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January 10, 2000

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: McGuire Nuclear Station Unit 2
Docket No. 50-370
Relief Request 99-001

Pursuant to 10CFR50.55a(g)(5)(iii), Duke Energy Corporation requests relief from some requirements of the ASME Boiler and Pressure Vessel Code as described in the attached Relief Request 99-001.

Questions should be directed to Julius Bryant, McGuire Licensing and Compliance, at (704) 875-4162.

Sincerely,

A handwritten signature in cursive script that reads 'H. B. Barron'.

H. B. Barron, Vice President
McGuire Nuclear Station

Attachment

A047

U.S. Nuclear Regulatory Commission
January 10, 2000
Page 2 of 2

cc: Mr. L. A Reyes
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Duke Energy Corporation

Station McGuire Unit 2SECOND 10-YEAR INTERVAL REQUEST FOR RELIEF NO. 99-001

Pursuant to 10CFR50.55a(g)(5)(iii), Duke Energy Corporation has determined that compliance with the specified examination requirements of ASME Section XI is impractical for McGuire Nuclear Station Unit 2. Information is therefore being submitted in support of this determination and request is being sought for relief from the applicable ASME Section XI requirements.

I. System / Components(s) for Which Relief is Requested:

ASME Section XI Class 1 Components listed below:

Examination Category B-D, Items B3.110., B3.120., B3.140., Full Penetration Welds of Nozzles in Vessels and Nozzle Inside Radius Sections

Pressurizer (Nozzle-to-Vessel Welds)

<u>ID Numbers</u>	<u>Item Numbers</u>	<u>End Of Cycle</u>
2PZR-13	B03.110.004	12
2PZR-14	B03.110.005	12
2PZR-15	B03.110.006	12
2PZR-16	B03.110.007	12

Pressurizer (Nozzle Inside Radius Section)

<u>ID Numbers</u>	<u>Item Numbers</u>	<u>End Of Cycle</u>
2PZR-13R	B03.120.003	12
2PZR-14R	B03.120.004	12
2PZR-15R	B03.120.005	12
2PZR-16R	B03.120.006	12

Steam Generator (Nozzle Inside Radius Section)

<u>ID Numbers</u>	<u>Item Numbers</u>	<u>End of Cycle</u>
2SGB-INLET	B03.140.003	12
2SGB-OUTLET	B03.140.004	12

Examination Category B-F, Items B5.70., Pressure Retaining Dissimilar Metal Welds

Steam Generator (Nozzle-to-Safe End Butt Welds)

<u>ID Numbers</u>	<u>Item Numbers</u>	<u>End Of Cycle</u>
2SGB-INLET-W5SE	B05.070.003	12
2SGB-OUTLET-W6SE	B05.070.004	12

ASME Section XI Class 2 Components listed below:

Examination Category C-A, Items C1.10., C1.30 Pressure Retaining Welds in Pressure Vessels

Seal Water Injection Filter (Shell Circumferential Weld)

<u>ID Numbers</u>	<u>Item Numbers</u>	<u>End Of Cycle</u>
2ASWINJF-1	C01.010.100	12
2ASWINJF-2	C01.010.101	12

Containment Spray Heat Exchanger (Tubesheet-to-Shell Weld)

<u>ID Numbers</u>	<u>Item Numbers</u>	<u>End Of Cycle</u>
2ACSHX-SH-48	C01.030.010	12

II. Code Requirement:

ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition with no Addenda, Tables IWB-2500 and IWC-2500, lists the following requirements for Examination Categories as shown below:

"Examination Category B-D, Full Penetration Welds of Nozzles in Vessels- Inspection Program B; Figure Number IWB-2500-7 (b)"

"Examination Category B-F, Pressure Retaining Dissimilar Metal Welds; Figure Number IWB-2500-8"

"Examination Category C-A, Pressure Retaining Welds in Pressure Vessels; Figure Number IWC-2500-1and IWC-2500-2". Note (1) adds the words "Includes essentially 100% of the weld length."

Note: Duke Energy Corporation with NRC approval has adopted Code Case N-460 which defines "essentially 100%" as greater than 90% coverage.

III. Code Requirement from which Relief is Requested:

Relief is requested from the requirement of examining essentially 100% of the weld length. Due to part geometry and actual physical barriers, obtaining greater than 90% of the weld volume as defined in Code Case N-460, which is utilized by Duke Energy, is not possible.

Examination Category B-D, Items B3.110., B3.120., B3.140., Full Penetration Welds of Nozzles in Vessels and Nozzle Inside Radius Sections

Pressurizer (Nozzle-to-Vessel Welds)

<u>Item Numbers</u>	<u>Actual Coverage Obtained</u>	
B03.110.004	62.70%	See Note 1
B03.110.005	62.70%	See Note 1
B03.110.006	62.70%	See Note 1
B03.110.007	62.70%	See Note 1

Note 1

ASME Section V, T-441.3.2 Scanning Requirements, 1989 Edition with no addenda as modified by Code Case N-460.

This Paragraph requires scanning of the examination volume(s) using three angle beams and a straight beam from both sides of the weld.

When scanning for reflectors parallel to the weld, the angle beams shall be aimed at right angles to the weld axis, with the search unit(s) manipulated so that the ultrasonic beams pass through the entire volume of weld metal. The adjacent base metal in the examination volume must be completely scanned by two angle beams, but need not be completely scanned by both angle beams from both directions (any combination of two angle beams will satisfy the requirement).

When scanning for reflectors transverse to the weld, the angle beam search units shall be aimed parallel to the axis of longitudinal and circumferential welds. The search unit shall be manipulated so that the ultrasonic beams pass through all of the examination volume. Scanning shall be done in two directions 180 degrees to each other to the extent possible. Areas blocked by geometric conditions shall be examined from at least one direction.

Code Case N-460 allows credit for full volume coverage, if it can be shown that greater than 90% of the required weld volume has been examined.

Pressurizer (Nozzle Inside Radius Section)

<u>Item Numbers</u>	<u>Actual Coverage Obtained</u>	
B03.120.003	62.79%	See Note 2
B03.120.004	62.79%	See Note 2
B03.120.005	62.79%	See Note 2
B03.120.006	62.79%	See Note 2

Steam Generator (Nozzle Inside Radius Section)

<u>Item Numbers</u>	<u>Actual Coverage Obtained</u>	
B03.140.003	83.28%	See Note 2
B03.140.004	83.28%	See Note 2

NOTE 2

ASME Section XI, 1989 Edition, Examination Volume shown in Figure IWB-2500-7 (b)

Examination Category B-F, Items B5.70., Pressure Retaining Dissimilar Metal Welds

Steam Generator (Nozzle-to-Safe End Butt Welds)

<u>Item Numbers</u>	<u>Actual Coverage Obtained</u>	
B05.070.003	75.00%	See Note 3
B05.070.004	75.00%	See Note 3

Note 3

ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda as modified by Code Case N-460.

The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed from two sides of the weld where practicable, or from one side of the weld, as a minimum.

Code Case N-460 allows credit for full volume coverage if it can be shown that greater than 90% of the required volume has been examined.

ASME Section XI Class 2 Components listed below:

Examination Category C-A, Items C1.10., C1.30 Pressure Retaining Welds in Pressure Vessels

Seal Water Injection Filter (Shell Circumferential Weld)

<u>Item Numbers</u>	<u>Actual Coverage Obtained</u>	
C01.010.100	89.66%	See Note 4
C01.010.101	80.31%	See Note 4

Containment Spray Heat Exchanger (Tubesheet-to-Shell Weld)

<u>Item Numbers</u>	<u>Actual Coverage Obtained</u>	
C01.030.010	24.00%	See Note 4

NOTE 4

ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda as modified by Code Case N-460.

The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed from two sides of the weld where practicable, or from one side of the weld, as a minimum.

IV. Basis for Relief:

ASME Section XI Class 1 Components listed below:

Examination Category B-D, Items B3.110., B3.120., B3.140., Full Penetration Welds of Nozzles in Vessels and Nozzle Inside Radius Sections

During the ultrasonic examination of the Pressurizer Safety Nozzle to Pressurizer Upper Head Welds:

2PZR-13 (Item Number B03.110.004)
 2PZR-14 (Item Number B03.110.005)
 2PZR-15 (Item Number B03.110.006), and
 2PZR-16 (Item Number B03.110.007)

shown in Attachment 1, coverage of the required examination volume could not be obtained. The examination coverage was limited to 62.70%, due to single sided access caused by the nozzle geometry. In order to achieve more coverage, the nozzle would have to be redesigned to allow access from both sides.

During the ultrasonic examination of the Pressurizer Safety Nozzle to Pressurizer Upper Head Inside Radius Sections:

2PZR-13R (Item Number B03.120.003)
2PZR-14R (Item Number B03.120.004)
2PZR-15R (Item Number B03.120.005), and
2PZR-16R (Item Number B03.120.006)

shown in Attachment 1, coverage of the required examination volume could not be obtained. The examination coverage was limited to 62.79%. The limitations are caused by the ratio of the nozzle O. D. to the vessel thickness. When the nozzle O. D. is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Conducting examinations from nozzle boss and OD blend radius using compound angles, determining which angles to use, metal paths to calibrate, and area of coverage are not accurate with manual calculations. Duke Energy is investigating the use of computer modeling to solve the limitation problems. Radiography is not practical because of the geometry of the component, which prevents placement of the film and exposure source.

Nozzle inside radius sections were examined with the ultrasonic method to the maximum extent practical from the vessel wall. Calibration blocks and procedures were in accordance with ASME Section V, Article 4.

During the ultrasonic examination of the Steam Generator Nozzles (Nozzle Inside Radius Section):

2SGB-Inlet (B03.140.003)
2SGB-Outlet (B03.140.004)

shown in Attachment 1, coverage of required examination volume could not be obtained. The examination coverage was limited to 83.28%. Limitations are caused by the ratio of the nozzle O.D. to the vessel thickness. When the nozzle O.D. is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Conducting examinations from nozzle boss and OD blend radius using compound angles, determining which angles to use, metal paths to calibrate, and area of coverage are not accurate with manual calculations. Duke Energy is investigating the use of computer modeling to solve the limitation problems. Radiography is not practical because of the

geometry of the component, which prevents placement of the film and exposure source.

Nozzle inside radius sections were examined with the ultrasonic method to the maximum extent practical from the vessel wall. Calibration blocks and procedures were in accordance with ASME Section V, Article 4.

Examination Category B-F, Items B5.70., Pressure Retaining Dissimilar Metal Welds

During the ultrasonic examination of the Steam Generator Nozzle-to-Safe End Welds:

2SGB-Inlet-W5SE (B05.070.003) and
2SGB-Outlet-W6SE (B05.070.004)

shown in Attachment 2, coverage of required examination volume could not be obtained. Material characteristics and single sided access caused by the component geometry prevents two-beam path direction coverage of the examination volume and limits the examination coverage to 75%.

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

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

$$\begin{aligned}\sin^{-1} &= (\sin 45^\circ \times V_s) \div V_L \\ &= (0.707 \times 0.123) \div 0.223\end{aligned}$$

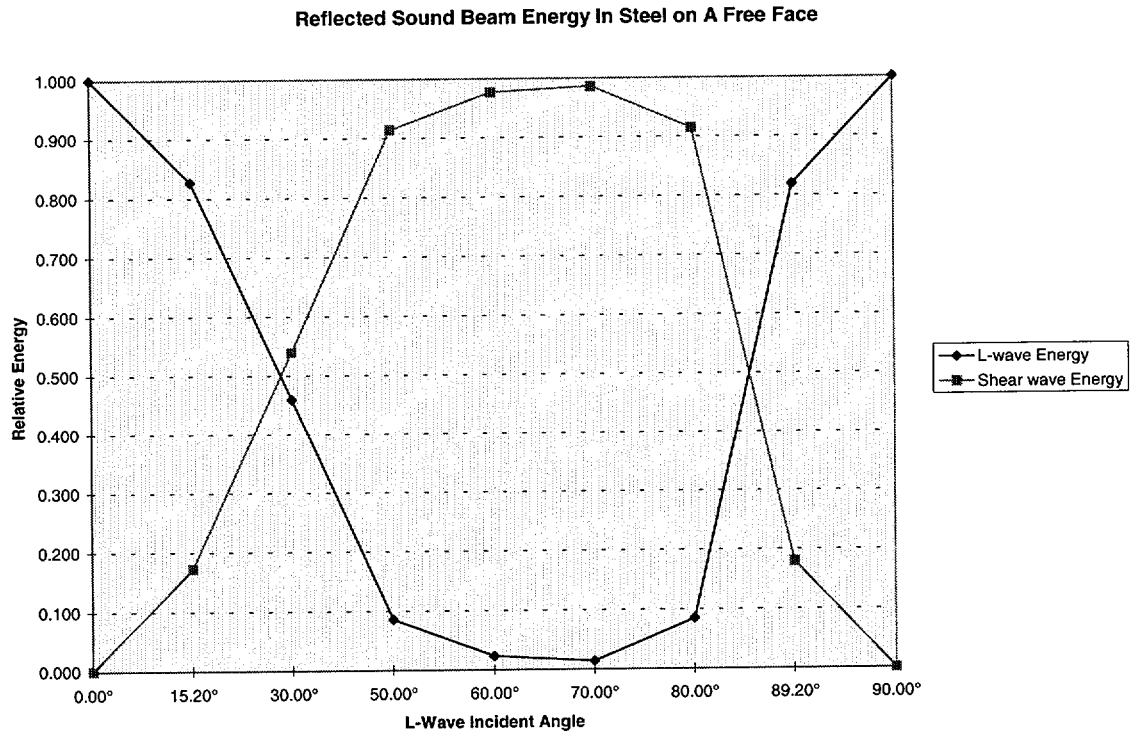
Where: \sin^{-1} is the shear wave angle

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

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

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

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



ASME Section XI Class 2 Components listed below:

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

Examination Category C-A, Items C1.10., C1.30 Pressure Retaining Welds in Pressure Vessels

During the ultrasonic examination of the Shell to Upper Flange Weld 2ASWINJF-1(C01.010.100), shown in Attachment 3, coverage of the required examination volume could not be obtained. The examination coverage was limited to 89.66% of the required examination volume due to single sided access caused by the nozzle geometry. In order to achieve more coverage, the weld would have to be redesigned to allow for more access.

During the ultrasonic examination of the Shell to Upper Flange Weld 2ASWINJF-2(C01.010.101), shown in Attachment 3, coverage of the required examination volume could not be obtained. The examination coverage was limited to 80.31% of the required examination volume due to single sided access caused by the nozzle geometry. In order to achieve more coverage, the weld would have to be redesigned to allow for more access.

During the ultrasonic examination of the Shell to Tubesheet Weld 2ACSHX-SH-48(C01.030.010), shown in Attachment 4, coverage of the required examination volume could not be obtained. The examination coverage was limited to 24% of the required examination volume due to the proximity of support beams that prevented scanning significant areas of the weld. In order to achieve more coverage, the equipment support would have to be redesigned or removed to allow for more access to the weld.

V. Alternate Examinations or Testing:

The use of radiography as an alternate volumetric examination for all the above listed components is not practical due to component thickness and geometric configurations. Other restrictions making radiography impractical are the physical barriers prohibiting access for placement of source, film, image quality indicator, etc.

Since radiography is impractical, Duke Energy Corporation will continue to use ultrasonic examination procedures to obtain maximum coverage to the extent practicable of the Item Numbers referenced in Section I of this Request for Relief. No additional ultrasonic examinations or alternate exams are planned during the

current interval for the welds referenced in Section I of the request.

For the Class 1 Components listed in Section I above, Duke Energy proposes to use pressure test requirements to compliment the limited examination coverage. The Code requires (reference Table IWB-2500-1, Item Number B15.50) that a system leakage test be performed after each refueling outage. Additionally a system hydrostatic test (reference Table IWB-2500-1, Item Number B15.51) is required once during each 10-year inspection interval. These tests require a VT-2 visual examination for evidence of leakage. This testing will provide additional assurance of pressure boundary integrity.

For the Class 2 Components listed in Section I above, Duke Energy proposes to use pressure test requirements to compliment the limited examination coverage. The Code requires (reference Table IWC-2500-1, Item Number C7.10) that a system pressure test be performed once each period. Additionally a system hydrostatic test (reference Table IWB-2500-1, Item Number C7.20) is required once during each 10-year inspection interval. These tests require a VT-2 visual examination for evidence of leakage. This testing will provide additional assurance of pressure boundary integrity.

VI. Justification for the Granting of Relief

Examination Category B-D, Items B3.110., B3.120., B3.140., Full Penetration Welds of Nozzles in Vessels and Nozzle Inside Radius Sections

The Pressurizer (Nozzle-to-Vessel Welds) are:
2PZR-13 (Item Number B03.110.004/Nozzle to Upper Head),
2PZR-14 (Item Number B03.110.005/Nozzle to Upper Head),
2PZR-15 (Item Number B03.110.006/Nozzle to Upper Head),
and 2PZR-16 (Item Number B03.110.007/Nozzle to Upper Head). These four Pressurizer Nozzle to Head Welds are limited due to single sided access caused by the nozzles geometry. In order to achieve more coverage, the nozzles would have to be redesigned to allow access from both sides. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage.

The Pressurizer (Nozzle Inside Radius Sections) are:
2PZR-13R (Item Number B03.120.003),
2PZR-14R (Item Number B03.120.004),

2PZR-15R (Item Number B03.120.005), and
2PZR-16R (Item Number B03.120.006).

These Pressurizer Nozzle to Upper Head Weld (Inside Radius Sections) are limited due to the ratio of the nozzle O.D. to the vessel thickness. When the nozzle O.D. is large in relation to the vessel thickness, less coverage can be obtained when scanning from the vessel side.

The Pressurizer Nozzle to Upper Head Welds/Inside Radius Sections (Weld Numbers 2PZR-13/2PZR-13R, 2PZR-14/2PZR-14R, 2PZR-15/2PZR-15R, 2PZR-16/2PZR-16R) are located on the upper head of the pressurizer and are not part of the reactor pressure vessel. The McGuire Nuclear Station Unit 2 Pressurizer was fabricated by Westinghouse and is free from unacceptable fabrication defects. Westinghouse performed rigorous state-of-the-art inspections following fabrication to ensure no significant flaws existed.

Steam Generator (Nozzle Inside Radius Sections):
2SGB-Inlet (B03.140.003), and 2SGB-Outlet
(B03.140.004). During the ultrasonic examination of the Steam Generator Nozzle Inside Radius Sections, coverage of required examination volume could not be obtained. Limitations are caused by the ratio of the nozzle O.D. to the vessel thickness. When the nozzle O. D. is large in relation to the vessel thickness, less coverage can be obtained when scanning from the vessel side. Examinations from the nozzle boss and O. D. blend radius using compound angles, determining which angles to use, and metal paths to calibrate for and area of coverage is not accurate with manual calculations.

The ten exams listed here for Examination Category B-D are located within the reactor coolant loop. These welds are not exposed to significant neutron fluence and are not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. These welds were rigorously inspected by radiography and dye penetrant during component fabrication and installation (the last two during the Steam Generator replacement outage) and verified to be free from unacceptable fabrication defects.

The McGuire Operating License is maintained by compliance with the Plant Technical Specifications. These Technical Specifications require primary coolant

leakage detection systems to be operable at all times or the Unit is to be taken to a shutdown condition. In accordance with Reg. Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems", these leakage detection systems are of sufficient sensitivity so as to detect an increase in primary leakage of 1 gpm within 1 hour. Plant Technical Specifications also impose limits on the total amount of primary coolant leakage allowable during Unit operation. As a result, the Primary Coolant leakage is required to be maintained at low levels at all times and surveillance requirements are performed to detect increases in the primary coolant leakage prior to exceeding Technical Specification allowable values.

In addition to the required leakage limits and detection systems, McGuire Engineering maintains an aggressive monitoring program to detect and trend all levels of leakage, regardless of magnitude. As a result, there is added confidence that pressure boundary leakage will be identified well within the scope of leak-before-break methodology.

Replacement or re-design of these nozzles is not a viable alternative. Duke Energy believes the amount of coverage obtained for these examinations, in conjunction with the Code required VT-2 visual examination after each refueling outage and the 10-year hydrostatic test, provides reasonable assurance of the continued structural integrity of the subject welds.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting this relief for the welds listed under Examination Category B-D will provide reasonable assurance of weld/component integrity, and is authorized by law. In addition, the requested relief will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Examination Category B-F, Items B5.70., Pressure Retaining Dissimilar Metal Welds

Steam Generator (Nozzle-to-Safe End Butt Welds)
2SGB-INLET-SE (B05.070.003), and
2SGB-OUTLET-SE (B05.070.004)

are limited due to material characteristics and single sided access caused by the component geometry which

prevents two-beam path direction coverage of the examination volume. In order to obtain the required two-beam path direction coverage, these two welds would have to be re-designed to allow scanning from both sides. The Steam Generator Nozzle-to-Safe End Butt Welds (Weld Numbers 2SGB-INLET-SE and 2SGB-OUTLET-SE) are located on the inlet and outlet of the steam generators for the reactor coolant piping. The McGuire Unit 2 Steam Generator Nozzle to Safe End Weld geometry prevented obtaining 100% volumetric examination coverage and therefore the 100% examinations are impractical. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage.

The two welds listed here for Examination Category B-F are located within the reactor coolant loop. These welds are not exposed to significant neutron fluence and are not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. These welds were rigorously inspected by radiography and dye penetrant during the construction of the replacement Steam Generators and verified to be free from unacceptable fabrication defects.

The McGuire Operating License is maintained by compliance with the Plant Technical Specifications. These Technical Specifications require primary coolant leakage detection systems to be operable at all times or the Unit is to be taken to a shutdown condition. In accordance with Reg. Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems", these leakage detection systems are of sufficient sensitivity so as to detect an increase in primary leakage of 1 gpm within 1 hour. Plant Technical Specifications also impose limits on the total amount of primary coolant leakage allowable during Unit operation. As a result, the Primary Coolant leakage is required to be maintained at low levels at all times and surveillance requirements are performed to detect increases in the primary coolant leakage prior to exceeding Tech Spec allowable values.

In addition to the required leakage limits and detection systems, McGuire Engineering maintains an aggressive monitoring program to detect and trend all levels of leakage, regardless of magnitude. As a result, there is added confidence that pressure boundary leakage will be identified well within the scope of leak-before-break methodology.

Replacement or re-design of these nozzles is not a viable alternative. Duke Energy believes the amount of coverage obtained for these examinations, in conjunction with the Code required VT-2 visual examination after each refueling outage and the 10-year hydrostatic test, provides reasonable assurance of the continued structural integrity of the subject welds.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting this relief for the welds listed under Examination Category B-F will provide reasonable assurance of weld/component integrity, and is authorized by law. In addition, the requested relief will not endanger life or property or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

ASME Section XI Class 2 Components listed below:

Examination Category C-A, Items C1.10., C1.30 Pressure Retaining Nozzle Welds in Vessels

During the ultrasonic examination of the Shell to Upper Flange Welds 2ASWINJF-1(C01.010.100) and 2ASWINJF-2(C01.010.101), coverage of the required examination volume was limited due to single sided access caused by the weld geometry. In order to achieve more coverage, these welds would have to be redesigned to allow for more access. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage.

The seal water injection filter is one of two filters where one is normally in service and the other in standby. Each filter is manually isolable from the other. There is also capability to completely bypass both seal injection filters, although this is undesirable.

In the event of a leak, normal Technical Specification required surveillance on water inventory would identify the presence of a leak. If the leak were of severe magnitude, abnormal VCT level trends or NC pump seal injection flows would provide operator warning prior to the Technical Specification coolant inventory surveillance. It is not likely that gross failure would occur without a warning sufficient to prompt operator response to swap to the standby filter or

bypass altogether. There are also abnormal procedures in place to deal effectively with a complete loss of seal injection were the failure to be catastrophic.

During the ultrasonic examination of the Shell to Tubesheet Weld 2ACSHX-SH-48(C01.030.010), coverage of the required examination volume was limited due to the proximity of support beams that prevented scanning significant areas of the weld. In order to achieve more coverage, the equipment support would have to be redesigned or removed to allow for more access to the weld. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage.

The Shell to Tubesheet Weld on the 2A NS Heat Exchanger forms the pressure boundary for the raw water cooling supply for this heat exchanger. A leak in this weld would be detected by actuation of the safety-related sump pumps for this room. In addition, unexpected level indications in the floor drain tank (to which the sump pumps discharge to) will prompt investigation and identification of the leak by either Operations or Chemistry personnel. This heat exchanger is one of two safety-related vessels maintained in a non-operational standby mode. Failure of the weld in question would be of little consequence unless it was of such a magnitude as to constitute a major flood. This scenario is difficult to postulate given the volume examined and low pressures and temperatures to which the weld is exposed to during all modes of operation.

Although the examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWC-2500-1 and IWC-2500-2 could not be met for the Examination Category C-A welds listed here, replacement or re-design of these welds is not a viable alternative. Duke Energy believes the amount of coverage obtained for these examinations, in conjunction with the Code required VT-2 visual examination after each refueling outage and the 10-year hydrostatic test, provides reasonable assurance of the continued structural integrity of the subject welds.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting relief for the welds listed under Examination Category C-A will provide reasonable assurance of weld/component integrity, and is authorized by law. In addition, the requested relief will not endanger life or property or

the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

VII. Implementation Schedule:

These examinations will continue to be scheduled as per the requirements of ASME Section XI for future inspection intervals at McGuire Nuclear Station, Unit 2.

Attachment 1. Drawings of Examination Category B-D affected welds/examination areas, and details, including calculation methods for:

B03.110.004
B03.110.005
B03.110.006
B03.110.007
B03.120.003
B03.120.004
B03.120.005
B03.120.006
B03.140.003
B03.140.004

Attachment 2. Drawings of Examination Category B-F affected welds, and details, including calculation methods for:

B05.070.003
B05.070.004

Attachment 3. Drawings of Examination Category C-A affected welds, and details, including calculation methods for:

C01.010.100
C01.010.101

Attachment 4. Drawings of Examination Category C-A affected welds, and details, including calculation methods for:

C01.030.001

The following individuals were involved in the development of this request for relief. Ken Pitser (McGuire Engineering) provided input to the engineering justification (section VI.) for granting relief. Jim McArdle (NDE Level III) provided sections III., IV., and V. Gary Scarboro (McGuire ISI Plan Manager) compiled and completed the request.

