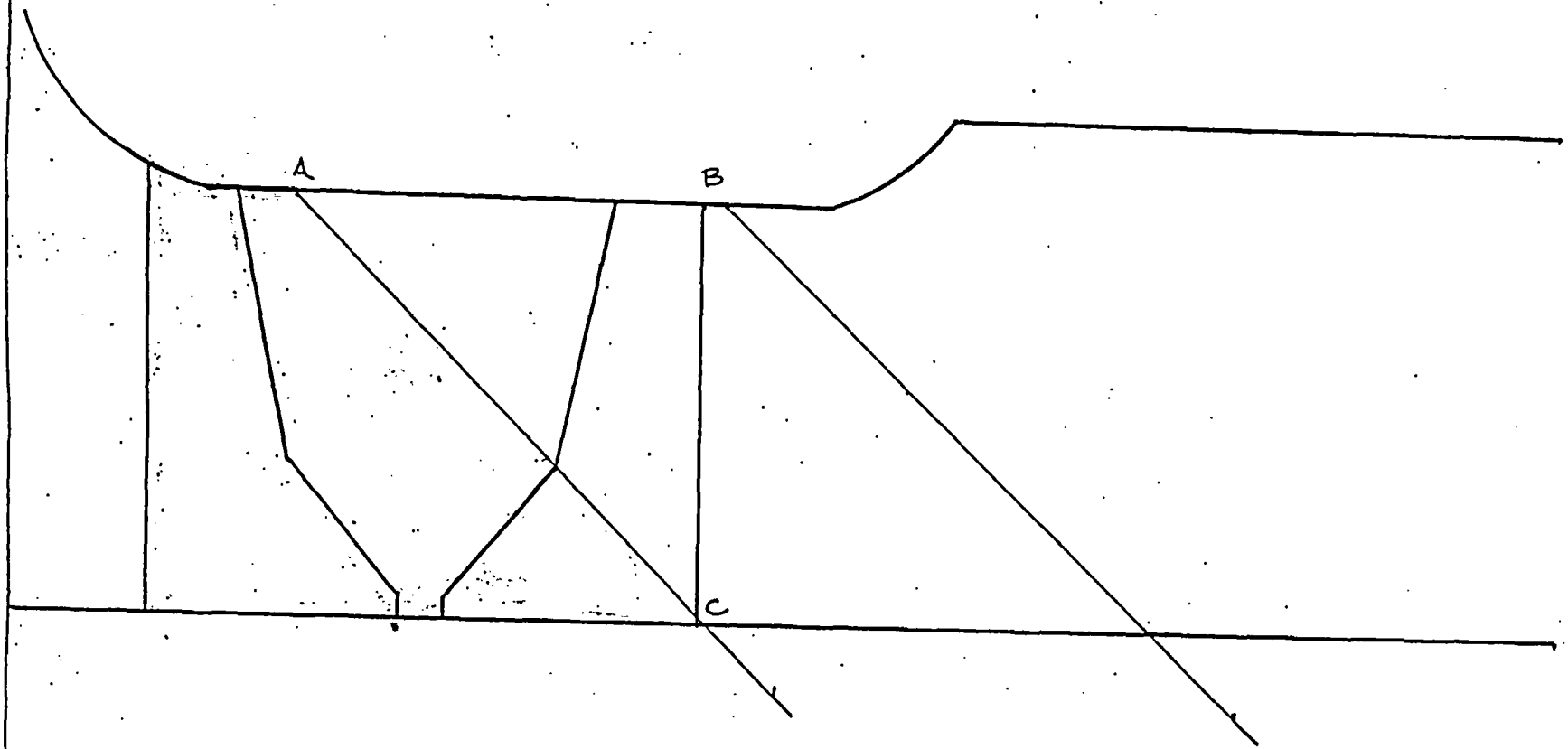
S1-1 E BONNETT

VOLA BODY - S2

SCAN 1 - 45° COVERAGE

ABC : $\frac{2.4in \times 2.35in}{2} = 2.82in^2$

$2.82in^2 / 7.74in^2 \times 100 = 36.4\%$



Pg 7 of 9

FULL COVERAGE

PART. COVERAGE

NO COVERAGE

