Duke Energy

H. B. Barron
Vice President

Duke Energy Corporation
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-9340
(704) 875-4800 OFFICE
(704) 875-4809 FAX

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Subject: McGuire Nuclear Station
Docket No. 50-370
Relief Request 98-005

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 98-005.

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

Sincerely,

/s/ H B Barron

H. B. Barron, Vice President
McGuire Nuclear Station

Attachment

A047

cc: Mr. L. A Reyes
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Mr. F. Rinaldi, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 9H3
Washington, D.C. 20555

S. M. Shaeffer
Senior NRC Resident Inspector
McGuire Nuclear Station

bxc w/att: J. W. Bryant
J. O. Barbour
R. Branch
G. J. Underwood
D. E. Caldwell
R. K. Rhyne
G. D. Scarboro
NRIA File/ELL

Duke Energy Corporation

Station: McGuire Unit 2

SECOND 10-YEAR INTERVAL REQUEST FOR RELIEF NO. 98-005

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-A: (Pressure Retaining Welds in Reactor Vessel)

Reactor Vessel (Head-to-Flange Weld)

ID Numbers	Item Numbers	End Of Cycle
2RPV-W08	B01.040.001	11

Examination Category B-D: (Full Penetration Welds of Nozzles in Vessels)

Reactor Vessel (Nozzle-to-Vessel Welds)

ID Numbers	Item Numbers	End Of Cycle
2RPV-W15	B03.090.05A	9
2RPV-W16	B03.090.06A	9
2RPV-W17	B03.090.07A	9
2RPV-W18	B03.090.08A	9

Reactor Vessel (Nozzle Inner Radius Section)

ID Numbers	Item Numbers	End Of Cycle
2RPV-W15	B03.100.005	9
2RPV-W16	B03.100.006	9
2RPV-W17	B03.100.007	9
2RPV-W18	B03.100.008	9

Pressurizer (Nozzle-to-Vessel Welds)

ID Numbers	Item Numbers	End Of Cycle
2PZR-10	B03.110.001	11
2PZR-12	B03.110.003	10

Examination Category B-D (continued)

Pressurizer (Nozzle Inner Radius Section)

ID Numbers	Item Numbers	End Of Cycle
2PZR-12R	B03.120.002	10

Examination Category B-F: (Pressure Retaining Dissimilar Metal Welds)

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

ID Numbers	Item Numbers	End Of Cycle
2SGA-INLET-SE	B05.070.001	9
2SGA-OUTLET-SE	B05.070.002	9

Piping Dissimilar Metal Butt Welds

ID Numbers	Item Numbers	End Of Cycle
2NC2F-1-2	B05.130.002	9
2NC2F-1-3	B05.130.003	9

Examination Category B-J: (Pressure Retaining Welds in Piping)

Branch Connection Welds (NPS 4 or Larger)

ID Numbers	Item Numbers	End Of Cycle
2NC16-WN8A	B09.031.001	10
2NC22-WN4	B09.031.002	9
2NC22-WN8	B09.031.003	9

ASME Section XI Class 2 Components listed below:

Examination Category C-B: (Pressure Retaining Nozzle Welds in Vessels)

Nozzle Inner Radius Section

ID Numbers	Item Numbers	End Of Cycle
2SGA-SB-02	C02.022.002	9

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 each Examination Categories as shown below:

"Examination Category B-A, Pressure Retaining Welds in Reactor Vessels; Figure Number IWB-2500-5"
Note (2) adds the words "Includes essentially 100% of weld length."

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

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

"Examination Category B-J, Pressure Retaining Welds in Piping; Figure Number IWB-2500- 9, 10 and 11"
Note (3) adds the words "Includes essentially 100% of weld length."

"Examination Category C-B, Pressure Retaining Nozzle Welds in Vessels; Figure Number IWC-2500-4 (a) or (b)"
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-A

Reactor Vessel (Head-to-Flange Weld)

Item Numbers	Actual Coverage Obtained	
B01.040.001	87.78%	See Note 1

Examination Category B-D

Reactor Vessel (Nozzle-to-Vessel Welds)

Item Numbers	Actual Coverage Obtained	
B03.090.005A	43.70%	See Note 1
B03.090.006A	43.70%	See Note 1
B03.090.007A	43.70%	See Note 1
B03.090.008A	43.70%	See Note 1

Reactor Vessel (Nozzle Inner Radius Section)

Item Numbers	Actual Coverage Obtained	
B03.100.005	87.70%	See Note 1
B03.100.006	87.70%	See Note 1
B03.100.007	87.70%	See Note 1
B03.100.008	87.70%	See Note 1

Pressurizer (Nozzle-to-Vessel Welds)

Item Numbers	Actual Coverage Obtained	
B03.110.001	74.78%	See Note 1
B03.110.003	71.50%	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.

Examination Category B-D

Pressurizer (Nozzle Inner Radius Section)

Item Numbers	Actual Coverage Obtained	
B03.120.002	62.86%	See Note 2

NOTE 2
ASME Section XI, 1989 Edition, Examination Volume shown in Figure IWB-2500-7 (b)

Examination Category B-F

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

Item Numbers	Actual Coverage Obtained	
B05.070.001	75.00%	See Note 3
B05.070.002	75.00%	See Note 3

Piping Dissimilar Metal Butt Welds

Item Numbers	Actual Coverage Obtained	
*B05.130.002	75.00%	See Note 3
*B05.130.003	75.00%	See Note 3

*Item numbers B05.130.002 and B05.130.003 no longer exist due to the Steam Generators being replaced. The new welds are no longer considered to be Dissimilar Metal Welds.

Examination Category B-J

Branch Connection Welds (NPS 4 or Larger)

Item Numbers	Actual Coverage Obtained	
B09.031.001	49.40%	See Note 3
B09.031.002	49.81%	See Note 3
B09.031.003	50.00%	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-B

Nozzle Inner Radius Section

Item Numbers	Actual Coverage Obtained	
C02.022.002	84.30%	See Note 4

Note 4
Limitations caused by the ratio of the nozzle OD to the vessel thickness resulted in 84.30% coverage of the required volume. When the nozzle OD 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 inner radius sections are examined with the ultrasonic method to the maximum extent practical from the vessel wall. Calibration blocks and procedures are in accordance with ASME Section V, Article 4.

IV. Basis for Relief:

ASME Section XI Class 1 Components listed below:

Examination Category B-A, Item B01.040, Pressure Retaining Welds in Reactor Vessel

During the ultrasonic examination of the Reactor Vessel Closure Head Weld 2RPV-W08 (Item Number B01.040.001) shown in Attachment 1, coverage of required examination volume could not be obtained. Geometric limitations caused by the proximity of lifting lugs and the head flange resulted in examination coverage of 87.78%. In order to achieve greater than 90% coverage, the weld would have to be redesigned to eliminate the interferences.

Examination Category B-D, Items B03.090., B03.100., B03.110., B03.120., Full Penetration Welds of Nozzles in Vessels and Nozzle Inner Radius Sections

During the ultrasonic examination of the Reactor Vessel Outlet Nozzle to Shell Welds

2RPV-W15 (Item Number B03.090.005A)
2RPV-W16 (Item Number B03.090.006A)
2RPV-W17 (Item Number B03.090.007A)
2RPV-W18 (Item Number B03.090.008A)

shown in Attachment 2, coverage of the required examination volume was limited to 43.70%. Limitations caused by the nozzle geometry, i.e. the nozzle taper prevented obtaining greater than 90% coverage. In order to achieve additional coverage, the nozzle would have to be re-designed to eliminate the taper.

During the ultrasonic examination of the Reactor Vessel Outlet Nozzle to Shell Welds (Inner Radius Sections)

2RPV-W15 (Item Number B03.100.005)
2RPV-W16 (Item Number B03.100.006)
2RPV-W17 (Item Number B03.100.007)
2RPV-W18 (Item Number B03.100.008)

shown in Attachment 2, coverage of the required examination volume was limited to 87.70%. Limitations caused by the nozzle geometry, i.e. the nozzle taper prevented obtaining greater than 90% coverage. In order to achieve additional coverage, the nozzle would have to be re-designed to eliminate the taper.

During the ultrasonic examination of the Pressurizer Nozzle to Lower Head Weld 2PZR-10 (Item Number B03.110.001) shown in Attachment 3, coverage of the required examination volume could not be obtained. The examination coverage was limited to 74.78%, 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 Nozzle to Upper Head Weld 2PZR-12 (Item Number B03.110.003) shown in Attachment 3, coverage of the required examination volume could not be obtained. The examination coverage was limited to 71.50%, 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 Spray Nozzle to Upper Head Weld 2PZR-12R (Item Number B03.120.002) shown in Attachment 3, coverage of the required examination volume could not be obtained. The examination coverage was limited to 62.86%. 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. Single-sided access caused by the nozzle geometry resulted in limited coverage of the required volume. In order to achieve more coverage the nozzle would have to be redesigned to allow access from both sides.

Examination Category B-F, Items B5.70., B5.130. Pressure Retaining Dissimilar Metal Welds

Note: These 4 welds were cut out and re-welded due to Steam Generator Replacement

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

2SGA-Inlet SE (B05.070.001) and
2SGA-Outlet SE (B05.070.002)

shown in Attachment 4, coverage of required examination volume could not be obtained. The examination coverage was limited to 75.00%. SEE NOTE 5.

During the ultrasonic examination of the Piping Dissimilar Metal Welds (Steam Generator Safe End to Pipe):

2NC2F-1-2 (B05.130.002) and
2NC2F-1-3 (B05.130.003)

shown in Attachment 4, coverage of required examination volume could not be obtained. The examination coverage was limited to 75.00%. SEE NOTE 5.

NOTE 5
Material characteristics and single-sided access caused by the component geometry prevents two-beam path direction coverage of the examination volume.

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

The calculations below 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.

$$\text{Sin}^{-1} = (\sin 45° \times V_s) + V_L$$

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

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/μsec.

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

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.

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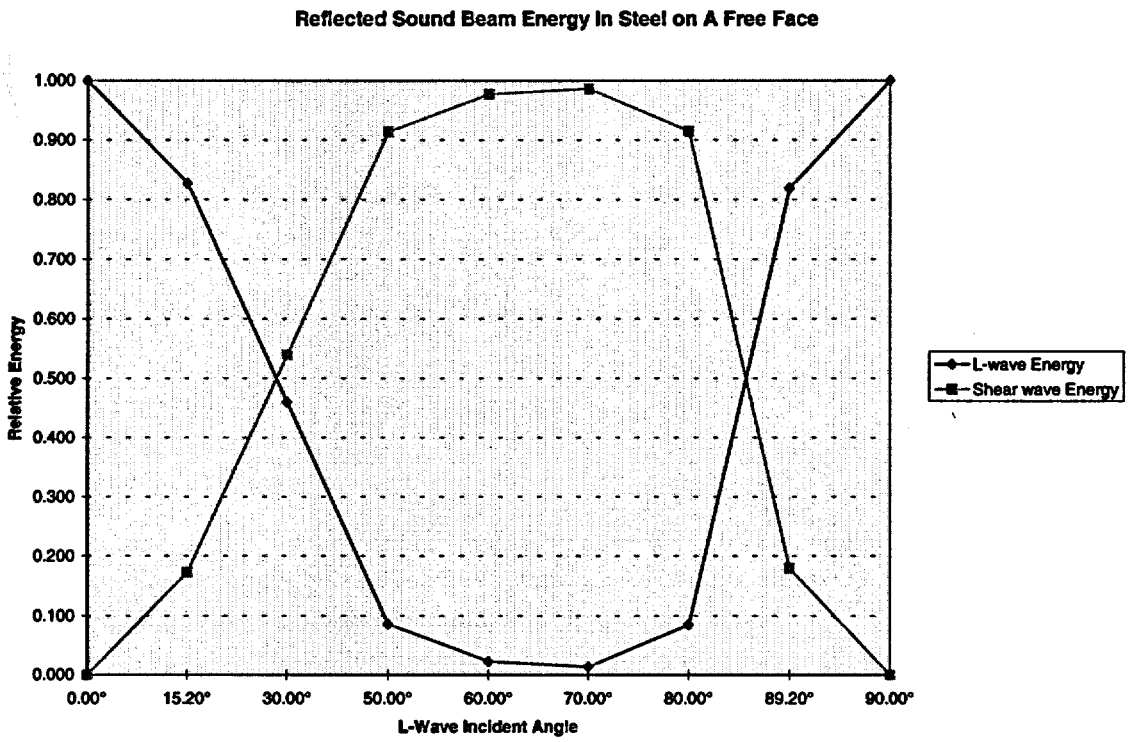
[1] Firestone, F. A. : Tricks with the Supersonic Reflectoscope, *J. Soc. Nondestructive Testing*, vol. 7, no. 2 Fall 1948.



Examination Category B-J Item B09.031.Pressure Retaining Welds in Piping

During the ultrasonic examination of Weld Number 2NC16-WN8A (B09.031.001) shown in Attachment 5, coverage of required examination volume could not be obtained. The examination coverage was limited to 49.40%. SEE NOTE 6.

During the ultrasonic examination of Weld Number 2NC22-WN4 (B09.031.002) shown in Attachment 5, coverage of required examination volume could not be obtained. The examination coverage was limited to 49.81%. SEE NOTE 6.

During the ultrasonic examination of Weld Number 2NC22-WN8 (B09.031.003) shown in Attachment 5, coverage of required examination volume could not be obtained. The examination coverage was limited to 50.00%. SEE NOTE 6.

Note 6
Single-sided access caused by the branch connection geometry prevents scanning from both sides of the weld.

Cast stainless steel characteristics mandate the use of refracted longitudinal waves. This type of ultrasonic

wave produces mode conversion at the pipe inside surface, thus preventing the use of sound path distances beyond the first "leg". Therefore, coverage of the required examination volume in two-beam path directions is not practical. In order to obtain the required two-beam path direction coverage, the branch connections and the elbow to pump weld would have to be re-designed to allow scanning from both sides of the weld over the required examination volume.

ASME Section XI Class 2 Components listed below:

Examination Category C-B, Items C2.22 Pressure Retaining Nozzle Welds in Vessels

NOTE: THIS WELD AND GENERATOR HAVE BEEN REPLACED

During the ultrasonic examination of the Feedwater Nozzle Inner Radius 2SGA-SB-02 (C02.022.002) shown in Attachment 6, coverage of the required examination volume was limited to 84.30%. Limitations were caused by the ratio of the nozzle OD to the vessel thickness. When the nozzle OD is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Duke Energy Corporation is investigating the use of computer modeling to solve the limitation problem.

Nozzle inner 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.

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 the pressure test to compliment the limited examination coverage. The Code requires (reference Table IWB-2500-1, Item Number B15.) that a system leakage test be performed after each refueling outage. Additionally a system hydrostatic test (reference Table IWB-2500-1, Item Number B15.) is required once during each 10-year inspection interval. These tests require a VT-2 visual examination for evidence of leakage. This testing will provide adequate assurance of pressure boundary integrity.

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

VI. Justification for the Granting of Relief

Examination Category B-A, Item B01.040, Pressure Retaining Welds in Reactor Vessel

During the ultrasonic examination of the Reactor Vessel Closure Head Weld 2RPV-W08 (Item Number B01.040.001) coverage of the required volume was limited to 87.78%. This limitation is caused by the proximity of three lifting lugs and the head flange. In order to achieve greater than 90% coverage, the weld would have to be redesigned to eliminate the interfering conditions. Reference Attachment 1

The Reactor Vessel Closure Head Weld listed above is located on the McGuire Unit 2 Reactor Vessel. This weld is not exposed to significant neutron fluence and is not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. This weld was rigorously inspected by radiography and

dye penetrant during construction and verified to be free from unacceptable fabrication defects. If a leak were to occur at the weld in question, the reactor coolant leakage calculation which is normally performed daily (and required by Technical Specifications to be performed every 72 hours) would provide an early indication of leakage. The unidentified leakage specification in Technical Specification 3.4.13 is 1 gpm. Several other indicators such as containment radiation monitors EMF-38,-39, and -40, the containment floor and equipment sump levels, containment humidity instruments, and the ventilation unit condensate drain tank level would provide early indication of weld leakage for prompt Operations and Engineering evaluation.

Duke Energy Corporation will continue to examine the referenced items using ultrasonic techniques to the maximum extent practical. These examinations will provide assurance of weld/component integrity. It is the belief of Duke Energy that this limited examination is the best available.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting this relief for the welds listed under Examination Category B-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.

Examination Category B-D, Items B3.90., B3.100., B3.110., B3.120., Full Penetration Welds of Nozzles in Vessels and Nozzle Inner Radius Sections

The Reactor Vessel (Nozzle-to-Vessel Welds) at 22, 158, 202 and 338 degrees are:

2RPV-W15(Item Numbers B03.090.005A),
2RPV-W16 (Item Numbers B03.090.006A),
2RPV-W17 (Item Numbers B03.090.007A), and
2RPV-W18 (Item Numbers B03.090.008A).

These four Outlet Nozzle to Shell Welds were limited due to the reactor vessel nozzle configuration. Therefore, the 100% volumetric examination is impractical for this weld. The imposition of this requirement would create a considerable burden on Duke

Energy Corporation. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage. Reference Attachment 2 for scan coverage.

The Reactor Vessel (Nozzle Inner Radius Sections) are:

2RPV-W15 (Item Numbers B03.100.005),
2RPV-W16 (Item Numbers B03.100.006),
2RPV-W17 (Item Numbers B03.100.007), and
2RPV-W18 (Item Numbers B03.100.008).

These four Outlet Nozzle Inner Radius Sections are limited due to the reactor vessel nozzle configuration. Therefore, the 100% volumetric examination is impractical for this weld. The imposition of this requirement would create a considerable burden on Duke Energy Corporation. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage. Reference Attachment 2 for scan coverage.

The Pressurizer (Nozzle-to-Vessel Welds) are 2PZR-10 (Item Number B03.110.001/Nozzle to Lower Head), and 2PZR-12 (Item Number B03.110.003/Nozzle to Upper Head). These two 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. Therefore, the 100% volumetric examination is impractical for this weld. The imposition of this requirement would create a considerable burden on Duke Energy Corporation. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage. Reference Attachment 3 for scan coverage.

The Pressurizer (Nozzle Inner Radius Section) is: 2PZR-12R (Item Number B03.120.002). This Pressurizer Nozzle to Upper Head Weld (Inner Radius Section) is 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. Therefore, the 100% volumetric examination is impractical for this weld. The imposition of this requirement would create a considerable burden on Duke Energy Corporation. During the examination of these welds, techniques were utilized to obtain the maximum

possible coverage. Reference Attachment 3 for scan coverage.

Although the examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWB-2500-7 could not be met, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity.

The Reactor Pressure Vessel (RPV) Outlet Nozzle to Shell Welds including the Nozzle Inner Radius Welds (Weld Numbers 2RPV-W15, 2RPV-W16, 2RPV-W17, 2RPV-W18) are by definition not in the beltline area of the RPV; therefore, it is not subject to fluence levels equal to or greater than 1 E7 n/cm2. RPV materials not in the highly irradiated beltline region are not prone to negative material property changes (i.e., embrittlement) associated with neutron bombardment. Based upon 10 CFR 50.55a, the ASME Code Section XI 1989 Edition requires essentially 100% RPV weld volumetric examinations of beltline welds during every inspection interval. The RPV Outlet Nozzle Welds do not meet the requirements of a beltline weld due to a significantly lower fluence exposure, resulting in far less potential degradation of ductility. The McGuire Nuclear Station Unit 2 RPV was fabricated by the Combustion Engineering Company and is free from unacceptable fabrication defects. Combustion Engineering performed rigorous state-of-the-art RPV inspections following fabrication to ensure no significant flaws existed.

The Pressurizer Nozzle to Lower/Upper Head Welds (Weld Numbers 2PZR-10, 2PZR-12, and 2PZR-12R) are located on the lower/upper head of the pressurizer and are not part of the reactor pressure vessel. 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. 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.

The McGuire Unit 2 RPV Outlet Nozzle geometry and Pressurizer Nozzle to Lower/Upper Head Weld geometry prevents obtaining 100% volumetric examination coverage and the 100% examinations are impractical. Replacement or re-design of these nozzles is not a viable

alternative and would create an undue burden on Duke Energy Corporation (See Note A)

Note A: The McGuire Plant 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. As per 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 systems are in place to detect increases in the primary coolant leakage. 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.