Sponsored By: Gary D. Scarboro Date 8/16/99

Approved By: R. Kevin Rhyme Date 8/16/99

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1253 Form NDE-UT-2A

Exam Finish: 1257 Revision 4

Station: McGuire ; Unit: 2 Component/Weld ID: 2PZR-13 Date: 3/26/99

Weld Length (in.): 47.1 Surface Condition: As Manufactured Lo: 9.2.3 Surface Temperature: 72° ° F

Examiner: Larry Mauldin *Larry Mauldin* Level: III Scans:

Examiner: David Zimmerman *David Z* Level: II 45 _____ dB 70 _____ dB

Procedure: NDE-640 Rev: 1 FC: * 45T _____ dB 70T _____ dB

60 _____ dB

60T _____ dB

Other: 0° @ 16 dB

Pyrometer S/N: MCNDE 27018

Cal Due: 7/28/99

Configuration: Safety Noz to Up Head

S2 Flow S1

NOZZLE to Up Head

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: N/A

IND #	4	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE					20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	WRITE SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	0°															

Serial No. 99-001
Attachment # 1
Page 1 of 60

Remarks: * 95-18, 95-19

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

Reviewed By: *Red Sheffield* Level: II Date: 3-30-99 Authorized Inspector: *[Signature]* Date: 3-30-99 Item No: B03.110.004

1
4/12/99

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

DUKE POWER COMPANY ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS				Exam Start: 1130		Form NDE-UT-2A					
				Exam Finish: 1246		Revision 4					
Station: McGuire		Unit: 2	Component/Weld ID: 2PZR-13				Date: 3/26/99				
Weld Length (in.): 47.1		Surface Condition: As Manufactured		Lo: 9.2.3		Surface Temperature: <u>72</u> ° F					
Examiner: David Zimmerman <i>David Zimmerman</i>		Level: II		Scans: 45 <input checked="" type="checkbox"/> <u>51.5</u> dB 70 <input type="checkbox"/> _____ dB 45T <input checked="" type="checkbox"/> <u>51.5</u> dB 70T <input type="checkbox"/> _____ dB 60 <input checked="" type="checkbox"/> <u>55.5</u> dB 60T <input checked="" type="checkbox"/> <u>55.5</u> dB Other: _____ dB				Pyrometer S/N: <u>MCNDE 27018</u>			
Examiner: Larry Mauldin <i>Larry Mauldin</i>		Level: III						Cal Due: <u>7/28/99</u>			
Procedure: NDE-620		Rev: 5						FC: N/A		Configuration: <u>Safety Noz to Up Head</u>	
Calibration Sheet No: 9902077, 9902078										S2 _____ Flow _____ S1 _____ Nozzle _____ to _____ Head _____ Scan Surface: OD Applies to NDE-680 only Skew Angle: _____ N/A	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA			DO NOT WRITE IN THIS SPACE		
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	45°															
NRI	60°															

 Attachment 1
 Page 2 of 60

Remarks:			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <u>I</u>	Date: <u>3-30-99</u>	Authorized Inspector: <i>[Signature]</i> Date: <u>3-30-99</u>
			Item No: B03.110.004

3/26/99

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

Examination Volume/Area Defined	
Base Metal <input checked="" type="checkbox"/>	Weld <input checked="" type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius <input type="checkbox"/>
Area Calculation	Volume Calculation

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
<p>BASE METAL 44.02 + WELD METAL 81.4 ÷ 2 =</p> <p>AGGREGATE COVERAGE 62.7%</p>							

Item No: 803.110.008

Prepared BY: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Larry S. Biltz</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

11/9/99

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

Examination Volume/Area Defined

Base Metal
 Weld
 Near Surface
 Bolting
 Inner Radius

Area Calculation	Volume Calculation
*SEE ATTACHED SHEETS	$15.8 \text{ sq. in.} \times 47.5 \text{ in.} =$ 750.5 cu. in.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	6.9	47.5	327.75	750.5	
2	45°	2	10.2	47.5	484.5	750.5	
3	45°	1	3.8	47.5	180.50	750.5	
4	60°	2	12.0	47.5	570.0	750.5	
5	60°	1	2.1	47.5	99.75	750.5	
6	45°	CW	6.9	47.5	327.75	750.5	
7	45°	CCW	6.9	47.5	327.75	750.5	
8	60°	CW	6.9	47.5	327.75	750.5	
9	60°	CCW	6.9	47.5	327.75	750.5	
					$2973.5 \div 6754.5 \times 100$		
							44.02 %

Item No: B03. 110. 004

Prepared BY: *Larry Mauldin* Level: *III* Date: *3-29-99*

Reviewed By: *Amy S. Bell* Level: *III* Date: *3-30-99*

4/12/99

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

Examination Volume/Area Defined	
Base Metal <input type="checkbox"/>	Weld <input checked="" type="checkbox"/>
Near Surface <input type="checkbox"/>	Bolting <input type="checkbox"/>
Inner Radius <input type="checkbox"/>	
Area Calculation	Volume Calculation
SEE ATTACHED SHEETS	$46.5 \text{ sq. in.} \times 47.5 \text{ in.} =$ 218.5 cu. in.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	4.5	47.5	213.75	218.5	
2	45°	2	4.3	47.5	204.25	218.5	
3	45°	1	1.6	47.5	76	218.5	
4	60°	2	4.4	47.5	209	218.5	
5	60°	1	.9	47.5	42.75	218.5	
6	45°	CW	4.5	47.5	213.75	218.5	
7	45°	CCW	4.5	47.5	213.75	218.5	
8	60°	CW	4.5	47.5	213.75	218.5	
9	60°	CCW	4.5	47.5	213.75	218.5	
					$1600.75 \div 1966.5 \times 100$		
					81.4%		

Item No: B03. 110. 004

Prepared BY: <i>Randy Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Sue A. Balle</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

G.A. 4/12/99

BASE MAT'L

PZR NOZZLE

AREA of INTEREST

ABCD =

$\frac{3.05}{2} (1.6 + 2.1) = 5.6425$

EFGH =

$\frac{3.05}{2} (1.6 + 2.9) = 6.8625$

HIJ =

$\pi \times 1.3 \times .75 = 3.063$

EIJ =

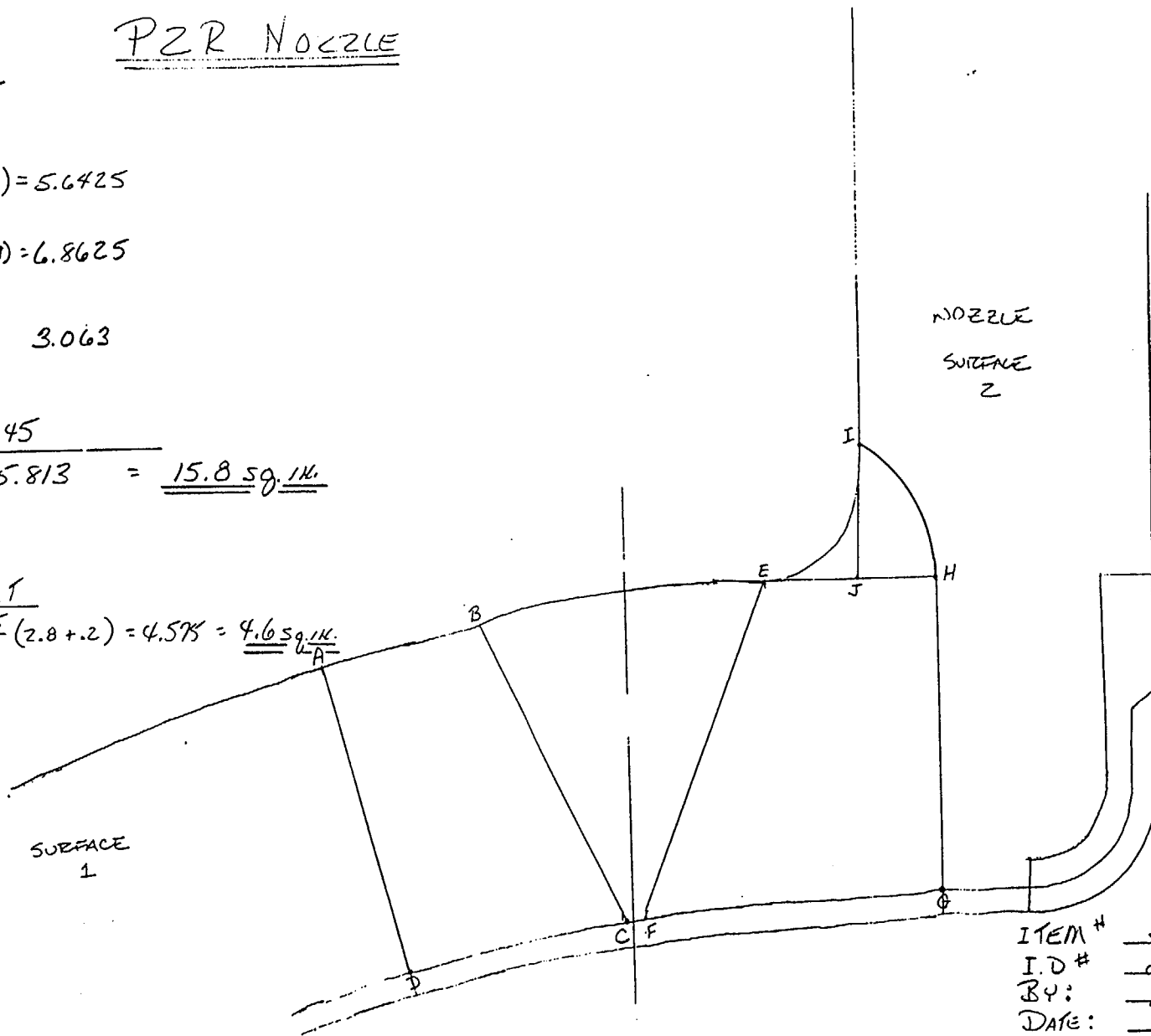
$\frac{.7 \times .7}{2} = .245$

$15.813 = \underline{\underline{15.8 \text{ sq. in.}}}$

WELD MAT'L

AREA of INTEREST

$BCEF = \frac{3.05}{2} (2.8 + .2) = 4.575 = \underline{\underline{4.6 \text{ sq. in.}}}$



ITEM #	303.110.004
ID #	222R.13
BY:	Larry Moulton
DATE:	3/29/99

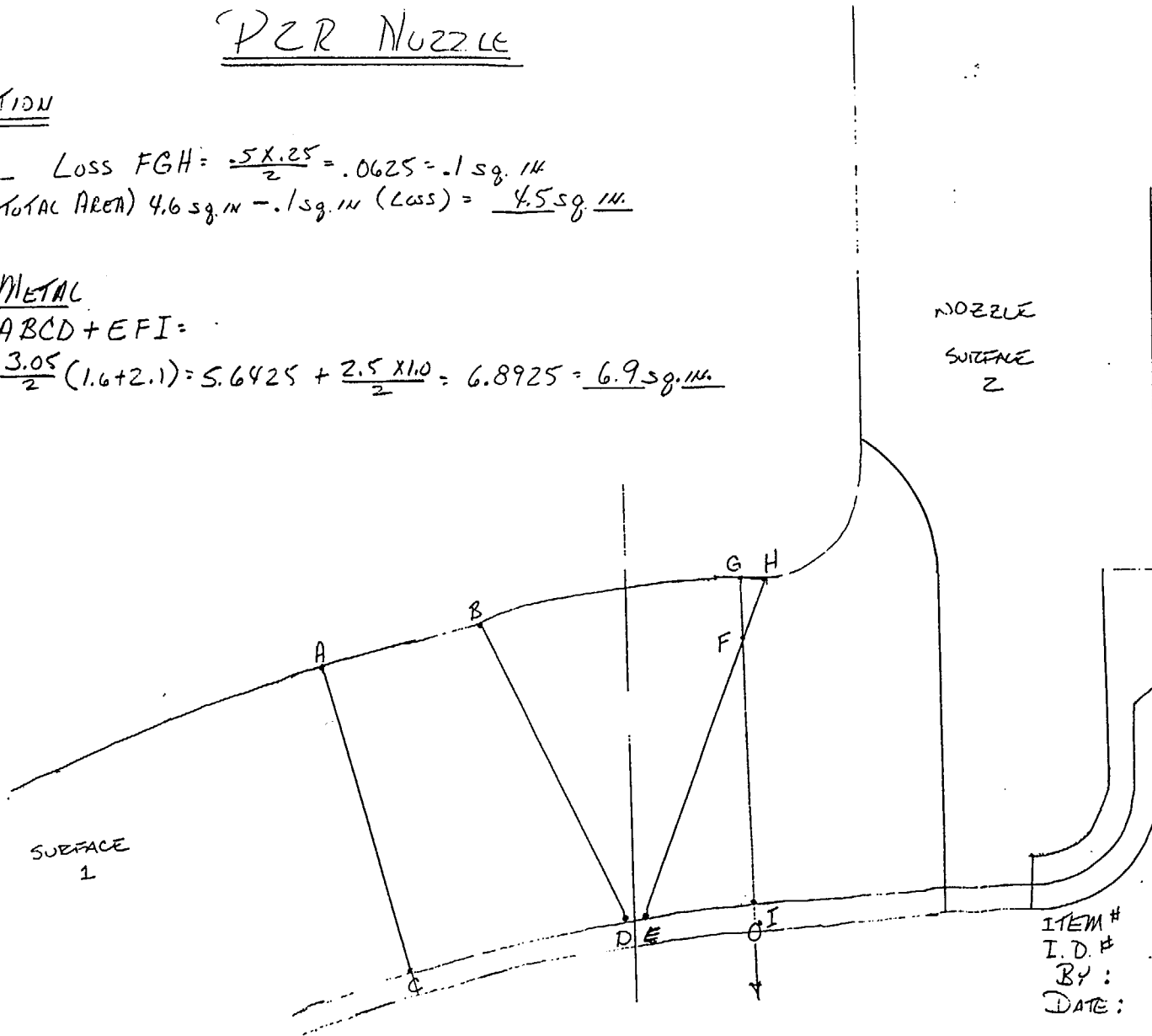
PZR Nozzle

AREAS of INSPECTION

0° WELD Loss FGH = $\frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$
 (TOTAL AREA) $4.6 \text{ sq. in.} - .1 \text{ sq. in. (Loss)} = \underline{4.5 \text{ sq. in.}}$

0° BASE METAL

ABCD + EFI =
 $\frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$



ITEM #	<u>303.110.004</u>
I.D. #	<u>2 PZR-13</u>
BY:	<u>Lane Mauldin</u>
DATE:	<u>03.29.99</u>

Y2R NOZZLE

AREAS OF INSPECTION

S2 TO S1

45° WELD

$$BDH = \frac{2.3 \times 1.4}{2} = 1.61 = \underline{1.6 \text{ sq. in.}}$$

60° WELD

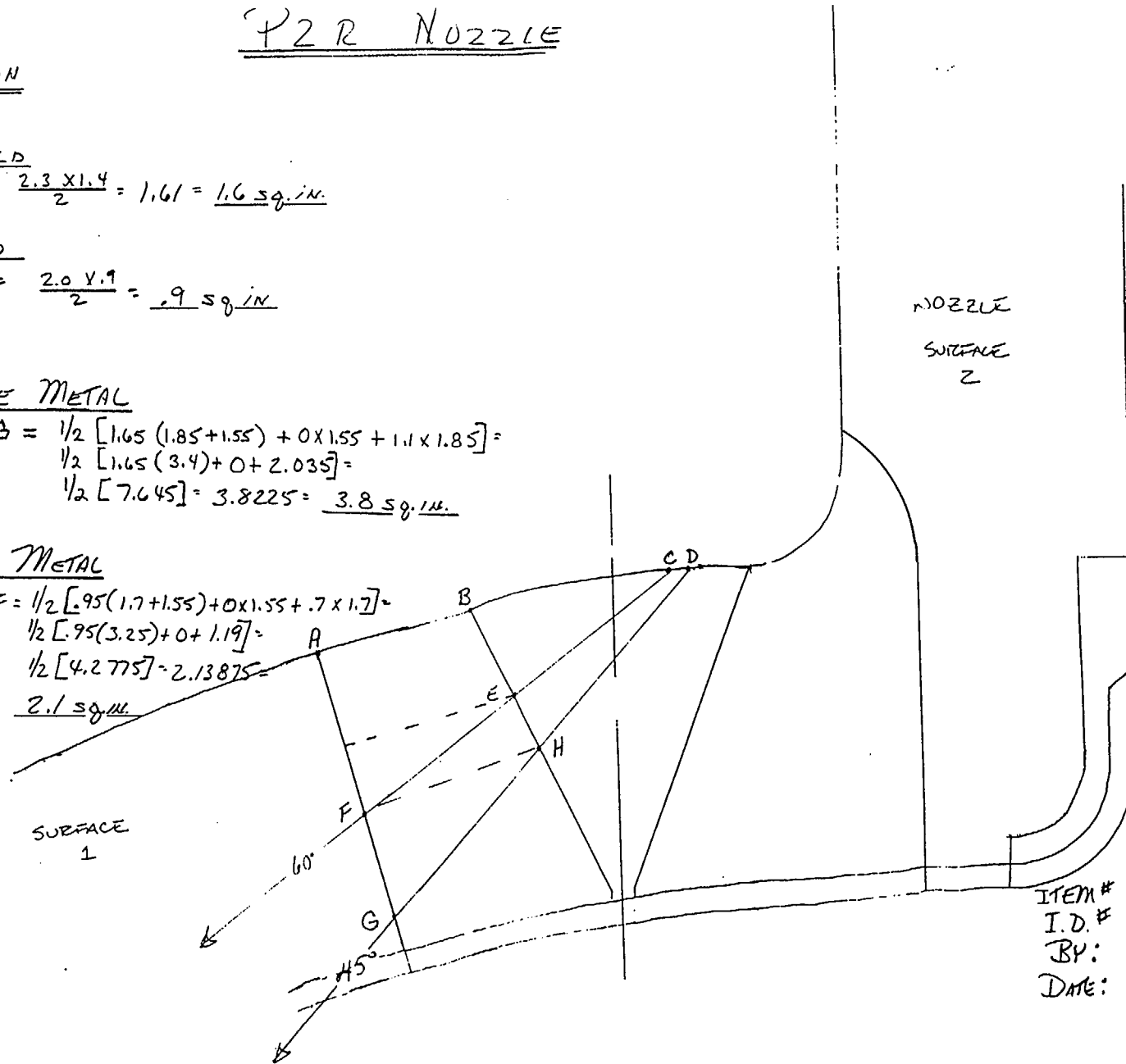
$$BCE = \frac{2.0 \times 1.1}{2} = \underline{.9 \text{ sq. in.}}$$

45° BASE METAL

$$\begin{aligned} ABHG &= \frac{1}{2} [1.65(1.85+1.55) + 0 \times 1.55 + 1.1 \times 1.85] = \\ &= \frac{1}{2} [1.65(3.4) + 0 + 2.035] = \\ &= \frac{1}{2} [7.645] = 3.8225 = \underline{3.8 \text{ sq. in.}} \end{aligned}$$

60° BASE METAL

$$\begin{aligned} AB EF &= \frac{1}{2} [.95(1.7+1.55) + 0 \times 1.55 + .7 \times 1.7] = \\ &= \frac{1}{2} [.95(3.25) + 0 + 1.19] = \\ &= \frac{1}{2} [4.2775] = 2.13875 = \\ &= \underline{2.1 \text{ sq. in.}} \end{aligned}$$



PZR NOZZLE

AREAS of INSPECTION

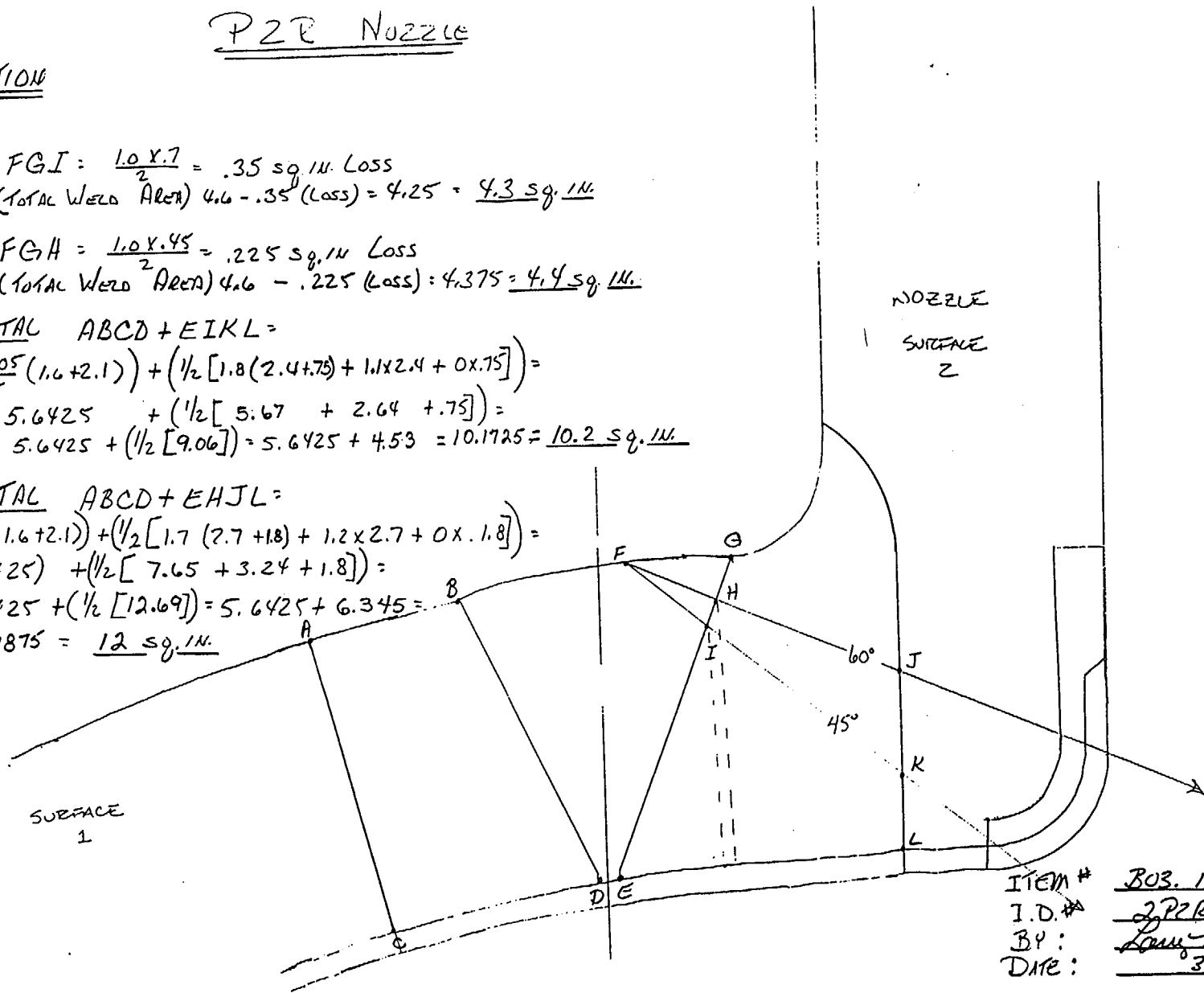
S1 TO S2

45° WELD = FGI = $\frac{1.0 \times 7}{2} = .35 \text{ sq. in. Loss}$
 (TOTAL WELD AREA) $4.6 - .35 \text{ (Loss)} = 4.25 = \underline{4.3 \text{ sq. in.}}$

60° WELD = FGH = $\frac{1.0 \times 4.5}{2} = .225 \text{ sq. in. Loss}$
 (TOTAL WELD AREA) $4.6 - .225 \text{ (Loss)} = 4.375 = \underline{4.4 \text{ sq. in.}}$

45° BASE METAL ABCD + EIKL =
 $\left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.8(2.4 + 7.5) + 1.1 \times 2.4 + 0 \times 7.5] \right) =$
 $5.6425 + \left(\frac{1}{2} [5.67 + 2.64 + 7.5] \right) =$
 $5.6425 + \left(\frac{1}{2} [9.06] \right) = 5.6425 + 4.53 = 10.1725 = \underline{10.2 \text{ sq. in.}}$

60° BASE METAL ABCD + EHJL =
 $\left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.7(2.7 + 1.8) + 1.2 \times 2.7 + 0 \times 1.8] \right) =$
 $(5.6425) + \left(\frac{1}{2} [7.65 + 3.24 + 1.8] \right) =$
 $5.6425 + \left(\frac{1}{2} [12.69] \right) = 5.6425 + 6.345 =$
 $11.9875 = \underline{12 \text{ sq. in.}}$



ITEM #	BOB. 110.004
I.D. #	2PZR-13
BY:	Lou Thauler
DATE:	3-29-99

FLK NOZZLE

AREAS OF INSPECTION

CW & CCW

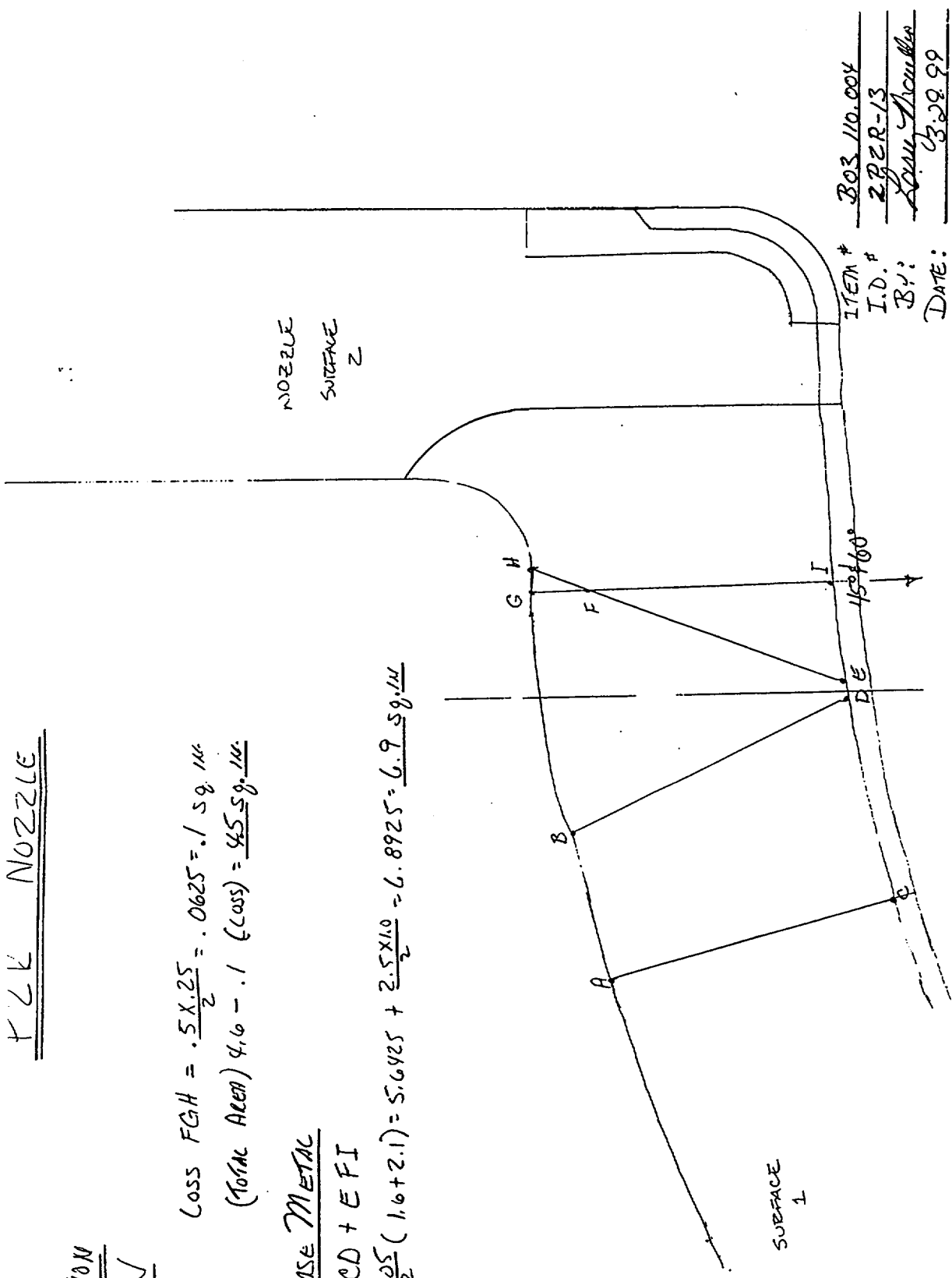
45° & 60° WELD

LOSS FGH = $\frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$
 (TOTAL AREA) $4.6 - .1$ (LOSS) = 4.5 sq. in.