ITEM NO: B12.040.002.D

ID NO: IND37A

INSP : [signature] III DATE: 05/25/05

SCALE : FULL ATTACHMENT 6 of 8

S1 - VE BONNETS

VAL BODY - S2

SCAN 2 - 45°/60° COVERAGE

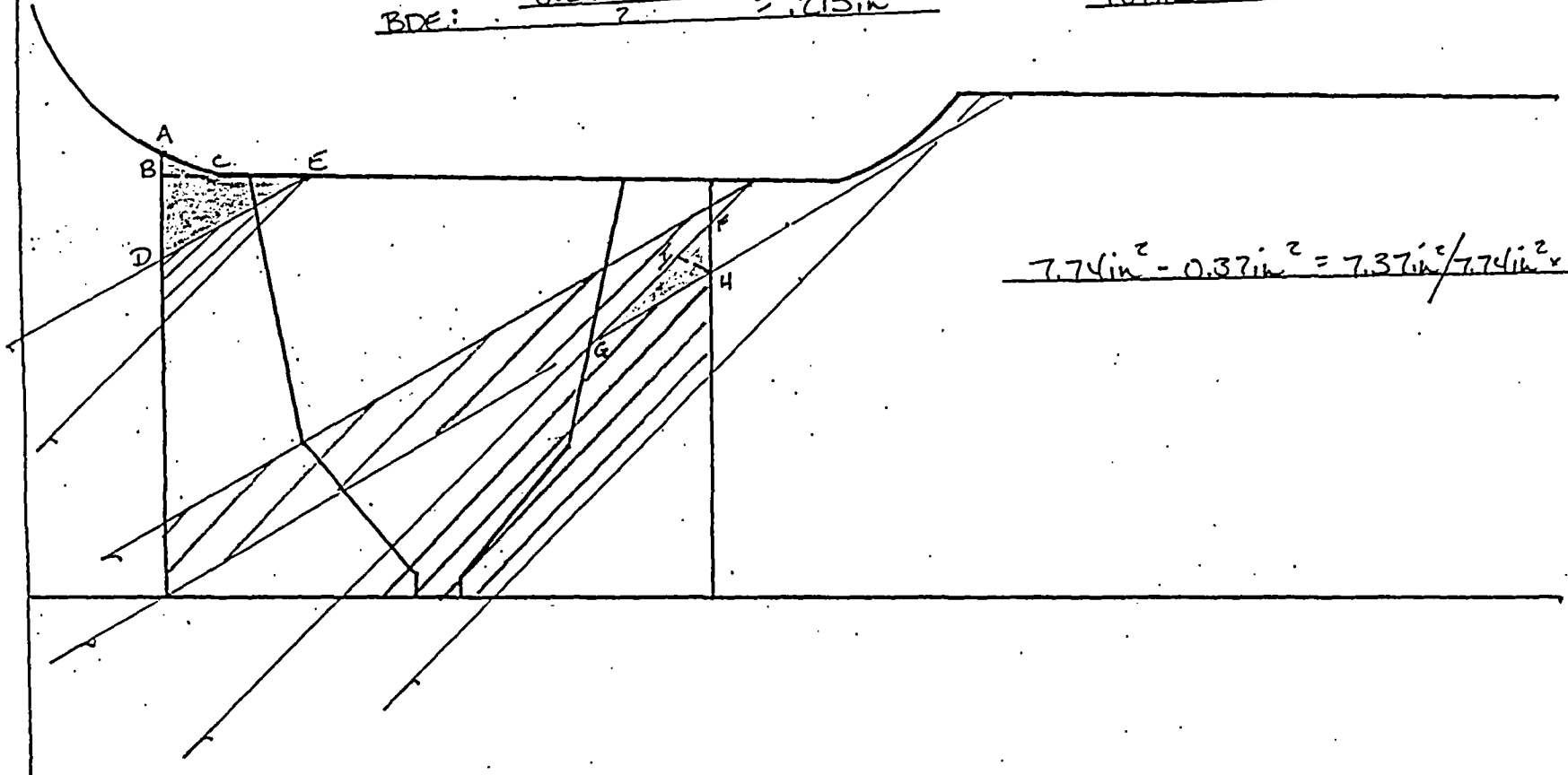
ABC: $\frac{0.4in \times 0.15in}{2} = 0.06in^2$