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., B5.130.
Pressure Retaining Dissimilar Metal Welds

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

2SGA-INLET-SE (B05.070.001),
2SGA-OUTLET-SE (B05.070.002)

Piping Dissimilar Metal Butt Welds

2NC2F-1-2 (B05.130.002),
2NC2F-1-3 (B05.130.003)

These four Dissimilar Metal Butt Welds are limited due to material characteristics and single-sided access caused by the component geometry prevents two-beam path

direction coverage of the examination volume. In order to obtain the required two-beam path direction coverage, these four welds would have to be re-designed to allow scanning from both sides. The Steam Generator Nozzle-to-Safe End Butt Welds (Weld Numbers 2SGA-INLET-SE and 2SGA-OUTLET-SE) are located on the inlet and outlet of the steam generators nozzles for the reactor coolant piping. Weld Numbers 2NC2F-1-2, and 2NC2F-1-3 are located on the Safe End to Reactor Coolant Piping. The weld geometry on these four welds 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. Reference Attachment 4 for scan coverage.

Although the examination volume requirements as defined in ASME Section XI 1986 Edition, Figure IWB-2500-8 could not be met, the amount of coverage obtained for these examinations provided an acceptable level of quality and integrity. Furthermore, these four welds were cutout and re-welded during the steam generator replacement (2EOC11 outage). These new welds received a complete radiographic examination to satisfy ASME Section III requirements. There is no safety significance to the lack of weld examination coverage for the previous cycle.

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.

Examination Category B-J, Item B9.31, Pressure Retaining Welds in Piping

Branch Connection Welds:

During the ultrasonic examination of the Pipe to Nozzle Branch Connection, Weld Number 2NC16-WN8A, (B09.031.001) shown in Attachment 5, coverage of the required examination volume could not be obtained. The examination coverage was limited due to single-sided access caused by the branch connection geometry that prevents scanning from both sides of the weld.

During the ultrasonic examination of the Pipe to Nozzle Branch Connection, Weld Number 2NC22-WN4 (B09.031.002) shown in Attachment 5, coverage of the required examination volume could not be obtained. The examination coverage was limited due to single-sided access caused by the branch connection geometry that prevents scanning from both sides of the weld.

During the ultrasonic examination of the Pipe to Nozzle Branch Connection, Weld Number 2NC22-WN8 (B09.031.003) shown in Attachment 5, coverage of the required examination volume could not be obtained. The examination coverage was limited due to single-sided access caused by the branch connection geometry that prevents scanning from both sides of the weld.

In order to obtain the required coverage, these welds would have to be redesigned. The 100% volumetric examination is impractical due to nozzle and weld material geometry, or branch piping interferences. Replacement or re-design of this piping Class 1 piping is not a viable alternative and would create an undue burden on Duke Energy Company. During the examination of these welds, techniques were utilized to obtain the maximum possible coverage. Reference Attachment 5 for scan coverage.

Although the examination volume requirements as defined in ASME Section XI 1989 Edition, Figures IWB-2500-9 thru -11 could not be met, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. See Note B.

Note B: The McGuire Plant 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. As per 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 systems are in place to detect increases in the primary coolant leakage. 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.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting this relief for the welds listed under Examination Category B-J 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-B, Items C2.22 Pressure Retaining Nozzle Welds in Vessels

During the ultrasonic examination of the Feedwater Nozzle to Shell Weld 2SGA-SB-02 (C02.022.002) shown in Attachment 6, coverage of the required examination volume was limited to 84.30%. Limitations were caused by the ratio of the nozzle OD to the vessel thickness. When the nozzle OD is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Duke Energy Corporation is investigating the use of computer modeling to solve the limitation problems for nozzle inner radius examinations.

Nozzle inner 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.

Although the examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWC-2500-4 (a) or (b) could not be met, the amount of coverage obtained for these examinations provided an acceptable level of quality and integrity.

The steam generators and associated nozzles have been replaced and there is no safety significance to the past examination coverage. The current steam generators were fully inspected by BWI prior to installation and relief for inspection of currently installed equipment is not requested.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting this relief for the welds listed under Examination Category C-B 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 in accordance with the requirements of ASME Section XI for future inspection intervals at McGuire Nuclear Station, Unit 2.

Attachment 1.

Drawings of affected weld details including calculation methods for:

B01.040.001

Attachment 2.

Drawings of affected weld details including calculation methods for:

B03.090.005A
B03.090.006A
B03.090.007A
B03.090.008A
B03.100.005
B03.100.006
B03.100.007
B03.100.008

Attachment 3.

Drawings of affected weld details including calculation methods for:

B03.110.001
B03.110.003
B03.120.002

Attachment 4 .

Drawings of affected weld details including calculation methods for:

B05.070.001
B05.070.002
B05.130.002
B05.130.003

Attachment 5.

Drawings of affected weld details including calculation methods for:

B09.031.001
B09.031.002
B09.031.003

Attachment 6.

Drawings of affected weld details including calculation methods for:

C02.022.002

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, Note A and B) 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 8/19/99

Approved By: L. Kevin Thyne Date 8/19/99

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS
(Reg. Guide 1.150)

Exam Start: 0106 | Form NDE-UT-2A/RPV

Exam Finish: 0251 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2RPV-W08 | Date: 10/10/97

Weld Length (in.): 542" | Surface Condition: AS GROUND | Lo: 0° VES.

Surface Temperature: 80 ° F

Examiner: Larry Mauldin Level: III

Examiner: N/A Level: II

Pyrometer S/N: MCNDE 27022

Cal Due: 2/14/98

Procedure: NDE-660 Rev: 2

FC: 97-15

Calibration Sheet No: 9702053

Scans:

45 ☒ 55 dB 70 ☐ ____ dB

45T ☒ 55 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: ____ dB

Configuration: .08 Upper Head to PC.09 Flar

PC.08 to PC.09

Scan Surface: OD

IND #	∠	Max % DAC	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 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	DO NOT WRITE IN THIS SPACE			
NRI	45°														

Remarks:

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

Sheet ____ of ____

Reviewed By: Rod Schuld Level: II Date: 11-4-97

Authorized Inspector: D R Klein Date: 11-6-97

Item No: B01.040.001

SEQUAL No. 98-005 Attachment 1 PAGE 1 of 17

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS
(Reg. Guide 1.150)

Exam Start: 0101 | Form NDE-UT-2A/RPV
Exam Finish: 0246 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2RPV-W08 | Date: 10/10/97

Weld Length (in.): 542" | Surface Condition: AS GROUND | Lo: 0° VES. | Surface Temperature: 80 ° F

Examiner: Marion T. Weaver Level: II
Examiner: Winfred C. Leeper Level: II

Procedure: NDE-660 Rev: 2 | FC: 97-15

Calibration Sheet No: 9702062

Scans:
45 ☐ ____ dB 70 ☐ ____ dB
45T ☐ ____ dB 70T ☐ ____ dB
60 ☐ ____ dB
60T ☐ ____ dB
Other: 35°-52 dB

Pyrometer S/N: MCNDE 27022
Cal Due: 2/14/98

Configuration: .08 Upper Head to PC.09 Flar

PC.08 to PC.09

Scan Surface: OD

IND #	∠	Max % DAC	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 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	20%dac 50%dac 100%dac	DO NOT WRITE IN THIS SPACE			
NRI	35°														

Remarks:

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

Reviewed By: Rod Sheffield Level: II Date: 11-4-97 | Authorized Inspector: R Klein Date: 11-6-97 | Item No: B01.040.001

Attachment 1
Page 2 of 17

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2RPV-W08 | Item No: B01.040.001 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L 539" to L 3.0" | INCHES FROM WO 1.5" to BEYOND
ANGLE: ☒ 0 ☒ 45 ☐ 60 ☐ Other 35° | FROM N/A DEG to N/A DEG

Remarks: LIFTING LUG @ 0°

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L 177.6" to L 183.6" | INCHES FROM WO 1.5" to BEYOND
ANGLE: ☒ 0 ☒ 45 ☐ 60 ☐ Other 35° | FROM N/A DEG to N/A DEG

Remarks: LIFTING LUG @ 120°

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L 358.3" to L 364.3" | INCHES FROM WO 1.5" to BEYOND
ANGLE: ☒ 0 ☒ 45 ☐ 60 ☐ Other 35° | FROM N/A DEG to N/A DEG

Remarks: LIFTING LUG @ 240°

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L N/A to L N/A | INCHES FROM WO 3.0" to BEYOND
ANGLE: ☒ 0 ☒ 45 ☐ 60 ☐ Other 35° | FROM 0 DEG to 360

Remarks: FLANGE

Prepared By: Larry Maulden | Level: III | Date: 10-10-97 | Sketch(s) attached ☒ yes ☐ no | Sheet ____ of ____

Reviewed By: Rod Sheffield | Date: 11-4-97 | Authorized Inspector: [signature] | Date: 11-6-97

Attachment 1
Page 3 of 17

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
7.0/2(3.5+3.8) = 25.55 X 2 = 51.1 SQ. IN	51.1 SQ IN X 542" = 27696 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
					121557.8	138481	87.78

Item No:	B01.040.001	
Prepared By: Larry Maulden	Level: III	Date: 10-10-97
Reviewed By: Rod Lyfield	Level: II	Date: 11-4-97

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
7.0/2(3.5+3.8) = 25.55 X 2 = 51.1 SQ. IN	51.1 SQ IN X 542" = 27696 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	51.1	52.4	26776.4	26776.4	100.00
1	0	N/A	28.7	18	516.6	919.8	56.16
2	35	S2	47.95	524	25125.8	26776.4	93.84
2	35	S2	11.7	18	210.6	919.8	22.90
3	45	S2	48.9	524	25623.6	26776.4	95.69
3	45	S2	8.4	18	151.2	919.8	16.44
4	35/45	CW	40.6	524	21274.4	26776.4	79.45
4	35/45	CW	16.8	18	302.4	919.8	32.88
5	35/45	CCW	40.6	524	21274.4	26776.4	79.45
5	35/45	CCW	16.8	18	302.4	9198	3.29

Item No: B01.040.001

Prepared By: Larry Mauldin Level: III Date: 10-10-97

Reviewed By: Rod Sheffield Level: II Date: 11-4-97

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
7.0/2(1.375 + 0.8) = 7.6 SQ. IN.	7.6 X 542 = 4119.2 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	7.6	542	4119.2	4119.2	100.00
2	35	S2	7.6	524	3982.4	3982.4	100.00
3	35	S2	1.4	18	25.2	136.8	18.42
3	35	S1	4.1	542	2222.2	4119.2	53.95
4	45	S2	7.6	524	3982.4	3982.4	100.00
4	45	S2	0.95	18	17.1	136.8	12.50
5	45	S1	2.8	542	1517.6	4119.2	36.84
6	35	CW	7.6	542	4119.2	4119.2	100.00
7	35	CCW	7.6	542	4119.2	4119.2	100.00
8	45	CW	7.6	542	4119.2	4119.2	100.00

Item No: B01.040.001

Prepared By: Larry Rawlins Level: III Date: 10-10-97

Reviewed By: Rod Seefeldt Level: II Date: 11-4-97

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

Examination Volume/Area Defined

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

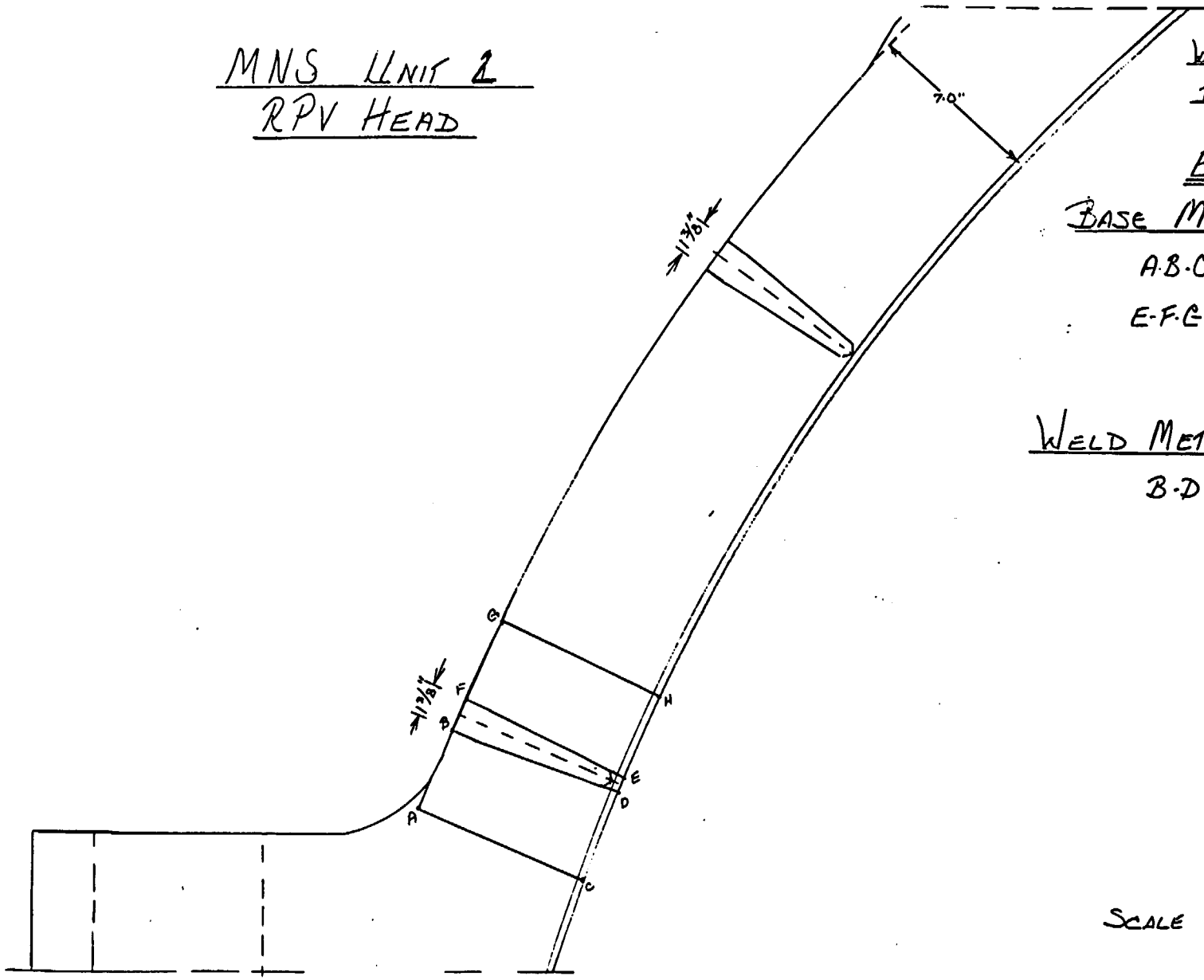
Area Calculation	Volume Calculation
7.0/2(1.375 + 0.8) = 7.6 SQ. IN.	7.6 X 542 = 4119.2 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
9	45	CCW	7.6	542	4119.2	4119.2	100.00
					32342.9	37072.8	87.24

Item No: B01.040.001		
Prepared By: Laura Moulder	Level: III	Date: 10/10/97
Reviewed By: Rod Hyfield	Level: II	Date: 11-4-97

MNS UNIT 2
RPV HEAD



WELD I.D. 2RPV-W08
ITEM # B01.040.001

EXAM AREAS

BASE METAL

A-B-C-D $\frac{7.0}{2}(3.5+3.8) = 25.55$ sq. in.

E-F-G-H $\frac{7.0}{2}(3.5+3.8) = 25.55$ sq in

51.1 sq. in.

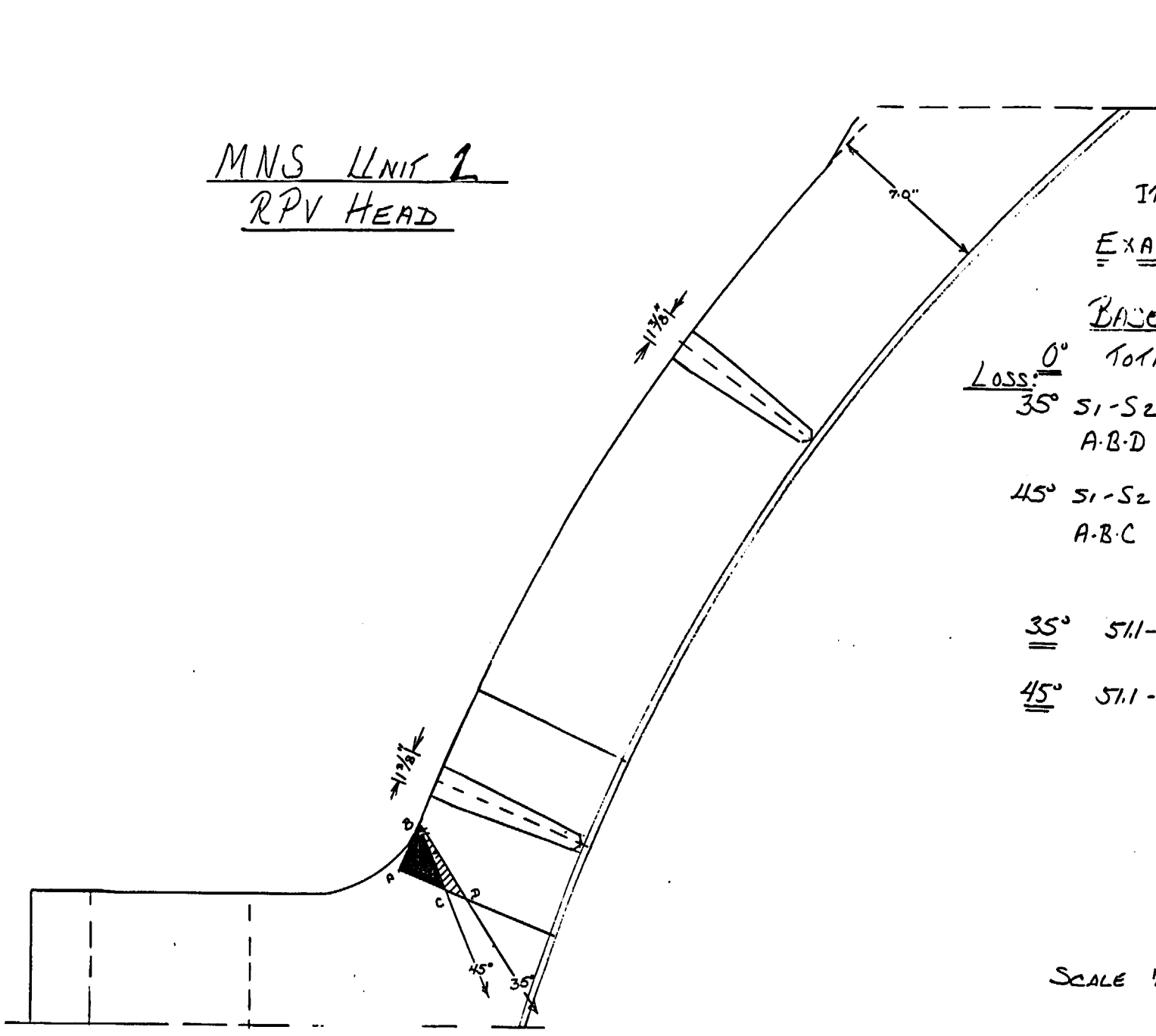
WELD METAL

B-D-E-F $\frac{7.0}{2}(1.375+.8) = 7.6125$

7.6 sq in.

SCALE 1/4" = 1.0"

MNS UNIT 2
RPV HEAD



WELD I.D. 2RPV-W08

ITEM # B01.040 (10)

EXAM AREAS:

BASE METAL

LOSS: 0° TOTAL COVERAGE 51.1 sq.in.