45° & 60° BASE METAL

ABCD + EFI

$\frac{3.25}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$



ITEM # BO3 110.004
 I.D. # 29ER-13
 BY: Dan Abouk
 DATE: 3.29.99

DUKE POWER COMPANY								Exam Start: 1257	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS								Exam Finish: 1301	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-14						Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3		Surface Temperature: <u>72</u> ° ° <u>F</u>			
Examiner: Larry Mauldin <i>Larry Mauldin</i>	Level: III		Scans:						Pyrometer S/N: <u>MCNDE 27018</u>
Examiner: David Zimmerman <i>David Zimmerman</i>	Level: II		45 <input type="checkbox"/> _____ dB		70 <input type="checkbox"/> _____ dB		Cal Due: <u>7/28/99</u>		
Procedure: NDE-640	Rev: <u>1</u>	FC: *	45T <input type="checkbox"/> _____ dB		70T <input type="checkbox"/> _____ dB		Configuration: <u>Safety Noz to Up Head</u>		
Calibration Sheet No: 9902075			60 <input type="checkbox"/> _____ dB				<u>S2</u> Flow <u>S1</u>		
			60T <input type="checkbox"/> _____ dB				<u>Nozzle</u> to <u>Up Head</u>		
			Other: <u>0° @ 16</u> dB				Scan Surface: <u>OD</u>		
							Applies to NDE-680 only		
							Skew Angle: <u>N/A</u>		

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	WRITE SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI		0°														

Remarks: * 95-18, 95-19			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <u>II</u>	Date: <u>3-30-99</u>	Authorized Inspector: <i>[Signature]</i> Date: <u>3-30-99</u>
			Item No: B03.110.005

Attachment 1
 Page 11 of 60
 R
 3/31/99

DUKE POWER COMPANY						Exam Start: 1141	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1252	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-14				Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3	Surface Temperature: <u>72</u> ° F		
Examiner: David Zimmerman <i>David Zimmerman</i>	Level: II		Scans:			Pyrometer S/N: <u>MCNDE 27018</u>	
Examiner: Larry Mauldin <i>Larry Mauldin</i>	Level: III		45 <input checked="" type="checkbox"/> <u>51.5</u> dB 70 <input type="checkbox"/> _____ dB			Cal Due: <u>7/28/99</u>	
Procedure: NDE-620	Rev: 5	FC: N/A	45T <input checked="" type="checkbox"/> <u>51.5</u> dB 70T <input type="checkbox"/> _____ dB			Configuration: <u>Safety Noz to Up Head</u>	
Calibration Sheet No: 9902077, 9902078			60 <input checked="" type="checkbox"/> <u>55.5</u> dB			S2 _____ Flow _____ S1 _____	
			60T <input checked="" type="checkbox"/> <u>55.5</u> dB			Nozzle _____ to _____ Head _____	
			Other: _____ dB			Scan Surface: <u>OD</u>	
						Applies to NDE-680 only	
						Skew Angle: N/A	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA					
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	45°															
NRI	60°															

Remarks:			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Rob Sheffield</i>	Level: <u>II</u>	Date: <u>3-30-99</u>	Authorized Inspector: <i>Pat Stein</i> Date: <u>3-30-99</u>
		Item No: B03.110.005	

Attachment 1
Page 12 of 60
BR 4/12/99

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

Examination Volume/Area Defined	
Base Metal <input checked="" type="checkbox"/>	Weld <input checked="" type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius <input type="checkbox"/>
Area Calculation	Volume Calculation

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
<p>BASE METAL 44.02 + WELD METAL 81.4 ÷ 2 =</p> <p>AGGREGATE COVERAGE 62.7 %</p>							

Item No: B03.110.005

Prepared BY: *Larry Mauldin* Level: *II* Date: *3-29-99*

Reviewed By: *Larry S. Bell* Level: *III* Date: *3-30-99*

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

Examination Volume/Area Defined	
Base Metal <input checked="" type="checkbox"/>	Weld <input type="checkbox"/>
Near Surface <input type="checkbox"/>	Bolting <input type="checkbox"/>
Inner Radius <input type="checkbox"/>	
Area Calculation	Volume Calculation
*SEE ATTACHED SHEETS	$15.8 \text{ sq. in.} \times 47.5 \text{ in.} =$ 750.5 cu. in.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	6.9	47.5	327.75	750.5	
2	45°	2	10.2	47.5	484.5	750.5	
3	45°	1	3.8	47.5	180.50	750.5	
4	60°	2	12.0	47.5	570.0	750.5	
5	60°	1	2.1	47.5	99.75	750.5	
6	45°	CW	6.9	47.5	327.75	750.5	
7	45°	CCW	6.9	47.5	327.75	750.5	
8	60°	CW	6.9	47.5	327.75	750.5	
9	60°	CCW	6.9	47.5	327.75	750.5	
$2973.5 \div 6754.5 \times 100$						44.02%	

Item No: 803.110.005

Prepared BY: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Aug. L. Bell</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

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

Examination Volume/Area Defined	
Base Metal <input type="checkbox"/>	Weld <input checked="" type="checkbox"/>
Near Surface <input type="checkbox"/>	Bolting <input type="checkbox"/>
	Inner Radius <input type="checkbox"/>
Area Calculation	Volume Calculation
SEE ATTACHED SHEETS	$4.6 \text{ sq. in.} \times 47.5 \text{ in.} =$ 218.5 cu. in.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	4.5	47.5	213.75	218.5	
2	45°	2	4.3	47.5	204.25	218.5	
3	45°	1	1.6	47.5	76	218.5	
4	60°	2	4.4	47.5	209	218.5	
5	60°	1	.9	47.5	42.75	218.5	
6	45°	CW	4.5	47.5	213.75	218.5	
7	45°	CCW	4.5	47.5	213.75	218.5	
8	60°	CW	4.5	47.5	213.75	218.5	
9	60°	CCW	4.5	47.5	213.75	218.5	
					$1600.75 \div 1966.5 \times 100$ 81.4%		

Item No: B03.110.005

Prepared BY: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Aug L. Bell</i>	Level: <i>IV</i>	Date: <i>3-30-99</i>

BASE MAT'L

PZR NOZZLE

AREA of INTEREST

ABCD =

$\frac{3.05}{2} (1.6 + 2.1) = 5.6425$

EFGH =

$\frac{3.05}{2} (1.6 + 2.9) = 6.8625$

HIJ =

$\pi \times 1.3 \times .75 = 3.063$

EIJ =

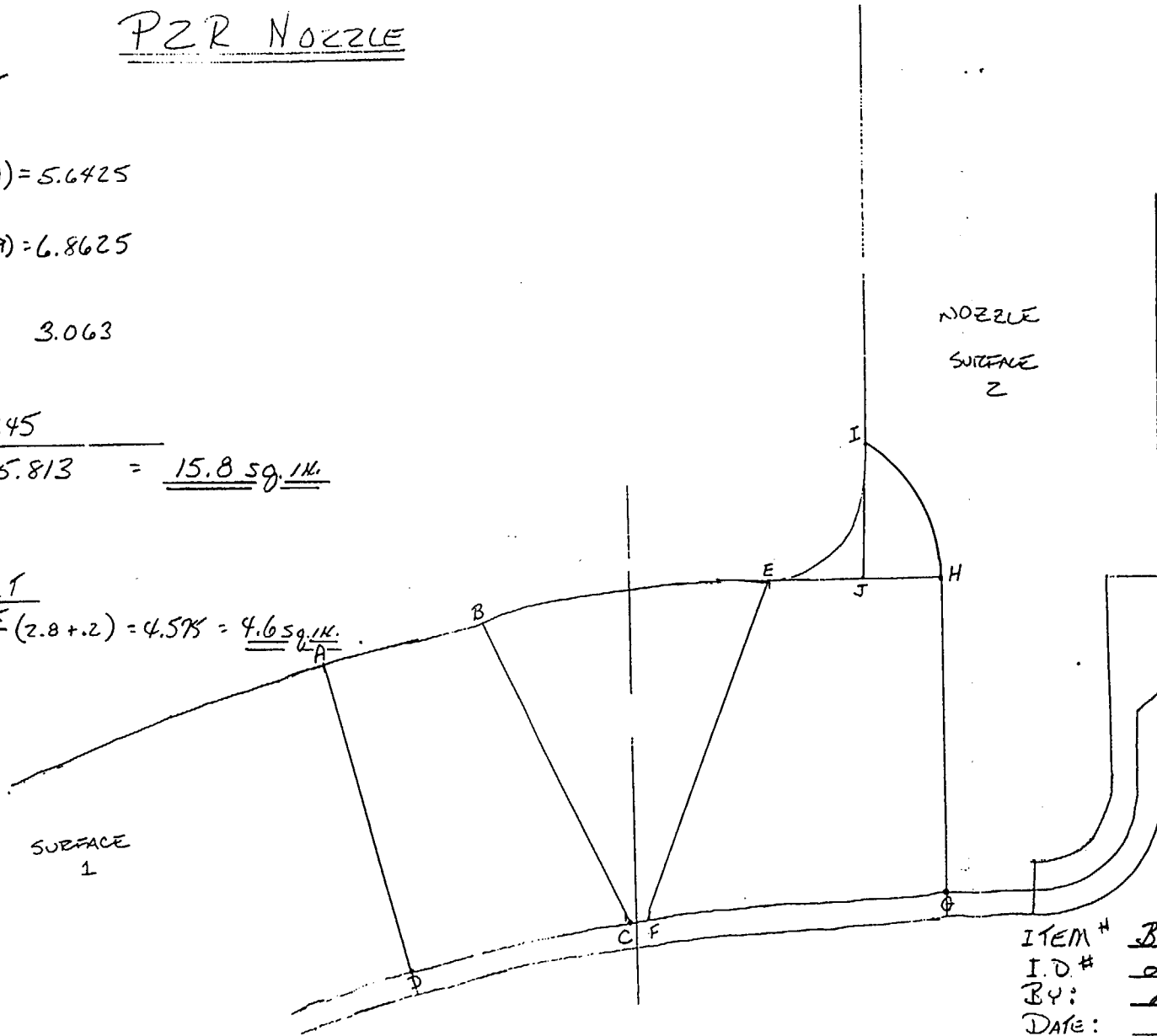
$\frac{.7 \times .7}{2} = .245$

$15.813 = \underline{\underline{15.8 \text{ sq. in.}}}$

WELD MAT'L

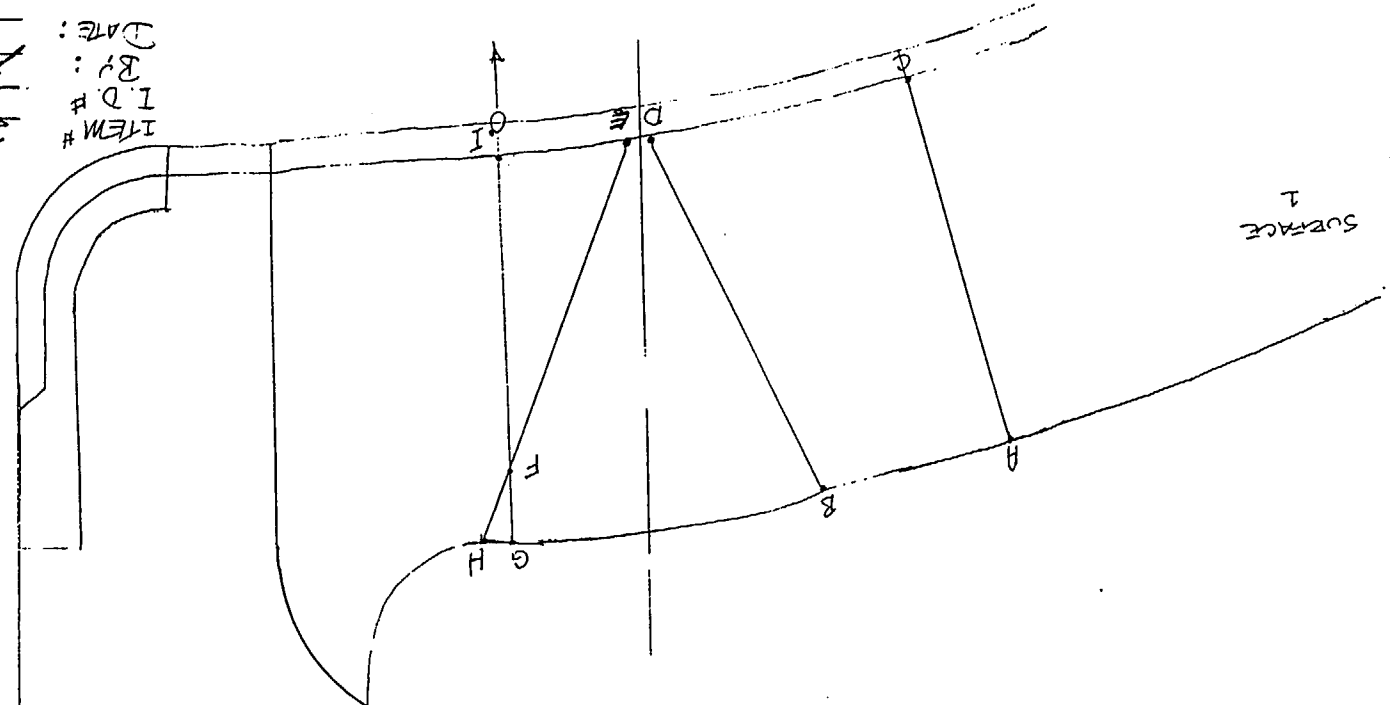
AREA of INTEREST

$BCEF = \frac{3.05}{2} (2.8 + .2) = 4.575 = \underline{\underline{4.6 \text{ sq. in.}}}$



ITEM #	<u>BO3.110.005</u>
I.D.#	<u>2 PZR-14</u>
BY:	<u>Lynn Douglas</u>
DATE:	<u>3.29.99</u>

ITEM # 803.110.005
I.D.# 222R-14
BY: ~~James D. Smith~~
DATE: 3/29/99



NOZZLE
SURFACE 2

$$\frac{D^{\circ} \text{ BASE METAL}}{ABCD + EFI} = \frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = 6.95 \text{ g./in.}$$

$$\frac{D^{\circ} \text{ WELD}}{\text{Loss FGH}} = \frac{.5 \times .25}{2} = .0625 = .15 \text{ g./in.}$$

$$\text{(Total Area) } 4.65 \text{ g./in.} - .15 \text{ g./in. (Loss)} = 4.55 \text{ g./in.}$$

PCR Nozzle

Areas of Inspection

P2E Nozzle

AREAS of INSPECTION

S1 TO S2

$$\begin{aligned} \underline{45^\circ \text{ WELD}} &= FGI = \frac{1.0 \times .7}{2} = .35 \text{ sq. in. Loss} \\ (\text{TOTAL WELD AREA}) & 4.6 - .35 (\text{Loss}) = 4.25 = \underline{4.3 \text{ sq. in.}} \end{aligned}$$

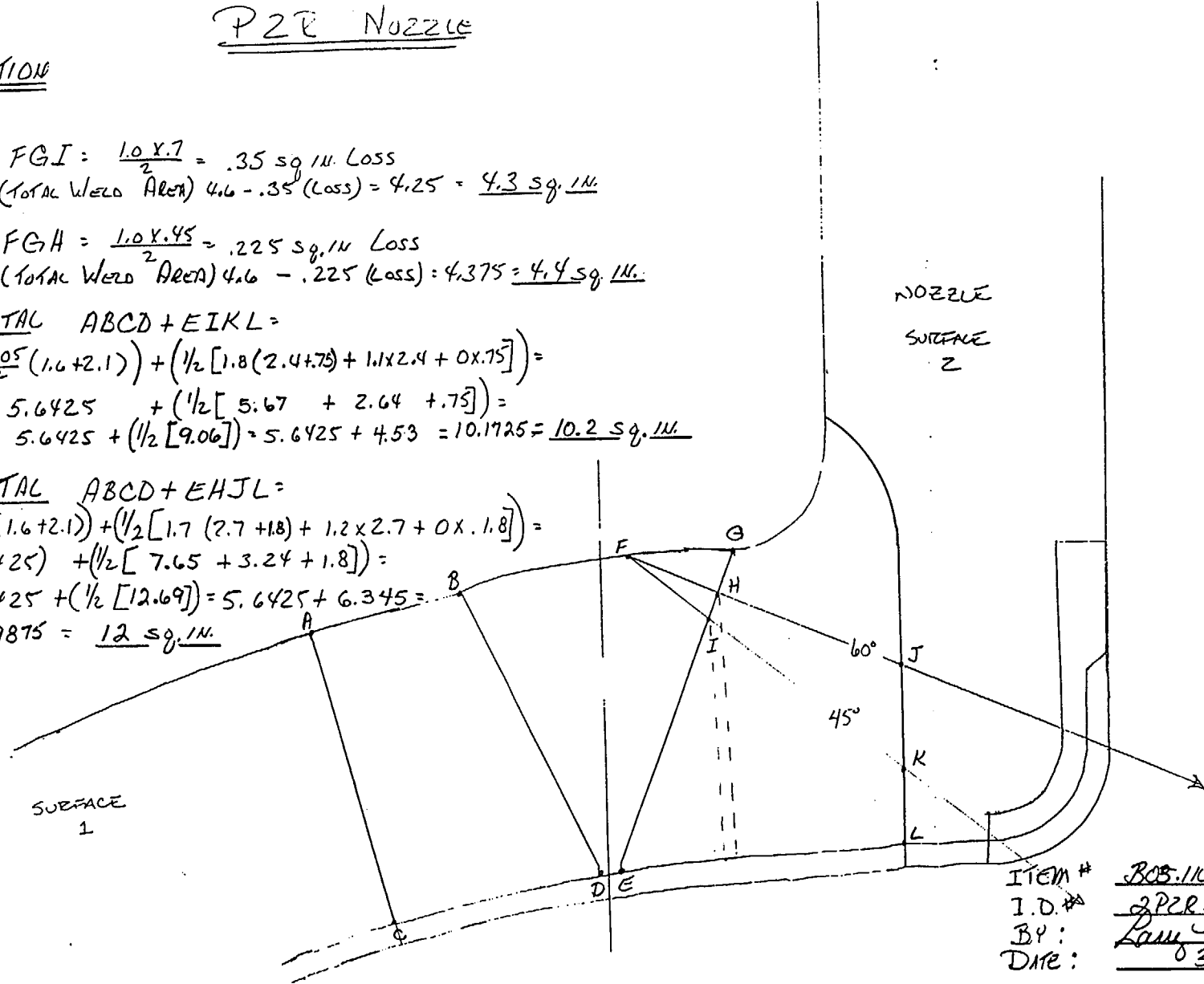
$$\begin{aligned} \underline{60^\circ \text{ WELD}} &= FGH = \frac{1.0 \times .45}{2} = .225 \text{ sq. in. Loss} \\ (\text{TOTAL WELD AREA}) & 4.6 - .225 (\text{Loss}) = 4.375 = \underline{4.4 \text{ sq. in.}} \end{aligned}$$

45° BASE METAL ABCD + EIKL =

$$\begin{aligned} & \left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.8(2.4 + .75) + 1.1 \times 2.4 + 0 \times .75] \right) = \\ & 5.6425 + \left(\frac{1}{2} [5.67 + 2.64 + .75] \right) = \\ & 5.6425 + \left(\frac{1}{2} [9.06] \right) = 5.6425 + 4.53 = 10.1725 = \underline{10.2 \text{ sq. in.}} \end{aligned}$$

60° BASE METAL ABCD + EHJL =

$$\begin{aligned} & \left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.7(2.7 + 1.8) + 1.2 \times 2.7 + 0 \times 1.8] \right) = \\ & (5.6425) + \left(\frac{1}{2} [7.65 + 3.24 + 1.8] \right) = \\ & 5.6425 + \left(\frac{1}{2} [12.69] \right) = 5.6425 + 6.345 = \\ & 11.9875 = \underline{12 \text{ sq. in.}} \end{aligned}$$



ITEM # BOB.110.005
I.D. # 2PER.14
BY: Lam Maulder
DATE: 03.29.99

Y2R NOZZLE

AREAS OF INSPECTION

S2 TO S1

45° WELD

$$BDH = \frac{2.3 \times 1.4}{2} = 1.61 = \underline{1.6 \text{ sq. in.}}$$

60° WELD

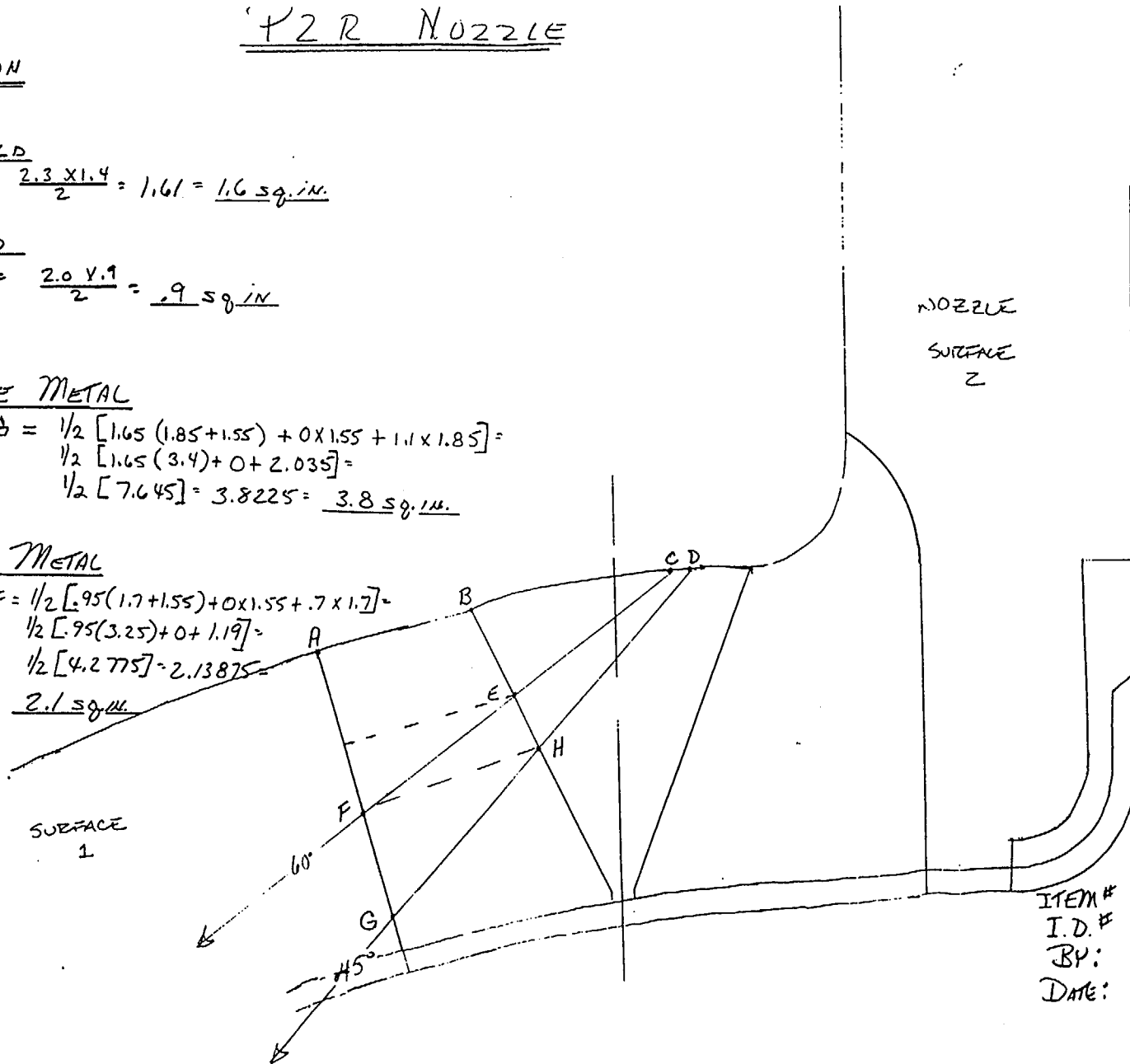
$$BCE = \frac{2.0 \times 1.9}{2} = \underline{.9 \text{ sq. in.}}$$

45° BASE METAL

$$ABHG = \frac{1}{2} [1.65(1.85 + 1.55) + 0 \times 1.55 + 1.11 \times 1.85] =$$
$$\frac{1}{2} [1.65(3.4) + 0 + 2.035] =$$
$$\frac{1}{2} [7.645] = 3.8225 = \underline{3.8 \text{ sq. in.}}$$

60° BASE METAL

$$ABEF = \frac{1}{2} [.95(1.7 + 1.55) + 0 \times 1.55 + .7 \times 1.7] =$$
$$\frac{1}{2} [.95(3.25) + 0 + 1.19] =$$
$$\frac{1}{2} [4.2775] = 2.13875 =$$
$$\underline{2.1 \text{ sq. in.}}$$



ITEM# B03.110.005
I.D.# 222R-14
BY: Lynn Mauldin
DATE: 03.29.99

Y2R NOZZLE

AREAS OF INSPECTION

CW & CCW

45° & 60° WELD

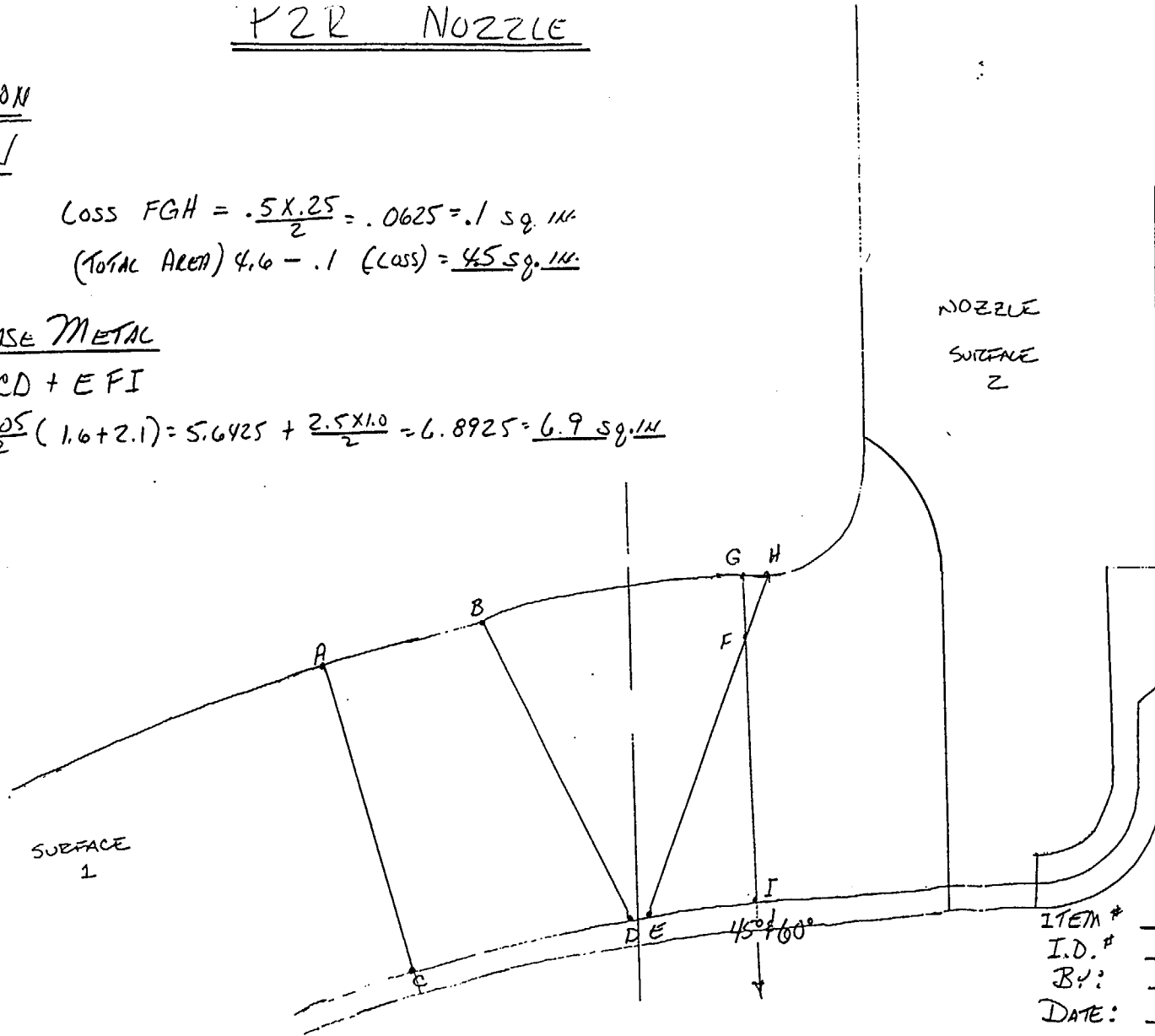
$$\text{Loss } FGH = \frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$$

$$\text{(TOTAL AREA) } 4.6 - .1 \text{ (LOSS)} = \underline{4.5 \text{ sq. in.}}$$

45° & 60° BASE METAL

ABCD + EFI

$$\frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$$



ITEM #	B03.110.005
I.D. #	2P2R-14
BY:	Lynn Naubler
DATE:	03.29.99

DUKE POWER COMPANY						Exam Start: 1133	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1138	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-15				Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3	Surface Temperature: <u>72</u> ° F		
Examiner: Gayle E. Houser <i>Gayle Houser</i>	Level: II	Scans:			Pyrometer S/N: <u>MCNDE 27018</u>		
Examiner: Winfred C. Leeper <i>Winfred C. Leeper</i>	Level: II	45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Cal Due: <u>7/28/99</u>			
Procedure: NDE-640	Rev: 1	45T <input type="checkbox"/> _____ dB	70T <input type="checkbox"/> _____ dB	Configuration: <u>Safety Noz to Up Head</u>			
Calibration Sheet No: 9902074	FC: *	60 <input type="checkbox"/> _____ dB	S2 _____ Flow _____ S1 _____				
		60T <input type="checkbox"/> _____ dB	<u>Nozzle to Up Head</u>				
		Other: <u>0° @ 16</u> dB	Scan Surface: OD				
			Applies to NDE-680 only				
			Skew Angle: N/A				

IND #	<i>4</i>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE			
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	0°															

Remarks: * 95-18, 95-19			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Paul Sheffield</i>	Level: <i>II</i>	Date: <i>3-30-99</i>	Authorized Inspector: <i>Stein</i> Date: <i>3-30-99</i>
			Item No: B03.110.006

Attachment 1
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R
3/26/99

DUKE POWER COMPANY					Exam Start: 1143	Form NDE-UT-2A	
					ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS		
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-15				Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3	Surface Temperature: <u>72</u> ° F		
Examiner: Gayle E. Houser <i>Gayle Houser</i>	Level: II		Scans:			Pyrometer S/N: <u>MCNDE 27018</u>	
Examiner: Winfred C. Leeper <i>Winfred C. Leeper</i>	Level: II		45 <input checked="" type="checkbox"/> <u>51.5</u> dB 70 <input type="checkbox"/> _____ dB			Cal Due: <u>7/28/99</u>	
Procedure: NDE-620	Rev: 5	FC: N/A	45T <input checked="" type="checkbox"/> <u>51.5</u> dB 70T <input type="checkbox"/> _____ dB			Configuration: <u>Safety Noz to Up Head</u>	
Calibration Sheet No: 9902076, 9902079			60 <input checked="" type="checkbox"/> <u>55.5</u> dB			<u>S2</u> Flow <u>S1</u>	
			60T <input checked="" type="checkbox"/> <u>55.5</u> dB			<u>Nozzle</u> to <u>Head</u>	
			Other: _____ dB			Scan Surface: <u>OD</u>	
						Applies to NDE-680 only	
						Skew Angle: N/A	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE		
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac				
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac				
1	45°	20	2.9	1.5	23.5	N/A	N/A	N/A	N/A	N/A	N/A	1	2	AX	No
NRI	60°														