BDE: $\frac{0.5in \times 0.85in}{2} = .213in^2$

FHI: $\frac{0.25in \times 0.2in}{2} = 0.025in^2$

GHI: $\frac{0.7in \times 0.2in}{2} = 0.07in^2$

TOTAL LOSS = $0.37in^2$



$7.74in^2 - 0.37in^2 = 7.37in^2 / 7.74in^2 \times 100 = 95.22\%$

pg 8 of 9

FULL COVERAGE

PART. COVERAGE

NO COVERAGE

ITEM NO: B12.040.002.D

ID NO: IND37A

INSP: [signature] III

DATE: 05/25/05

SCALE: FULL

ATTACHMENT 7 of 8

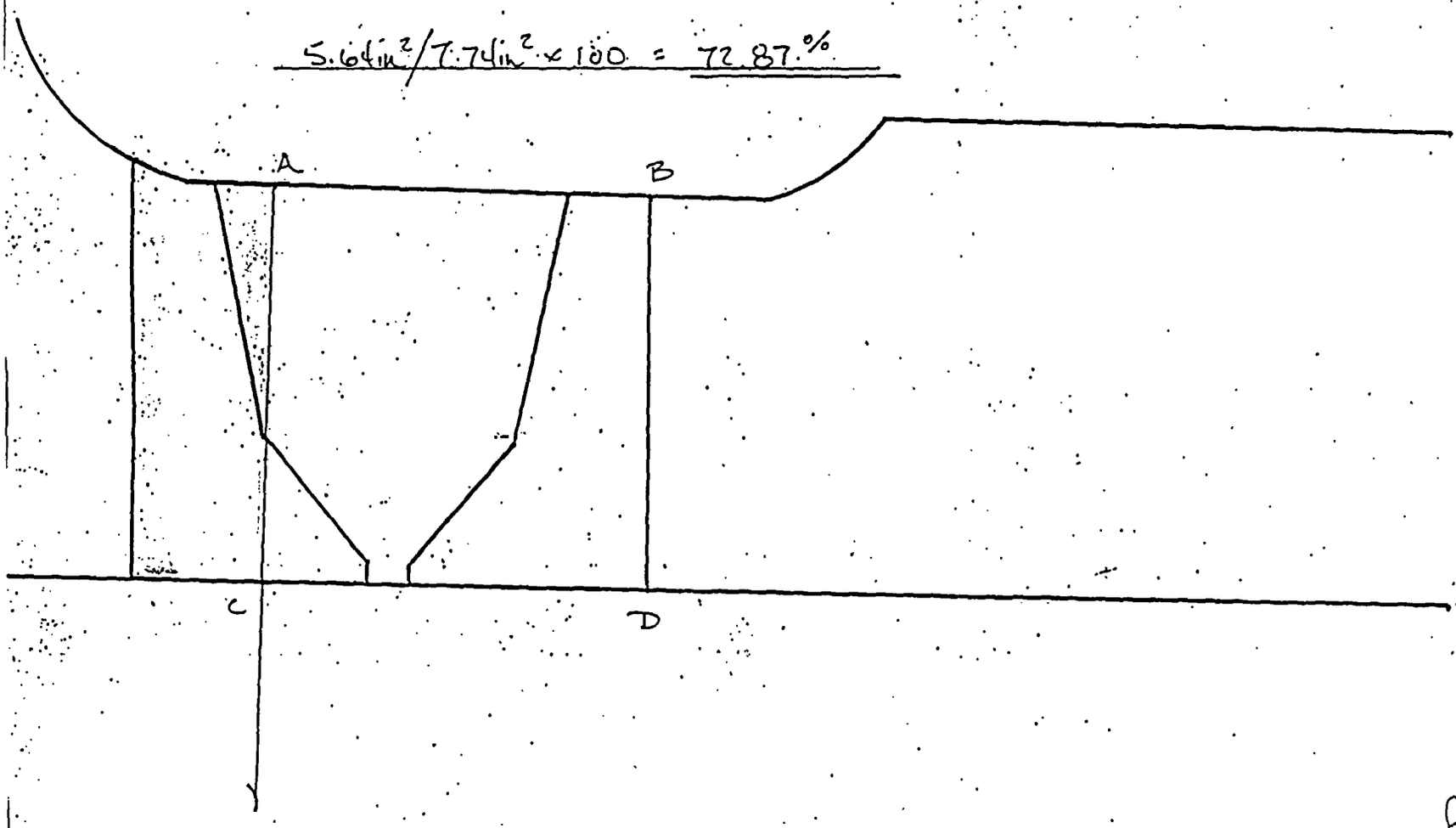
D1-V = BONNET

VALVE BODY - S2

SCAN 3,4 - 45° COVERAGE

ABCD: 2.4in x 2.35in = 5.64in²

5.64in²/7.74in² x 100 = 72.87%



Pg 9 of 9

FULL COVERAGE
PART. COVERAGE
NO COVERAGE

ITEM NO: B12.040.002.D
ID NO: IND37A
INSP: [signature] DATE: 05/25/05
SCALE: FULL

ATTACHMENT B of B

Duke Energy.

UT Pipe Weld Examination

Site/Unit: Catawba / 1 | Procedure: NDE-600 | Outage No.: CNS1EOC15

Summary No.: C05.011.049 | Procedure Rev.: 16 | Report No.: UT-05-169

Workscope: ISI | Work Order No.: 98688907 | Page: 1 of 25

Code: Asme Section XI 1989 | Cat./Item: C-F-1/C5.11.49 | Location: N/A 05/30/05

Drawing No.: CN-1ND-39 | Description: Valve (1ND2A) to Pipe

System ID: ND

Component ID: C05.011.049 /1ND39-12 | Size/Length: N/A | Thickness/Diameter: 1.125" / 12"

Limitations: Yes-See Attached Limitation Report | Start Time: 1201 | Finish Time: 1239

Examination Surface: Inside ☐ Outside ☑ | Surface Condition: AS GROUND

Lo Location: 9.1.1.1 | Wo Location: Centerline of Weld | Couplant: ULTRAGEL II | Batch No.: 05125

Temp. Tool Mfg.: D.A.S | Serial No.: MCNDE32797 | Surface Temp.: 79 °F