35° S1-S2 OR S2-S1 =

A·B·D $\frac{2.1 \times 3.0}{2}$ = 3.15 sq.in

45° S1-S2 OR S2-S1 =

A·B·C $\frac{2.1 \times 2.1}{2}$ = 2.2 sq.in

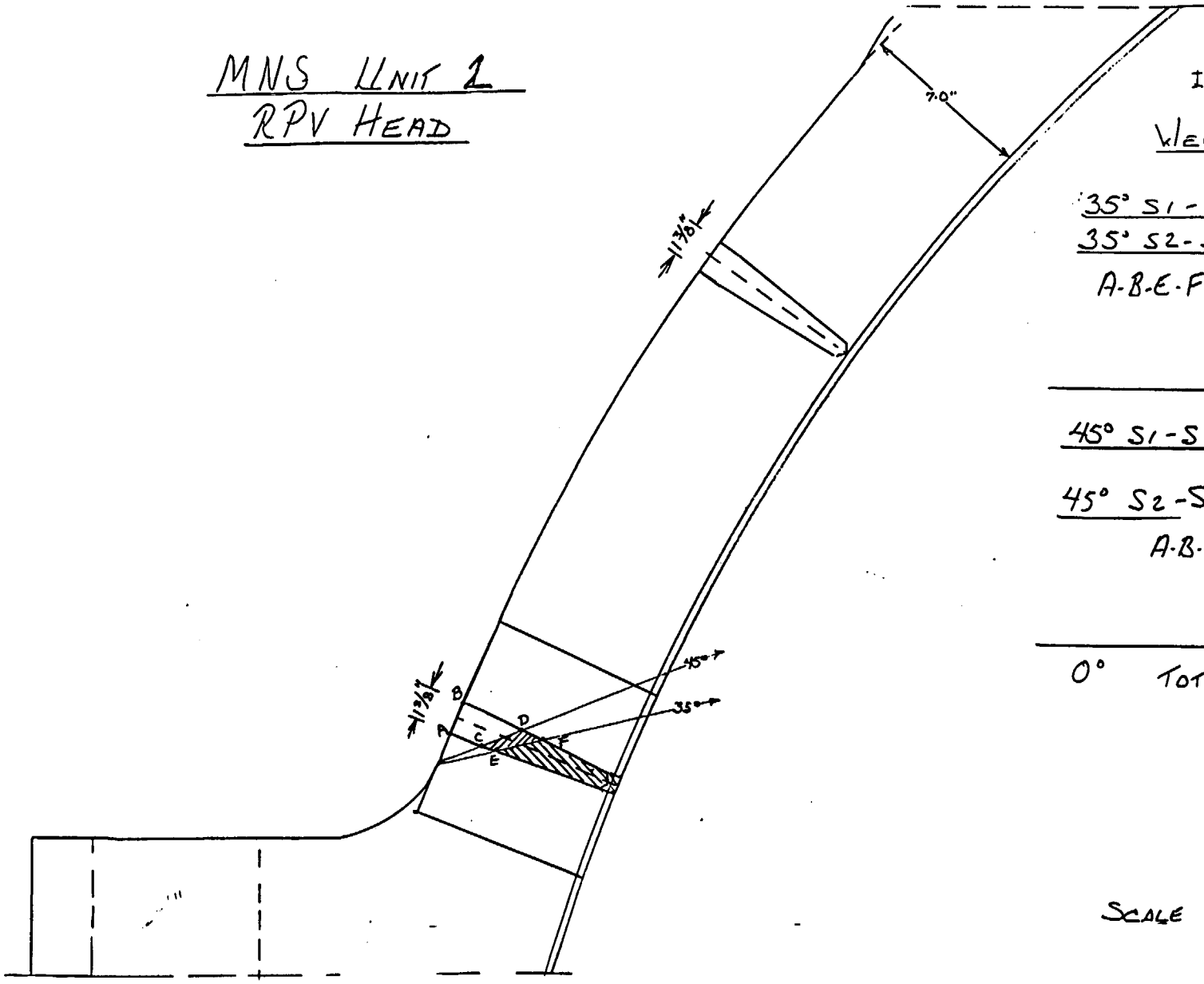
35° 51.1 - 3.15 = COVERAGE 47.95 sq.in

45° 51.1 - 2.2 = COVERAGE 48.9 sq.in

SCALE 1/4" = 1.0"

Attachment 1
Page 9 of 12

MNS UNIT 2
RPV HEAD



WELD I.D 2RPV-W08
ITEM # B01.040.071

WELD METAL

35° S1-S2 TOTAL COVERAGE 7.6 sq in
35° S2-S1

A-B-E-F $\frac{1.375}{2}(3.8+2.2) = 4.125$

COVERAGE 4.1 sq. in.

45° S1-S2 TOTAL COVERAGE 7.6 sq in

45° S2-S1

A-B-C-D

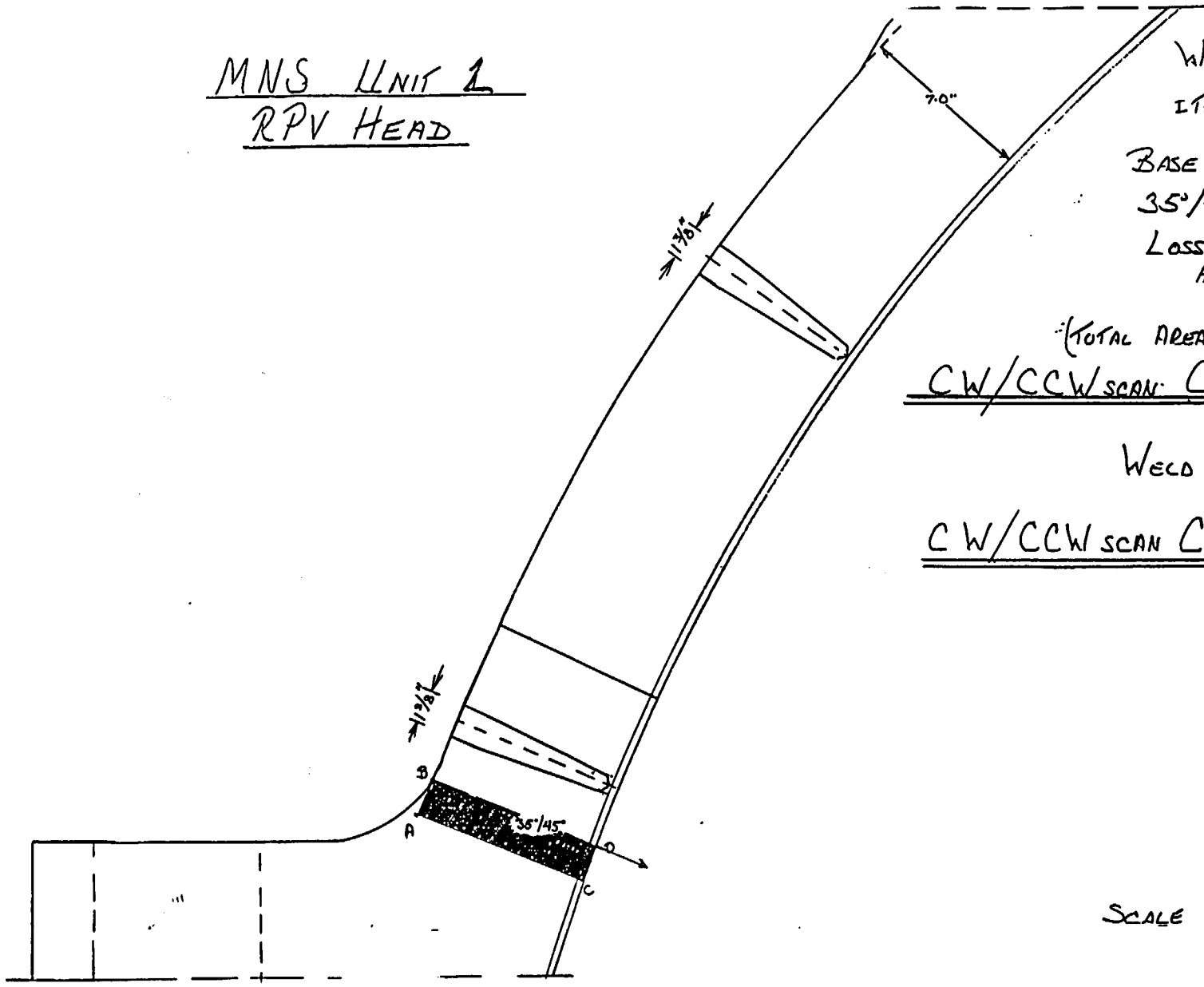
$\frac{1.375}{2}(2.7+1.4) = 2.818$

COVERAGE 2.8 sq. in.

0° TOTAL COVERAGE 7.6 sq. in

SCALE 1/4" = 1.0"

MNS UNIT 1
RPV HEAD



WECO I.D. 2RPV-W08

ITEM # B01.040.001

BASE METAL:

35°/45° CW & CCW

LOSS:

A-B-C-D = 7.0 X 1.5 = 10.5 sq. in.

(TOTAL AREA) 51.1 sq in − 10.5 sq. in = 40.6

CW/CCW SCAN COVERAGE = 40.6 sq in

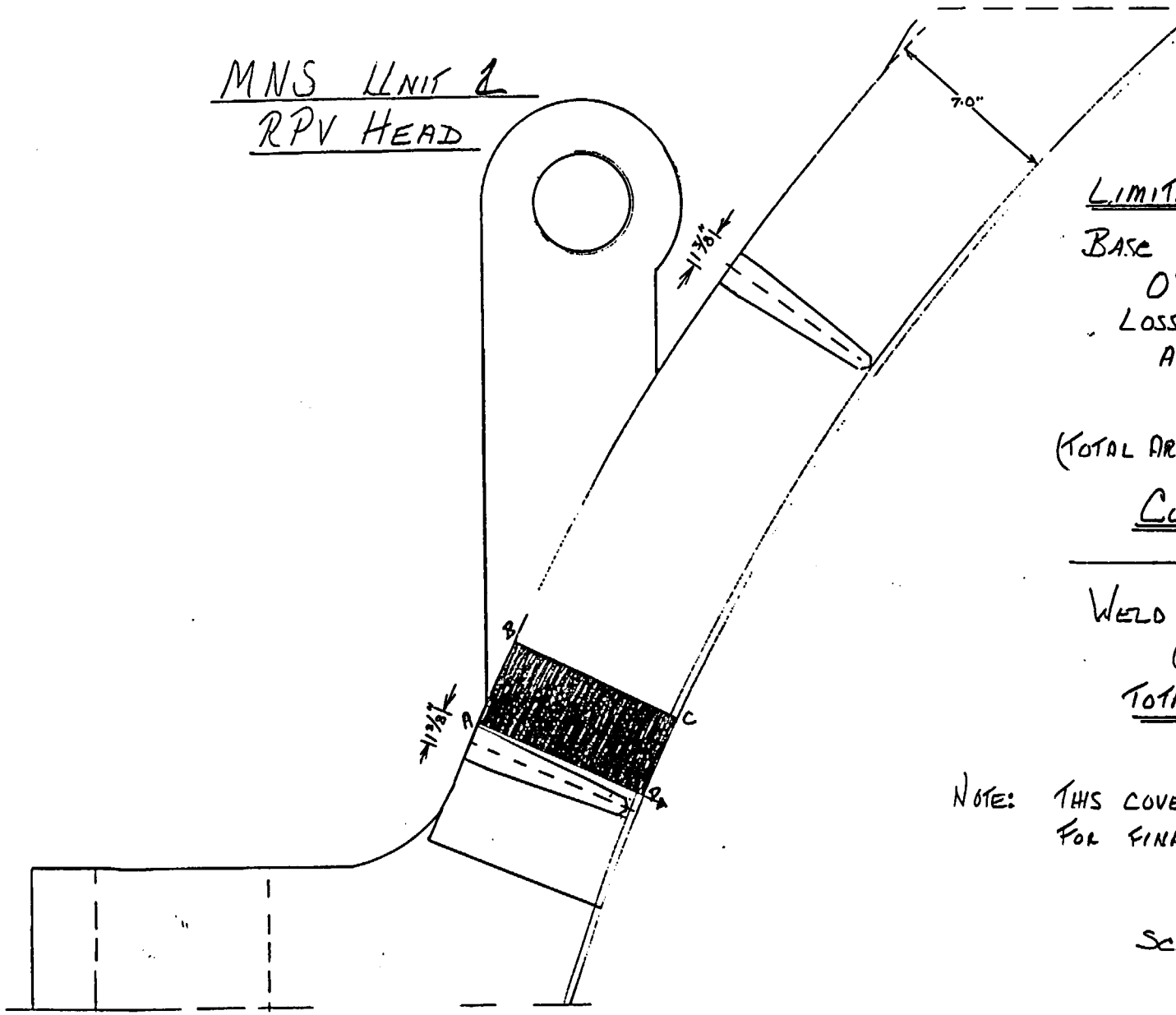
WECO METAL:

CW/CCW SCAN COVERAGE (TOTAL) 7.6 sq in.

SCALE 1/4" = 1.0"

Attachment 1
Page 11 of 17

MNS UNIT 2
RPV HEAD



WELD I.D. 2 RPV-W08

ITEM # B01.040.001

LIMITATIONS DUE TO LUGS

BASE METAL

0°

LOSS:

A-B-CD

3.2 X 7.0 = 22.4 sq. in.

(TOTAL AREA) 51.1 - 22.4 = 28.7 sq. in.

COVERAGE 28.7 sq. in.

WELD METAL

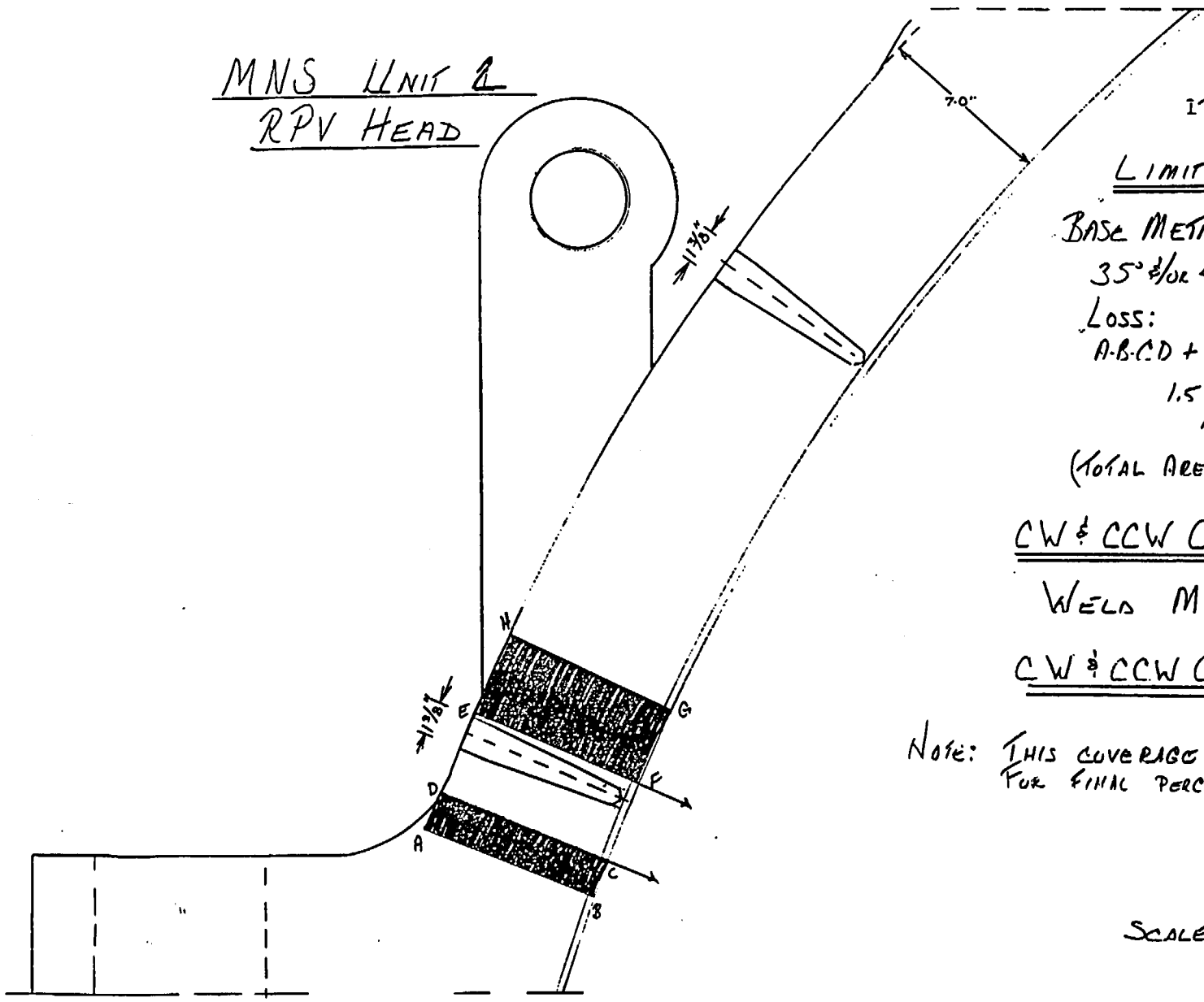
0°

TOTAL COVERAGE 7.6 sq. in.

NOTE: THIS COVERAGE IS FOR 1 LUG ONLY.
FOR FINAL PERCENTAGE MULTIPLY BY 3.

SCALE 1/4" = 1.0"

MNS Unit 2
RPV Head



Weld I.D 2RPV-W08

Item # B01.040.001

Limitations Due To Lugs

Base Metal

35° &/or 45° CW &/or CCW

Loss:

A·B·C·D + E·F·G·H

1.5 X 7.0 + 3.4 X 7.0 =
10.5 + 23.8 = 34.3 sq. in.

(Total Area) 51.1 − 34.3 = 16.8 sq. in.

CW & CCW Coverage = 16.8 sq. in.

Weld Metal

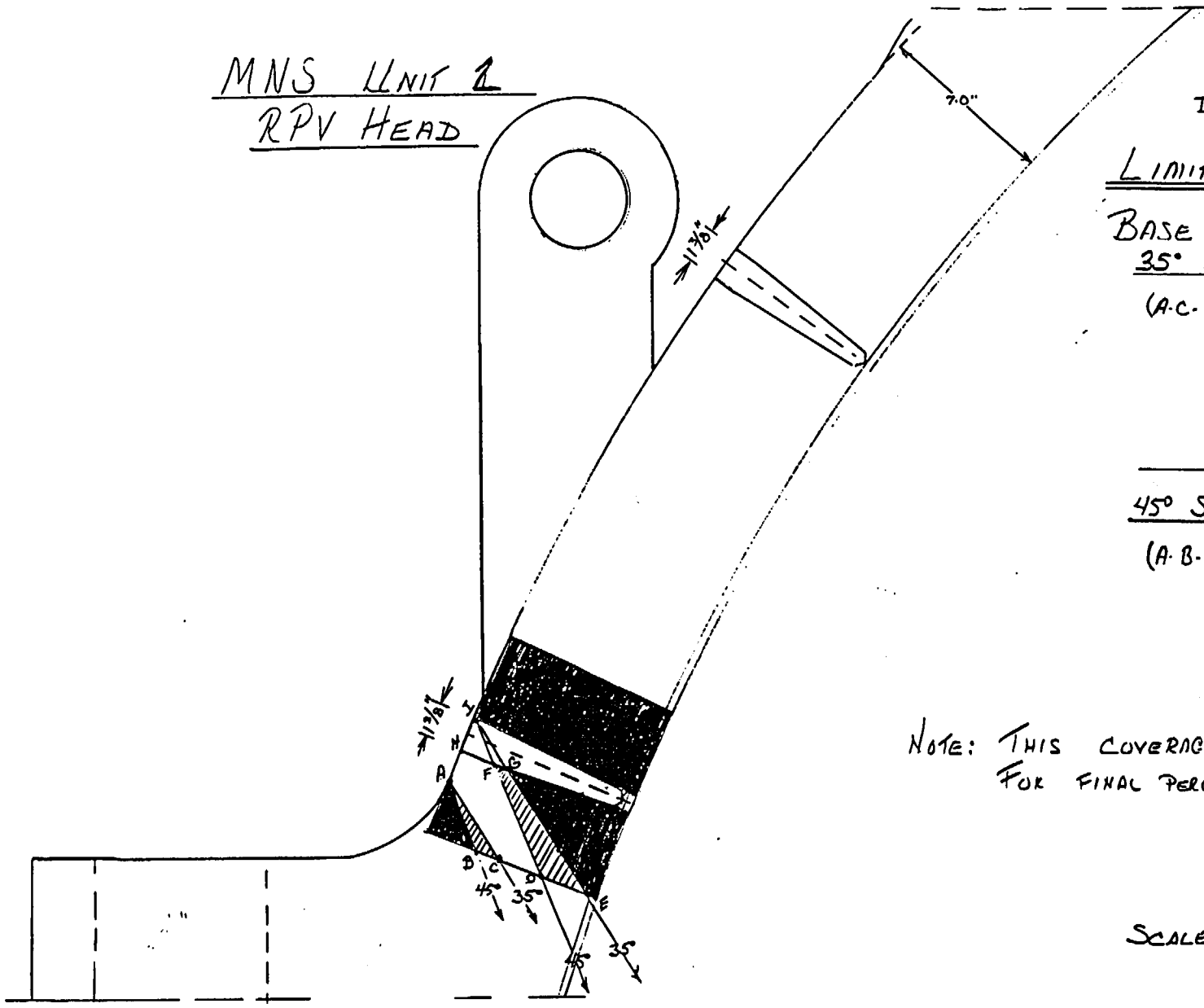
CW & CCW Coverage (Total) 7.6 sq. in.

Note: This coverage is for 1 lug only.
For final percentage multiply by 3.

Scale 1/4" = 1.0"

Attachment 1
Page 13 of 17

MNS UNIT 2
RPV HEAD



WELD I.D. 2RPV-W08
ITEM # B01.040.001

LIMITATIONS DUE TO LUGS

BASE METAL:
35° S1-S2,

(A·C·E·I)-(G·H·I)=

$\frac{2.2}{2}(8.3+3.7) - \frac{1.2 \times 2.5}{2} =$

13.2 - 1.5 = 11.7

COVERAGE 11.7 sq. in.