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Remarks:				
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>				Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <i>II</i>	Date: <i>3-30-99</i>	Authorized Inspector: <i>Atkins</i>	Date: <i>3-30-99</i>
				Item No: B03.110.006

8/26/99

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

Examination Volume/Area Defined

Base Metal
 Weld
 Near Surface
 Bolting
 Inner Radius

Area Calculation	Volume Calculation

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
<p>BASE METAL 44.02 + WELD METAL 81.4 ÷ 2 =</p> <p>AGGREGATE COVERAGE 62.7 %</p>							

Item No: B03.110.006

Prepared BY: <i>Larry Moulden</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Suz S. Bibb</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

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

Examination Volume/Area Defined	
Base Metal <input checked="" type="checkbox"/>	Weld <input type="checkbox"/>
Near Surface <input type="checkbox"/>	Bolting <input type="checkbox"/>
Inner Radius <input type="checkbox"/>	
Area Calculation	Volume Calculation
*SEE ATTACHED SHEETS	$15.8 \text{ sq. in.} \times 47.5 \text{ in.} =$ 750.5 cu. in.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	6.9	47.5	327.75	750.5	
2	45°	2	10.2	47.5	484.5	750.5	
3	45°	1	3.8	47.5	180.50	750.5	
4	60°	2	12.0	47.5	570.0	750.5	
5	60°	1	2.1	47.5	99.75	750.5	
6	45°	CW	6.9	47.5	327.75	750.5	
7	45°	CCW	6.9	47.5	327.75	750.5	
8	60°	CW	6.9	47.5	327.75	750.5	
9	60°	CCW	6.9	47.5	327.75	750.5	
					$2973.5 \div 6754.5 \times 100$		
							44.02 %

Item No: B03.110.006

Prepared BY: <i>Larry Mauldin</i>	Level: <i>HF</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Aug. A. Bell</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

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

Examination Volume/Area Defined	
Base Metal <input type="checkbox"/>	Weld <input checked="" type="checkbox"/>
Near Surface <input type="checkbox"/>	Bolting <input type="checkbox"/>
Inner Radius <input type="checkbox"/>	
Area Calculation	Volume Calculation
SEE ATTACHED SHEETS	$4.6 \text{ sq. in.} \times 47.5 \text{ in.} =$ 218.5 cu. in.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	4.5	47.5	213.75	218.5	
2	45°	2	4.3	47.5	204.25	218.5	
3	45°	1	1.6	47.5	76	218.5	
4	60°	2	4.4	47.5	209	218.5	
5	60°	1	.9	47.5	42.75	218.5	
6	45°	CW	4.5	47.5	213.75	218.5	
7	45°	CCW	4.5	47.5	213.75	218.5	
8	60°	CW	4.5	47.5	213.75	218.5	
9	60°	CCW	4.5	47.5	213.75	218.5	
					$1600.75 \div 1966.5 \times 100$ 81.4%		

Item No: B03.110.006

Prepared BY: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Shy S. Bell</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

BASE MAT'LAREA of INTEREST

ABCD =

$$\frac{3.05}{2}(1.6 + 2.1) = 5.6425$$

EFCH =

$$\frac{3.05}{2}(1.6 + 2.9) = 6.8625$$

HIJ =

$$\pi \times 1.3 \times .75 = 3.063$$

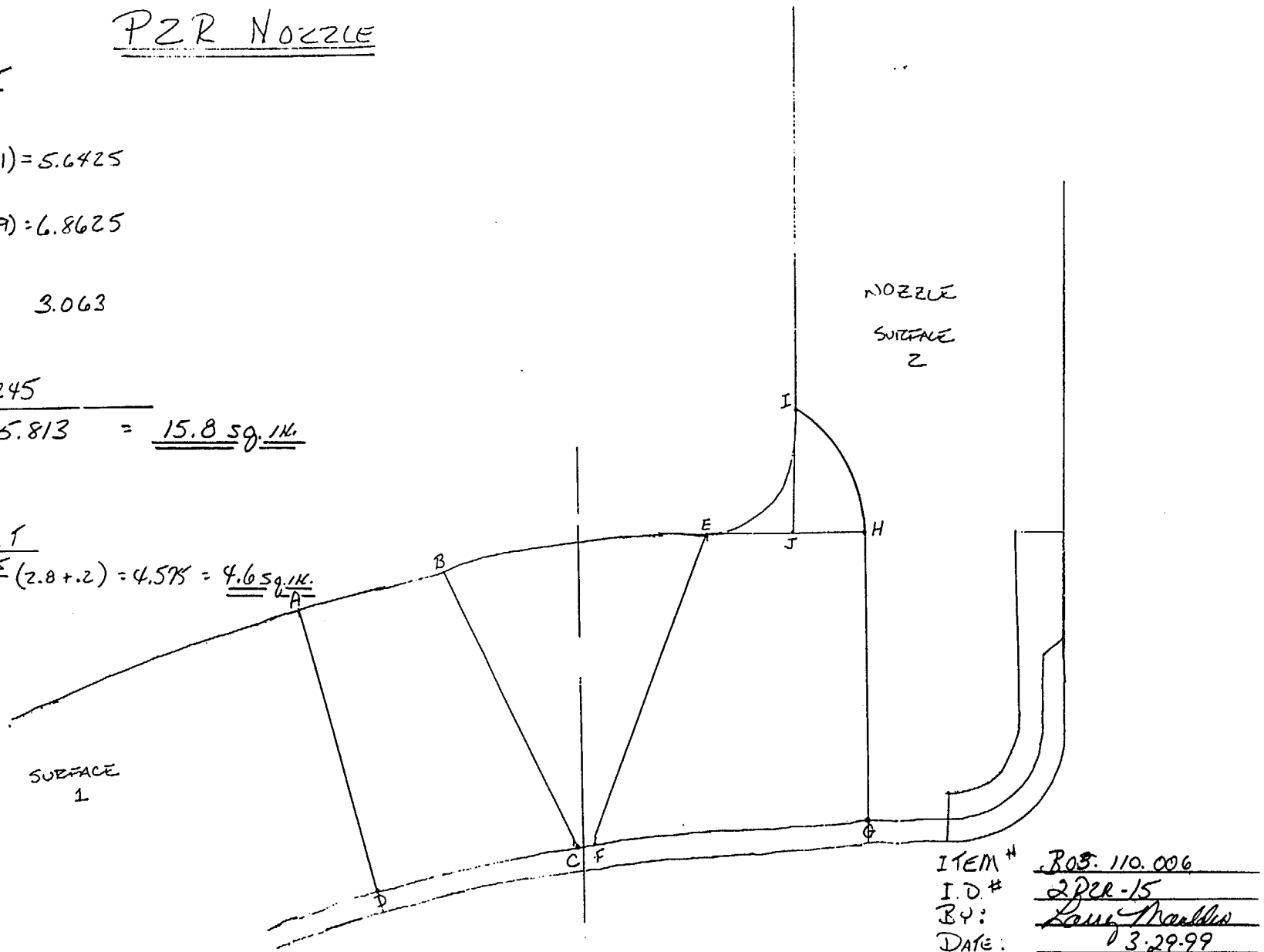
EIJ =

$$\frac{.7 \times .7}{2} = .245$$

$$\frac{15.813}{15.813} = \underline{\underline{15.8 \text{ sq. in.}}}$$

WELD MAT'LAREA of INTEREST

$$BCEF = \frac{3.05}{2}(2.8 + .2) = 4.575 = \underline{\underline{4.6 \text{ sq. in.}}}$$



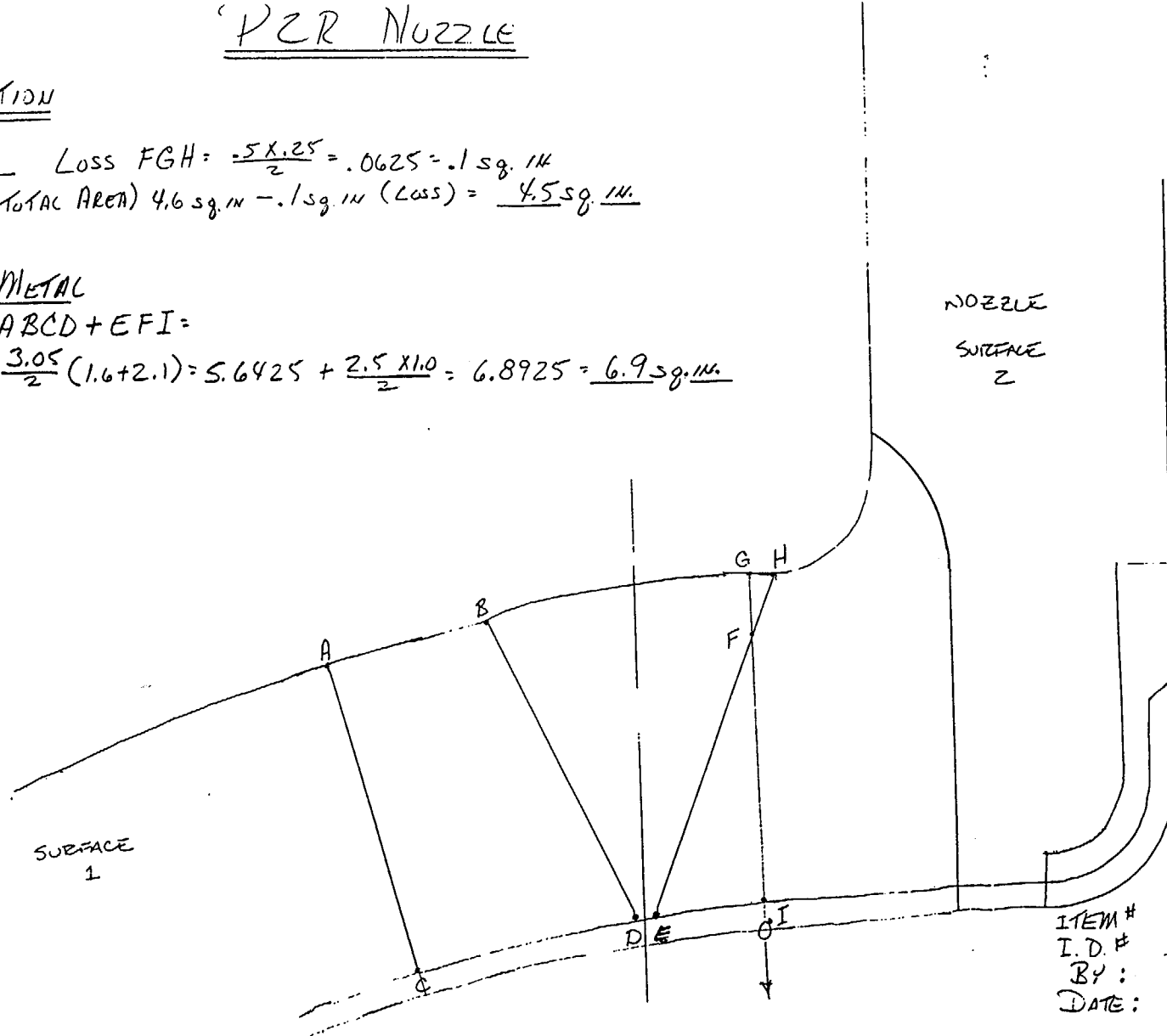
PCR NOZZLE

AREAS of INSPECTION

0° WELD Loss FGH = $\frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$
(TOTAL AREA) $4.6 \text{ sq. in.} - .1 \text{ sq. in. (LOSS)} = \underline{4.5 \text{ sq. in.}}$

0° BASE METAL

ABCD + EFI =
 $\frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$



ITEM # B03.110.006
I.D.# 22PR-15
BY: Tom Mueller
DATE: 03.29.99

P2R Nozzle

AREAS of INSPECTION

S1 TO S2

$$\begin{aligned} \underline{45^\circ \text{ WELD}} &= FGI = \frac{1.0 \times 7}{2} = .35 \text{ sq. in. Loss} \\ &(\text{TOTAL WELD AREA}) 4.6 - .35 (\text{Loss}) = 4.25 = \underline{4.3 \text{ sq. in.}} \end{aligned}$$

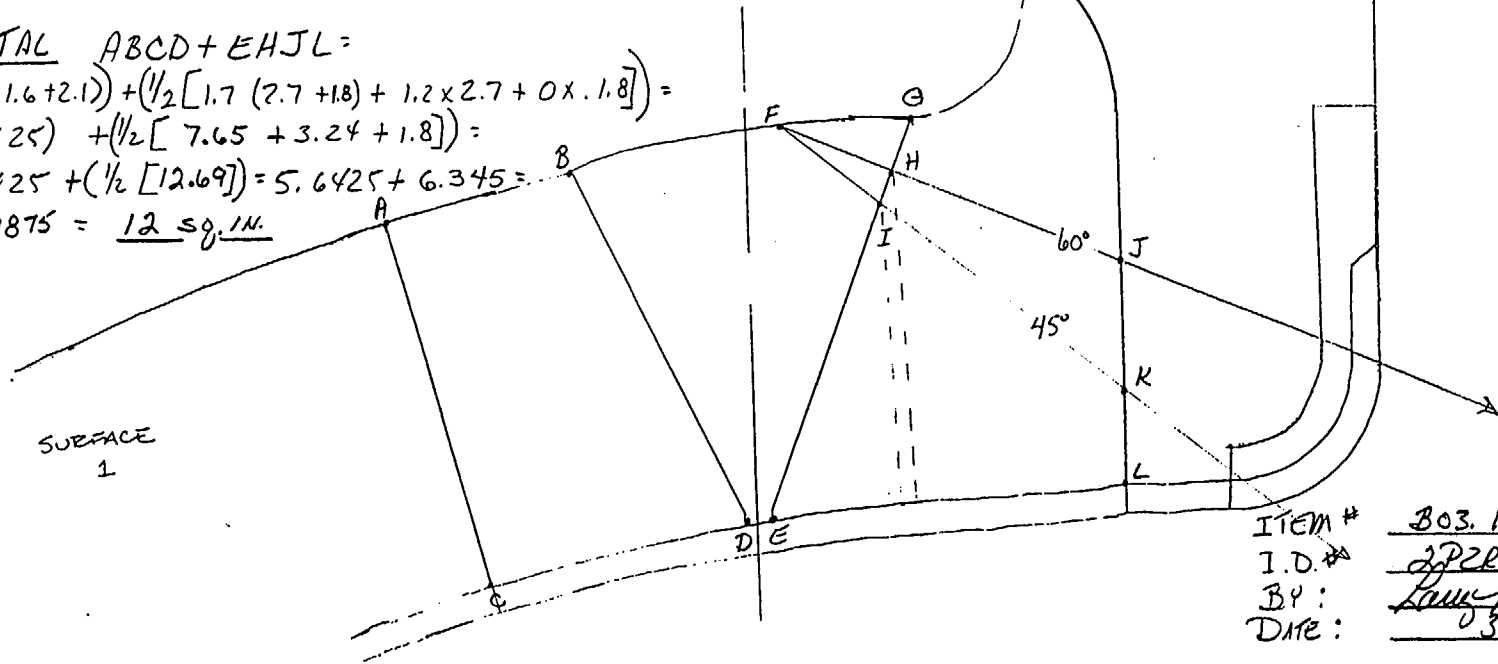
$$\begin{aligned} \underline{60^\circ \text{ WELD}} &= FGH = \frac{1.0 \times 4.5}{2} = .225 \text{ sq. in. Loss} \\ &(\text{TOTAL WELD AREA}) 4.6 - .225 (\text{Loss}) = 4.375 = \underline{4.4 \text{ sq. in.}} \end{aligned}$$

45° BASE METAL ABCD + EIKL =

$$\begin{aligned} &\left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.8 (2.4 + 7.5) + 1.1 \times 2.4 + 0 \times 7.5] \right) = \\ &5.6425 + \left(\frac{1}{2} [5.67 + 2.64 + 7.5] \right) = \\ &5.6425 + \left(\frac{1}{2} [9.06] \right) = 5.6425 + 4.53 = 10.1725 = \underline{10.2 \text{ sq. in.}} \end{aligned}$$

60° BASE METAL ABCD + EHJL =

$$\begin{aligned} &\left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.7 (2.7 + 1.8) + 1.2 \times 2.7 + 0 \times 1.8] \right) = \\ &(5.6425) + \left(\frac{1}{2} [7.65 + 3.24 + 1.8] \right) = \\ &5.6425 + \left(\frac{1}{2} [12.69] \right) = 5.6425 + 6.345 = \\ &11.9875 = \underline{12 \text{ sq. in.}} \end{aligned}$$



ITEM #	303.110.006
I.D. #	2P2R-15
BY:	Lawrence
DATE:	03-29-99

Attachment 1
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P2R NOZZLE

AREAS of INSPECTION

S₂ TO S₁

45° WELD

$$BDH = \frac{2.3 \times 1.4}{2} = 1.61 = \underline{1.6 \text{ sq. in.}}$$

60° WELD

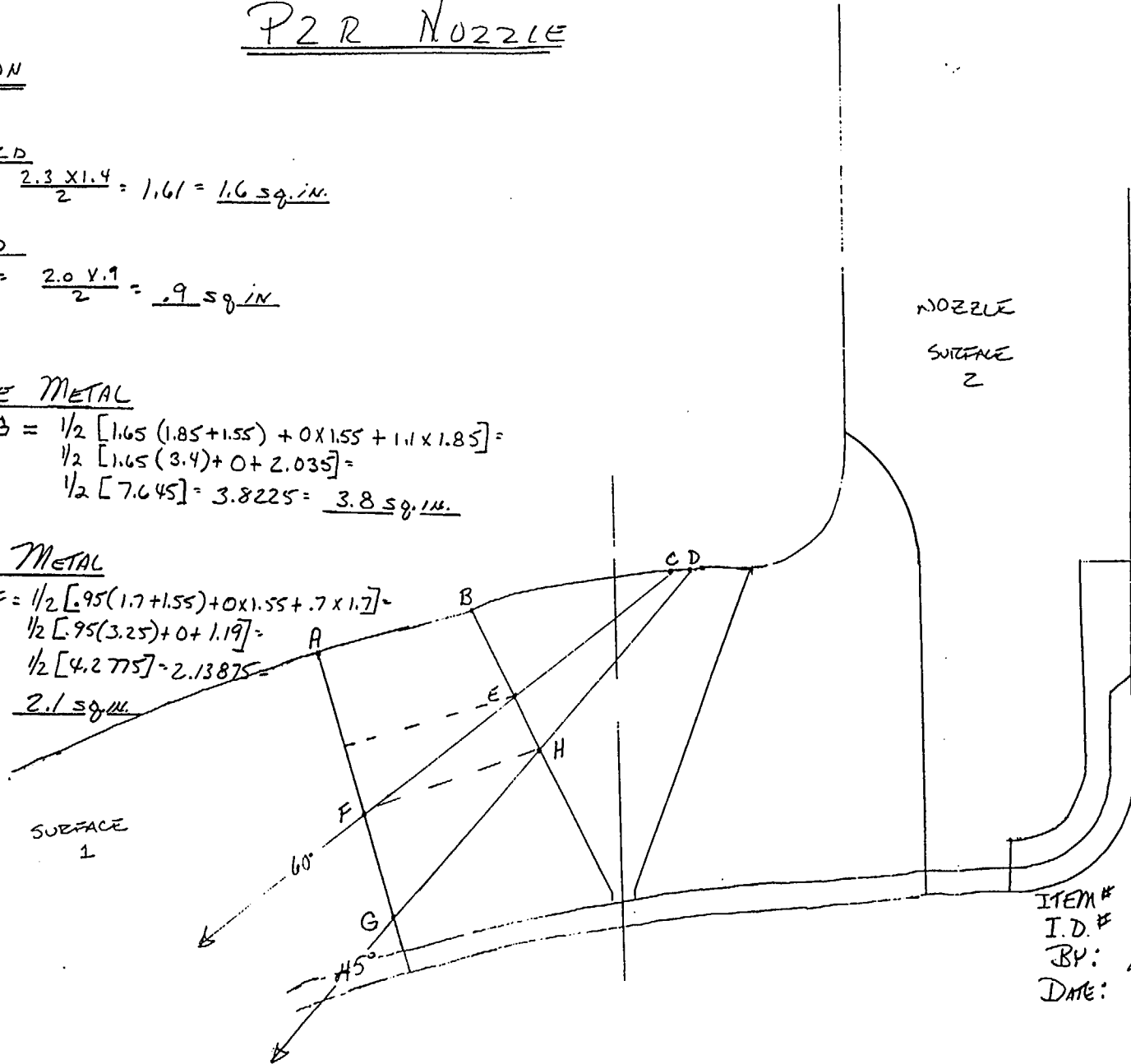
$$BCE = \frac{2.0 \times 1.1}{2} = \underline{.9 \text{ sq. in.}}$$

45° BASE METAL

$$\begin{aligned} ABHG &= \frac{1}{2} [1.65(1.85+1.55) + 0 \times 1.55 + 1.1 \times 1.85] = \\ &\frac{1}{2} [1.65(3.4) + 0 + 2.035] = \\ &\frac{1}{2} [7.645] = 3.8225 = \underline{3.8 \text{ sq. in.}} \end{aligned}$$

60° BASE METAL

$$\begin{aligned} ABEF &= \frac{1}{2} [.95(1.7+1.55) + 0 \times 1.55 + .7 \times 1.7] = \\ &\frac{1}{2} [.95(3.25) + 0 + 1.19] = \\ &\frac{1}{2} [4.2775] = 2.13875 = \\ &\underline{2.1 \text{ sq. in.}} \end{aligned}$$



ITEM# B03.110.006
I.D.# 2P2R-15
BY: Larry Trautler
DATE: 03.29.99

P2K NOZZLE

AREAS OF INSPECTION

CW & CCW

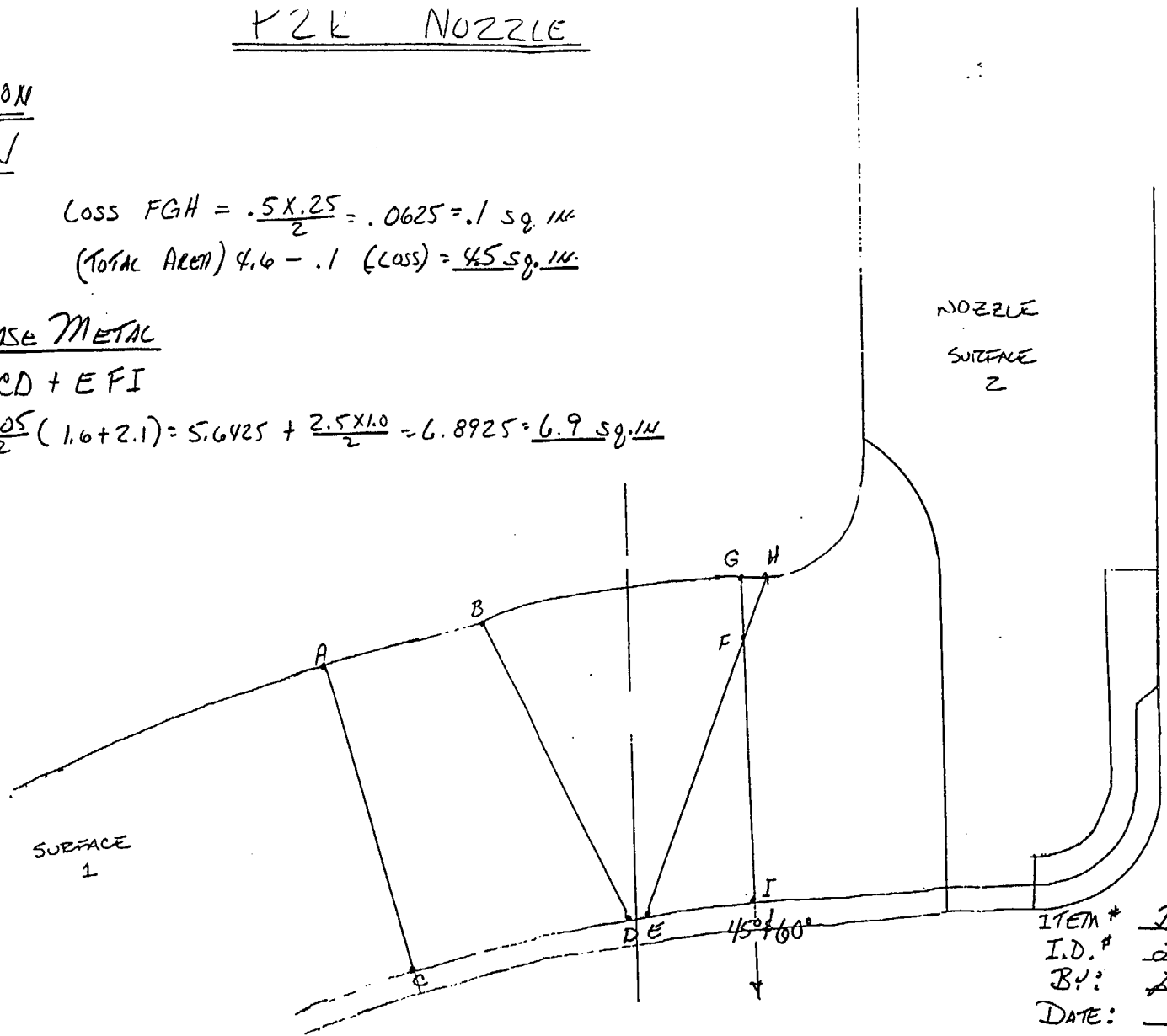
45° & 60° WELD

LOSS FGH = $\frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$
 (TOTAL AREA) $4.6 - .1 \text{ (LOSS)} = \underline{4.5 \text{ sq. in.}}$

45° & 60° BASE METAL

ABCD + EFI

$\frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$



ITEM #	<u>B03.110.006</u>
I.D. #	<u>2P2R-15</u>
BY:	<u>Larry Naudler</u>
DATE:	<u>03-29-99</u>

DUKE POWER COMPANY					Exam Start: 1138	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS					Exam Finish: 1142	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-16			Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured		Lo: 9.2.3	Surface Temperature: <u>72</u> ° <u>F</u>		
Examiner: Gayle E. Houser <i>Gayle Houser</i>	Level: II	Scans:		Pyrometer S/N: <u>MCNDE 27018</u>		
Examiner: Winfred C. Leeper <i>Winfred C. Leeper</i>	Level: II	45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Cal Due: <u>7/28/99</u>		
Procedure: NDE-640	Rev: 1	45T <input type="checkbox"/> _____ dB	70T <input type="checkbox"/> _____ dB	Configuration: <u>Relief Noz to Up Head</u>		
Calibration Sheet No: 9902074	FC: *	60 <input type="checkbox"/> _____ dB		<u>S2</u> Flow <u>S1</u>		
		60T <input type="checkbox"/> _____ dB		<u>Nozzle</u> to <u>Up Head</u>		
		Other: <u>0° @ 16</u> dB		Scan Surface: <u>OD</u>		
				Applies to NDE-680 only		
				Skew Angle: <u>N/A</u>		

IND #	4	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE		
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	0°															

Remarks: * 95-18, 95-19			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <i>II</i>	Date: <i>3-30-99</i>	Authorized Inspector: <i>[Signature]</i> Date: <i>3-30-99</i>
			Item No: B03.110.007

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3/26/99

DUKE POWER COMPANY						Exam Start: 1155	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1249	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-16				Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3	Surface Temperature: <u>72</u> ° ° <u>F</u>		
Examiner: Gayle E. Houser <i>Gayle Houser</i>	Level: II		Scans:			Pyrometer S/N: <u>MCNDE 27018</u>	
Examiner: Winfred C. Leeper <i>Winfred Leeper</i>	Level: II		45 <input checked="" type="checkbox"/> <u>51.5</u> dB 70 <input type="checkbox"/> _____ dB			Cal Due: <u>7/28/99</u>	
Procedure: NDE-620	Rev: 5	FC: N/A	45T <input checked="" type="checkbox"/> <u>51.5</u> dB 70T <input type="checkbox"/> _____ dB			Configuration: <u>Relief Noz to Up Head</u>	
Calibration Sheet No: 9902076, 9902079			60 <input checked="" type="checkbox"/> <u>55.5</u> dB			<u>S2</u> Flow <u>S1</u>	
			60T <input checked="" type="checkbox"/> <u>55.5</u> dB			<u>Nozzle</u> to <u>Head</u>	
			Other: _____ dB			Scan Surface: <u>OD</u>	
						Applies to NDE-680 only	
						Skew Angle: N/A	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA			DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	45°															
NRI	60°															