Cal. Report No.: CAL-05-183, CAL-05-184, CAL-05-185

Angle Used	0	45	45T	60	60L	
Scanning dB			46.0	46.4	52.3	

Indication(s): Yes ☐ No ☑ | Scan Coverage: Upstream ☑ Downstream ☑ CW ☑ CCW ☑

Comments:

FC 05-08

Results: Accept ☑ Reject ☐ Info ☐

Percent Of Coverage Obtained > 90%: No - 76.1% | Reviewed Previous Data: Yes

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Zimmerman, David K.	III	David K. Zimmerman	5/20/2005		III	5/30/05
Examiner	Level	Signature	Date	Site Review	Signature	Date
Moss, Gary J.	II	Gary J. Moss	5/20/2005	N/A		
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A				Robert McGrell	6-8-05

RFR #05-CN-004 ATTACHMENT J

DUKE POWER COMPANY
ISI LIMITATION REPORT

Component/Weld ID: 1ND39-12 **Item No:** C05.011.049

remarks: Valve Configuration

Scan	Surface	Beam Direction	From L	to L	Inches from W0	to	Angle	other	From DEG	to DEG
☐ NO SCAN ☒ LIMITED SCAN	☐ 1 ☒ 2	☒ 1 ☐ 2 ☐ cw ☐ ccw	N/A	N/A	+1.1"	Beyond	☐ 0 ☐ 45 ☒ 60		0	360
☐ NO SCAN ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw					☐ 0 ☐ 45 ☐ 60			
☐ NO SCAN ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw					☐ 0 ☐ 45 ☐ 60			
☐ NO SCAN ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw					☐ 0 ☐ 45 ☐ 60			

Sketch(s) attached ☒ yes ☐ No

Prepared By: David Zimmerman [signature] -Level: III Date: 05/20/2005

Sheet 2 of ~~3~~ 5 [initials] 5/30/05

Reviewed By: [signature] III Date: 5/30/05

Authorized Inspector: [signature] Date: 6-8-05

Pg 2 of 5

Duke Energy.