45° S1-S2

(A·B·D·I)-(F·H·I)=

$\frac{2.0}{2}(7.2+2.3) - \frac{1.0 \times 2.2}{2} =$

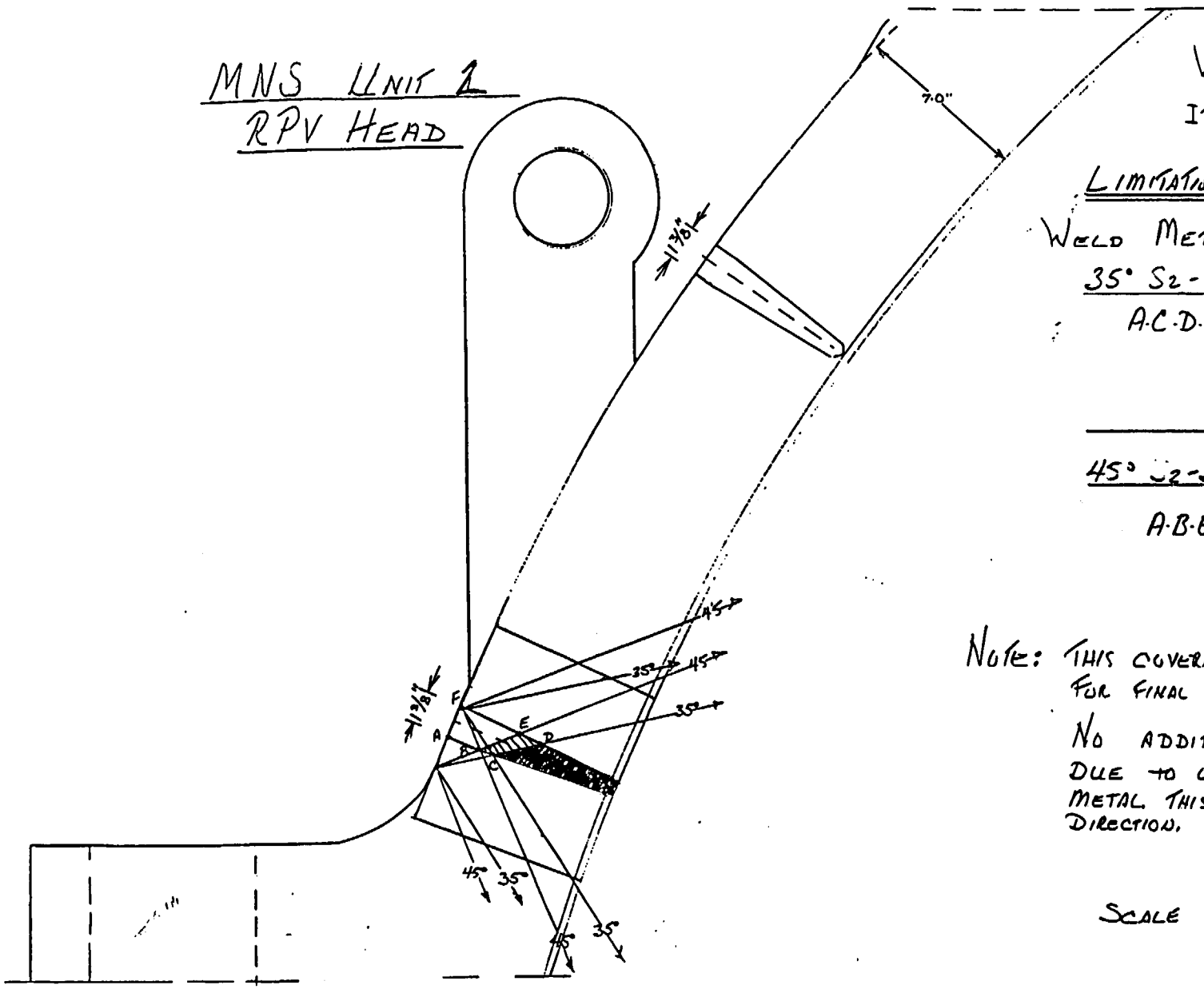
9.5 - 1.1 = 8.4

COVERAGE 8.4 sq in.

NOTE: THIS COVERAGE IS FOR 1 LUG ONLY.
FOR FINAL PERCENTAGE MULTIPLY BY 3.

SCALE 1/4" = 1.0"

MNS UNIT 2
RPV HEAD



WELD I.D 2RPV-W08

ITEM # B01.040.001

LIMITATIONS DUE TO LUGS

WELD METAL:

35° S2-S1

A-C-D-F $\frac{1.375}{2}(3.8+2.2) = 4.125$

COVERAGE 4.1 sq. in.

45° S2-S1

A-B-E-F $\frac{1.375}{2}(2.7+1.4) = 2.818$

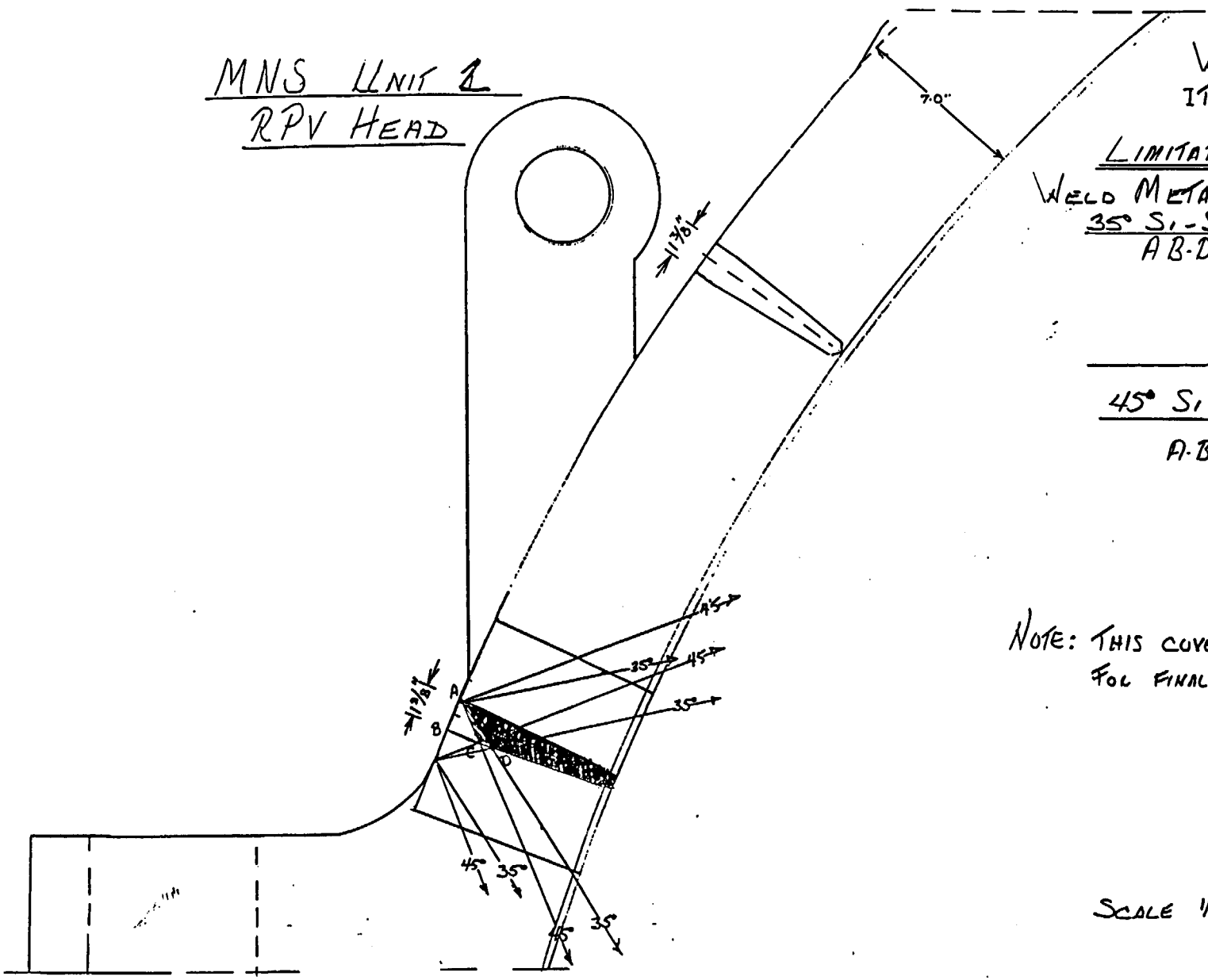
COVERAGE 2.8 sq. in.

NOTE: THIS COVERAGE IS FOR 1 LUG ONLY. FOR FINAL PERCENTAGE MULTIPLY BY 3.

NO ADDITIONAL LOSS WAS INCURRED DUE TO LUGS IN THE WELD METAL. THIS WAS IN THE S2-S1 DIRECTION.

SCALE 1/4" = 1.0"

MNS UNIT 2
RPV HEAD



WELD I.D. 2RPV-W08
ITEM # B01.040001

LIMITATIONS DUE TO LUGS

WELD METAL

35° S1 - S2

A B D $\frac{2.0 \times 1.375}{2} = 1.375$

COVERAGE 1.4 sq. in.

45° S1 - S2

A B C $\frac{1.375 \times 1.375}{2} = .945$

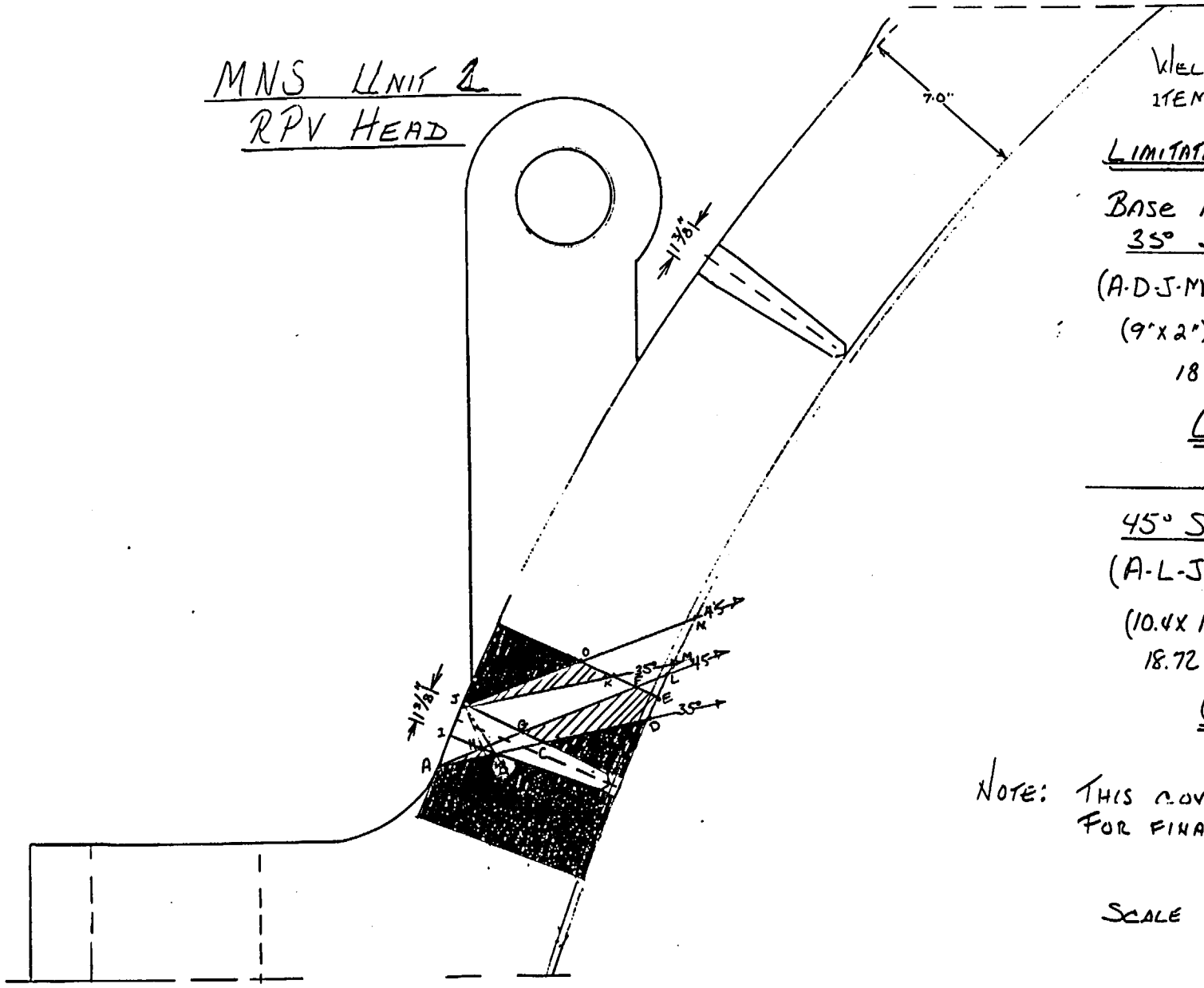
COVERAGE .95 sq. in.

NOTE: THIS COVERAGE IS FOR 1 LUG ONLY.
FOR FINAL PERCENTAGE MULTIPLY BY 3.

SCALE 1/4" = 1.0"

Attachment 1
Page 16 of 17

MNS UNIT 2
RPV HEAD



WELD I.D. 2RPV-W08
ITEM # B01.30 #11

LIMITATIONS DUE TO LUGS

BASE METAL

35° $S_2 - S_1$

$(A \cdot D \cdot J \cdot M) - (B \cdot I \cdot J \cdot C + E \cdot K \cdot M)$

$(9" \times 2") - \left[\frac{1.375}{2}(2.0+3.8) + \frac{2.6+1.7}{2}\right] =$

$18" - (7.975 + 1.43) = 8.595$

COVERAGE 8.6 SQ. IN.

45° $S_2 - S_1$

$(A \cdot L \cdot J \cdot N) - (H \cdot I \cdot J \cdot G + F \cdot L \cdot N \cdot O)$

$(10.4 \times 1.8) - \left[\frac{1.375}{2}(1.5+2.7) + \frac{1.8}{2}(5.0+1.2)\right] =$

$18.72 - (2.8875 + 5.58) = 10.2525$

COVERAGE 10.3 SQ. IN.

NOTE: THIS COVERAGE IS FOR 1 LUG ONLY. FOR FINAL PERCENTAGE MULTIPLY BY 3.

SCALE 1/4" = 1.0"

Attachment 1
Page 12 of 17

OUTLET NOZZLE TO SHELL WELDS & OUTLET NOZZLE INSIDE RADIUS

Total Area =	216.35 in²	(Near Surface + Weld + T/2)
Near Surface Area =	15.07 in²	(Vertical Cross-Section)
Weld Area =	18.84 in²	(Vertical Cross-Section)
T/2 Area =	182.44 in²	(Vertical Cross-Section)
Inside Radius Area =	8.76 in²	(Vertical Cross-Section)
Total Area =	204.11 in²	(Near Surface + Weld + T/2)
Near Surface Area =	15.10 in²	(Horizontal Cross-Section)
Weld Area =	13.08 in²	(Horizontal Cross-Section)
T/2 Area =	175.93 in²	(Horizontal Cross-Section)
Inside Radius Area =	8.90 in²	(Horizontal Cross-Section)

OUTLET NOZZLE INSIDE RADIUS

ITEM NO.: B03.100.005 I.D. NO.: 2RPV-W15	ITEM NO.: B03.100.006 I.D. NO.: 2RPV-W16
ITEM NO.: B03.100.007 I.D. NO.: 2RPV-W17	ITEM NO.: B03.100.008 I.D. NO.: 2RPV-W18

CIRC 70° Gets 7.82 in² Coverage Vertical Section

70° Gets 7.07 in² Coverage Horizontal Section

$$\text{Covered Area} = \left(\frac{7.82}{8.76} + \frac{7.07}{8.90} \right) \times .50 = 84.4\ \%$$

AXIAL 70° Gets 8.40 in² Coverage Vertical Section

70° Gets 7.66 in² Coverage Horizontal Section

$$\text{Covered Area} = \left(\frac{8.40}{8.76} + \frac{7.66}{8.90} \right) \times .50 = 91.0\ \%$$

70° INSIDE RADIUS COVERAGE

AXIAL	CIRC
91.0	84.4

Aggregate Coverage = 87.7 %

OUTLET NOZZLE TO SHELL WELDS

ITEM NO.: B03.090.005/A
I.D. NO.: 2RPV-W15

ITEM NO.: B03.090.006/A
I.D. NO.: 2RPV-W16

ITEM NO.: B03.090.007/A
I.D. NO.: 2RPV-W17

ITEM NO.: B03.090.008/A
I.D. NO.: 2RPV-W18

CIRC

70° Gets 6.17 in² Coverage Vertical Section

70° Gets 6.36 in² Coverage Horizontal Section

$$\text{Covered Area} = \left(\frac{6.17}{15.07} + \frac{6.36}{15.10} \right) \times .50 = 41.5$$

0° Gets 33.28 in² Coverage Vertical Section

0° Gets 16.47 in² Coverage Horizontal Section

$$\text{Covered Area} = \left(\frac{33.28}{201.28} + \frac{16.47}{189.01} \right) \times .50 = 12.6\ \%$$

45° & 60° Get 3.75 in² Weld Coverage Vertical Section

45° & 60° Get 56.95 in² T/2 Coverage Vertical Section

45° & 60° Get 0.00 in² Weld Coverage Horizontal Section

45° & 60° Get 44.92 in² T/2 Coverage Horizontal Section

$$\text{45° \& 60° Covered Area} = \left[\left(\frac{56.95 + 3.75 + 3.75}{182.44 + 18.84 + 18.84} \right) + \left(\frac{44.92 + 0.00 + 0.00}{175.93 + 13.08 + 13.08} \right) \right] \times .50$$

$$= 25.8\ \%$$

OUTLET NOZZLE TO SHELL WELDS CONTINUED

AXIAL 45° Gets 12.77 in² Coverage Vertical Section of Near Surface

45° Gets 9.96 in² Coverage Horizontal Section of Near Surface

$$\text{Covered Area} = \left(\frac{12.77}{15.07} + \frac{9.96}{15.10} \right) \times .50 = 75.3\ \%$$

0° Gets 180.77 in² Coverage Vertical Section

0° Gets 124.50 in² Coverage Horizontal Section

$$\text{Covered Area} = \left(\frac{180.77}{201.28} + \frac{124.50}{189.01} \right) \times .50 = 77.8\ \%$$

45° Gets 154.56 in² Coverage Vertical Section

45° Gets 155.82 in² Coverage Horizontal Section

$$\text{Covered Area} = \left(\frac{154.56}{201.28} + \frac{155.82}{189.01} \right) \times .50 = 79.6\ \%$$