Remarks:			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Rod Sefford</i>	Level: <i>II</i>	Date: <i>3-30-99</i>	Authorized Inspector: <i>[Signature]</i> Date: <i>3-30-99</i>
			Item No: B03.110.007

Attachment 1
Page 32 of 60

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

Examination Volume/Area Defined	
Base Metal <input checked="" type="checkbox"/>	Weld <input checked="" type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius <input type="checkbox"/>
Area Calculation	Volume Calculation

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
<p>BASE METAL 44.02 + Weld Metal 81.4 ÷ 2 =</p> <p style="font-size: 1.2em;">AGGREGATE COVERAGE 62.7 %</p>							

Item No: B03.110.007

Prepared BY: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Amy S. Bubb</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

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

Examination Volume/Area Defined	
Base Metal <input checked="" type="checkbox"/>	Weld <input type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius <input type="checkbox"/>
Area Calculation	Volume Calculation
*SEE ATTACHED SHEETS	$15.8 \text{ sq. in.} \times 47.5 \text{ in.} =$ 750.5 cu. in.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	6.9	47.5	327.75	750.5	
2	45°	2	10.2	47.5	484.5	750.5	
3	45°	1	3.8	47.5	180.50	750.5	
4	60°	2	12.0	47.5	570.0	750.5	
5	60°	1	2.1	47.5	99.75	750.5	
6	45°	CW	6.9	47.5	327.75	750.5	
7	45°	CCW	6.9	47.5	327.75	750.5	
8	60°	CW	6.9	47.5	327.75	750.5	
9	60°	CCW	6.9	47.5	327.75	750.5	
					$2973.5 \div 6754.5 \times 100$		
					44.02 %		

Item No: B03.110.007

Prepared BY: <i>Larry Mueller</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Doug S. Bell</i>	Level: <i>III</i>	Date: <i>3-30-99</i>

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

Examination Volume/Area Defined

Base Metal
 Weld
 Near Surface
 Bolting
 Inner Radius

Area Calculation	Volume Calculation
SEE ATTACHED SHEETS	$4.6 \text{ sq. in.} \times 47.5 \text{ in.} =$ 218.5 cu. in.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	0°	N/A	4.5	47.5	213.75	218.5	
2	45°	2	4.3	47.5	204.25	218.5	
3	45°	1	1.6	47.5	76	218.5	
4	60°	2	4.4	47.5	209	218.5	
5	60°	1	.9	47.5	42.75	218.5	
6	45°	CW	4.5	47.5	213.75	218.5	
7	45°	CCW	4.5	47.5	213.75	218.5	
8	60°	CW	4.5	47.5	213.75	218.5	
9	60°	CCW	4.5	47.5	213.75	218.5	
					$1600.75 \div 1966.5 \times 100$		
					81.4%		

Item No: 803.110.007

Prepared BY: Larry Mauldin Level: III Date: 3-29-99

Reviewed By: Larry A. Bill Level: III Date: 3-30-99

BASE MAT'L

PZR NOZZLE

AREA of INTEREST

ABCD =

$\frac{3.05}{2} (1.6 + 2.1) = 5.6425$

EFGH =

$\frac{3.05}{2} (1.6 + 2.9) = 6.8625$

HIJ =

$\pi \times 1.3 \times .75 = 3.063$

EIJ =

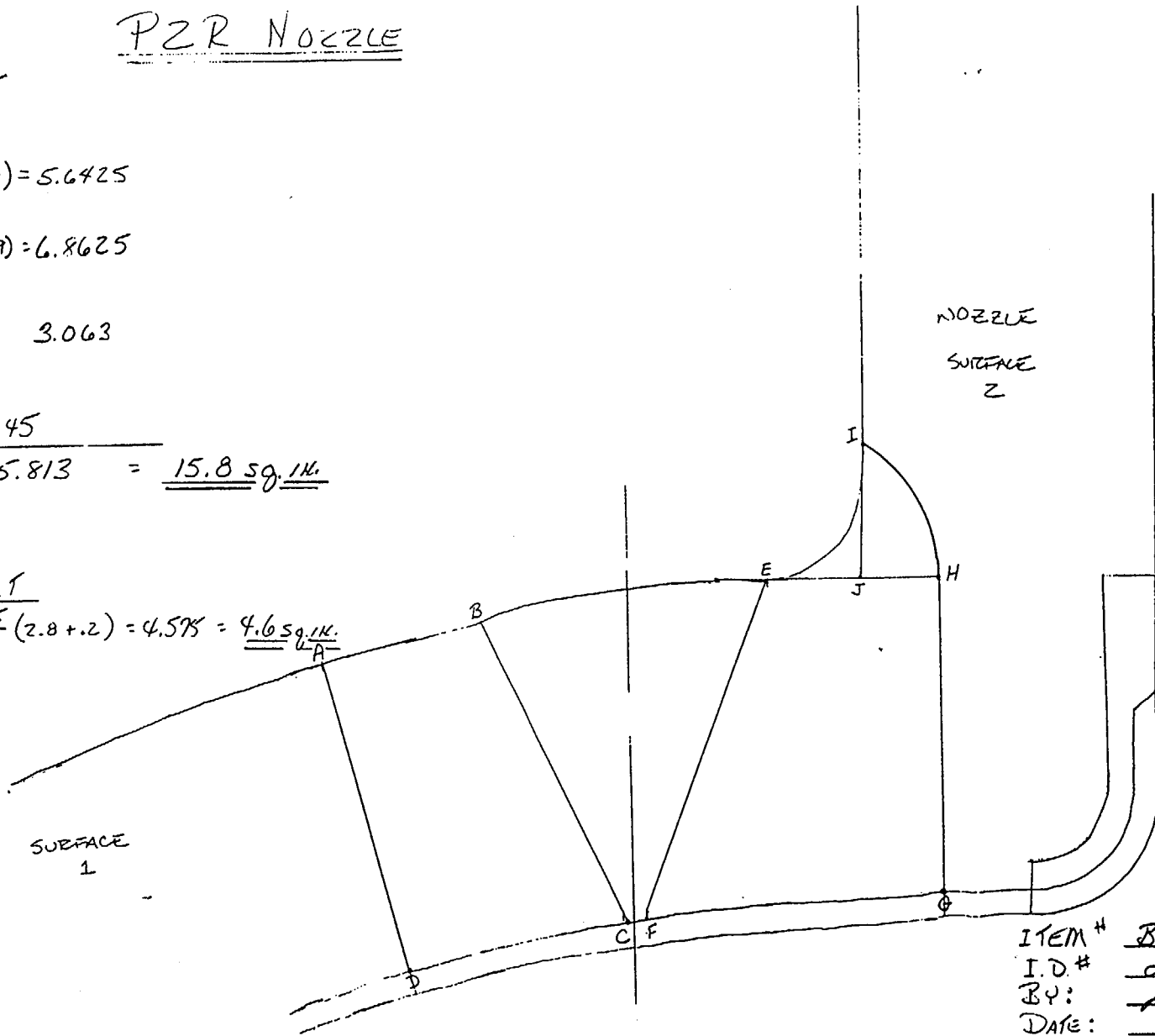
$\frac{.7 \times .7}{2} = .245$

$15.813 = \underline{\underline{15.8 \text{ sq. in.}}}$

WELD MAT'L

AREA of INTEREST

$BCEF = \frac{3.05}{2} (2.8 + .2) = 4.575 = \underline{\underline{4.6 \text{ sq. in.}}}$



ITEM #	<u>B03.110.007</u>
I.D.#	<u>222-16</u>
BY:	<u>Larry Mauldin</u>
DATE:	<u>03-29-99</u>

PCR Nozzle

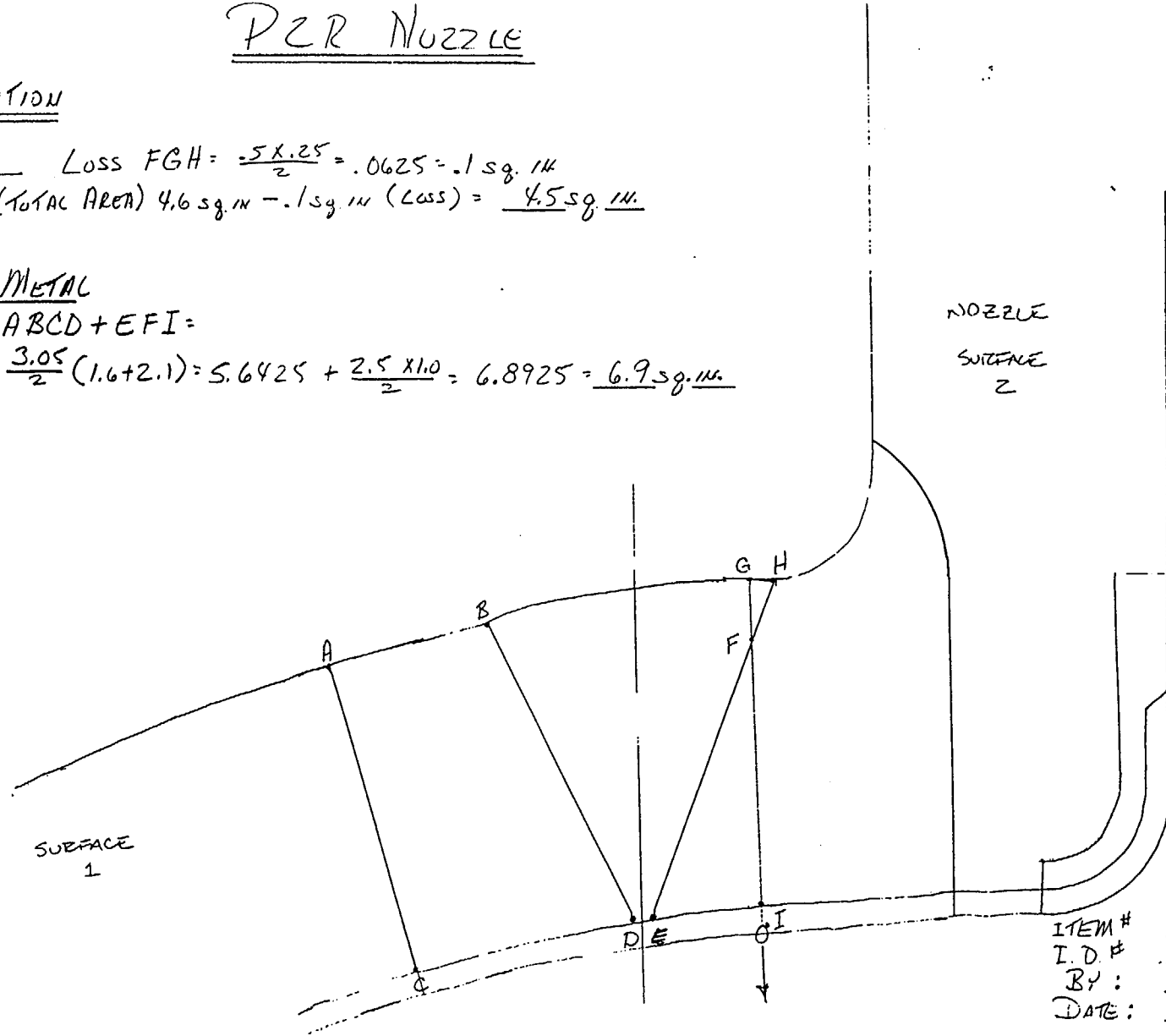
AREAS of INSPECTION

0° WELD Loss FGH = $\frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$
(TOTAL AREA) $4.6 \text{ sq. in.} - .1 \text{ sq. in. (Loss)} = \underline{4.5 \text{ sq. in.}}$

0° BASE METAL

ABCD + EFI =

$\frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$



ITEM # B03.110.007
I.D.# 2PCR-16
BY: Lou Mauler
DATE: 03.29.99

PZR NOZZLE

AREAS of INSPECTION

S1 TO S2

$$\begin{aligned} \underline{45^\circ \text{ WELD}} &= FGI = \frac{1.0 \times .7}{2} = .35 \text{ sq. in. Loss} \\ &(\text{TOTAL WELD AREA}) 4.6 - .35 (\text{Loss}) = 4.25 = \underline{4.3 \text{ sq. in.}} \end{aligned}$$

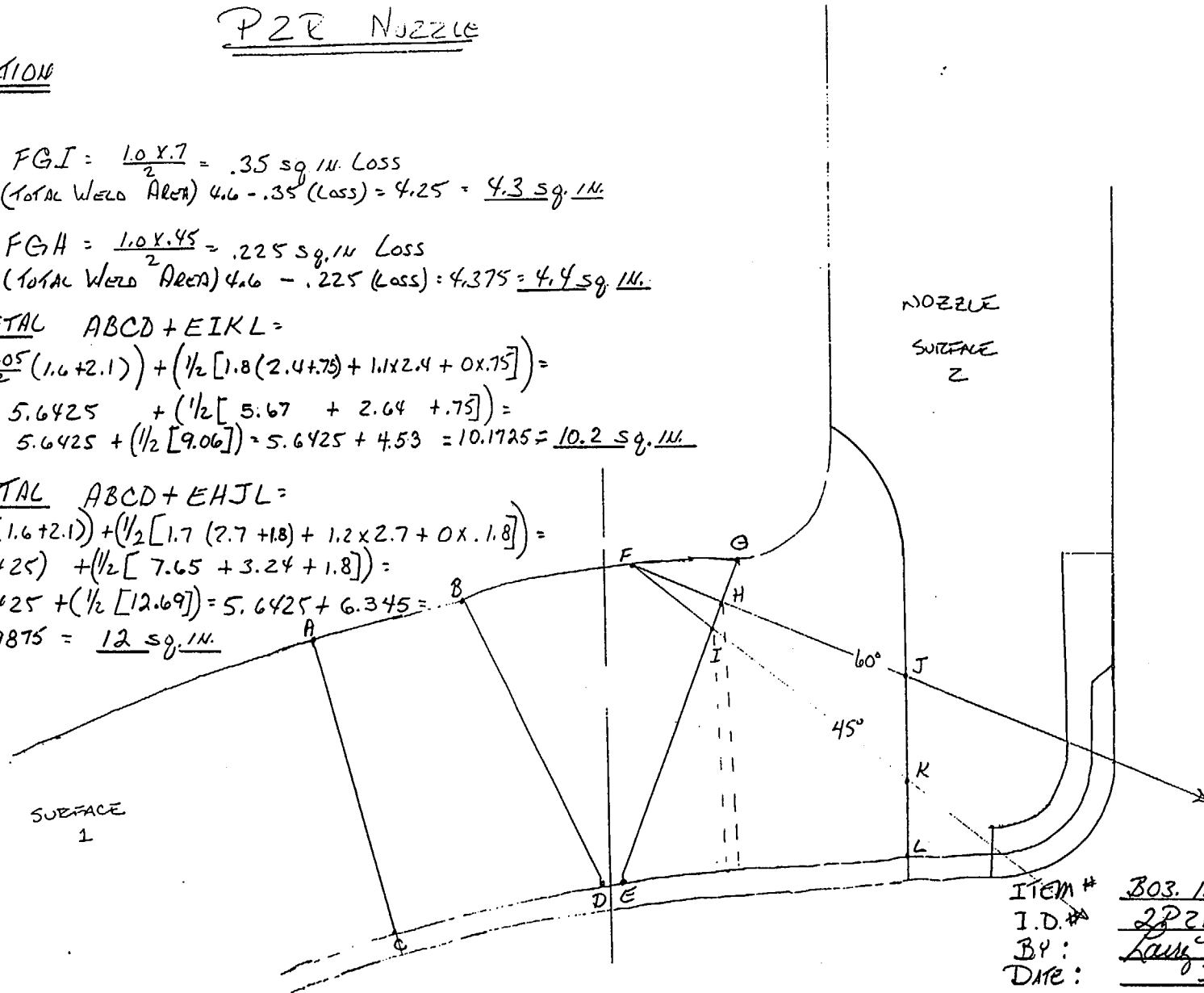
$$\begin{aligned} \underline{60^\circ \text{ WELD}} &= FGH = \frac{1.0 \times .45}{2} = .225 \text{ sq. in. Loss} \\ &(\text{TOTAL WELD AREA}) 4.6 - .225 (\text{Loss}) = 4.375 = \underline{4.4 \text{ sq. in.}} \end{aligned}$$

45° BASE METAL ABCD + EIKL =

$$\begin{aligned} &\left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.8 (2.4 + 7.5) + 1.1 \times 2.4 + 0 \times 7.5] \right) = \\ &5.6425 + \left(\frac{1}{2} [5.67 + 2.64 + 7.5] \right) = \\ &5.6425 + \left(\frac{1}{2} [9.06] \right) = 5.6425 + 4.53 = 10.1725 = \underline{10.2 \text{ sq. in.}} \end{aligned}$$

60° BASE METAL ABCD + EHJL =

$$\begin{aligned} &\left(\frac{3.05}{2} (1.6 + 2.1) \right) + \left(\frac{1}{2} [1.7 (2.7 + 1.8) + 1.2 \times 2.7 + 0 \times 1.8] \right) = \\ &(5.6425) + \left(\frac{1}{2} [7.65 + 3.24 + 1.8] \right) = \\ &5.6425 + \left(\frac{1}{2} [12.69] \right) = 5.6425 + 6.345 = \\ &11.9875 = \underline{12 \text{ sq. in.}} \end{aligned}$$



ITEM #	B03.110.007
I.D. #	2PZR-16
BY:	Larry Mueller
DATE:	3-29-99

P2R NOZZLE

AREAS of INSPECTION

S2 to S1

45° WELD

$$BDH = \frac{2.3 \times 1.4}{2} = 1.61 = \underline{1.6 \text{ sq. in.}}$$

60° WELD

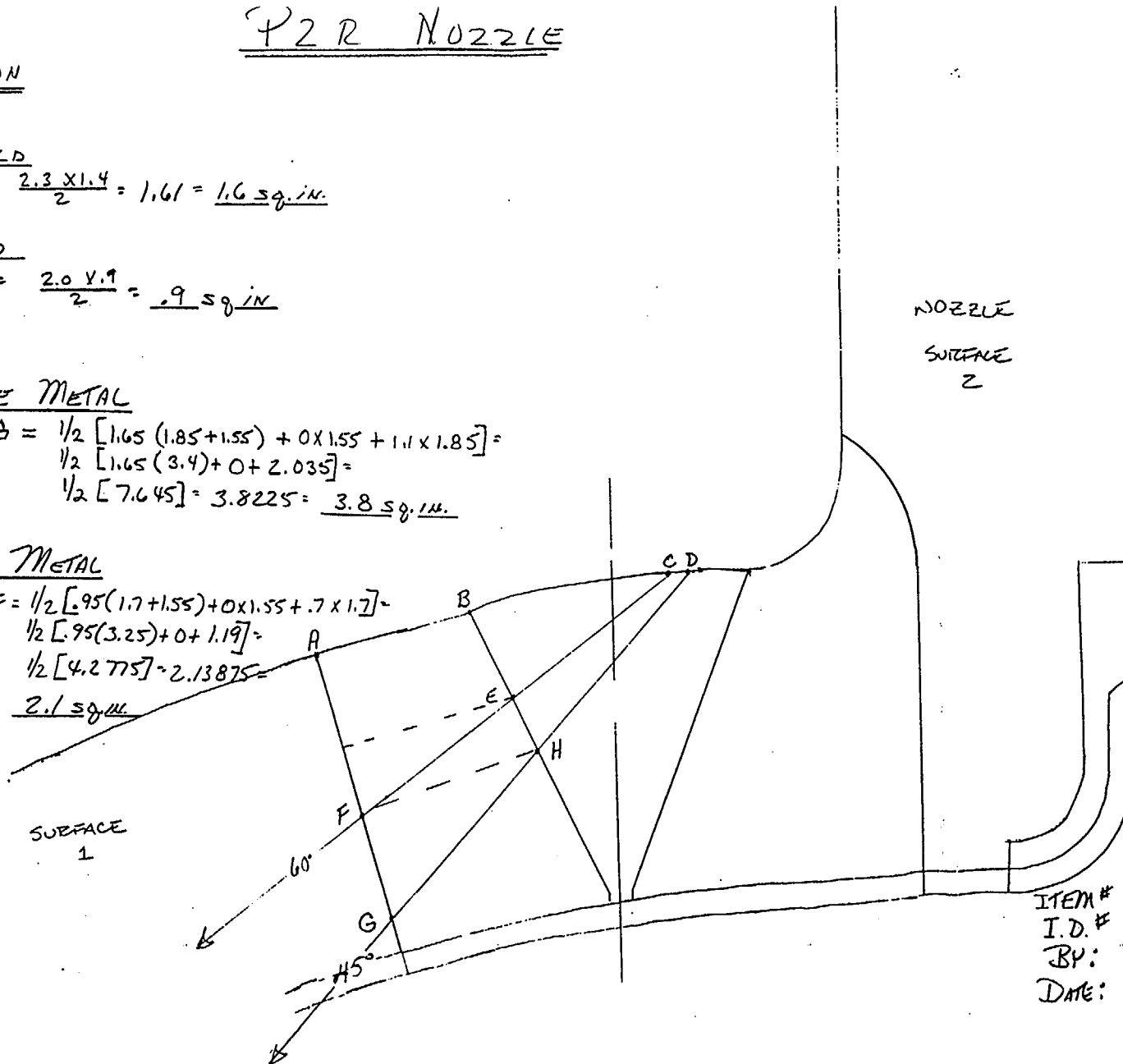
$$BCE = \frac{2.0 \times 1.9}{2} = \underline{.9 \text{ sq. in.}}$$

45° BASE METAL

$$\begin{aligned} ABHG &= \frac{1}{2} [1.65(1.85+1.55) + 0 \times 1.55 + 1.11 \times 1.85] = \\ &\frac{1}{2} [1.65(3.4) + 0 + 2.035] = \\ &\frac{1}{2} [7.645] = 3.8225 = \underline{3.8 \text{ sq. in.}} \end{aligned}$$

60° BASE METAL

$$\begin{aligned} AB EF &= \frac{1}{2} [.95(1.7+1.55) + 0 \times 1.55 + .7 \times 1.7] = \\ &\frac{1}{2} [.95(3.25) + 0 + 1.19] = \\ &\frac{1}{2} [4.2775] = 2.13875 = \\ &\underline{2.1 \text{ sq. in.}} \end{aligned}$$



NOZZLE
SURFACE
2

SURFACE
1

ITEM# B03.110.007
I.D.# 29P2R-16
BY: Larry Mauldin
DATE: 3-29-99

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Y2R NOZZLE

AREAS OF INSPECTION

CW & CCW

45° & 60° WELD

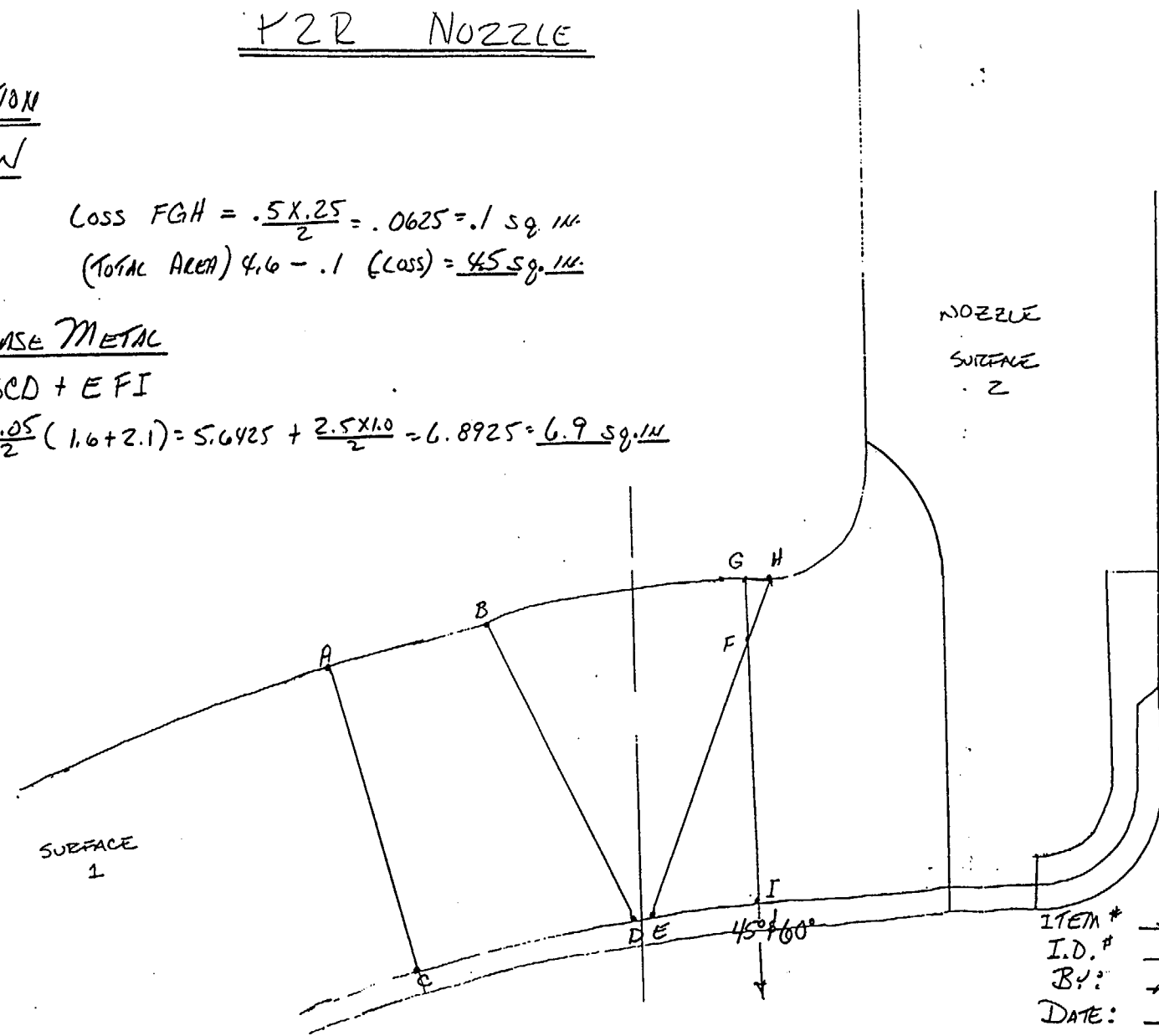
$$\text{Loss } FGH = \frac{.5 \times .25}{2} = .0625 = .1 \text{ sq. in.}$$

$$\text{(TOTAL AREA) } 4.6 - .1 \text{ (LOSS)} = \underline{4.5 \text{ sq. in.}}$$

45° & 60° BASE METAL

ABCD + EFI

$$\frac{3.05}{2} (1.6 + 2.1) = 5.6425 + \frac{2.5 \times 1.0}{2} = 6.8925 = \underline{6.9 \text{ sq. in.}}$$



ITEM #	B03.110.007
I.D. #	20PER-16
BY:	Larry Nambui
DATE:	3-29-99

DUKE POWER COMPANY						Exam Start: 1153	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1222	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-13R				Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3	Surface Temperature: <u>72</u> ° ° <u>F</u>		
Examiner: David Zimmerman <i>David Zimmerman</i>	Level: II	Scans:			Pyrometer S/N: <u>MCNDE 27018</u>		
Examiner: Larry Mauldin <i>Larry Mauldin</i>	Level: III	45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Cal Due: <u>7/28/99</u>			
Procedure: NDE-680	Rev: 1	45T <input type="checkbox"/> _____ dB	70T <input checked="" type="checkbox"/> <u>59</u> dB	Configuration: <u>INNER RADIUS</u>			
FC: 95-16		60 <input type="checkbox"/> _____ dB	S2 _____ Flow _____ S1 _____				
Calibration Sheet No: 9902080, 9902082		60T <input checked="" type="checkbox"/> <u>55.5</u> dB	Inner Rad _____ to _____ Head _____				
		Other: _____ dB	Scan Surface: <u>OD</u>				
			Applies to NDE-680 only				
			Skew Angle: 60&70@14°				

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI		60°														
NRI		70°														

Remarks:			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Rod Jeffers</i>	Level: <u>II</u>	Date: <u>3-30-99</u>	Authorized Inspector: <i>[Signature]</i> Date: <u>3-30-99</u>
			Item No: B03.120.003

Attachment 1
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4/12/99

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

Examination Volume/Area Defined	
Base Metal <input type="checkbox"/>	Weld <input type="checkbox"/>
Near Surface <input type="checkbox"/>	Bolting <input type="checkbox"/>
Inner Radius <input checked="" type="checkbox"/>	
Area Calculation	Volume Calculation
* SEE ATTACHED SHEETS	$1.72 \text{ sq. in.} \times 47.5 \text{ in.} = 81.7 \text{ cu. in.}$

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°/70°	CW	1.08	47.5	51.3	81.7	
2	60°/70°	CW	1.08	47.5	51.3	81.7	
					<u>102.6</u>	<u>÷ 163.4</u>	X 100 =
					62.79%		