Determination of Percent Coverage for UT Examinations - Pipe

Site/Unit:	Catawba / 1	Procedure:	NDE-600	Outage No.:	CNS1EOC15
Summary No.:	C05.011.049	Procedure Rev.:	16	Report No.:	UT-05-169
Workscope:	ISI	Work Order No.:	98688907	Page:	3 of 3

45 deg

Scan 1		% Length X		% volume of length / 100 =		% total for Scan 1
Scan 2		% Length X		% volume of length / 100 =		% total for Scan 2
Scan 3	100.000	% Length X	100.000	% volume of length / 100 =	100.000	% total for Scan 3
Scan 4	100.000	% Length X	100.000	% volume of length / 100 =	100.000	% total for Scan 4

Add totals and divide by # scans = 100.000 % total for 45 deg

Other deg - 60 (to be used for supplemental scans)

The data to be listed below is for coverage that was not obtained with the 45 deg scans.

Scan 1	100.000	% Length X	52.860	% volume of length / 100 =	52.860	% total for Scan 1
Scan 2	100.000	% Length X	51.430	% volume of length / 100 =	51.430	% total for Scan 2
Scan 3		% Length X		% volume of length / 100 =		% total for Scan 3
Scan 4		% Length X		% volume of length / 100 =		% total for Scan 4

Percent complete coverage

Add totals for each scan required and divide by # of scans to determine;

76.073 % Total for complete exam

Site Field Supervisor: David K. [illegible] III Date: 05/20/05

NOTE: 60°RL SCAN NOT INCLUDED IN PERCENT COVERAGE DUE TO REQUIREMENTS OF 10CFR 50.55a(b)(2)(xv)(A)(2). BEST EFFORT SCAN WITH 60°RL OBTAINED 47.14% COVERAGE IN ONE AXIAL DIRECTION.