AXIAL			CIRC			
NS	0	45	70	60	45	0
75.3	77.8	79.6	41.5	25.8	25.8	12.6

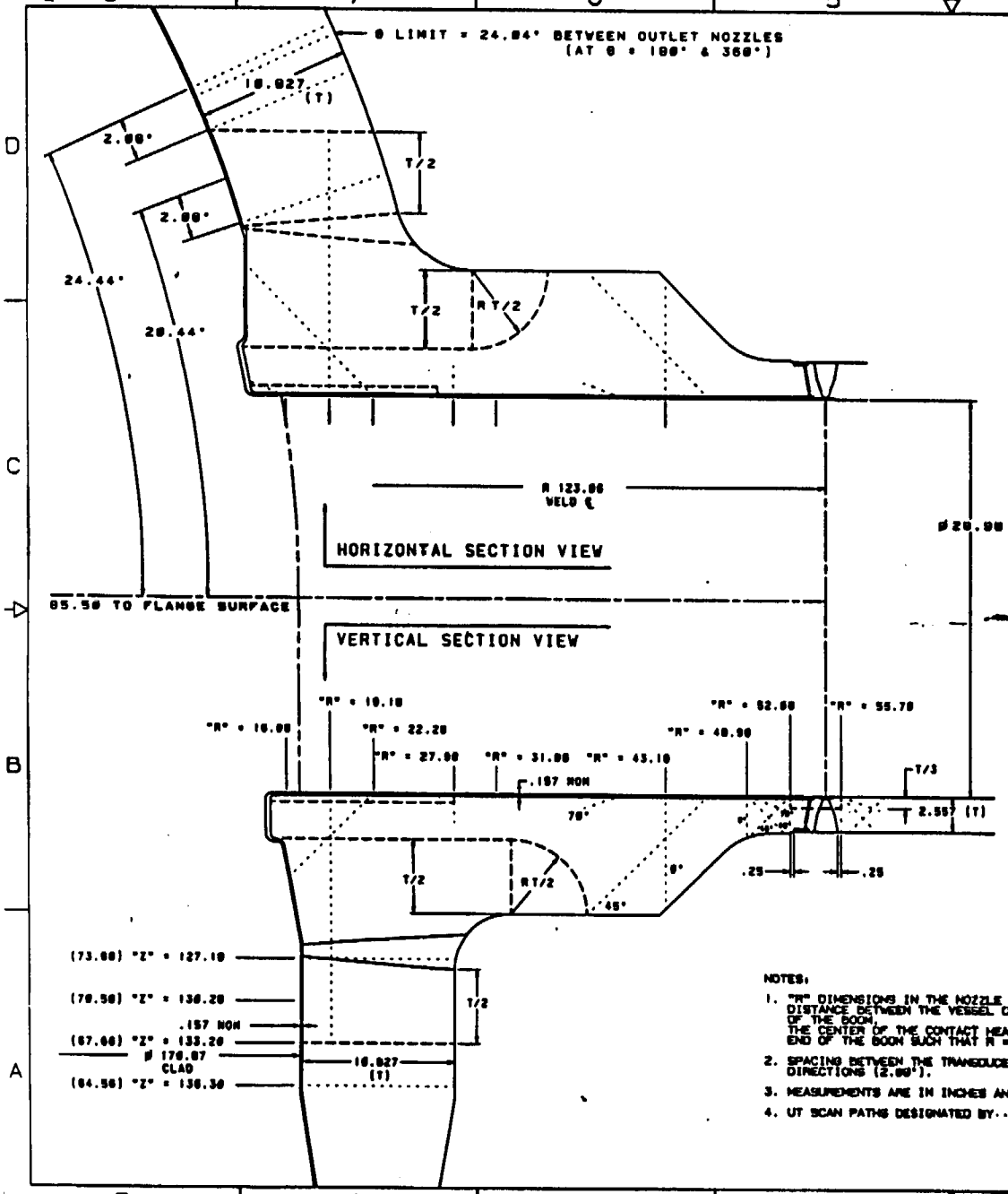
Aggregate Coverage =

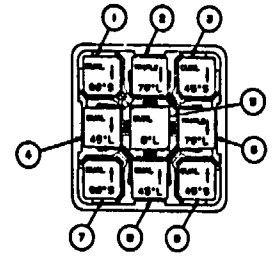
$$[\ 75.3 \times (15.07 + 15.10) + (77.8 + 79.6) \times (201.28 + 189.01)$$
$$+ 41.5 \times (15.07 + 15.10) + (25.8 + 25.8)$$
$$\times (182.44 + 18.84 + 18.84 + 175.93 + 13.08 + 13.08)$$
$$+ 12.6 \times (216.35 + 204.11)\ ] /$$
$$[\ (15.07 + 15.10) \times 2 + (201.28 + 189.01) \times 2$$
$$+ (182.44 + 18.84 + 18.84 + 175.93 + 13.08 + 13.08) \times 2$$
$$+ (216.35 + 204.11)\ ]$$

Aggregate Coverage = 43.7 %

Attachment 2
Page 4 of 4

θ LIMIT = 24.84° BETWEEN OUTLET NOZZLES
(AT θ = 180° & 360°)





VIEW OF CONTACT HEAD
ON THE SCAN SURFACE
LOOKING FROM BACK OF HEAD

GAMMA = 0 DEGREES
(CLOCKWISE +)

TABLE I

TABLE II

TABLE III

WELD NO.	SCAN	θ ℄
V-15	015	22
V-16	016	158
V-17	017	202
V-18	018	338

NOTES:

1. "R" DIMENSIONS IN THE NOZZLE BORE REFERENCE THE DISTANCE BETWEEN THE VESSEL CENTERLINE AND THE END OF THE BOOM. THE CENTER OF THE CONTACT HEAD IS OFFSET FROM THE END OF THE BOOM SUCH THAT R = 88.44 + "R".
2. SPACING BETWEEN THE TRANSDUCERS IS 3.18" IN ALL DIRECTIONS (2.88").
3. MEASUREMENTS ARE IN INCHES AND DECIMAL DEGREES.
4. UT SCAN PATHS DESIGNATED BY..... LINES.

REVISIONS

REV	DESCRIPTION	DATE	APP

McGUIRE UNIT 2

OUTLET NOZZLE
ARIS II EXAMINATION
SCAN COVERAGE

V-OUT

DWG. NO. 1227599 D

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1005 | Exam Finish: 1034 | Form NDE-UT-2A | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2PZR-10 | Date: 11/18/97

Weld Length (in.): 76.0" | Surface Condition: AS GROUND | Lo: 9.2.3

Surface Temperature: 71 ° F

Examiner: James W. Setzer James W Setzer Level: III

Examiner: Larry Mauldin Larry Mauldin Level: III

Pyrometer S/N: MCNDE 27024

Cal Due: 2/14/98

Procedure: NDE-620 Rev: 5

FC: N/A

Calibration Sheet No: 9702098, 9702099

Scans:

45 ☒ 49.5 dB 70 ☐ _____ dB

45T ☒ 49.5 dB 70T ☐ _____ dB

60 ☐ _____ dB

60T ☐ _____ dB

Other: 35°-52 dB

Configuration: IRGE NOZZLE to PZR LOWEF

S1 Flow S2

.OWER HEAI to NOZZLE

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: N/A

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
		DO NOT WRITE IN THIS SPACE				20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	DO NOT WRITE IN THIS SPACE			
35°	NRI														
45°	NRI														

Remarks:

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

Sheet _____ of _____

Reviewed By: Rod Sheffield Level: II Date: 11-20-97

Authorized Inspector: Date: 11-25-97

Item No: B03.110.001

SERIAL No. 98-005
Attachment 3
Page 1 of 31

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2PZR-10 | Item No: B03.110.001 | Remarks:

☐ NO SCAN
☒ LIMITED SCAN
SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☒ cw ☒ ccw
FROM L 0+0" to L 0+48"
INCHES FROM WO C/L +2.5" to BEYOND
ANGLE: ☒ 0 ☒ 45 ☐ 60 ☐ Other 35°
FROM ____ DEG to ____ DEG

Remarks: HEATER BUNDLE CONFIGURATION

☐ NO SCAN
☒ LIMITED SCAN
SURFACE: ☐ 1 ☒ 2
BEAM DIRECTION: ☒ 1 ☐ 2 ☒ cw ☒ ccw
FROM L ____ to L ____
INCHES FROM WO C/L +2.0" to BEYOND
ANGLE: ☒ 0 ☒ 45 ☐ 60 ☐ Other 35°
FROM 0 DEG to 360 DEG

Remarks: NOZZLE CONFIGURATION

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

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

Prepared By: JIM SETZER Level: III Date: 11/24/97 | Sketch(s) attached ☐ yes ☒ no | Sheet ____ of ____

Reviewed By: Rod Sheffield Date: 11-24-97 | Authorized Inspector: Date:

Attachment 3
Page 2 of 31

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
TOTAL AGGREGATE COVERAGE FOR WELD AND BASE METAL COMBINED	

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
				BASE METAL	1879.8	3042	61.79
				WELD	2862	3299.4	86.74
				AGGREGATE	4741.8	6341.4	74.78

Item No: B03.110.001

Prepared By: Larry Rouleau Level: III Date: 11-18-97

Reviewed By: Rod Sheffield Level: II Date: 11-20-97

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
2.6/ 2 X (1.3 + 1.7) X 2 = 7.8 SQ. IN.	TOTAL VOLUME = 7.8 X 78" = 608.4 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	4.4	78	343.2	608.4	56.41
2	45°	S2	6.7	78	522.6	608.4	85.90
3	35°	S2	5.4	78	421.2	608.4	69.23
4	35/45	CW	3.8	78	296.4	608.4	48.72
5	35/45	CCW	3.8	78	296.6	608.4	48.75
				TOTAL	1879.8	3042	61.79

Item No: B03.110.001

Prepared By: Larry Moulder Level: III Date: 11-18-97

Reviewed By: Rod Sheffield Level: II Date: 11-26-97

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
2.6 / 2 X (2.6 + 1.0) = 4.68 = 4.7 SQ. IN.	TOTAL VOLUME = 7.8 X 78" = 608.4 CU. IN. HEATER BUNDLE VOL. = 4.7 X 48 = 225.6 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	4.7	78	366.6	366.6	100.00
2	45°	S2	4.7	30	141	141	100.00
3	45°	S2	4.2	48	201.6	225.6	89.36
4	45°	S1	2.1	78	163.8	366.6	44.68
5	45°	CW	4.7	78	366.6	366.6	100.00
6	45°	CCW	4.7	78	366.6	366.6	100.00
7	35°	S1	4.6	30	138	141	97.87
8	35°	S1	4.6	48	220.8	225.6	97.87
9	35°	S2	2.1	78	163.8	366.6	44.68
10	35°	CW	4.7	78	366.6	366.6	100.00

Item No: B03.110.001

Prepared By: Larry Mauldin Level: III Date: 11-18-97

Reviewed By: Ted Sheffield Level: II Date: 11-20-97

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

Examination Volume/Area Defined

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

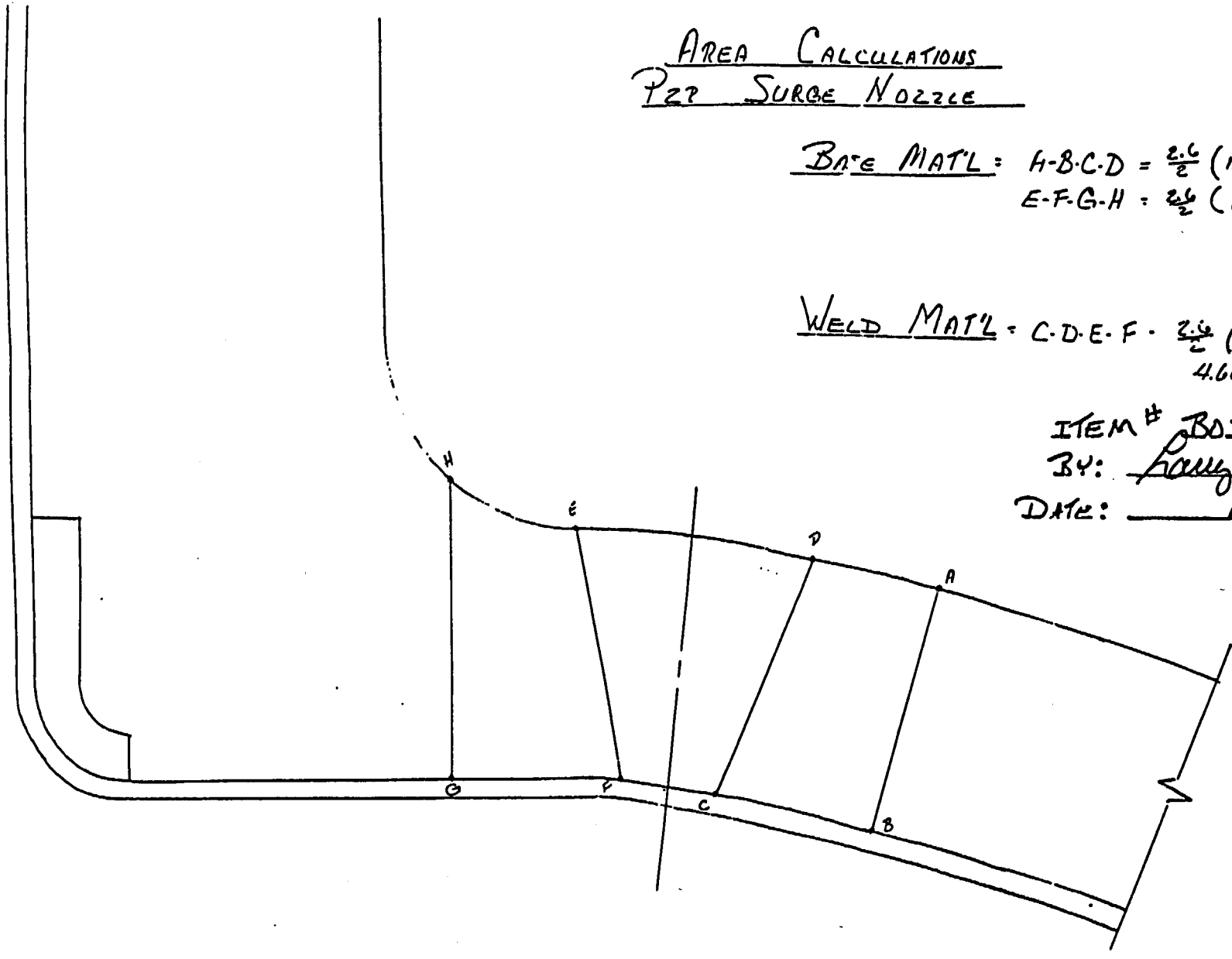
Area Calculation	Volume Calculation
2.6 / 2 X (2.6 + 1.0) = 4.68 = 4.7 SQ. IN.	TOTAL VOLUME = 7.8 X 78" = 608.4 CU. IN. HEATER BUNDLE VOL. = 4.7 X 48 = 225.6 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
11	35°	CCW	4.7	78	366.6	366.6	100.00
				TOTAL	2862	3299.4	86.74

Item No: B03.110.001		
Prepared By: Larry Rawlek	Level: III	Date: 11-18-97
Reviewed By: Rod Sheffield	Level: II	Date: 11-20-97

AREA CALCULATIONS
PZR SURGE NOZZLE

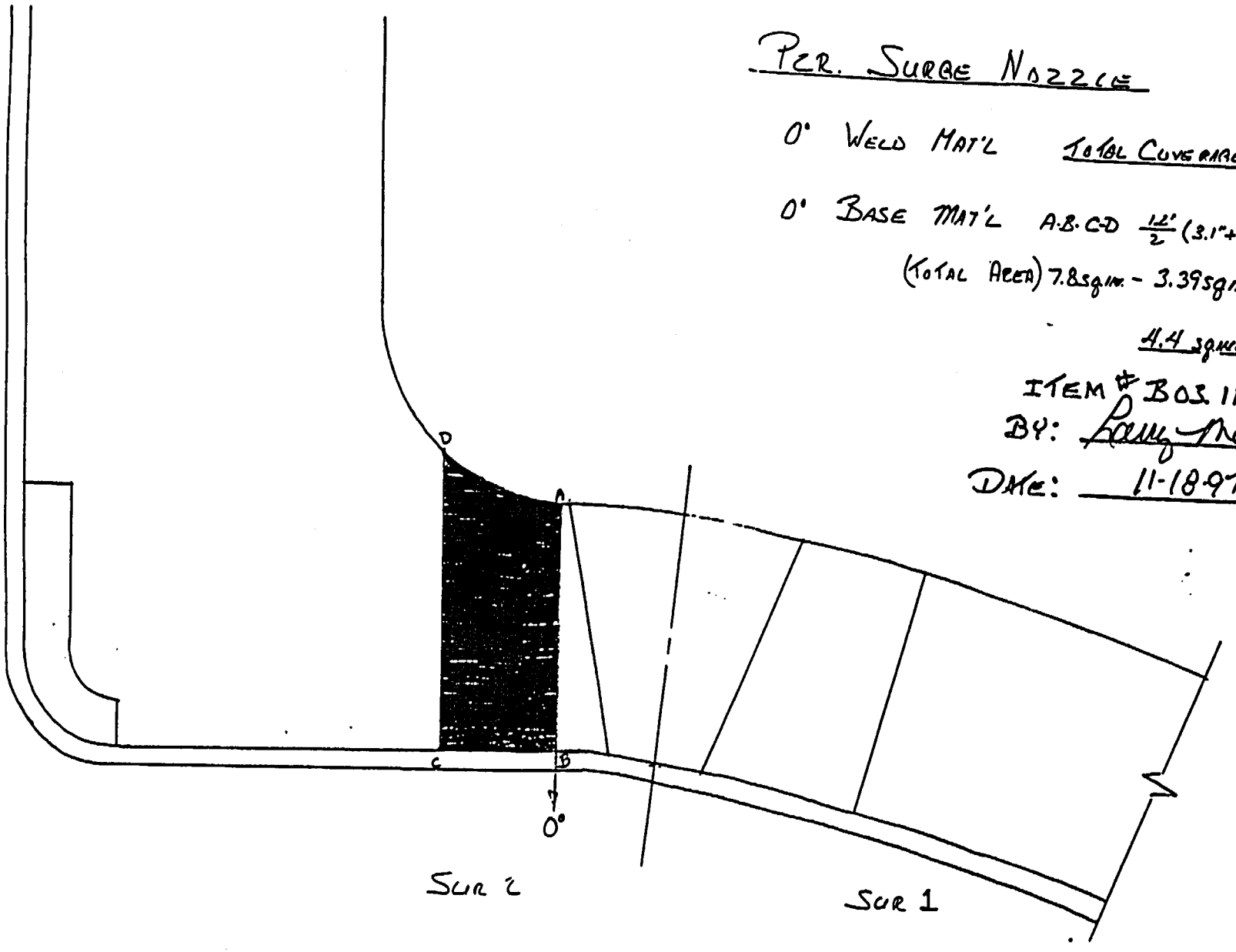


BASE MAT'L: H-B-C-D = $\frac{2.6}{2}(1.3"+1.7") = 3.9$ sq in
E-F-G-H = $\frac{2.6}{2}(1.3+1.7") = 3.9$ sq in
7.8 sq in

WELD MAT'L = C-D-E-F = $\frac{2.6}{2}(2.6"+1.0")$ =
4.68" = 4.7 sq in

ITEM # B03.110.001
BY: Larry Moulder
DATE: 11-18-97

Attachment 3
Page 7 of 31



PER. SURGE NOZZLE 0°

0° WELD MAT'L TOTAL COVERAGE

0° BASE MAT'L A·B·C·D $\frac{12'}{2}(3.1'' + 2.55'') = 3.39$

(TOTAL AREA) 7.8 sq in. − 3.395 sq in. = 4.4 sq in.

4.4 sq in. COVERAGE

ITEM # BOS 110.001

BY: Larry Mauldin

DATE: 11-18-97

Attachment 3
Page 8 of 31

P.I.R. SURGE NOZZLE — BASE MAT'L

45° S1 to S2 Loss ABC $\frac{1.8 \times 1.2}{2}$ = 1.1 sq in.

(TOTAL AREA) 7.8 sq in. − 1.1 sq in. = 6.7 sq. in. COVERAGE

35° S1 to S2 Loss (C-D-E) − (A-E-G) = $\frac{3.0 \times 1.7}{2} - \frac{7 \times 4}{2}$ = 2.4 sq in

(TOTAL AREA) 7.8 sq in. − 2.4 sq in. = 5.4 sq in COVERAGE

35° AND/OR 45° CIRCUMFERENTIAL SCANS

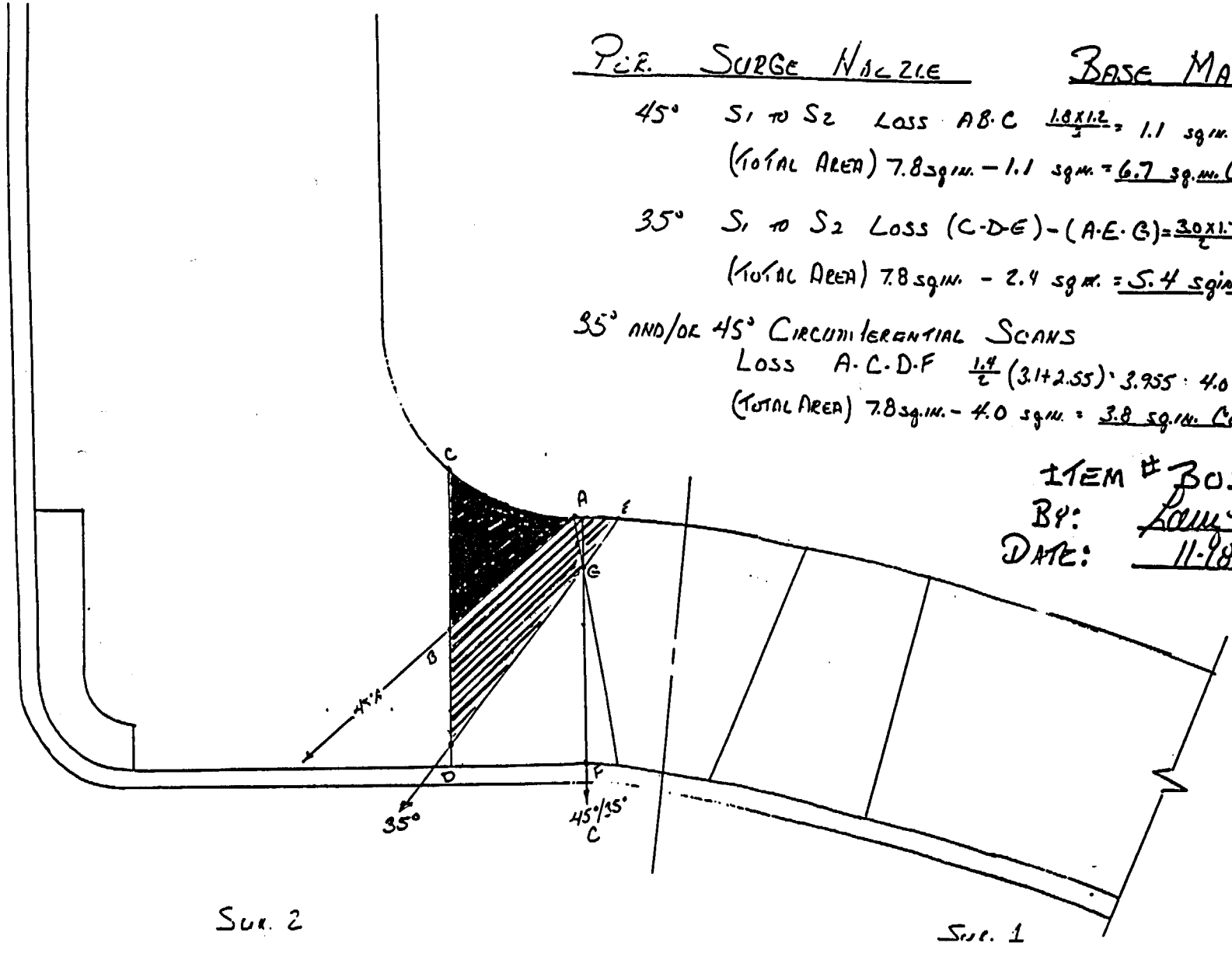
Loss A-C-D-F $\frac{1.4}{2}(3.1+2.55) \cdot 3.955 \cdot 4.0$ sq in.