Item No: B03.120.003

Prepared BY: <i>Larry Mueller</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Shy L. Bitt</i>	Level: <i>III</i>	Date: <i>3-29-99</i>

NOZZLE INNER RADIUS

AREA of INTEREST

$$\pi \times 1'' - \pi \times .5''^2 \div 4 =$$

$$3.1415 - .7853 \div 4 = .589 \text{ sq. in. (RADIUS)}$$

$$ABCD = 2.25'' \times .5'' = 1.125 \text{ sq. in. (NOZZLE)}$$

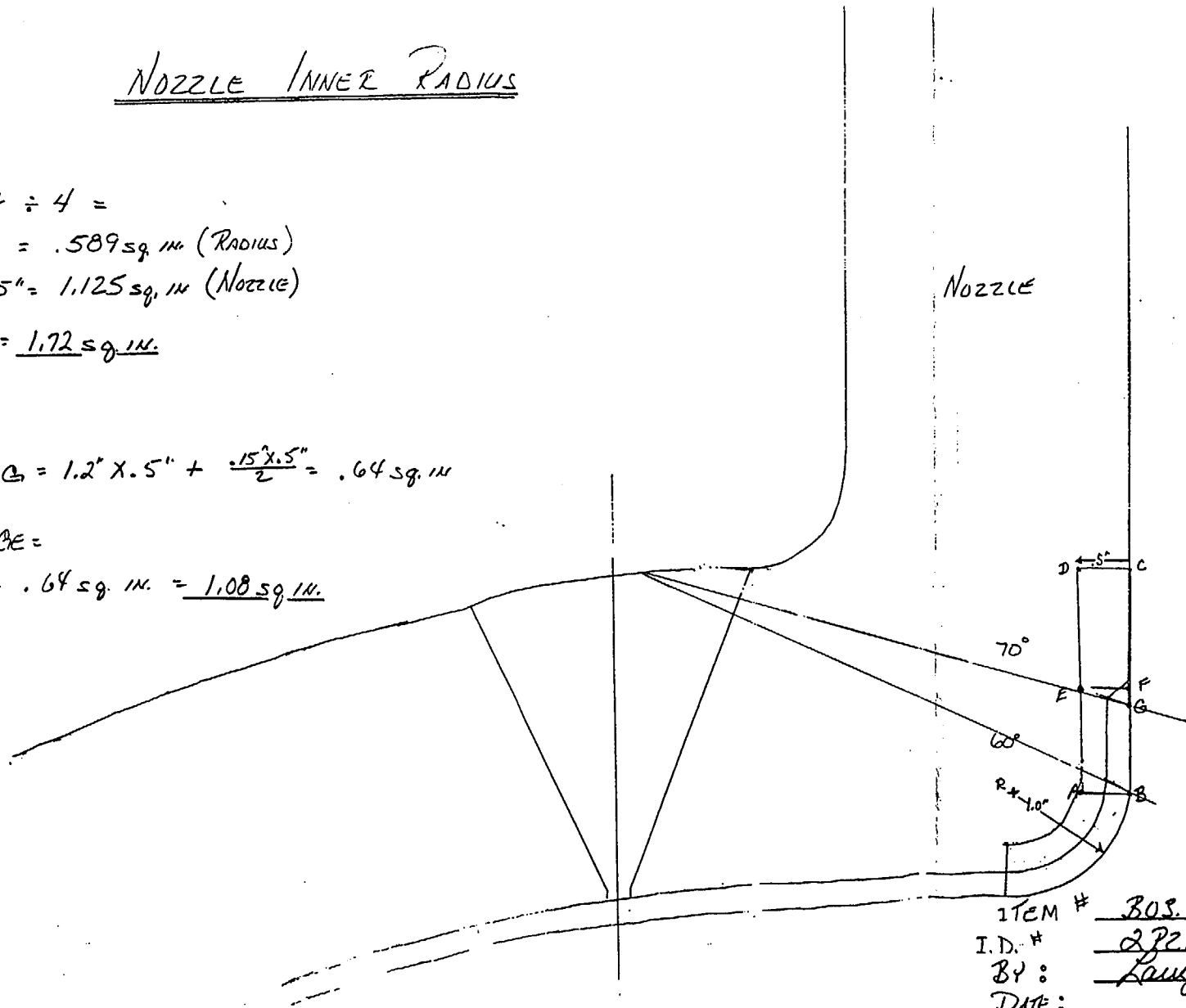
$$1.125 + .589 = \underline{1.72 \text{ sq. in.}}$$

AREA of LOSS

$$CDEF + EFG = 1.2'' \times .5'' + \frac{.15'' \times .5''}{2} = .64 \text{ sq. in.}$$

AREA of COVERAGE =

$$1.72 \text{ sq. in.} - .64 \text{ sq. in.} = \underline{1.08 \text{ sq. in.}}$$



ITEM # BOS. 120.003
I.D. # 272R-13R
BY: Lynn Thauler
DATE: 03.29.99

DUKE POWER COMPANY					Exam Start: 1202	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS					Exam Finish: 1231	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-14R			Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured		Lo: 9.2.3	Surface Temperature: <u>72</u> ° ° <u>F</u>		
Examiner: David Zimmerman <i>David Zimmerman</i>	Level: II		Scans:		Pyrometer S/N: <u>MCNDE 27018</u>	
Examiner: Larry Mauldin <i>Larry Mauldin</i>	Level: III		45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Cal Due: <u>7/28/99</u>	
Procedure: NDE-680	Rev: 1	FC: 95-16	45T <input type="checkbox"/> _____ dB	70T <input checked="" type="checkbox"/> <u>59</u> dB	Configuration: <u>INNER RADIUS</u>	
Calibration Sheet No: 9902080, 9902082			60 <input type="checkbox"/> _____ dB		<u>S2</u> Flow <u>S1</u>	
			60T <input checked="" type="checkbox"/> <u>55.5</u> dB		<u>Inner Rad</u> to <u>Head</u>	
			Other: _____ dB		Scan Surface: OD	
					Applies to NDE-680 only	
					Skew Angle: 60&70@14°	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE		
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI		60°														
NRI		70°														

Remarks:					
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>					Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <u>II</u>	Date: <u>3-30-99</u>	Authorized Inspector: <i>[Signature]</i>	Date: <u>3-30-99</u>	Item No: B03.120.004

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R Gu
4/12/99

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

Examination Volume/Area Defined

Base Metal Weld Near Surface Bolting Inner Radius

Area Calculation	Volume Calculation
* SEE ATTACHED SHEETS	1.72 sq. in. X 47.5 in. = 81.7 cu. in.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°/70°	CW	1.08	47.5	51.3	81.7	
2	60°/70°	CW	1.08	47.5	51.3	81.7	
					<u>102.6</u>	<u>163.4</u>	X 100 =
					62.79%		

Item No: B03.120.004

Prepared BY: Larry Mauldin Level: III Date: 3-29-99

Reviewed By: Larry S. Bibb Level: III Date: 3-29-99

NOZZLE INNER RADIUS

AREA OF INTEREST

$$\pi \times 1''^2 - \pi \times .5''^2 \div 4 =$$

$$3.1415 - .7853 \div 4 = .589 \text{ sq. in. (RADIUS)}$$

$$ABCD = 2.25'' \times .5'' = 1.125 \text{ sq. in. (NOZZLE)}$$

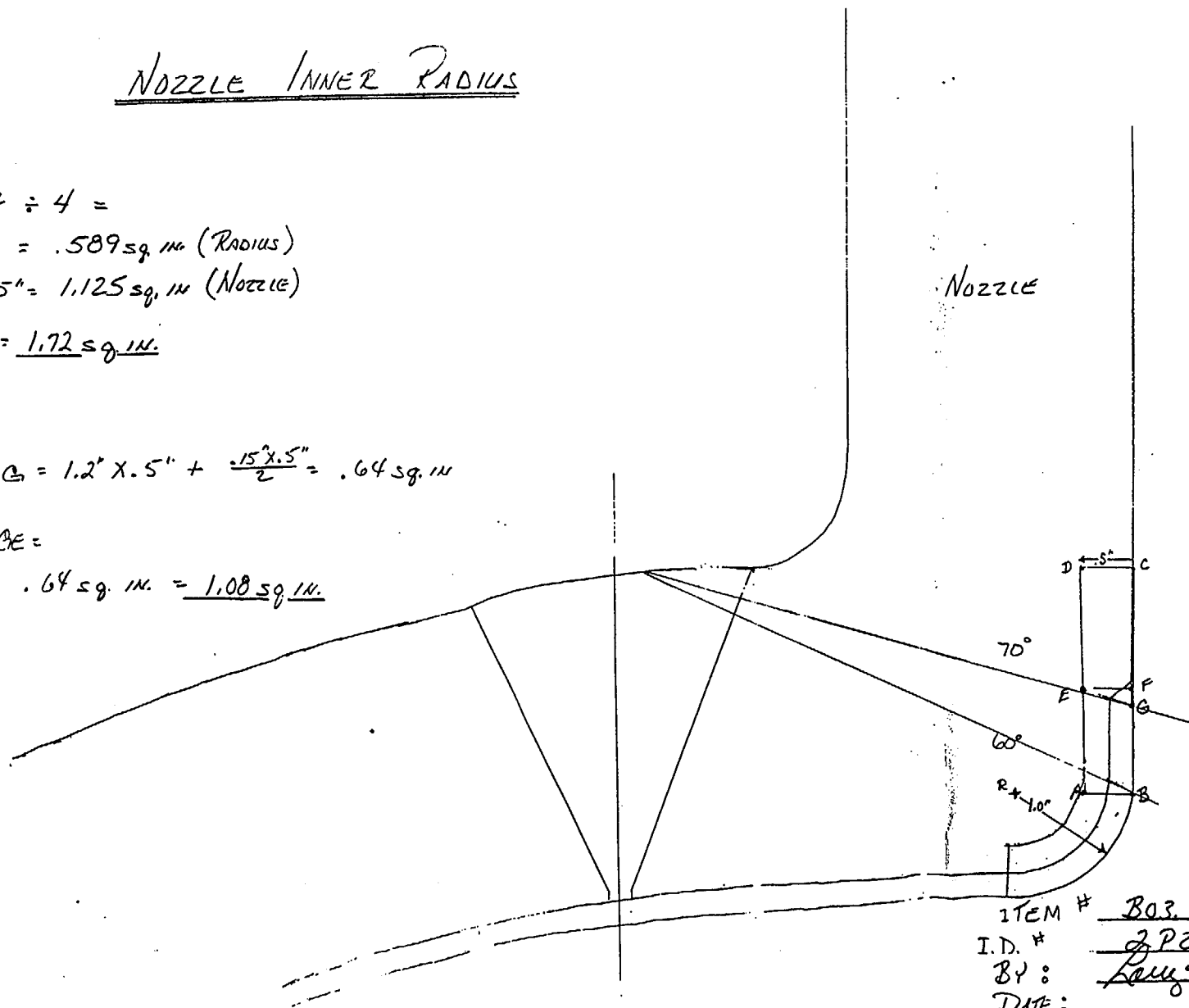
$$1.125 + .589 = \underline{1.72 \text{ sq. in.}}$$

AREA OF LOSS

$$CDEF + EFG = 1.2'' \times .5'' + \frac{.15'' \times .5''}{2} = .64 \text{ sq. in.}$$

AREA OF COVERAGE =

$$1.72 \text{ sq. in.} - .64 \text{ sq. in.} = \underline{1.08 \text{ sq. in.}}$$



DUKE POWER COMPANY						Exam Start: 1249	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1318	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-15R				Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured			Lo: 9.2.3	Surface Temperature: 72° ° F		
Examiner: Gayle E. Houser <i>Gayle Houser</i>	Level: II	Scans:			Pyrometer S/N: MCNDE 27018		
Examiner: Winfred C. Leeper <i>Winfred C. Leeper</i>	Level: II	45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Cal Due: 7/28/99			
Procedure: NDE-680	Rev: 1	45T <input type="checkbox"/> _____ dB	70T <input checked="" type="checkbox"/> 59 dB	Configuration: INNER RADIUS			
	FC: 95-16	60 <input type="checkbox"/> _____ dB		S2 _____ Flow _____ S1 _____			
Calibration Sheet No: 9902081, 9902083		60T <input checked="" type="checkbox"/> 55.5 dB		Inner Rad _____ to _____ Head _____			
		Other: _____ dB		Scan Surface: OD			
				Applies to NDE-680 only			
				Skew Angle: 60&70@14°			

IND #	<i>4</i>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE		
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	60°															
NRI	70°															

Remarks:					
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>					Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <i>II</i>	Date: <i>3-30-99</i>	Authorized Inspector: <i>R. J. [Signature]</i>	Date: <i>3-30-99</i>	Item No: B03.120.005

Attachment 1
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R 3/11/99

DUKE POWER COMPANY Limited Examination Coverage Worksheet	NDE-91-1 Revision 0
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Examination Volume/Area Defined

Base Metal
 Weld
 Near Surface
 Bolting
 Inner Radius

Area Calculation	Volume Calculation
<p>*SEE ATTACHED SHEETS</p>	<p>1.72 sq. in. X 47.5 in. = 81.7 cu. in.</p>

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°/70°	CW	1.08	47.5	51.3	81.7	
2	60°/70°	CW	1.08	47.5	51.3	81.7	
					$102.6 \div 163.4$		$\times 100 =$ 62.79%

Item No: B03.120.005

Prepared BY: *Randy Mauldin* Level: *III* Date: *3-29-99*

Reviewed By: *Larry S. Bilb* Level: *III* Date: *3-29-99*

NOZZLE INNER RADIUS

AREA of INTEREST

$$\pi \times 1'' - \pi \times .5''^2 \div 4 =$$

$$3.1415 - .7853 \div 4 = .589 \text{ sq. in. (RADIUS)}$$

$$A B C D = 2.25'' \times .5'' = 1.125 \text{ sq. in. (NOZZLE)}$$

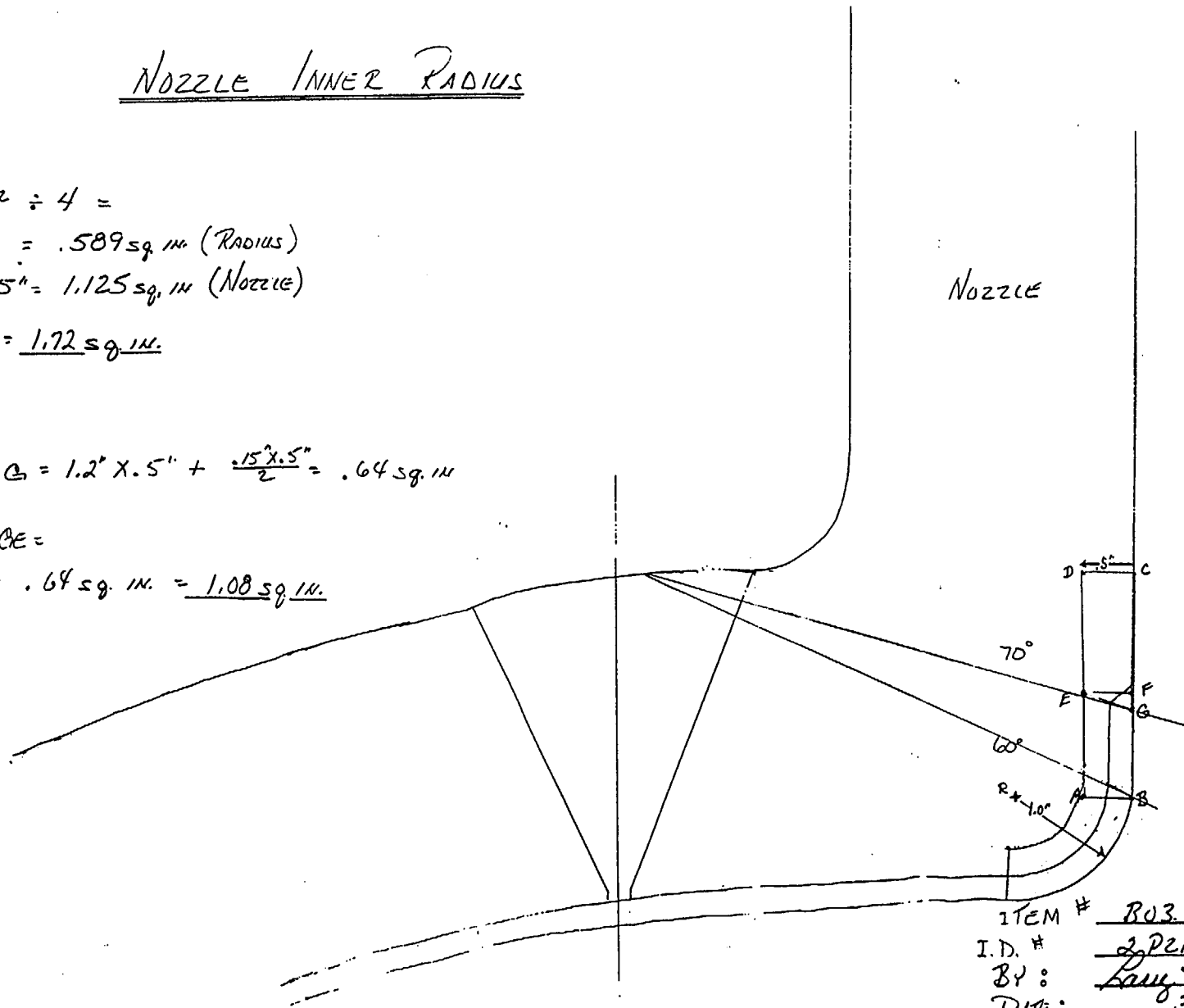
$$1.125 + .589 = \underline{1.72 \text{ sq. in.}}$$

AREA of LOSS

$$C D E F + E F G = 1.2'' \times .5'' + \frac{.15'' \times .5''}{2} = .64 \text{ sq. in.}$$

AREA of COVERAGE =

$$1.72 \text{ sq. in.} - .64 \text{ sq. in.} = \underline{1.08 \text{ sq. in.}}$$



ITEM # B03.120.005
 I.D. # 2 PER-15R
 BY: Larry Mauldin
 DATE: 3.29.99

DUKE POWER COMPANY					Exam Start: 1258	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS					Exam Finish: 1329	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2PZR-16R			Date: 3/26/99	
Weld Length (in.): 47.1	Surface Condition: As Manufactured		Lo: 9.2.3	Surface Temperature: <u>72</u> ° F		
Examiner: Gayle E. Houser <i>Gayle Houser</i>	Level: II	Scans: 45 <input type="checkbox"/> _____ dB 70 <input type="checkbox"/> _____ dB 45T <input type="checkbox"/> _____ dB 70T <input checked="" type="checkbox"/> <u>59</u> dB 60 <input type="checkbox"/> _____ dB 60T <input checked="" type="checkbox"/> <u>55.5</u> dB Other: _____ dB			Pyrometer S/N: <u>MCNDE 27018</u>	
Examiner: Winfred C. Leeper <i>Winfred C. Leeper</i>	Level: II				Cal Due: <u>7/28/99</u>	
Procedure: NDE-680	Rev: 1	FC: 95-16	Configuration: <u>INNER RADIUS</u> <u>S2</u> Flow <u>S1</u> <u>Inner Rad</u> to <u>Head</u> Scan Surface: <u>OD</u>			
Calibration Sheet No: 9902081, 9902083					Applies to NDE-680 only Skew Angle: <u>60&70@14°</u>	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA			DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI		60°														
NRI		70°														

Remarks:					
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>					Sheet _____ of _____
Reviewed By: <i>Rod Sheffield</i>	Level: <u>II</u>	Date: <u>3-30-99</u>	Authorized Inspector: <i>R. Klein</i>	Date: <u>3-30-99</u>	Item No: B03.120.006

Attachment 1
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R 2/12/99

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

Examination Volume/Area Defined

Base Metal Weld Near Surface Bolting Inner Radius

Area Calculation	Volume Calculation
*SEE ATTACHED SHEETS	1.72 sq. in. X 47.5 in. = 81.7 cu. in.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°/70°	CW	1.08	47.5	51.3	81.7	
2	60°/70°	CW	1.08	47.5	51.3	81.7	
					102.6	÷ 163.4	X 100 =
							62.79%

Item No: B03.120.006

Prepared BY: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-29-99</i>
Reviewed By: <i>Larry S. Bullock</i>	Level: <i>III</i>	Date: <i>3-29-99</i>

NOZZLE INNER RADIUS

AREA of INTEREST

$$\pi \times 1''^2 - \pi \times .5''^2 \div 4 =$$

$$3.1415 - .7853 \div 4 = .589 \text{ sq. in. (RADIUS)}$$

$$ABCD = 2.25'' \times .5'' = 1.125 \text{ sq. in. (NOZZLE)}$$

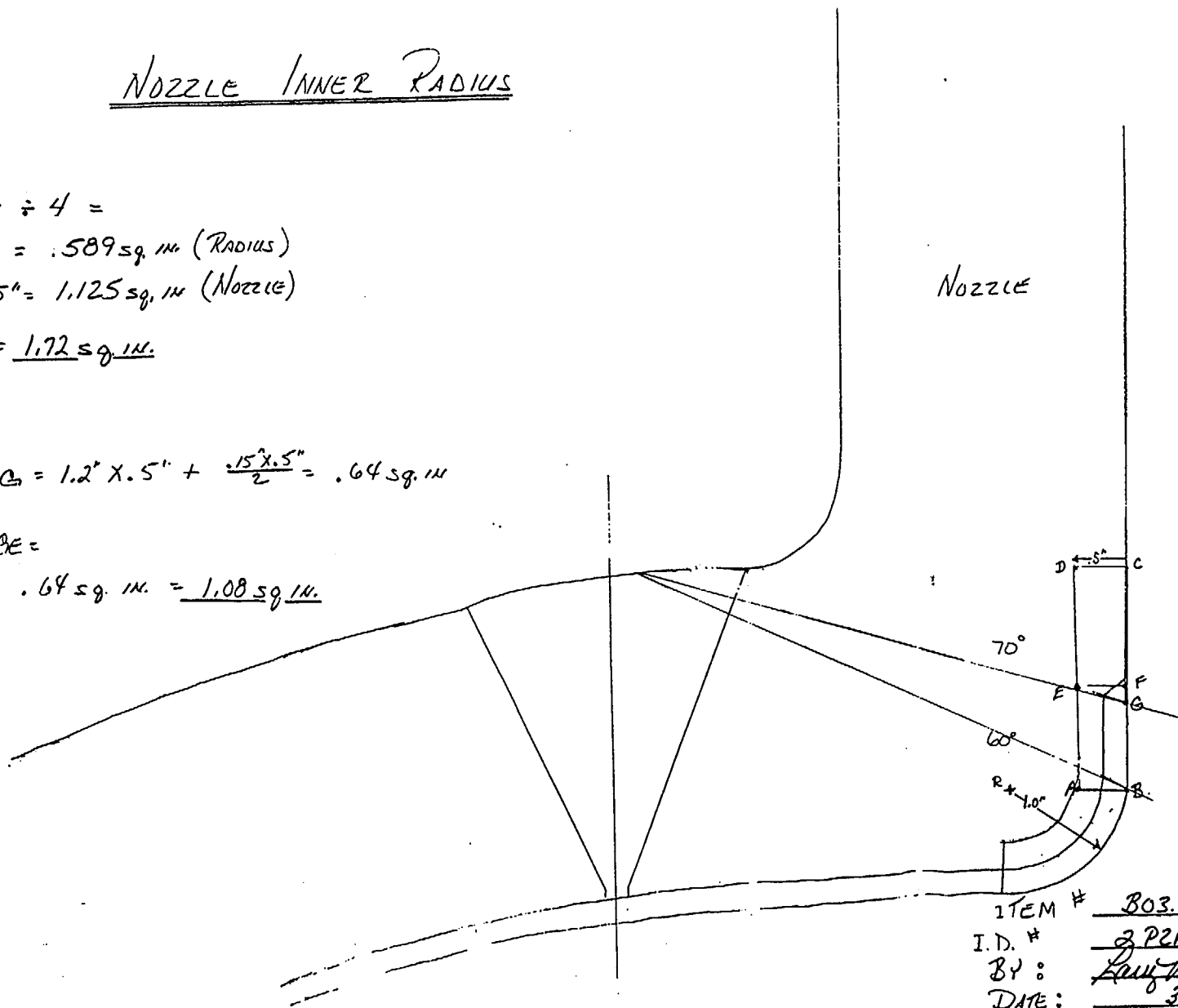
$$1.125 + .589 = \underline{1.72 \text{ sq. in.}}$$

AREA of LOSS

$$CDEF + EFG = 1.2'' \times .5'' + \frac{.15'' \times .5''}{2} = .64 \text{ sq. in.}$$

AREA of COVERAGE =

$$1.72 \text{ sq. in.} - .64 \text{ sq. in.} = \underline{1.08 \text{ sq. in.}}$$



DUKE POWER COMPANY						Exam Start: 1450	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1635	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2SGB-INLET				Date: 3/17/99	
Weld Length (in.): N/A	Surface Condition: AS MACHINED		Lo: RT "0"		Surface Temperature: <u>97</u> ° <u>F</u>		
Examiner: Jay A. Eaton	Level: II	Scans:		Pyrometer S/N: <u>MCNDE 27022</u>			
Examiner: David Zimmerman	Level: II	45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Cal Due: <u>5/17/99</u>			
Procedure: NDE-680	Rev: 1	45T <input type="checkbox"/> _____ dB	70T <input checked="" type="checkbox"/> <u>76</u> dB	Configuration: <u>INNER RADIUS</u>			
Calibration Sheet No: 9902035, 9902036	FC: 95-16	60 <input type="checkbox"/> _____ dB	Other: _____ dB	N/A Flow N/A		N/A to N/A	
		60T <input checked="" type="checkbox"/> <u>67</u> dB		Scan Surface: OD		Applies to NDE-680 only	
				Skew Angle: 23.5° .23			

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA			DO NOT WRITE IN THIS SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI		60°														
NRI		70°														

Remarks:					
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>					Sheet _____ of _____
Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
<i>Jay S. Bell</i>	<i>IV</i>	<i>3-23-99</i>	<i>R Klein</i>	<i>3-24-99</i>	B03.140.003

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**DUKE POWER COMPANY
ISI LIMITATION REPORT**

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2SGB-INLET

Item No: B03.140.003

Remarks:

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 - 22.0" to L 0 - 42.5" INCHES FROM WO N/A to N/A
 ANGLE: 0 45 60 Other 70° FROM N/A DEG to N/A DEG

SUPPORT CORNER IS 1.0 FROM C/L OF NOZZLE OD RADIUS

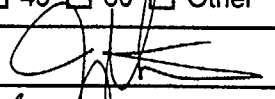
NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L N/A to L N/A INCHES FROM WO C/L + 6" to C/L + 10"
 ANGLE: 0 45 60 Other 70° FROM 176 DEG to 184 DEG

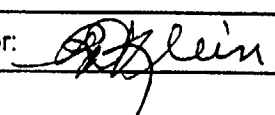
ELECTRICAL BOX ON HEAD

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L N/A to L N/A INCHES FROM WO C/L RADIUS to BEYOND
 ANGLE: 0 45 60 Other _____ FROM 0 DEG to 360 DEG

LIMITED ON NOZZLE C/L OF BLEND RADIUS

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

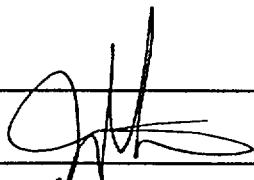
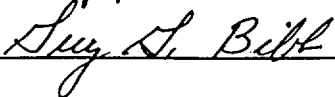
Prepared By:  Level: II Date: 3/17/99 Sketch(s) attached yes no Sheet _____ of _____