Pg 3 of 5

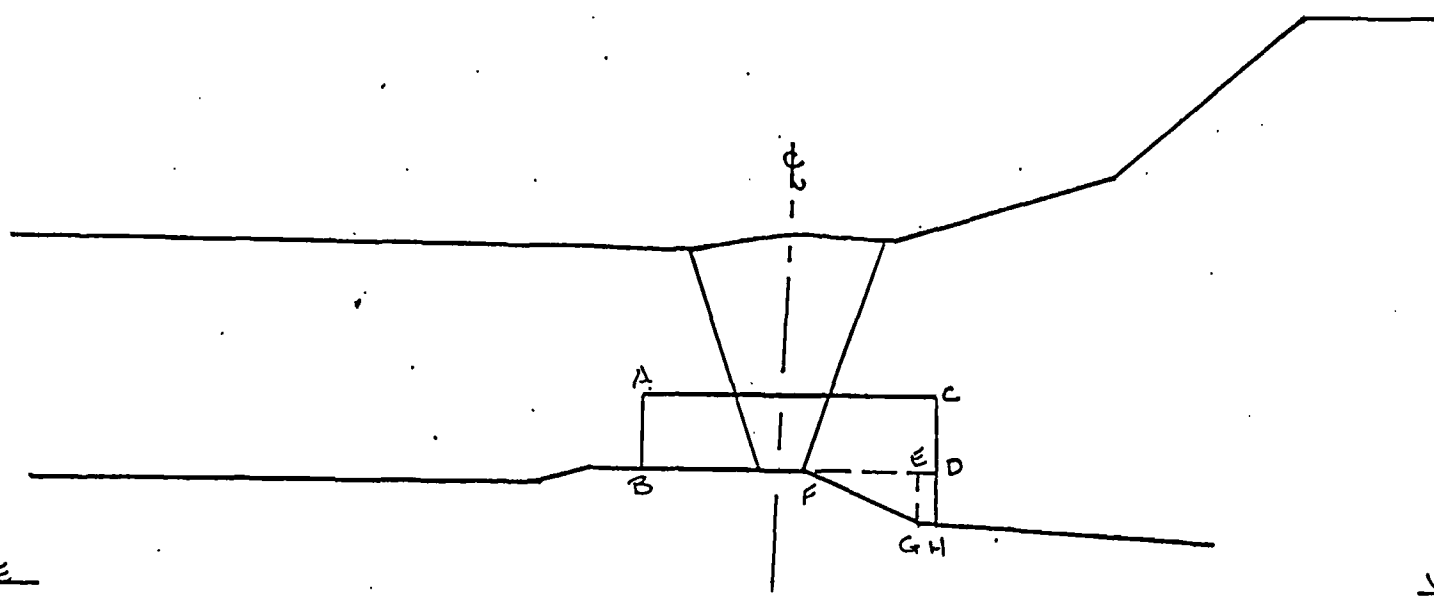
EXAM AREA OF INTEREST

ABCD : $1.55in \times 0.39in = 0.61in^2$

DEGH : $0.1in \times 0.25in = 0.03in^2$

EFG : $\frac{0.25in \times 0.6in}{2} = 0.06in^2$

TOTAL AREA = $0.7in^2$



S1 - PIPE

Pg 4 of 5

VALVE IND2A - S2.

ITEM NO: C.05.011.049	
ID NO: IND 39-12	UT-05-169
INSP: Daniel K. Z.	DATE 25/20/05
SCALE: FULL	PAGE 4 of 5

EXAM AREA OF COVERAGE

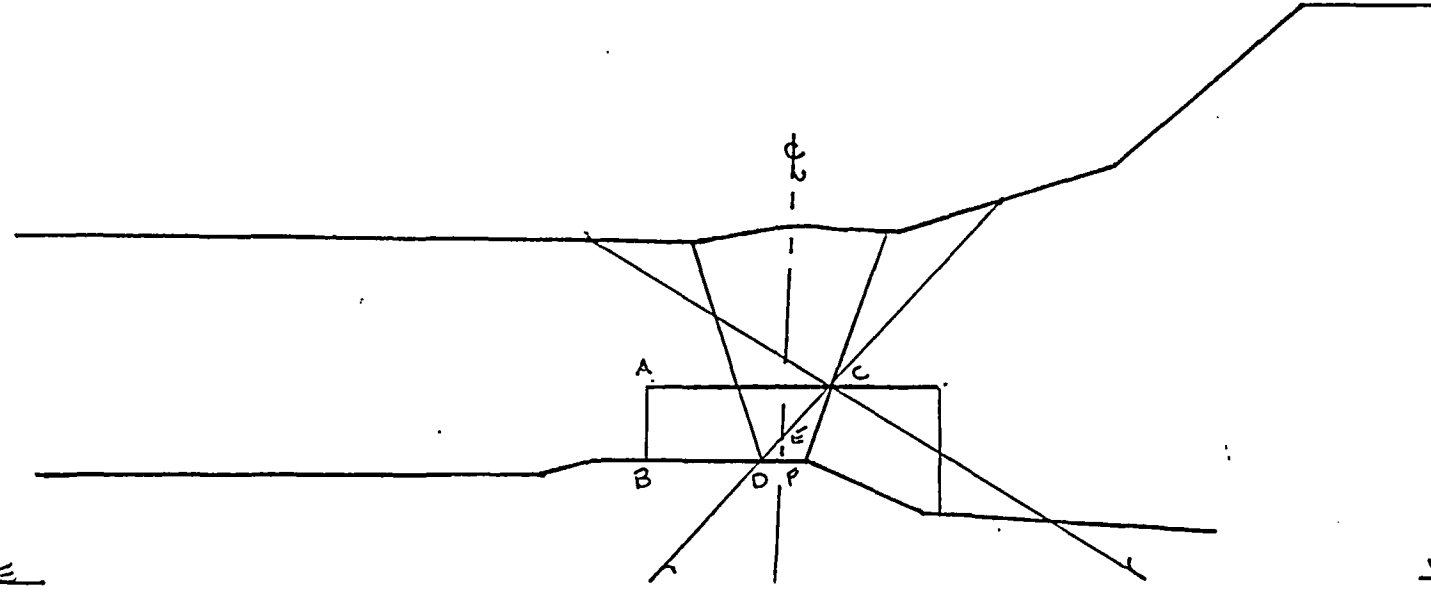
SCAN 1: ABCD + DEF = $.39in\left(\frac{1.0in + .85in}{2}\right) + \left(\frac{.1in \times .1in}{2}\right)$

$= 0.37in^2/.7in^2 \times 100 = 52.86\%$

SCAN 2: ABCD = $.39in\left(\frac{1.0in + .85in}{2}\right)$

$= .36in^2/.7in^2 \times 100 = 51.43\%$

SCAN 3, 4: 100% (NO LOSS)



S1 - PIPE

VALVE IND2A - S2

Pg 5 of 5

ITEM NO: C05.011.049	
ID NO: IND 39-12	UT-05-169
INSP: David K. Z III	DAT: 05/20/05
SCALE: FULL	PAGE 5 of 5

Duke Power.