(TOTAL AREA) 7.8 sq in. − 4.0 sq in. = 3.8 sq. in. COVERAGE

ITEM # B03.110.001

BY: Lou Nanelli

DATE: 11-18-97



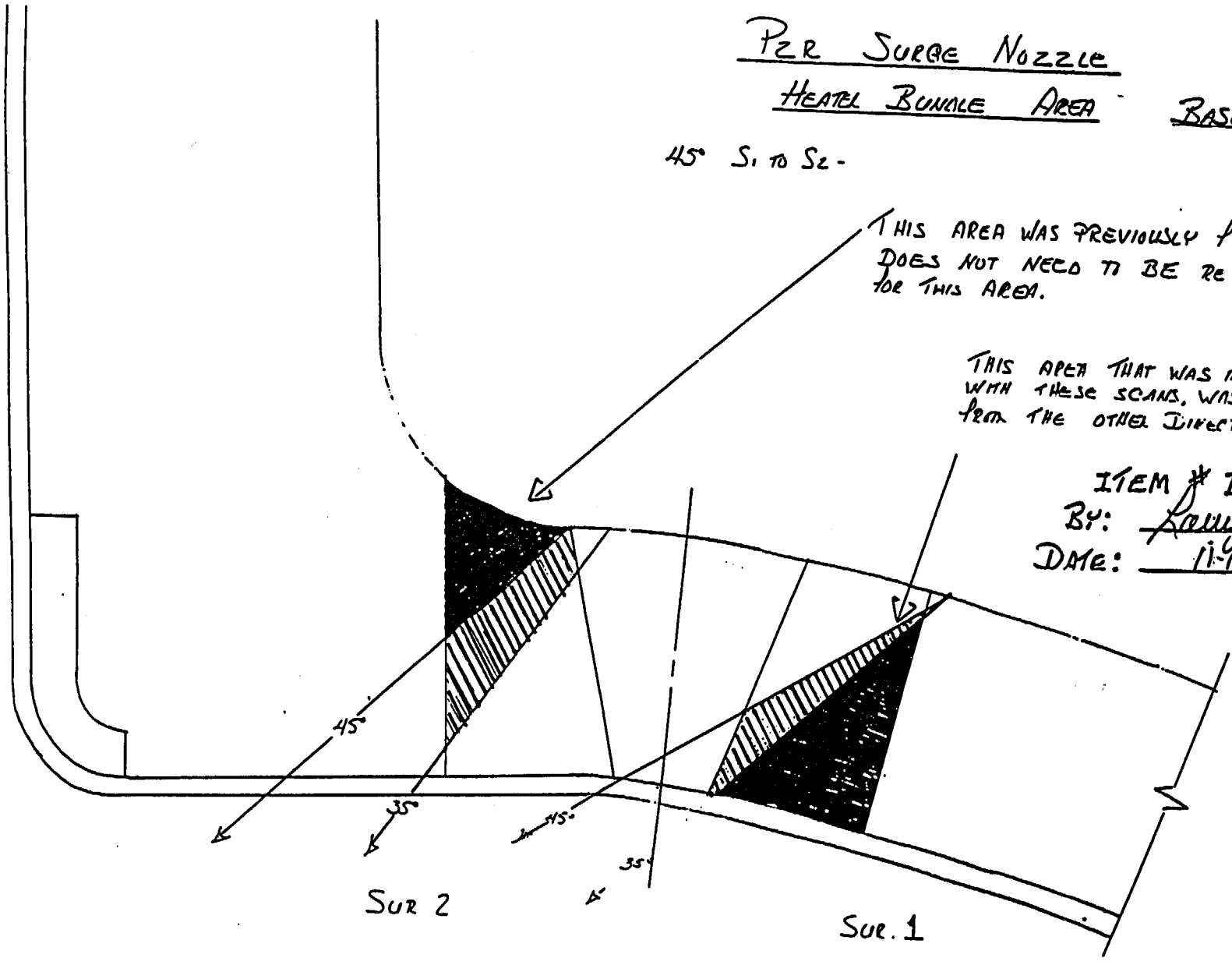
SUR. 2

SUR. 1

PZR SURGE NOZZLE
HEATER BUNDLE AREA

BASE MAT'L

45° S_1 to S_2 -



ITEM # B03.110.001
BY: Larry Mauldin
DATE: 11-18-97

Pzr. Surge Nozzle — Weld Mat'l

45° S1 to S2

35° S1 to S2

TOTAL COVERAGE

(Loss) A-R-C $\frac{.7 \times .4}{2}$ = .14 sq.in. = .1 sq. in.

TOTAL AREA 4.7 sq.in. - .1 sq.in. = 4.6 sq.in. COVERAGE

35° AND/OR 45° CIRCUMFERENTIAL SCANS

(Loss) B-C-D $\frac{.45 \times .1}{2}$ = .023 = .02 sq.in

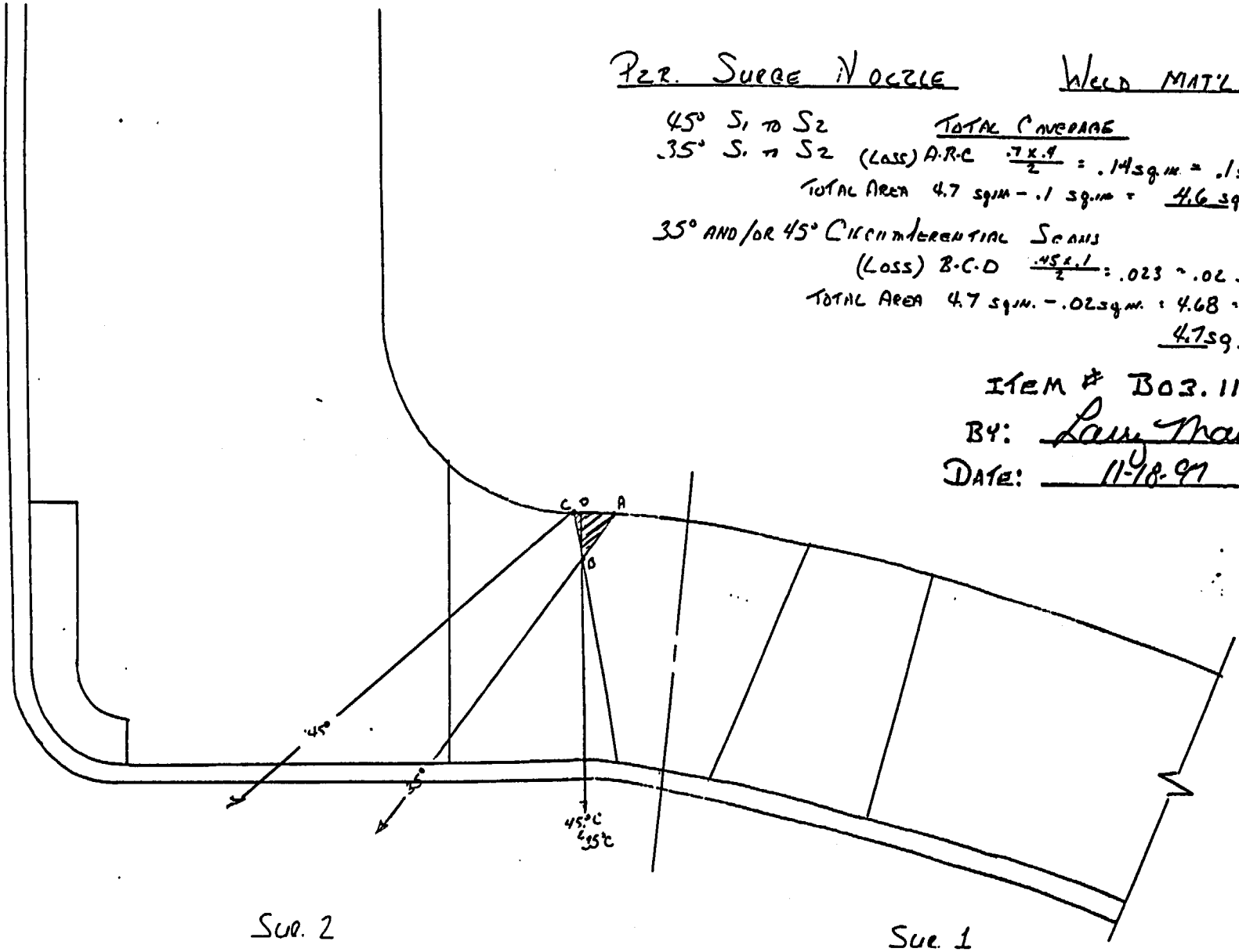
TOTAL AREA 4.7 sq.in. - .023 sq.in. = 4.68 = 4.7 sq.in.

4.7 sq in COVERAGE

ITEM # B03.110.001

BY: Larry Mauldin

DATE: 11-18-97



Sub. 2

Sub. 1

PZR. SURGE NOZZLE

HEATER BUNDLE AREA

WELD MAT'L

45° S1 TO S2 LOSS A·B·C = $\frac{1.6 \times .6}{2}$ = .48 sq in.

(TOTAL AREA) 4.68 sq in. − .48 sq in. = 4.2 sq in COVERAGE

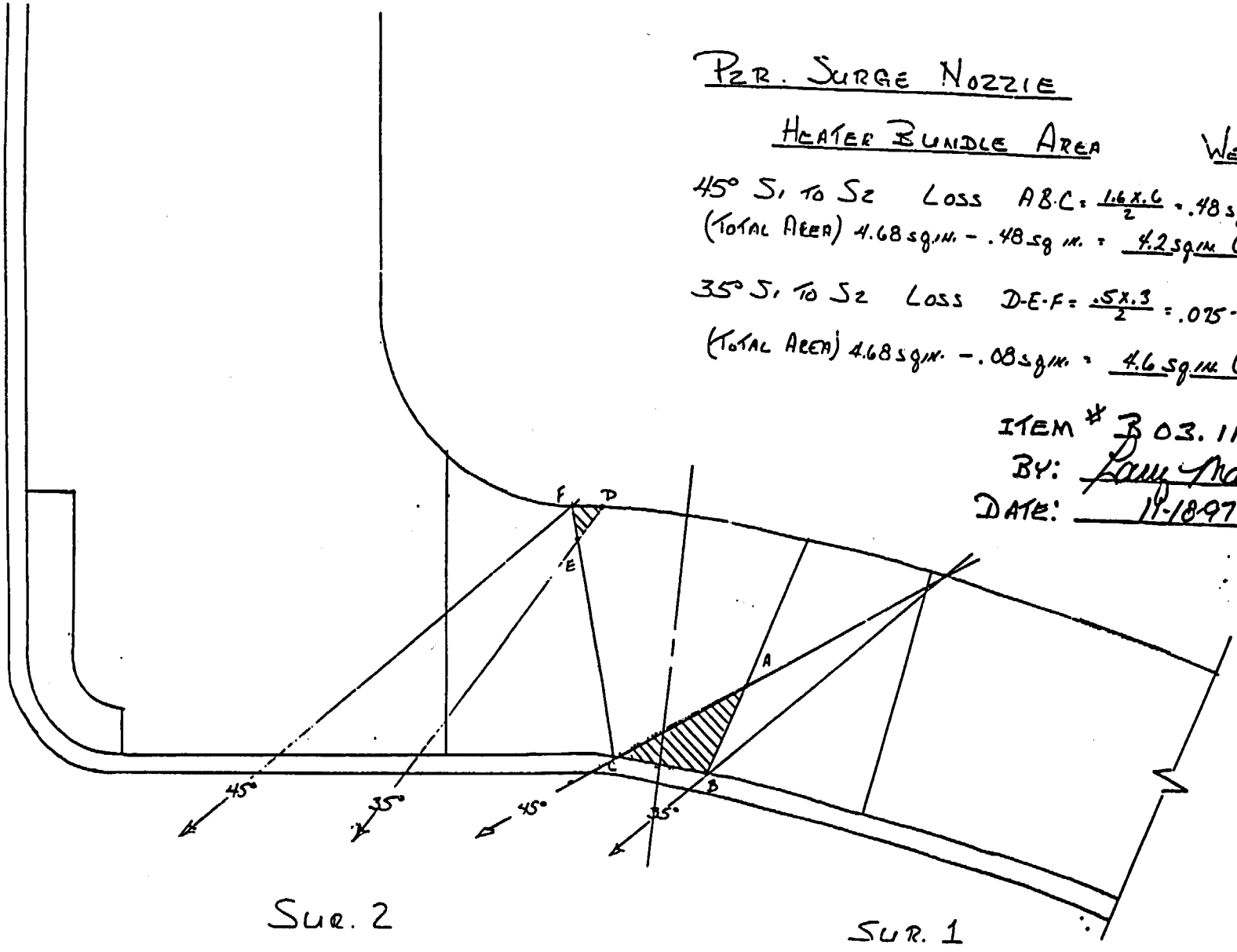
35° S1 TO S2 LOSS D·E·F = $\frac{.5 \times .3}{2}$ = .075 ~ .08 sq in.

(TOTAL AREA) 4.68 sq in. − .08 sq in. = 4.6 sq in COVERAGE

ITEM # B 03.110.001

BY: Larry Mauldin

DATE: 11-18-97



SUR. 2

SUR. 1

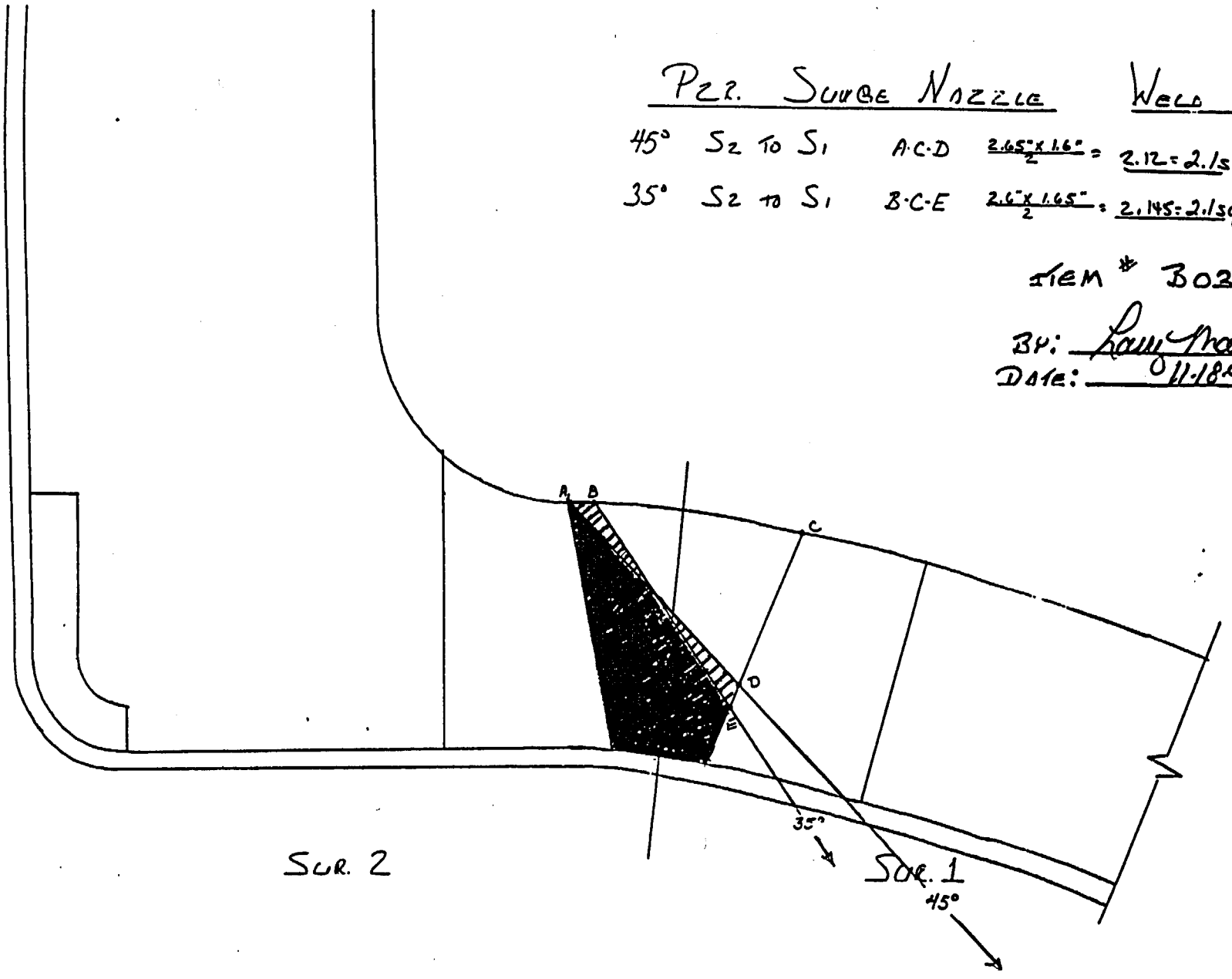
Attachment 3
Page 12 of 31

PZR. SURGE NOZZLE				WELD MAT'L
45°	S2 TO S1	A·C·D	$\frac{2.65" \times 1.6"}{2}$ =	2.12 = 2.1 sq in COVERAGE
35°	S2 TO S1	B·C·E	$\frac{2.6" \times 1.65"}{2}$ =	2.145 = 2.1 sq in. COVERAGE

ITEM # B02.110.001

BY: Larry Saulsbee

DATE: 11-18-97



Attachment 3
Page 13 of 31

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1154 | Form NDE-UT-2A

Exam Finish: 1230 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2PZR-12 | Date: 4/11/96

Weld Length (in.): 40.0 | Surface Condition: AS GROUND | Lo: B&W#1 | Surface Temperature: 78 ° ___

Examiner: Rodney G. Sheffield Rodney G. Sheffield Level: II | Pyrometer S/N: MCNDE 27029

Examiner: David Zimmerman Level: II | Cal Due: 6/14/96

Procedure: NDE-620 Rev: 3 | FC: 96-02

NDE-640 1 | **

Calibration Sheet No: 9602073, 9602072, 9602074, 9602075

Scans:

45 ☒ 59 dB 70 ☐ ___ dB

45T ☒ 59 dB 70T ☐ ___ dB

60 ☒ 57 dB

60T ☒ 57 dB

Other: * dB

Configuration: NOZZLE

NOZZLE Flow SHELL

___ to ___

Scan Surface: OD

Applies to NDE-680 only

Skew Angle:

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
		DO NOT WRITE IN THIS SPACE				20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	20%dac HMA 50%dac 100%dac	DO NOT WRITE IN THIS SPACE			
NRI	0°														
NRI	45°														
NRI	60°														

Remarks: Scans Other * 0° 22, 60°L - 72.5 / FC ** 95-18, 95-19

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

Reviewed By: Level: Date:

Wayne C. Leeper II 5-7-96

Authorized Inspector: Date:

5-9-96

Item No: B03.110.003

Attachment 3
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DUKE POWER COMPANY