Reviewed By: Guy L. Bell Date: 3-23-99 Authorized Inspector:  Date: 3/24/99

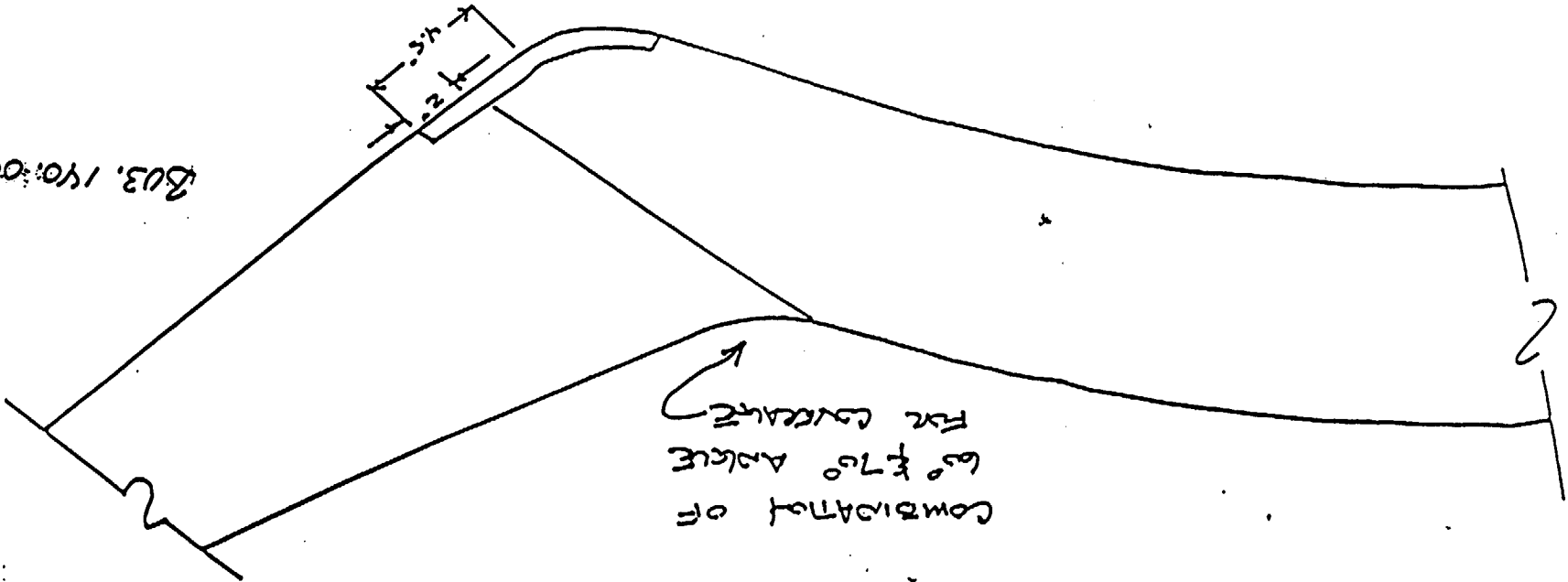
Attachment 1
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R
3
4/12/99

DUKE POWER COMPANY						NDE-91-1	
Limited Examination Coverage Worksheet						Revision 0	
Examination Volume/Area Defined							
<input type="checkbox"/> Base Metal		<input type="checkbox"/> Weld		<input type="checkbox"/> Near Surface		<input type="checkbox"/> Bolting	<input checked="" type="checkbox"/> Inner Radius
Area Calculation				Volume Calculation			
TOTAL AREA = 5.98 SQ. IN.				5.98 SQ. IN. X 30 IN DIA. TT = 563.6 IN CU.			
Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
60/70		23.5/23°SKEW	4.98	94.25	469.37	563.6	83.28

			Item No: B03.140.003
Prepared By:		Level: II	Date: 3/17/99
Reviewed By:		Level: III	Date: 3-23-99

803.140:003



$$5.58 \text{ in}^2 - (2.0 \text{ in} \times 0.5 \text{ in}) = 4.58 \text{ in}^2$$

Area Adjusted

$$\text{TOTAL AREA} = 5.98 \text{ in}^2$$

$$4.5 \text{ in} \times 0.5 \text{ in} = 2.25 \text{ in}^2$$

$$\frac{5.98 \text{ in}^2 - 2.25 \text{ in}^2}{4} = 3.73 \text{ in}^2$$

AREA CALCULATION

2 5/8 B - INCH NOZZLE

TOTAL % COVERAGE

$$\frac{4.58 \text{ in}^2}{5.98 \text{ in}^2} = 83.3 \%$$

$$83.3 \%$$

DUKE POWER COMPANY						Exam Start: 1450	Form NDE-UT-2A	
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1635	Revision 4	
Station: McGuire	Unit: 2	Component/Weld ID: 2SGB-OUTLET				Date: 3/17/99		
Weld Length (in.): N/A	Surface Condition: AS MACHINED		Lo: RT "0"		Surface Temperature: <u>97</u> ° <u>F</u>			
Examiner: Jay A. Eaton <i>[Signature]</i>	Level: II	Scans: 45 <input type="checkbox"/> _____ dB 70 <input type="checkbox"/> _____ dB 45T <input type="checkbox"/> _____ dB 70T <input checked="" type="checkbox"/> <u>76</u> dB 60 <input type="checkbox"/> _____ dB 60T <input checked="" type="checkbox"/> <u>67</u> dB Other: _____ dB				Pyrometer S/N: <u>MCNDE 27022</u>		
Examiner: David Zimmerman <i>[Signature]</i>	Level: II					Cal Due: <u>5/17/99</u>		
Procedure: NDE-680	Rev: 1	FC: 95-16	Configuration: <u>INNER RADIUS</u>				N/A Flow N/A	
Calibration Sheet No: 9902035, 9902036						N/A to N/A		Scan Surface: <u>OD</u>
						Applies to NDE-680 only		
						Skew Angle: <u>23.5° .23</u>		

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI		60°														
NRI		70°														

Remarks:			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>[Signature]</i>	Level: <u>III</u>	Date: <u>3-23-99</u>	Authorized Inspector: <i>[Signature]</i> Date: <u>3-24-99</u>
			Item No: B03.140.004

Attachments 1
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**DUKE POWER COMPANY
ISI LIMITATION REPORT**

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2SGB-OUTLET

Item No: B03.140.004

Remarks:

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0+23.5 to L 0+43.8 INCHES FROM WO N/A to N/A
 ANGLE: 0 45 60 Other 70° FROM N/A DEG to N/A DEG

SUPPORT CORNER IS 1.0 FROM C/L OF NOZZLE OD RADIUS

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L N/A to L N/A INCHES FROM WO C/L RADIUS to BEYOND
 ANGLE: 0 45 60 Other 70° FROM 0 DEG to 360 DEG

LIMITED ON NOZZLE FROM C/L OF BLEND RADIUS

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

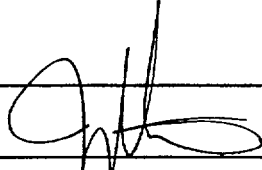
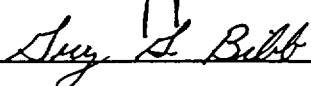
NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L _____ to L _____ INCHES FROM WO _____ to _____
 ANGLE: 0 45 60 Other _____ FROM _____ DEG to _____ DEG

Prepared By: [Signature] Level: II Date: 3/17/99 Sketch(s) attached yes no Sheet _____ of _____

Reviewed By: Guy J. Bell Date: 3-23-99 Authorized Inspector: [Signature] Date: 3-24-99

Attachment 1
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 4/12/99

DUKE POWER COMPANY						NDE-91-1	
Limited Examination Coverage Worksheet						Revision 0	
Examination Volume/Area Defined							
<input type="checkbox"/> Base Metal		<input type="checkbox"/> Weld		<input type="checkbox"/> Near Surface		<input type="checkbox"/> Bolting	<input checked="" type="checkbox"/> Inner Radius
Area Calculation				Volume Calculation			
TOTAL AREA = 5.98 SQ. IN.				5.98 SQ. IN. X 30 IN DIA. TT = 563.6 IN CU.			
Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
60/70		23.5/23°SKEW	4.98	94.25	469.37	563.6	83.28

		Item No:	B03.140.004
Prepared By:		Level:	II
Date:		Date:	3/17/99
Reviewed By:		Level:	III
Date:		Date:	3-23-99

Z SGB - OUTLET NOZZLE

AREA CALCULATION

$$\frac{\sin^2 R\pi - 4.5 \sin^2 R\pi}{4} = 3.73 \text{ in}^2$$

$$4.5 \text{ in} \times 0.5 \text{ in} = \underline{2.25 \text{ in}^2}$$

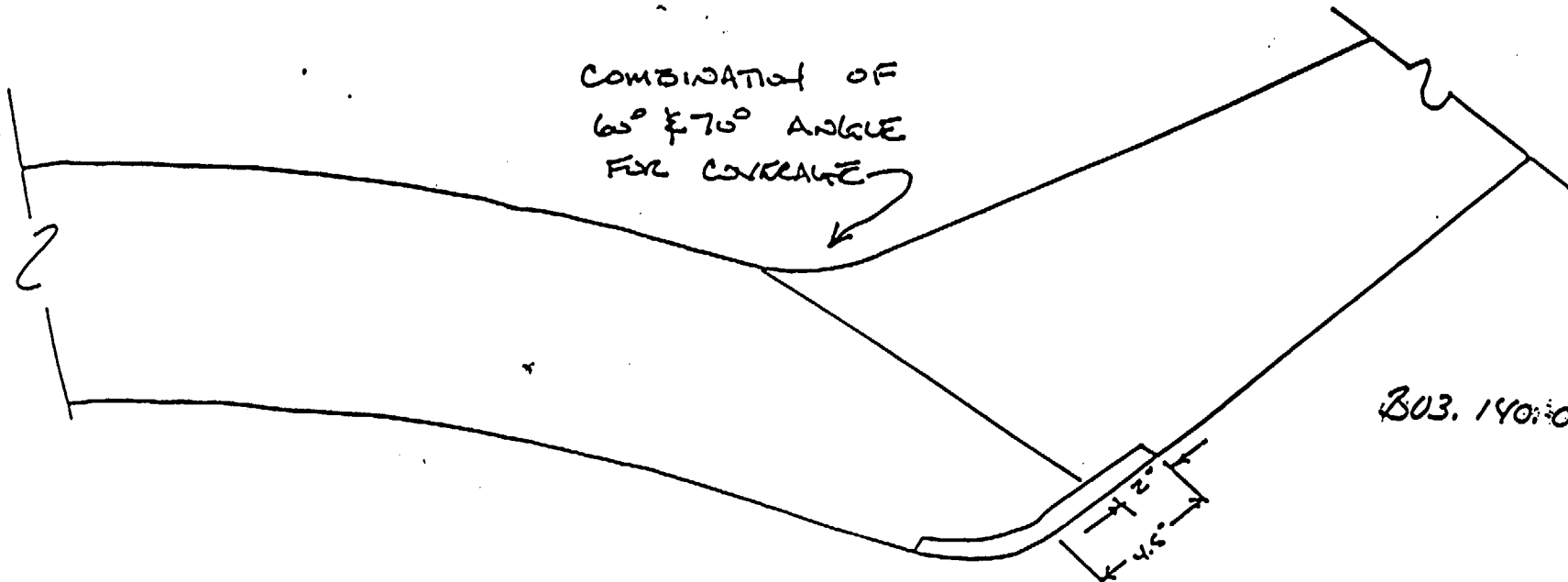
$$\text{TOTAL AREA} = 5.98 \text{ in}^2$$

TOTAL % COVERAGE

$$\frac{4.98 \text{ in}^2}{5.98 \text{ in}^2} = 83.3 \times 100 = \boxed{83.3 \%}$$

AREA ADJUSTED

$$5.98 \text{ in}^2 - (2.0 \text{ in} \times 0.5 \text{ in}) = 4.98 \text{ in}^2$$



B03.140:004

DUKE POWER COMPANY				Exam Start: 1428		Form NDE-UT-2A	
				Exam Finish: 1510		Revision 4	
Station: McGuire		Unit: 2	Component/Weld ID: 2SGB-INLET-W5SE			Date: 3/17/99	
Weld Length (in.): 121.0		Surface Condition: AS MACHINED		Lo: RT"0"		Surface Temperature: <u>94</u> ° F	
Examiner: Guy G. Bibb <i>Guy G. Bibb</i>		Level: III		Scans:		Pyrometer S/N: <u>MCNDE 27022</u>	
Examiner: James L. Panel <i>James L. Panel</i>		Level: II		45 <input type="checkbox"/> _____ dB 70 <input type="checkbox"/> _____ dB		Cal Due: <u>5/17/99</u>	
Procedure: NDE-930 Rev: 1		FC: N/A		45T <input checked="" type="checkbox"/> <u>68.5</u> dB 70T <input type="checkbox"/> _____ dB		Configuration: <u>INLET NOZZLE to SAFE END</u>	
Calibration Sheet No: 9902033, 9902034				60 <input type="checkbox"/> _____ dB		<u>N/A</u> Flow <u>N/A</u>	
				60T <input type="checkbox"/> _____ dB		<u>NOZ -SUR1</u> to <u>END-SUR</u>	
				Other: <u>*33° 62.5</u> dB		Scan Surface: <u>OD</u>	
						Applies to NDE-680 only	
						Skew Angle: <u>N/A</u>	

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
						20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE	DO NOT WRITE IN THIS SPACE	
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac				
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac				
NRI		33°L													
NRI		45°L													

Remarks: * SCANED AT 62.5 db DUE TO SIGNAL TO NOISE RATIO			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-23-99</i>	Authorized Inspector: <i>[Signature]</i> Date: <i>3-24-99</i>
			Item No: B05.070.003

ATTACHMENT 2
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R
G
4/12/99

**DUKE POWER COMPANY
ISI LIMITATION REPORT**

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2SGB-INLET-W5SE

Item No: B05.070.003

Remarks:

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 to L 121.0 INCHES FROM WO N/A to N/A
 ANGLE: 0 45 60 Other _____ FROM 0 DEG to 360° DEG

DUE TO NOZZLE CONFIGURATION

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

Prepared By: GUY G. BIBB *Guy G. Bibb* Level: III Date: 3/17/99 Sketch(s) attached yes no Sheet _____ of _____

Reviewed By: *Ray Muller* Date: 3-23-99 Authorized Inspector: *[Signature]* Date: 3-24-99

ATTACHMENT 7
PAGE 2 OF 8

A
GG
4/12/99

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

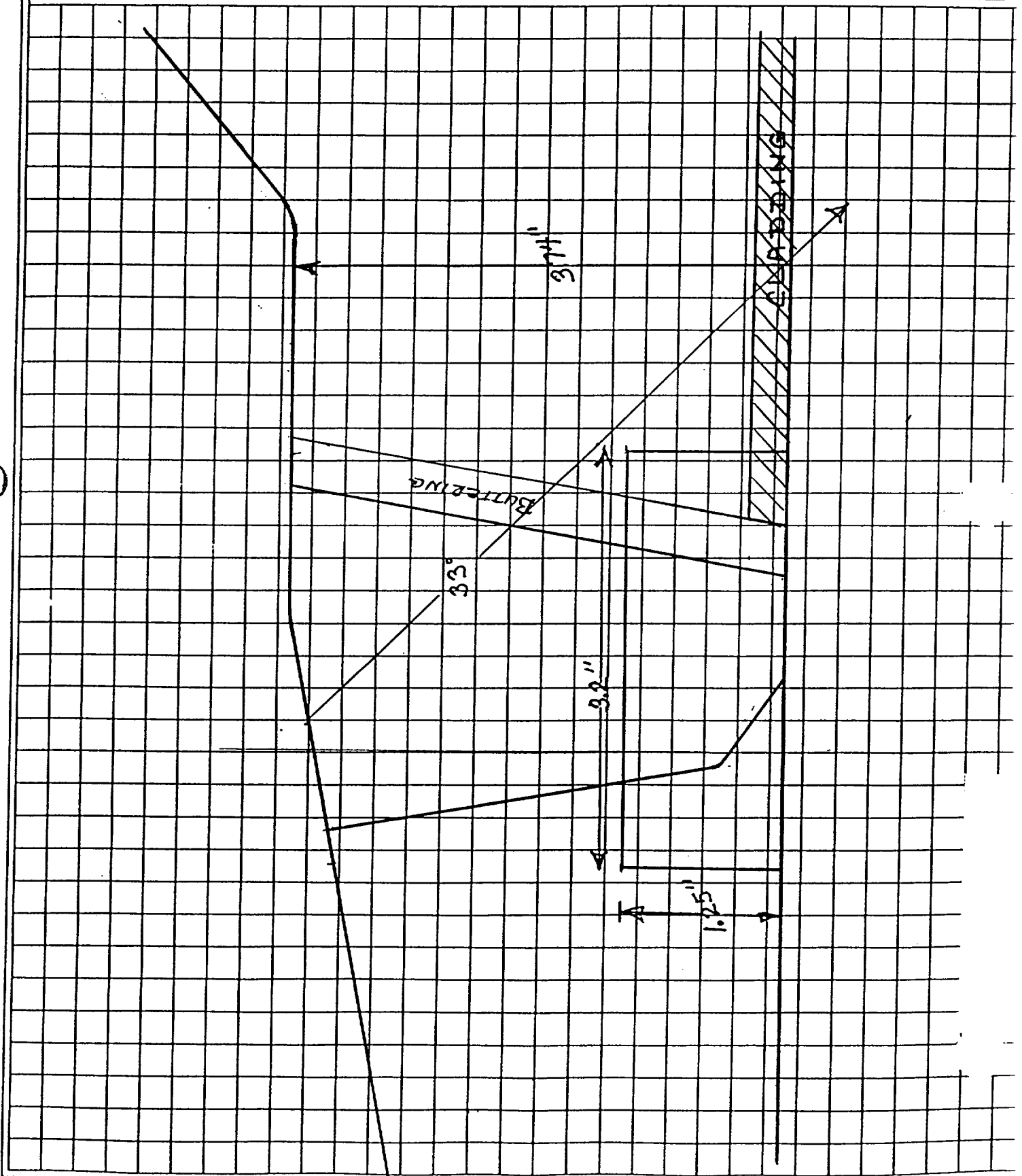
Examination Volume/Area Defined				
<input checked="" type="checkbox"/> Base Metal	<input checked="" type="checkbox"/> Weld	<input type="checkbox"/> Near Surface	<input type="checkbox"/> Bolting	<input type="checkbox"/> Inner Radius

Area Calculation	Volume Calculation
3.2" X 1.25" = 4 SQ. IN.	4 SQ. IN. X 121"(WELD LENGTH) = 484 CU. IN.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	33	1	4	121	484	484	100.00
2	45	2	0	121	0	484	0.00
3	45	CW	4	121	484	484	100.00
4	45	CW	4	121	484	484	100.00
		TOTAL	AGGREGATE	COVERAGE	1452	1936	75.00

		Item No:	B05.070.003
Prepared By: GUY G. BIBB	<i>Guy G. Bibb</i>	Level: III	Date: 3/17/99
Reviewed By:	<i>Larry Maulder</i>	Level: III	Date: 3-23-99

Station MCGUIRE Unit 2 Rev: _____ File No. _____ Sheet _____ Of _____
Subject SATE END TO NOZZLE
2 SG-B-INLET-^{US}SE By Dwight A. Bilt Date 3-17-99
Prob No. B05.070.003 Checked By Larry Moulder Date 3-23-99



DUKE POWER COMPANY						Exam Start: 1330	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1415	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2SGB-OUTLET-W6SE				Date: 3/17/99	
Weld Length (in.): 121.0	Surface Condition: AS MACHINED		Lo: RT"0"		Surface Temperature: <u>94</u> ° <u>F</u>		
Examiner: Guy G. Bibb <i>Guy G. Bibb</i>	Level: III	Scans:		Pyrometer S/N: <u>MCNDE 27022</u>		Cal Due: <u>5/17/99</u>	
Examiner: James L. Panel <i>James L. Panel</i>	Level: II	45 <input type="checkbox"/> _____ dB	70 <input type="checkbox"/> _____ dB	Configuration: <u>UTLET NOZZLE to SAFE EN</u>			
Procedure: NDE-930	Rev: 1	45T <input checked="" type="checkbox"/> <u>68.5</u> dB	70T <input type="checkbox"/> _____ dB	<u>N/A</u> Flow <u>N/A</u>			
	FC: N/A	60 <input type="checkbox"/> _____ dB		<u>NOZ -SUR1</u> to <u>.END-SUR</u>			
Calibration Sheet No: 9902033, 9902034		60T <input type="checkbox"/> _____ dB		Scan Surface: <u>OD</u>			
		Other: <u>*33° 62.5</u> dB		Applies to NDE-680 only			
				Skew Angle: <u>N/A</u>			

IND #	<u>4</u>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA			DO NOT WRITE IN THIS SPACE		
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
NRI	33°L															
NRI	45°L															

Remarks: * SCANED AT 62.5 db DUE TO SIGNAL TO NOISE RATIO			
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet _____ of _____
Reviewed By: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-23-99</i>	Authorized Inspector: <i>[Signature]</i> Date: <i>3-24-99</i>
			Item No: B05.070.004

ATTACHMENT 2
PAGE 5 OF 8

R
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4/18/99

**DUKE POWER COMPANY
ISI LIMITATION REPORT**

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2SGB-OUTLET-W6SE

Item No: B05.070.004

Remarks:

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 to L 121.0 INCHES FROM WO N/A to N/A
 ANGLE: 0 45 60 Other _____ FROM 0 DEG to 360° DEG

DUE TO NOZZLE CONFIGURATION

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

Prepared By: GUY G. BIBB *Guy G. Bibb* Level: III Date: 3/17/99 Sketch(s) attached yes no Sheet _____ of _____

Reviewed By: *Larry Maulder* Date: *3-23-99* Authorized Inspector: *R Klein* Date: *3-24-99*

ATTACHMENT 2
PAGE 6 OF 8
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GG
4/12/99

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

Examination Volume/Area Defined	
<input checked="" type="checkbox"/> Base Metal <input checked="" type="checkbox"/> Weld <input type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius	
Area Calculation	Volume Calculation
3.2" X 1.25" = 4 SQ. IN.	4 SQ. IN. X 121" (WELD LENGTH) = 484 CU. IN.

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	33	1	4	121	484	484	100.00
2	45	2	0	121	0	484	0.00
3	45	CW	4	121	484	484	100.00
4	45	CW	4	121	484	484	100.00
		TOTAL	AGGREGATE	COVERAGE	1452	1936	75.00

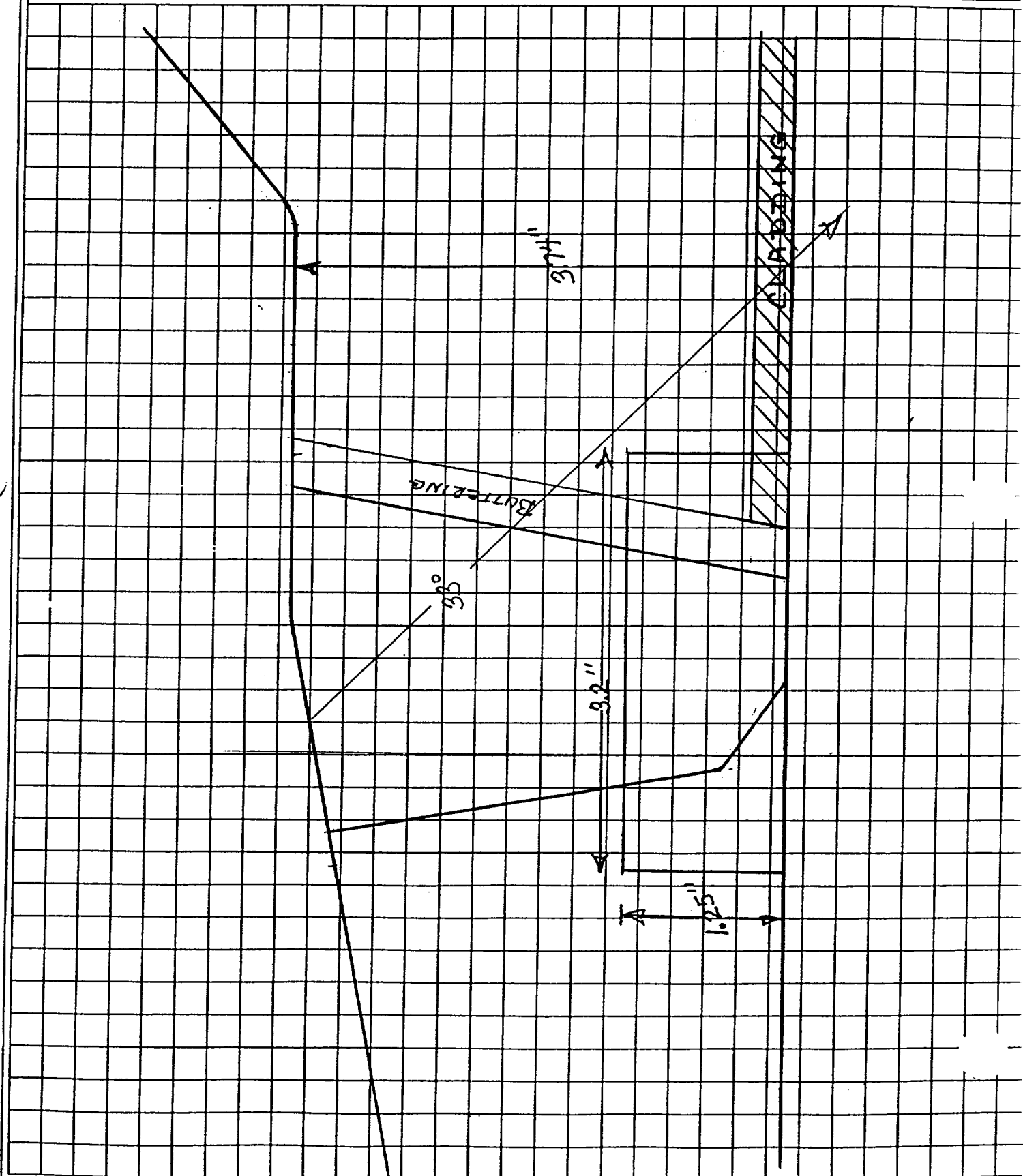
Item No:	B05.070.004
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Prepared By: GUY B. BIBB	<i>Guy B. Bibb</i>	Level: III	Date: 3/17/99
Reviewed By:	<i>Larry Mauldin</i>	Level: III	Date: 3-23-99

Station McGUIRE Unit 2 Rev. File No. Sheet Of

Subject SATE END TO NOZZLE
2 SC-B-OUTLET-SE By Larry S. Bill Date 3-17-90

Prob No. BOS. 070. 004 Checked By Larry Mauldin Date 3-23-90



DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1321 Form NDE-UT-2A
 Exam Finish: 1358 Revision 4

Station: McGuire Unit: 2 Component/Weld ID: 2ASWINJF-1 Date: 3/4/99

Weld Length (in.): 14.5" Surface Condition: AS GROUND Lo: NT W Surface Temperature: 74° ° F

Examiner: Gary J. Moss *Gary J. Moss* Level: II Scans: Pyrometer S/N: MCNDE 27008
 Cal Due: 6/15/99

Examiner: Jay A. Eaton *Jay A. Eaton* Level: II 45 56* dB 70 _____ dB
 Configuration: SHELL to UPPER FLANGE

Procedure: NDE-630 Rev: 2 FC: 45T 45* dB 70T _____ dB
 UPPER FLANG Flow SHELL

Calibration Sheet No: 99-02 60 52.5* dB
 S1 to S2

9902015, 9902016, 9902017 60T _____ dB
 Scan Surface: OD

Other: _____ dB Applies to NDE-680 only
 Skew Angle: N/A

IND #	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE		
					50%dac	50%dac	50%dac	50%dac	50%dac	50%dac				
					100%dac	100%dac	100%dac	100%dac	100%dac	100%dac				
NRI	45°													
NRI	45°L													
NRI	60°L													

Remarks: * Db REDUCED TO OBTAIN 2 : 1 SIGNAL TO NOISE RATIO.

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

Reviewed By: *Rod Sheffield* Level: II Date: 3-11-99 Authorized Inspector: *[Signature]* Date: 3-17-99 Item No: C01.010.100

SERIAL NO: 99-061
 ATTACHMENT 3
 PAGE 1 OF 10
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 4/13/99

**DUKE POWER COMPANY
ISI LIMITATION REPORT**

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2ASWINJF-1

Item No: C01.010.100

Remarks:

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 + 1.5" to L 0 - 1.5" INCHES FROM WO C/L + .75 to BEYOND
 ANGLE: 0 45 60 Other _____ FROM _____ DEG to _____ DEG

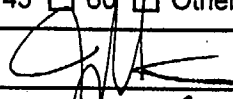
COUPLING WELD

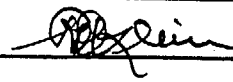
NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L _____ to L _____ INCHES FROM WO C/L + 1" to BEYOND
 ANGLE: 0 45 60 Other _____ FROM 0 DEG to 360 DEG

FLANGE TAPER

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

Prepared By:  Level: II Date: 3/4/99 Sketch(s) attached yes no Sheet _____ of _____

Reviewed By: Paul Sheffield Date: 3-11-99 Authorized Inspector:  Date: 3-17-99

ATTACHMENT 3
PAGE 2 OF 10

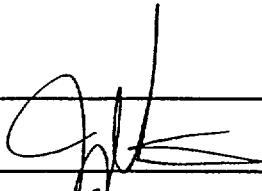
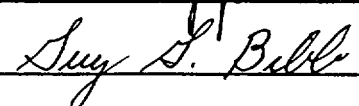
R
G
4/1/99

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

Examination Volume/Area Defined					
<input checked="" type="checkbox"/> Base Metal	<input checked="" type="checkbox"/> Weld	<input type="checkbox"/> Near Surface	<input type="checkbox"/> Bolting	<input type="checkbox"/> Inner Radius	

Area Calculation	Volume Calculation
.7" AREA EXAMINED FOR 11.5" OF WELD. (3" IN THE S1 AND S2 DIRECTIONS COULD NOT BE EXAMINED DUE TO COUPLING).	