D.M. JAMIL
Vice President

Duke Power
Catawba Nuclear Station
4800 Concord Road / CN01VP
York, SC 29745-9635

803 831 4251

803 831 3221 fax

June 14, 2005

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTENTION: Document Control Desk

Subject: Duke Energy Corporation
Catawba Nuclear Station Unit 1
Docket No. 50-413
Response to NRC Bulletin 2004-01: Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors

Reference: Letter from Duke Energy Corporation to the NRC, same subject, dated July 27, 2004

NRC Bulletin 2004-01, "Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors," required that within 60 days of plant restart following the next inspection of Alloy 82/182/600 pressurizer penetrations and steam space piping connections, submit to the NRC a statement indicating that the inspections described in the response to item (1)(c) of the bulletin were completed and a description of the as-found condition of the pressurizer shell, any findings of relevant indications of through-wall leakage, followup NDE performed to characterize flaws in leaking penetrations or steam space piping connections, a summary of all relevant indications found by NDE, a summary of the disposition of any findings of boric acid, and any corrective actions taken and/or repairs made as result of the indications found.

During the Catawba Unit 1 Refueling Outage (1EOC15), inspections described in the response to item (1)(c) of the bulletin were completed. A 100% bare metal visual (BMV)

RGR #05-CN-004 ATTACHMENT K

examination was performed on all Alloy 82/182/600 weld locations on the pressurizer. These BMV inspections were performed by VT-2 qualified inspectors. The inspection scope included the following locations:

(1) pressurizer surge line nozzle weld
(3) pressurizer safety valve nozzle welds
(1) pressurizer spray nozzle weld
(1) pressurizer PORV nozzle weld
(1) pressurizer manway

There was no evidence of leakage or boric acid deposits observed at any of these locations. The exterior surfaces are in very good condition with no wastage of the top or bottom heads.

There are no NRC commitments contained in this letter.

Inquiries on this matter should be directed to A. Jones-Young at (803) 831-3051.

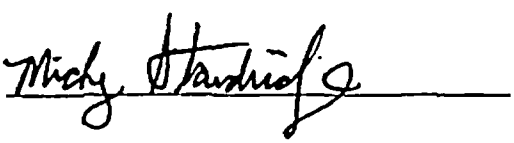
Very truly yours,

D.M. Jamil
Site Vice President

D. M. Jamil, being duly sworn, affirms that he is the person who subscribed his name to the foregoing statement, and that all matters and facts set forth herein are true and correct to the best of his knowledge.

D. M. Jamil, Site Vice President

Subscribed and sworn to me: 6-14-05

 , Notary Public

My commission expires: 7-10-2012

SEAL

xc:

W. D. Travers
U. S. Nuclear Regulatory Commission
Regional Administrator, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

S. E. Peters
NRC Project Manager
U. S. Nuclear Regulatory Commission
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E. F. Guthrie
Senior Resident Inspector
U. S. Nuclear Regulatory Commission
Catawba Nuclear Site

H. J. Porter
Division of Radioactive Waste Management
South Carolina Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

bxc:

L. F. Vaughn
L. A. Keller
W. O. Callaway
D. L. Ward
A. D. Jones-Young
K. E. Nicholson
RGC
Master File
NSRB
ELL

Catawba Owners:
Saluda River Electric Corporation
P. O. Box 929
Laurens, SC 29360-0929

NC Municipal Power Agency No. 1
P. O. Box 29513
Raleigh, NC 27626-0513

T. R. Puryear
NC Electric Membership Corporation
CN03G

Piedmont Municipal Power Agency
121 Village Drive
Greer, SC 29651