ISI LIMITATION REPORT

WCL

FORM NDE- UT-4

Revision 1

Component/Weld ID: 2RCR-17 Item No: B03.110.003 003

remarks: Due to nozzle configuration

[X] NO SCAN	SURFACE	BEAM DIRECTION
[ ] LIMITED SCAN	[X] 1 [X] 2	[X] 1 [X] 2 [X] cw [X] ccw
FROM L____ to L____	INCHES FROM W0 1.4 to BEYOND	
ANGLE: [X] 0 [X] 45 [X] 60 other ____	FROM 0 DEG to 360 DEG	

[ ] NO SCAN	SURFACE	BEAM DIRECTION
[ ] LIMITED SCAN	[ ] 1 [ ] 2	[ ] 1 [ ] 2 [ ] cw [ ] ccw
FROM L____ to L____	INCHES FROM W0____ to ____	
ANGLE: [ ] 0 [ ] 45 [ ] 60 other	FROM ____ DEG to ____ DEG	

[ ] NO SCAN	SURFACE	BEAM DIRECTION
[ ] LIMITED SCAN	[ ] 1 [ ] 2	[ ] 1 [ ] 2 [ ] cw [ ] ccw
FROM L____ to L____	INCHES FROM W0____ to ____	
ANGLE: [ ] 0 [ ] 45 [ ] 60 other	FROM ____ DEG to ____ DEG	

[ ] NO SCAN	SURFACE	BEAM DIRECTION
[ ] LIMITED SCAN	[ ] 1 [ ] 2	[ ] 1 [ ] 2 [ ] cw [ ] ccw
FROM L____ to L____	INCHES FROM W0____ to ____	
ANGLE: [ ] 0 [ ] 45 [ ] 60 other	FROM ____ DEG to ____ DEG	

Sketch(s) attached [ ] yes [ ] no

Prepared By: [signature] Level: II Date: 4-11-96 Sheet 7 of 20

Reviewed By: [signature] Date: 5-7-96 Authorized Inspector: [signature] Date: 5-9-96

Attachment 3
Page 15 of 31

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
1.8 x 5.8 = 10.44 sq. in.	10.44 x 40 = 417.6 sq, cu. in.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	2	10.06	40	402.6	417.6	96.41
2	60	2	10.41	40	416.4	417.6	99.71
3	45	1	3.22	40	128.8	417.6	30.84
4	60	1	1.40	40	56	417.6	13.41
5	45	CW	8.64	40	345.6	417.6	82.76
6	45	CCW	8.64	40	345.6	417.6	82.76
7	60	CW	8.64	40	345.6	417.6	82.76
8	60	CCW	8.64	40	345.6	417.6	82.76
				Total =	2386.2	3340.8	71.43

Total Volume Examined - 3053.6 / Total Volume Required 4268.8 = 71.5% Total Coverage

Item No: B03.110.003

Prepared By: David K. Zimmerman Level: II Date: 4-11-96

Reviewed By: [signature] Level: II Date: 5-6-96

DUKE POWER COMPANY

Limited Examination Coverage Worksheet 9 of 20

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
5.8 x 1.0 = 5.8 sq. in.	5.8 sq. in. x 40 in. = 232 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	60L	2	4.62	40	184.4	232	79.48
2	60L	1	3.275	40	131	232	56.47
3	60L	CW	4.4	40	176	232	75.86
4	60L	CCW	4.4	40	176	232	75.86
				Total =	667.4	928	71.92

WCL B03.110.003

Item No: ~~B03.011.003~~

Prepared By: David K. Zimmerman Level: II Date: 4-11-96

Reviewed By: Wm. John C. Leeper Level: III Date: 5-6-96

R 6/17/96

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS (continuation)

Form NDE-UT-2B

Revision 3

Station: McGuire | Unit: 2 | Component/Weld ID: 2PZR-12 | Date: 4/11/96

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

Examiner: Rodney G. Sheffield Rodney G. Sheffield Level: II | Examiner: David Zimmerman David C. Zimmerman Level: II