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45°	CW	0.7	14.5	10.15	10.15	100.00
2	45°	CCW	0.7	14.5	10.15	10.15	100.00
3	45°	S1/S2	0.7	11.5	8.05	10.15	79.31
4	60°	S1/S2	0.7	11.5	8.05	10.15	79.31
TOTAL			AGGREGATE	COVERAGE	36.4	40.6	89.66

		Item No:	C01.010.100
Prepared By:		Level:	II
			Date: 3/10/99
Reviewed By:		Level:	III
			Date: 3-11-99

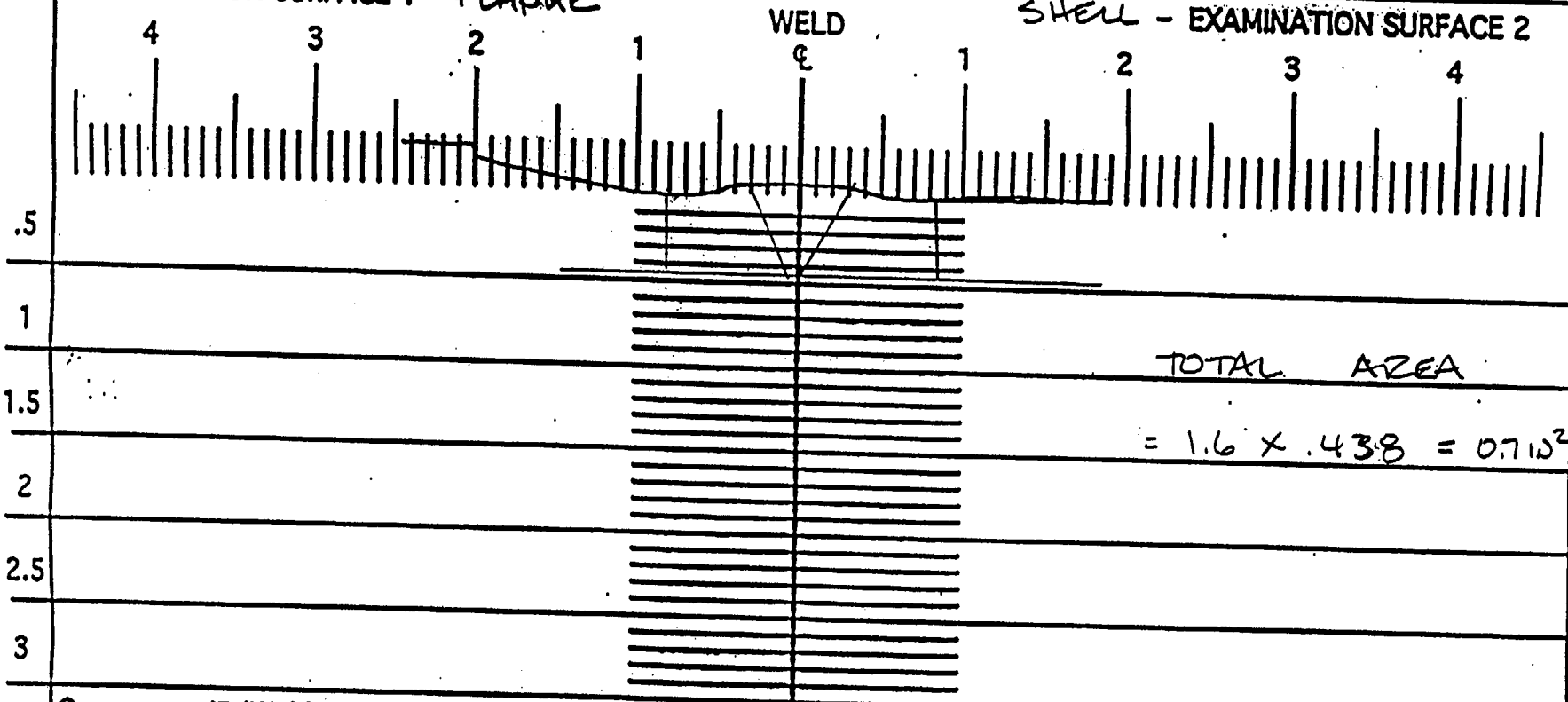
DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

EXAMINATION SURFACE 1 FLANGE

SHELL - EXAMINATION SURFACE 2



Component ID/Weld No. ZASWINTF-1

Remarks:

Examiner:

Reviewed By:

Authorized Inspector:

Item No: C01.010.100

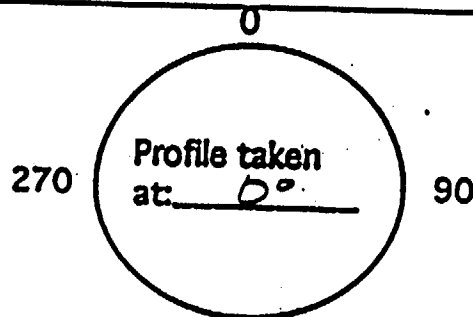
Level: II

Date: 3/10/99

Level: III

Date: 3-11-99

Date: 3-17-99



180 Sheet of

DUKE POWER COMPANY						Exam Start: 1321	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 1358	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2ASWINJF-2				Date: 3/4/99	
Weld Length (in.): 14.5"	Surface Condition: AS GROUND			Lo: NT W	Surface Temperature: <u>74</u> ° ° <u>F</u>		
Examiner: Gary J. Moss <i>Gary J. Moss</i>	Level: II	Scans:				Pyrometer S/N: <u>MCNDE 27008</u>	
Examiner: Jay A. Eaton <i>Jay A. Eaton</i>	Level: II	45 <input checked="" type="checkbox"/> <u>56*</u> dB	70 <input type="checkbox"/> _____ dB	Cal Due: <u>6/15/99</u>		Configuration: <u>SHELL to LOWER FLANGE</u>	
Procedure: NDE-630	Rev: 2	45T <input checked="" type="checkbox"/> <u>45*</u> dB	70T <input type="checkbox"/> _____ dB	S1 _____ Flow _____ S2 _____		<u>SHELL to L. FLANGE</u>	
Calibration Sheet No: 9902015, 9902016, 9902017	FC: 99-02	60 <input checked="" type="checkbox"/> <u>52.5*</u> dB	60T <input type="checkbox"/> _____ dB	Scan Surface: <u>OD</u>		Applies to NDE-680 only	
				Other: _____ dB	Skew Angle: N/A		

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE			
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
1		45°L	178%	.655	.65	INT	360	N/A	N/A	N/A	N/A	2	1	AXIAL	NO	
2		60°L	158%	.916	.95	INT	360	N/A	N/A	N/A	N/A	2	1	AXIAL	NO	
NRI		45°														

Remarks: * Db REDUCED TO OBTAIN 2 : 1 SIGNAL TO NOISE RATIO

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

Reviewed By: <i>Rod Sheffield</i>	Level: <u>II</u>	Date: <u>3-11-99</u>	Authorized Inspector: <i>R. Quinn</i>	Date: <u>3-17-99</u>	Item No: C01.010.101
--------------------------------------	---------------------	-------------------------	--	-------------------------	-------------------------

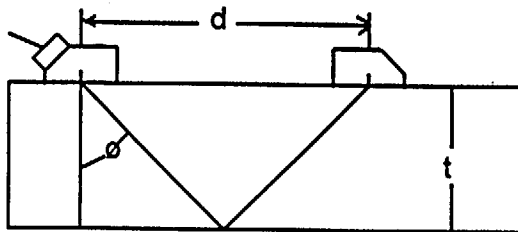
ATTACHMENT 3
PAGE 5 OF 10

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4/13/99

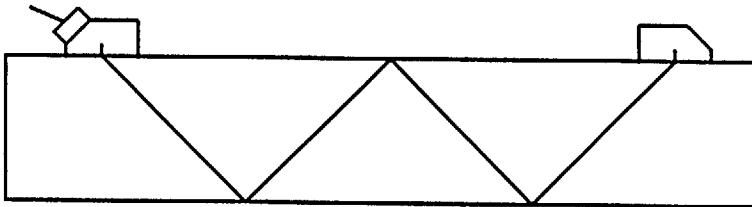
**DUKE POWER COMPANY
ULTRASONIC BEAM ANGLE MEASUREMENT RECORD**

Form NDE-UT-9

Revision 3



$$\tan \phi = \frac{(d/2)}{t}$$



For thin wall pipe use 2nd Vee path

$$\tan \phi = \frac{(d/2)}{2t}$$

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

Pipe Size: _____ 4" _____

Pipe Schedule: _____

Nominal 45 deg: d= 0.8 ; t= 0.438 ; measured angle= 42.50 deg
 Nominal 60 deg: d= 0 ; t= 0 ; measured angle= 0.00 deg
 Nominal 70 deg: d= 0 ; t= 0 ; measured angle= 0.00 deg

Item No.
C01.010.101

Examiner Jay A. Eaton	Level II	Date 3/4/99	Examiner Gary J. Moss	Level II	Date 3/4/99
Reviewed By <i>Rod Sheffield</i>	Level II	Date 3-11-99	Authorized Inspector <i>G. J. Moss</i>	Date 3-17-99	

ATTACHMENT 3
PAGE 6 OF 10

R
3/13/99

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2ASWINJF-2

Item No: C01.010.101

Remarks:

NO SCAN

SURFACE

BEAM DIRECTION

FLANGE TAPER

LIMITED SCAN

1 2

1 2 cw ccw

FROM L _____ to L _____ INCHES FROM WO C/L + .8" 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 WO _____ 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 WO _____ 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 WO _____ to _____

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

Prepared By: 

Level: II

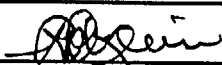
Date: 3/4/99

Sketch(s) attached yes no

Sheet _____ of _____

Reviewed By: Rod Sheffield

Date: 3-11-99

Authorized Inspector: 

Date: 3-17-99

ATTACHMENT 3
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R
3
4/13/99

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

Examination Volume/Area Defined				
<input checked="" type="checkbox"/> Base Metal	<input checked="" type="checkbox"/> Weld	<input type="checkbox"/> Near Surface	<input type="checkbox"/> Bolting	<input type="checkbox"/> Inner Radius

Area Calculation	Volume Calculation
SEE ATTACHED SHEETS	SEE ATTACHED SHEETS

Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45°	CW	.7	14.5	10.15	10.15	100.00
2	45°	CCW	.7	14.5	10.15	10.15	100.00
3	45°	S1	.39	14.5	5.7	10.15	56.16
4	45°	S2	.6	14.5	8.7	10.15	85.71
5	60°	S1	.36	14.5	5.22	10.15	51.43
6	60°	S2	.62	14.5	8.99	10.15	88.57
		TOTAL	AGGREGATE	COVERAGE	48.91	60.9	80.31

		Item No: C01.010.101
Prepared By:	Level: II	Date: 3/10/99
Reviewed By:	Level: III	Date: 3-11-99

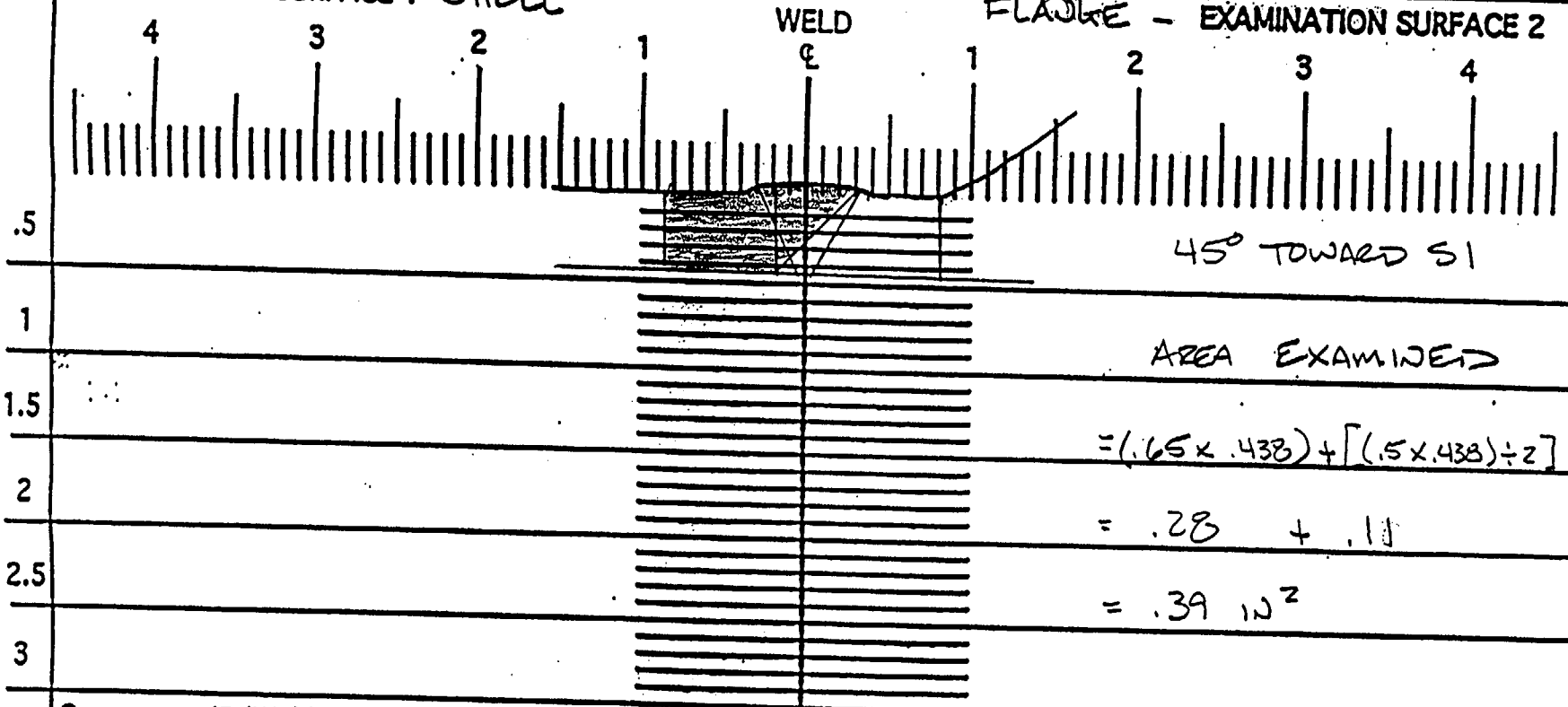
DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

EXAMINATION SURFACE 1 - SHELL

FLAJOKE - EXAMINATION SURFACE 2



AREA EXAMINED

$$= (.65 \times .438) + [(.5 \times .438) \div 2]$$

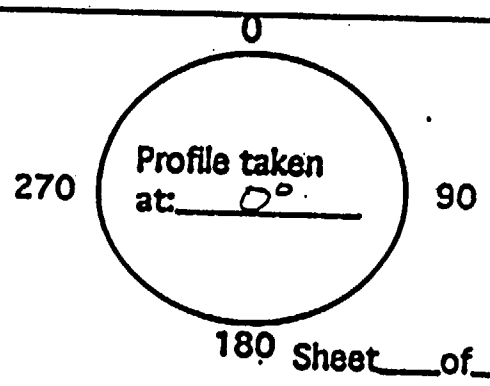
$$= .28 + .11$$

$$= .39 \text{ in}^2$$

Component ID/Weld No. ZASWINJF-2

Remarks:

Examiner: *[Signature]* Item No: C01.010.101
 Reviewed By: *[Signature]* Level: II Date: 3/10/99
 Authorized Inspector: *[Signature]* Level: III Date: 3-11-99



180 Sheet of

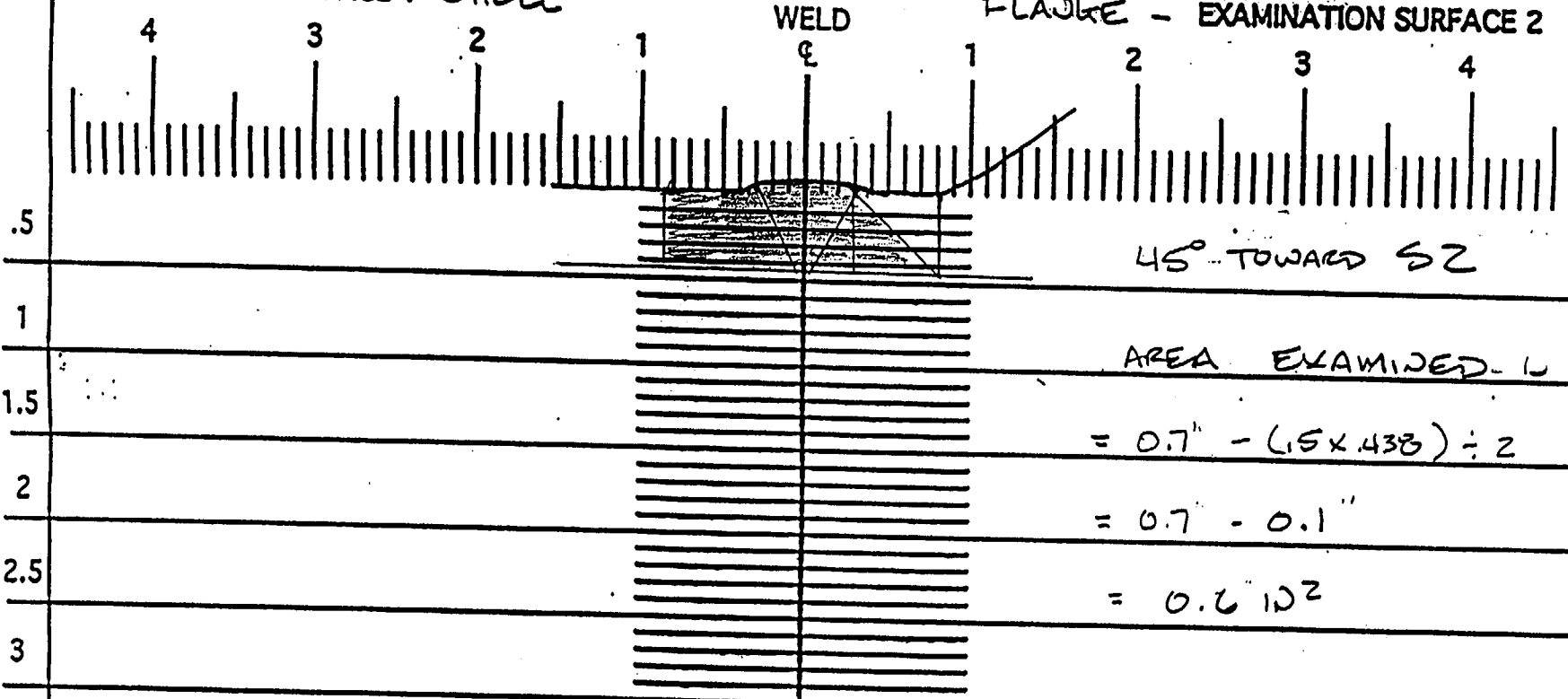
DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

EXAMINATION SURFACE 1-SHELL

FLAW - EXAMINATION SURFACE 2



45° TOWARD SZ

AREA EXAMINED - L

$$= 0.7" - (15 \times .438) \div 2$$

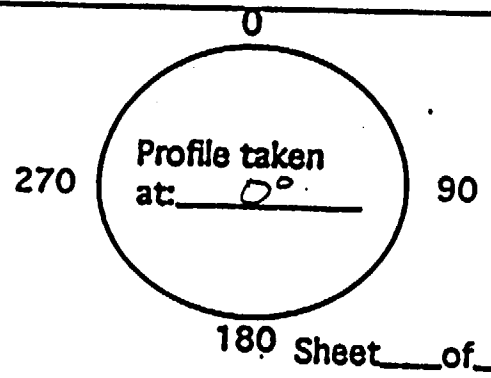
$$= 0.7 - 0.1"$$

$$= 0.6" \text{ ID}^2$$

Component ID/Weld No. ZASWINJF-2

Remarks:

Examiner: *[Signature]* Item No: C01.010.101
 Reviewed By: *[Signature]* Level: II Date: 3/10/99
 Authorized Inspector: *[Signature]* Level: IV Date: 3-11-99



180 Sheet of

DUKE POWER COMPANY						Exam Start: 0810	Form NDE-UT-2A
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS						Exam Finish: 0829	Revision 4
Station: McGuire	Unit: 2	Component/Weld ID: 2ACSHX-SH-48				Date: 3/12/99	
Weld Length (in.): 175"	Surface Condition: AS GROUND	Lo: 0°	Surface Temperature: 74 ° F				
Examiner: Jay A. Eaton <i>[Signature]</i>	Level: II	Scans:				Pyrometer S/N: MCNDE 27008	
Examiner: Gayle E. Houser <i>[Signature]</i>	Level: II	45 <input checked="" type="checkbox"/> 33 dB	70 <input type="checkbox"/> _____ dB	Cal Due: 6/15/99			
Procedure: NDE-630	Rev: 2	45T <input checked="" type="checkbox"/> 33 dB	70T <input type="checkbox"/> _____ dB	Configuration: SHELL to TUBESHEET			
FC:	99-02	60 <input type="checkbox"/> _____ dB	S1 Flow S2				
Calibration Sheet No: 9902025, 9902026		60T <input type="checkbox"/> _____ dB	T-SHEET to SHELL				
		Other: _____ dB	Scan Surface: OD				
				Applies to NDE-680 only			
				Skew Angle: N/A			

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps	
		DO NOT WRITE IN THIS SPACE				20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA		DO NOT WRITE IN THIS SPACE			
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac					
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac					
1	45°	100	1.1	0.4	163.0"	360°	INT	N/A	N/A	N/A	N/A	2	1	AXIAL	NO	

Remarks:					
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>					Sheet _____ of _____
Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
<i>[Signature]</i>	III	3-16-99	<i>[Signature]</i>	3-20-99	C01.030.010

SERIAL NO: 99-001
 ATTACHMENT 4
 PAGE 1 OF 4

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 4/13/99

**DUKE POWER COMPANY
ISI LIMITATION REPORT**

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2ACSHX-SH-48

Item No: C01.030.010

Remarks:

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 - 10" to L 0 + 10" INCHES FROM WO S1 + 1.5 to S2 + .5
 ANGLE: 0 45 60 Other _____ FROM _____ DEG to _____ DEG

THESE AREAS WERE NOT ACCESSABLE TO PREP THE WELD.

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 + 20" to L 0 + 65.5" INCHES FROM WO S1 + 1.5 to S2 + .5
 ANGLE: 0 45 60 Other _____ FROM _____ DEG to _____ DEG

100% OF WELD EXAMINED IN AREAS THAT WERE SCANNED

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 + 77.5" to L 0 + 95.5" INCHES FROM WO S1 + 1.5 to S2 + .5
 ANGLE: 0 45 60 Other _____ FROM _____ DEG to _____ DEG

TOTAL COVERAGE = 24%

NO SCAN SURFACE BEAM DIRECTION
 LIMITED SCAN 1 2 1 2 cw ccw
 FROM L 0 + 105.5" to L 0 + 155" INCHES FROM WO S1 + 1.5 to S2 + .5
 ANGLE: 0 45 60 Other _____ FROM _____ DEG to _____ DEG

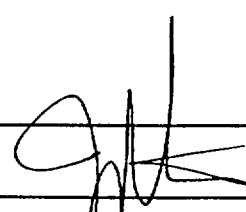
Prepared By: JAY A. EATON *[Signature]* Level: II Date: 3/12/99 Sketch(s) attached yes no Sheet _____ of _____

Reviewed By: *Larry S. Babl* Date: 3-16-99 Authorized Inspector: *[Signature]* Date: 3-20-99

ATTACHMENT 4
PAGE 2 OF 4

[Signature]
4/13/99

DUKE POWER COMPANY						NDE-91-1	
Limited Examination Coverage Worksheet						Revision 0	
Examination Volume/Area Defined							
<input checked="" type="checkbox"/> Base Metal		<input checked="" type="checkbox"/> Weld		<input type="checkbox"/> Near Surface		<input type="checkbox"/> Bolting	<input type="checkbox"/> Inner Radius
Area Calculation				Volume Calculation			
SEE ATTACHED SKETCH = 1.4 Sq IN				SEE NDE-UT-4. ONLY 42" OF 175" TOTAL WELD LENGTH INSPECTED.			
Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1-4	45	ALL	1.4	42	58.8	245	24.00

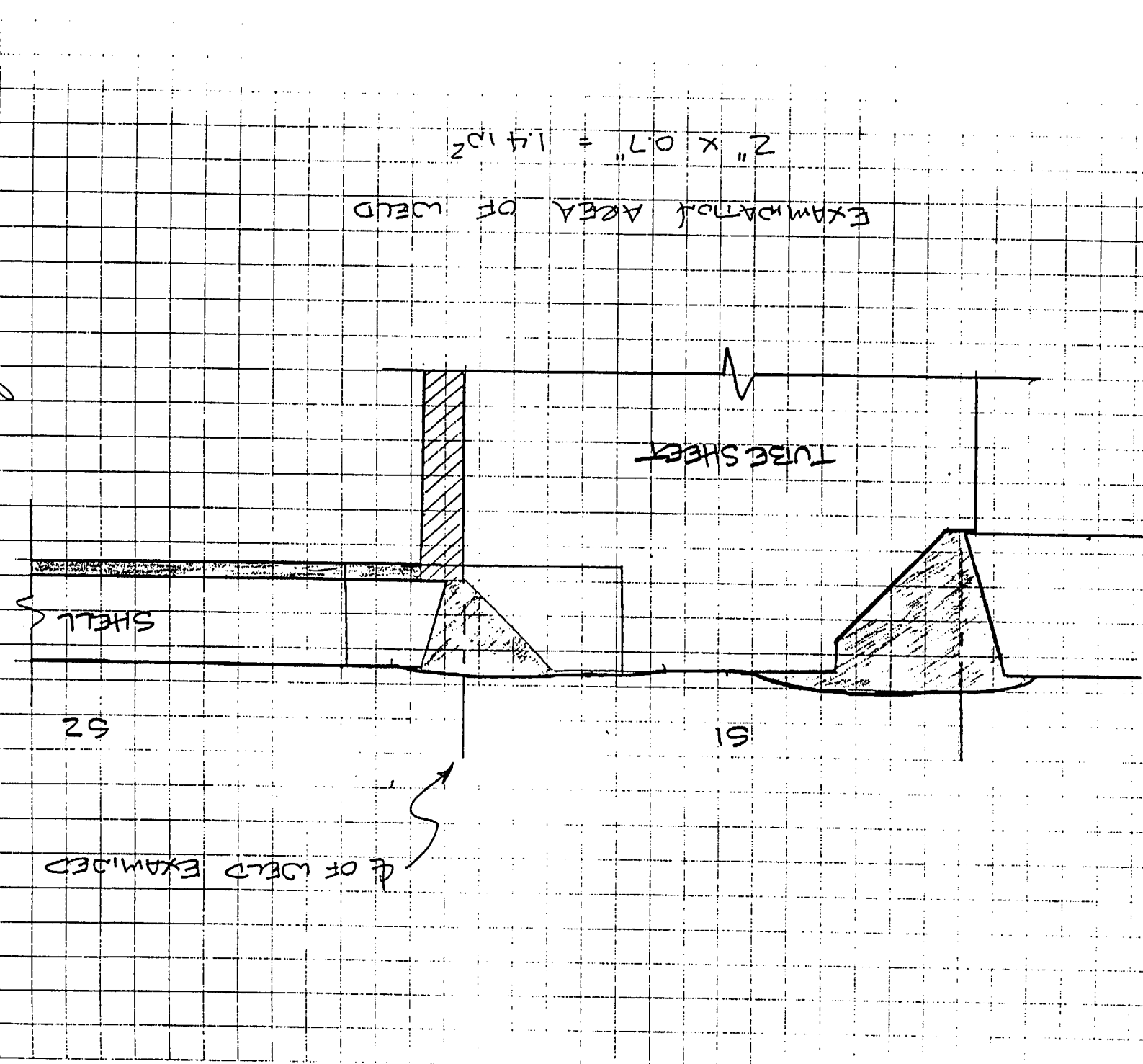
			Item No:	C01.030.010	
Prepared By: JAY A. EATON			Level:	II	
Reviewed By: <i>Larry S. Bell</i>			Level:	III	
			Date:	3/12/99	
			Date:	3-16-99	

Station MC GUITRE Unit Z Rev. _____ File No. _____ Sheet _____ Of _____

Subject CONTAINMENT SPRAY HX ZA SHELL TO TUBESHEETS

ITEM # CD1.030.010 By [Signature] Date 3/15/99

Prob No. WEUD # ZACSHX-SH-48 Checked by [Signature] Date 3-16-99



EXAMPLE OF AREA OF WELD
2" x 0.7" = 1.4102