Remarks: Scans Other * 0° 22, 60°L - 72.5 FC ** 95-18, 95-19

Sheet ____ of ____

Reviewed By: Wayne C. Leeper II Level: Date: 5-6-96

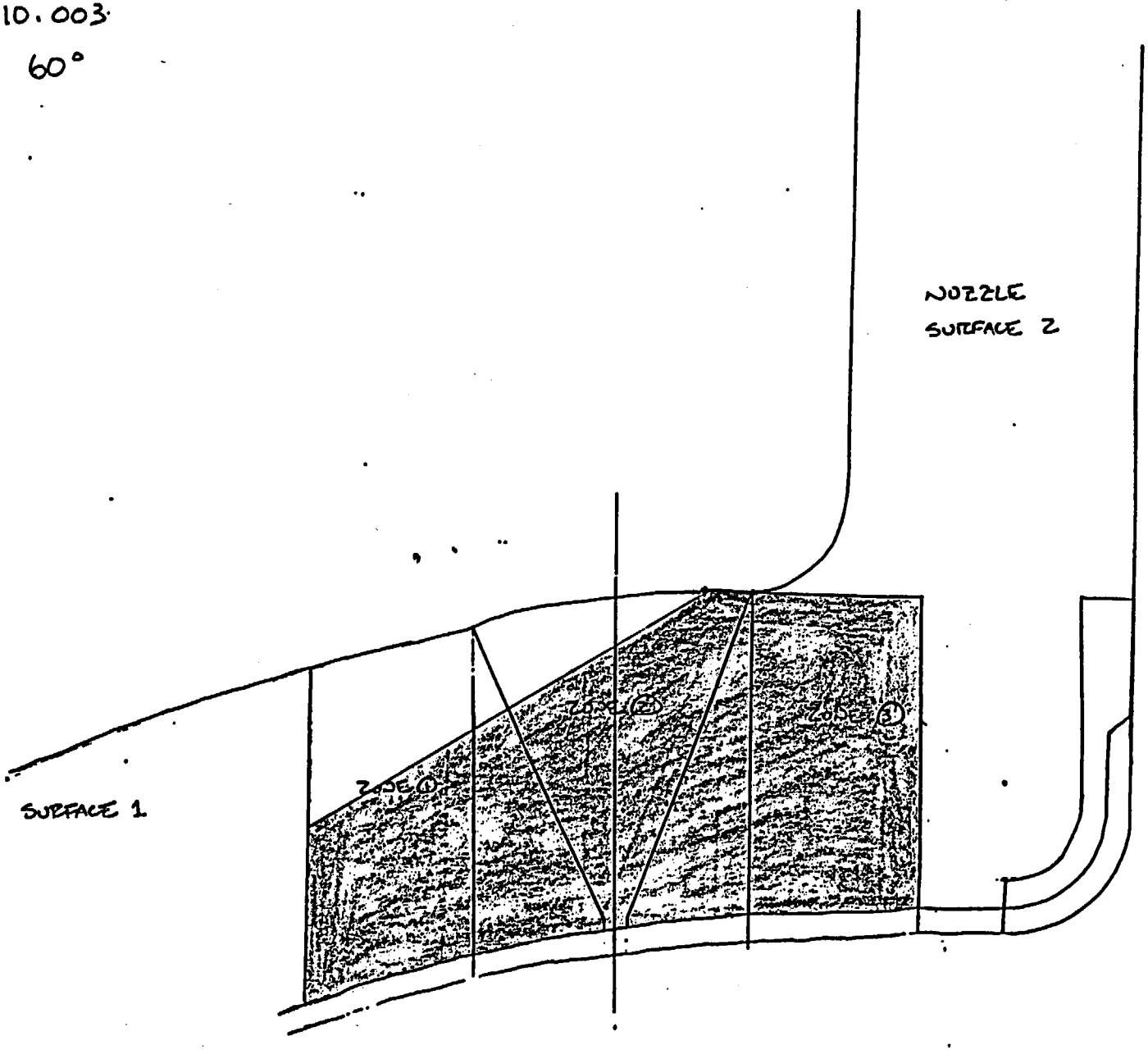
Authorized Inspector: Date: 5-7-96

Item No: B03.110.003

Attachment 3
Page 18 of 31

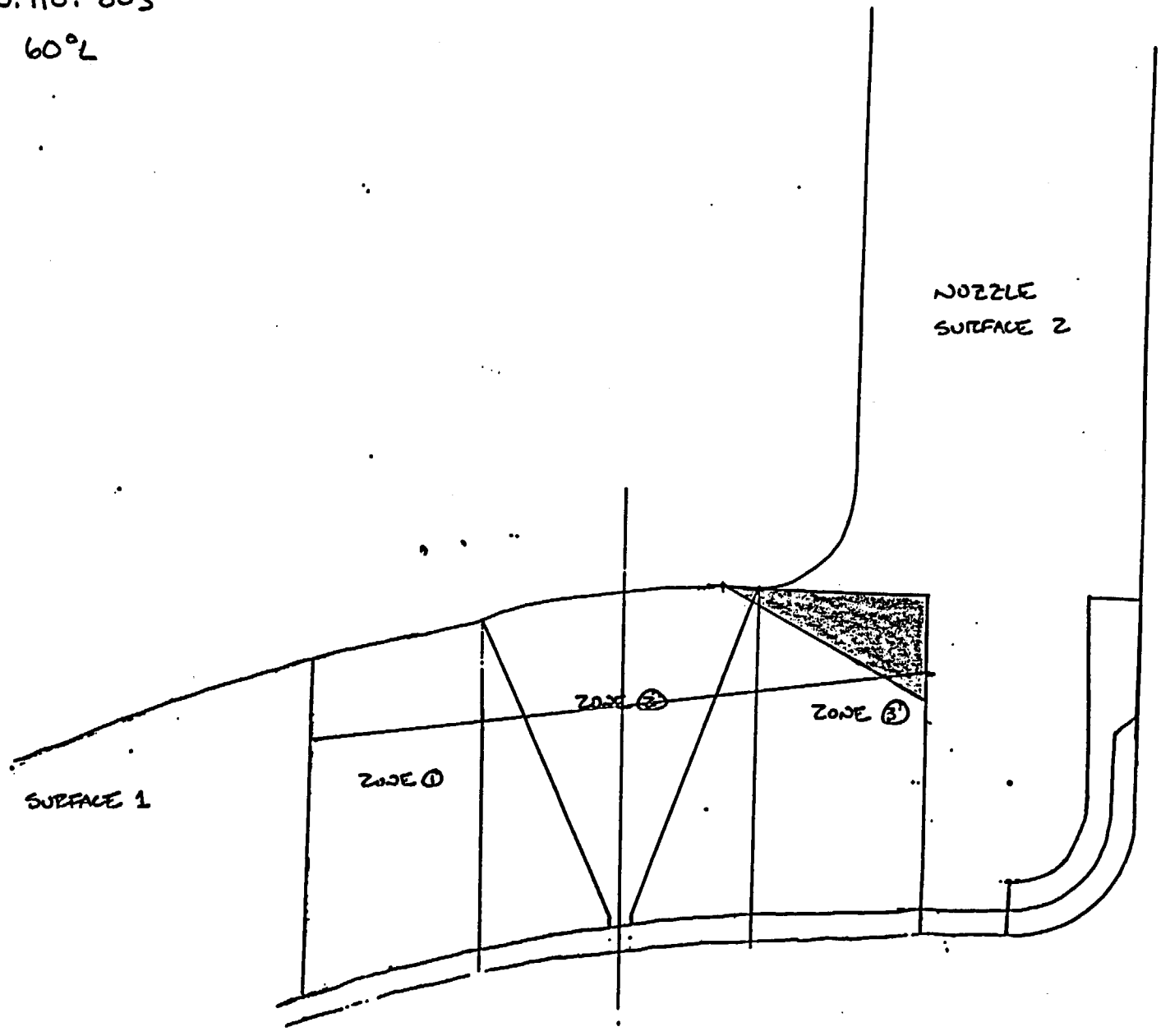
Item # 803.110.003

SCAN 4 60°



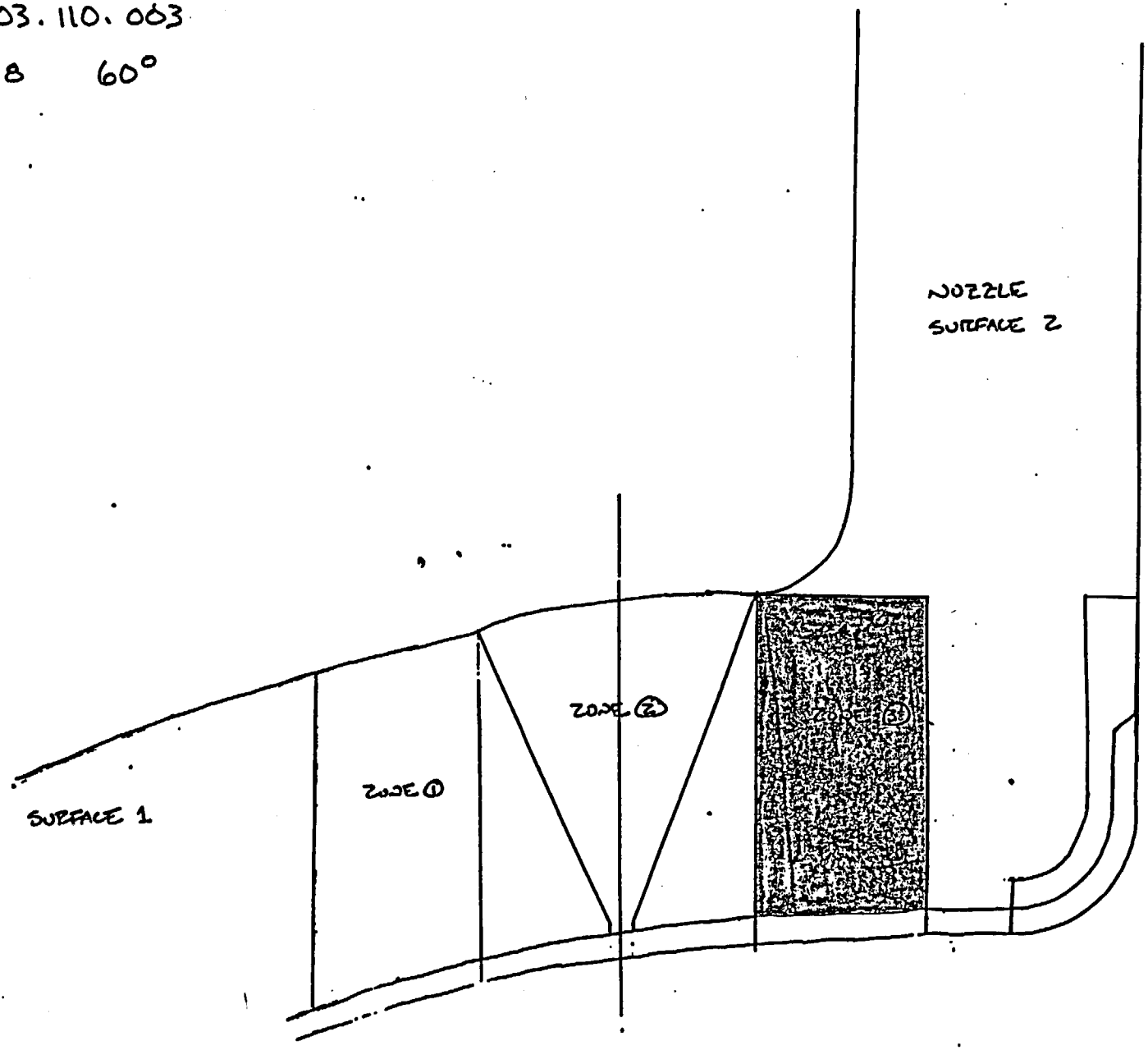
Item # B03.110.003

SCAN 1 60°L



Item # B03.110.003

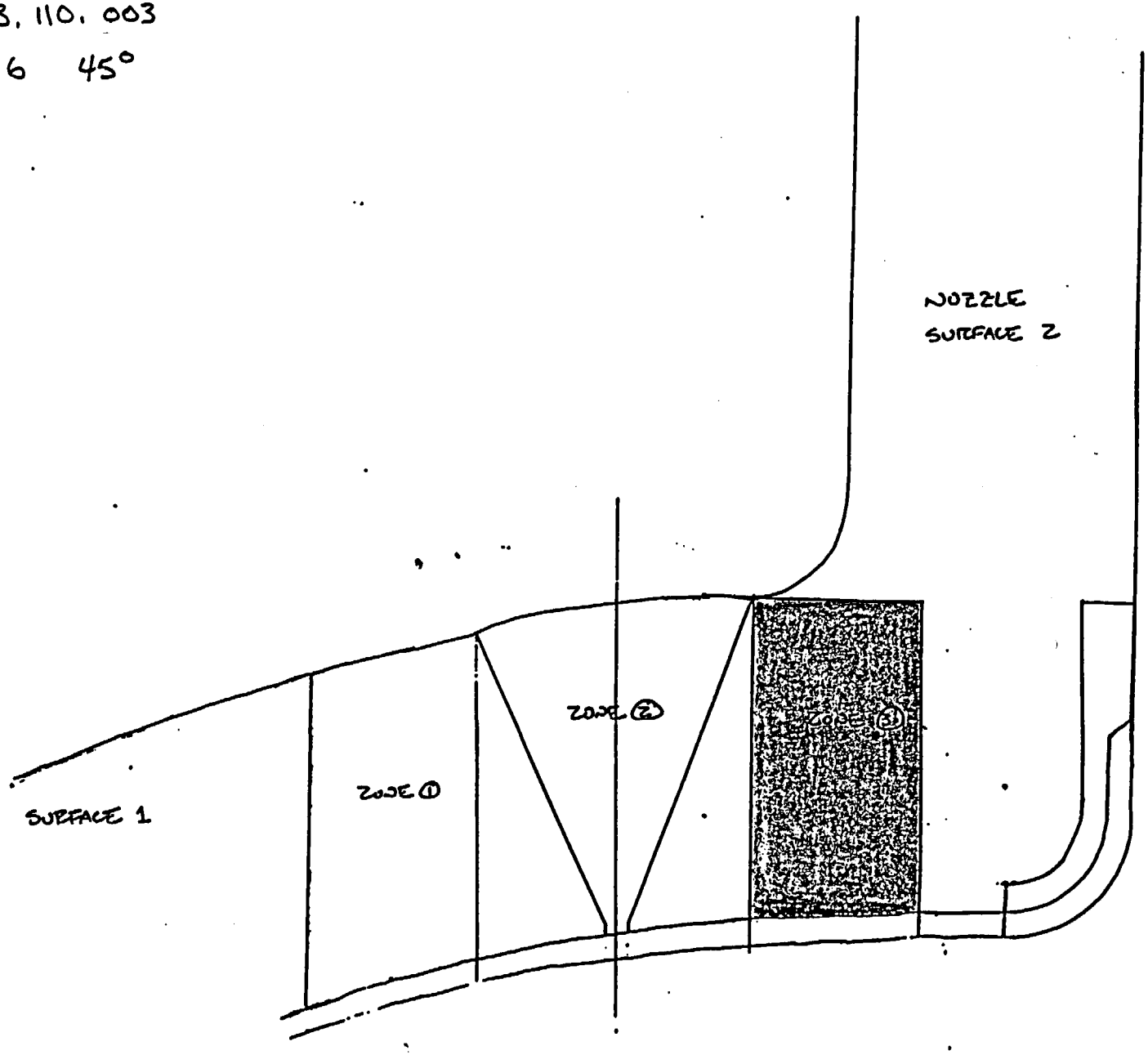
SCAN 7+8 60°



Attachment 3
Page 21 of 31

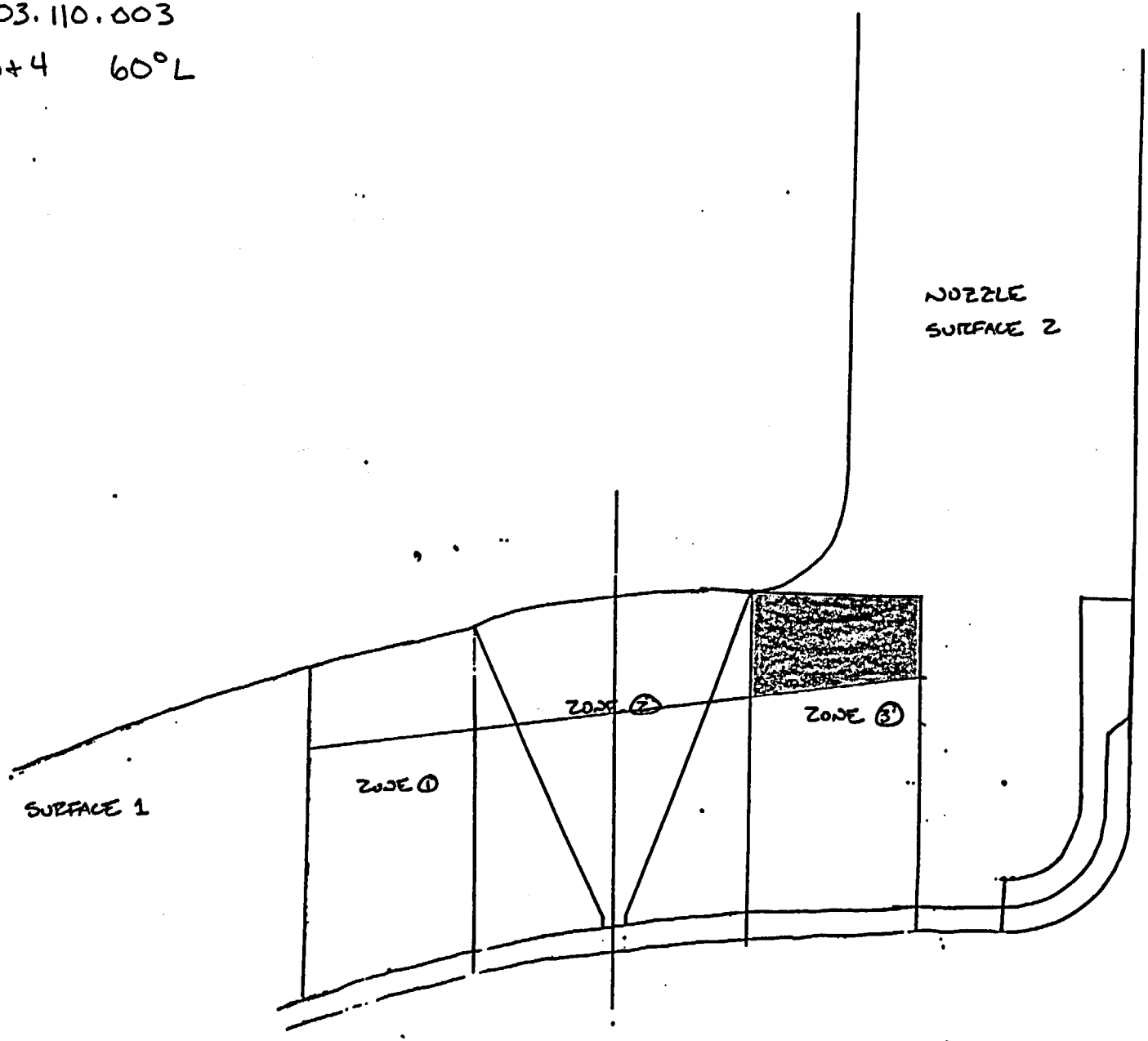
Item # B03.110.003

SCAN 5+6 45°

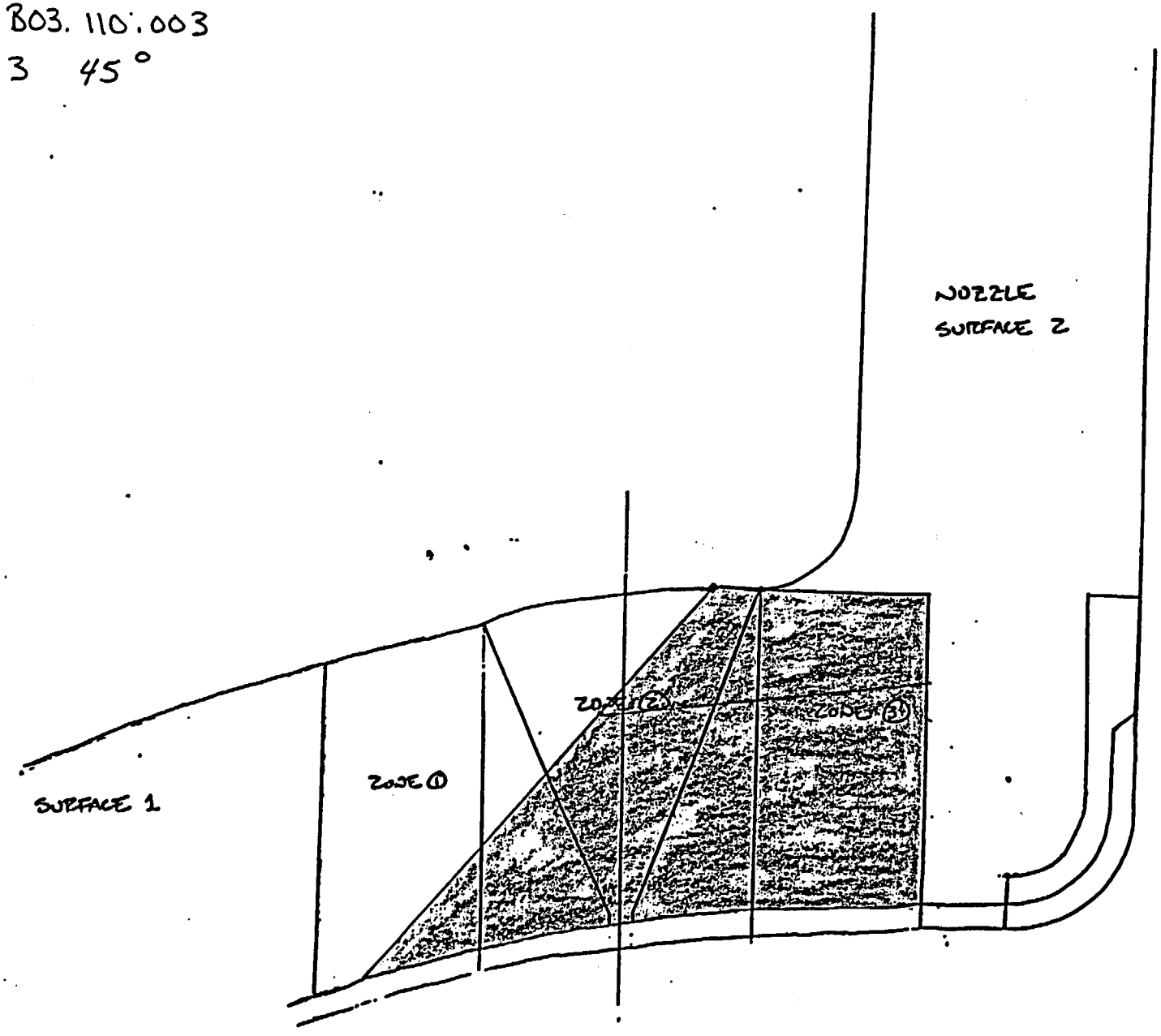


Item # B03.110.003

SCAN 3+4 60°L

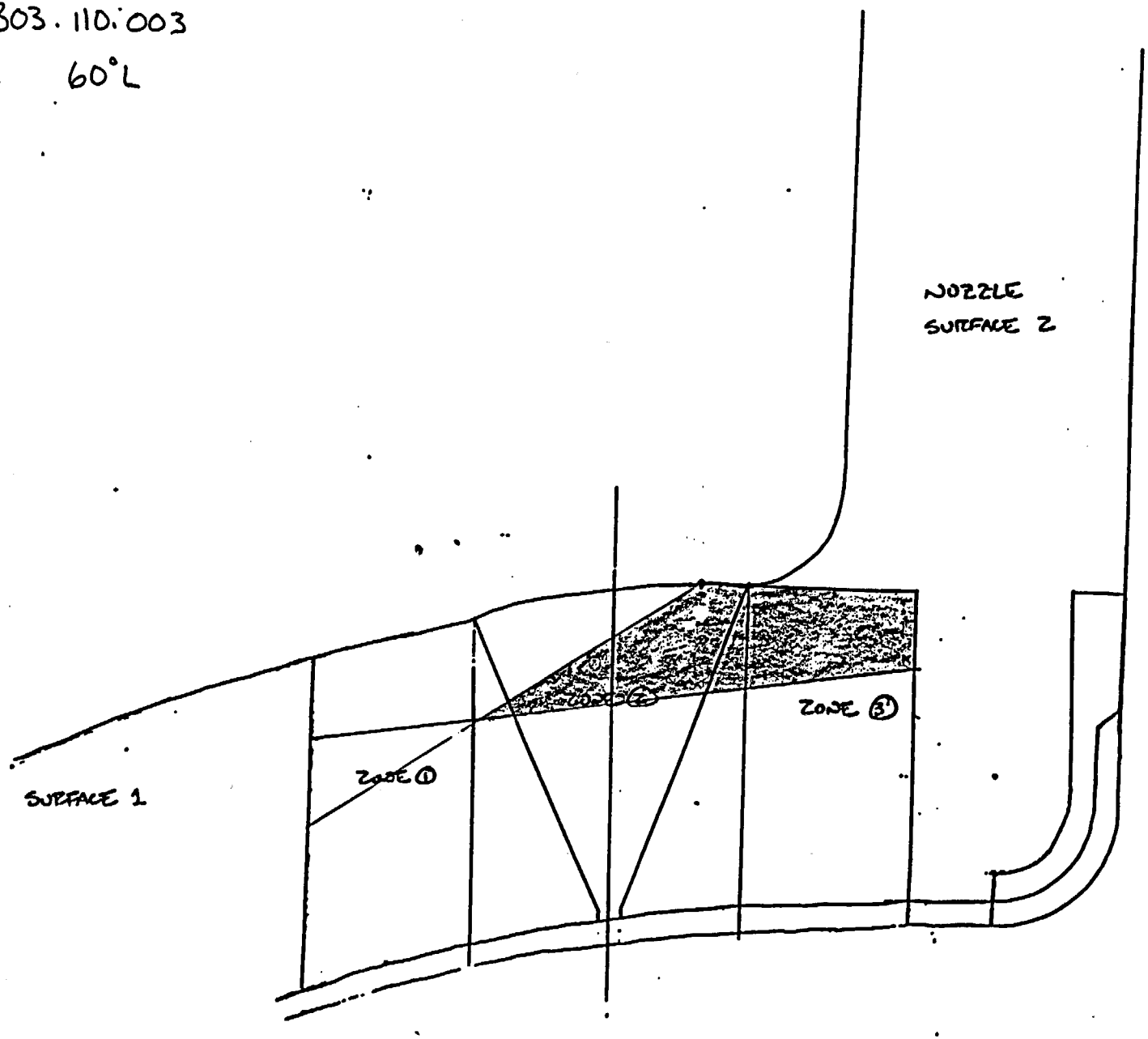


Item # B03.110.003
SCAN 3 45°



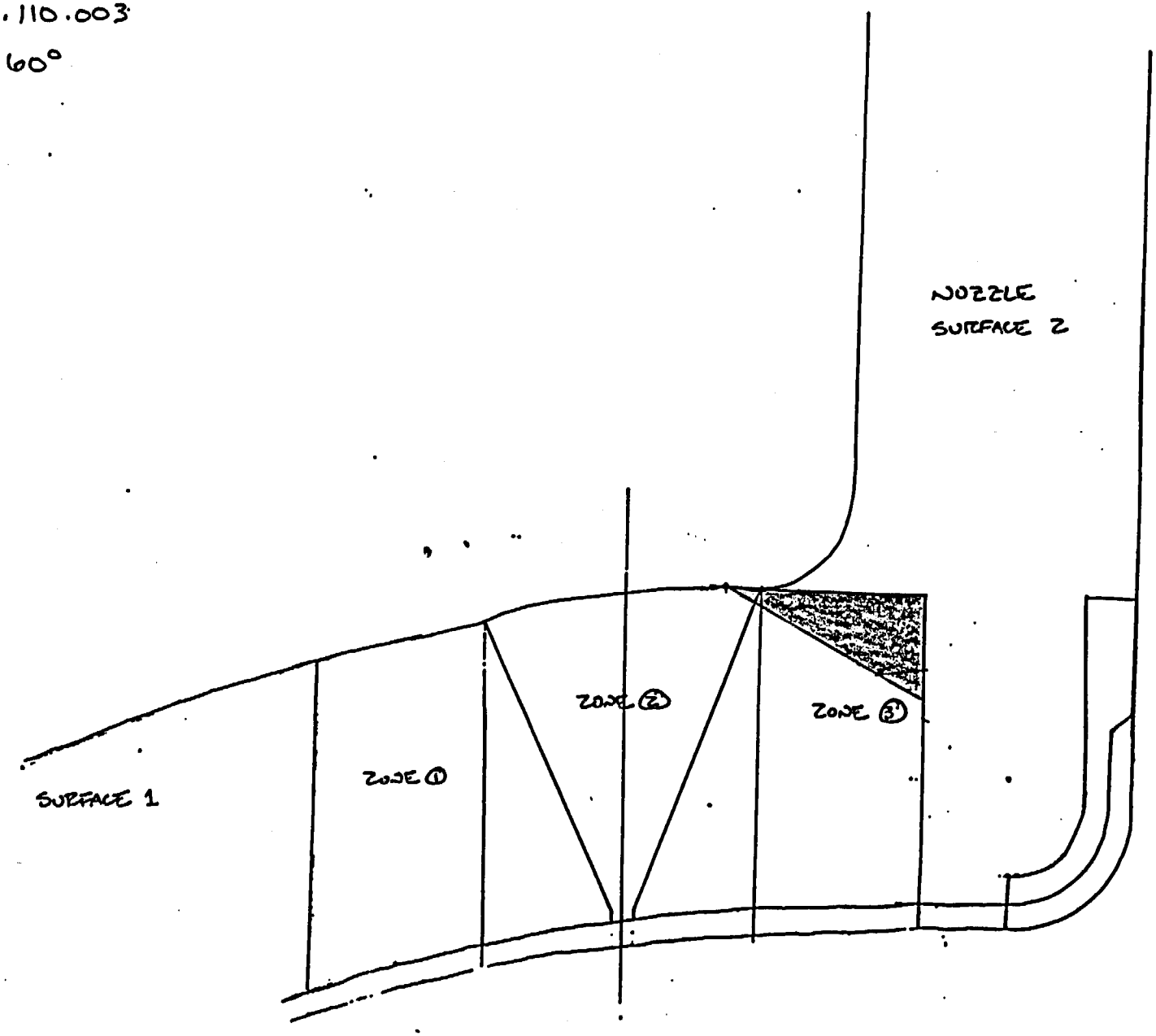
Item # B03.110.003

SCAN 2 60°L



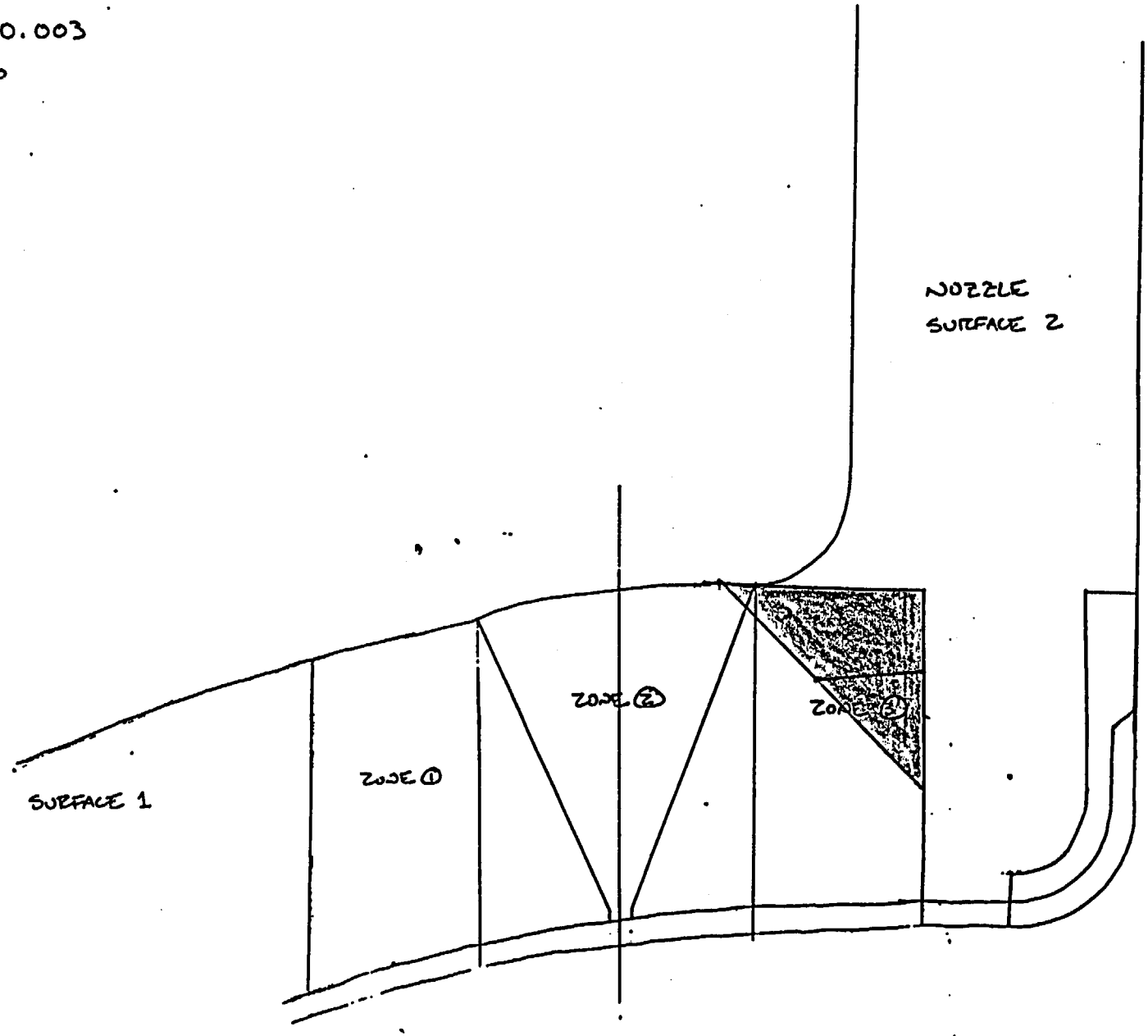
Item # B03.110.003

SCAN 2 60°



Item # B03.110.003

Scan 1 45°



Attachment 3
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DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1211 | Exam Finish: 1241 | Form NDE-UT-2A | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2PZR-12R | Date: 4/11/96

Weld Length (in.): N/A | Surface Condition: GROUND | Lo: B&W #1 | Surface Temperature: 78 °

Examiner: David Zimmerman - Level: II | Pyrometer S/N: MCNDE 27029

Examiner: Rodney G. Sheffield - Level: II | Cal Due: 6/14/96

Procedure: NDE-680 Rev: 1 | FC: 95-16

Calibration Sheet No: 9602035, 9602036

Scans:
45 ☐ ____ dB 70 ☒ 63 dB
45T ☐ ____ dB 70T ☐ ____ dB
60 ☒ 57 dB
60T ☐ ____ dB
Other: ____ dB

Configuration: INNER RADIUS
____ Flow ____
____ to ____
Scan Surface: OD

Applies to NDE-680 only
Skew Angle: 23°

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

Remarks:

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

Reviewed By: Wayne C. Leap | Level: II | Date: 4-18-96

Authorized Inspector: R.H. Klein | Date: 4-26-96 | Item No: B03.120.002

Attachment 3
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DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2PZR-12R   Item No: B03.120.002   Remarks:

[X] NO SCAN
[ ] LIMITED SCAN
SURFACE: [X] 1 [ ] 2
BEAM DIRECTION: [ ] 1 [X] 2 [ ] cw [ ] ccw
FROM L NA to L NA   INCHES FROM WO NA to NA
ANGLE: [ ] 0 [ ] 45 [X] 60 [ ] Other 70   FROM 0 DEG to 360 DEG

Remarks: NOZZLE RADIUS

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

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

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

Prepared By: David K. Z[illegible]   Level: II   Date: 4-12-96   Sketch(s) attached [ ] yes [X] no   Sheet ____ of ____

Reviewed By: W[illegible]   Date: 4-18-96   Authorized Inspector: [signature]   Date: 4-26-96

Attachment 3
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DUKE POWER COMPANY Limited Examination Coverage Worksheet 5 of 5	NDE-91-1 Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
3.5 in X 0.5 in = 1.7 sq in	3.5 in X 0.5 in X 40.0 in = 70 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°	SKEW	~~1.74~~ 1.1	40.0	44	70	62.86
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00
							0.00

* 60° & 70° USED AS ONE SCAN TO OBTAIN MAXIMUM COVERAGE - NOT TO BE FIGURED SEPERATELY.

Total Volume Examined 44 / Total Volume Required 70 = 62.86 % Total Coverage

Item No: B03.120.002		
Prepared By: David K. Zimmerman	Level: II	Date: 4-12-96
Reviewed By: W. R. C. Lee	Level: II	Date: 4-18-96

RJ 4/17/96

PZR. SPRAY NOZZLE

AREA: $3.5 \times .5 = 1.75$ sq. in

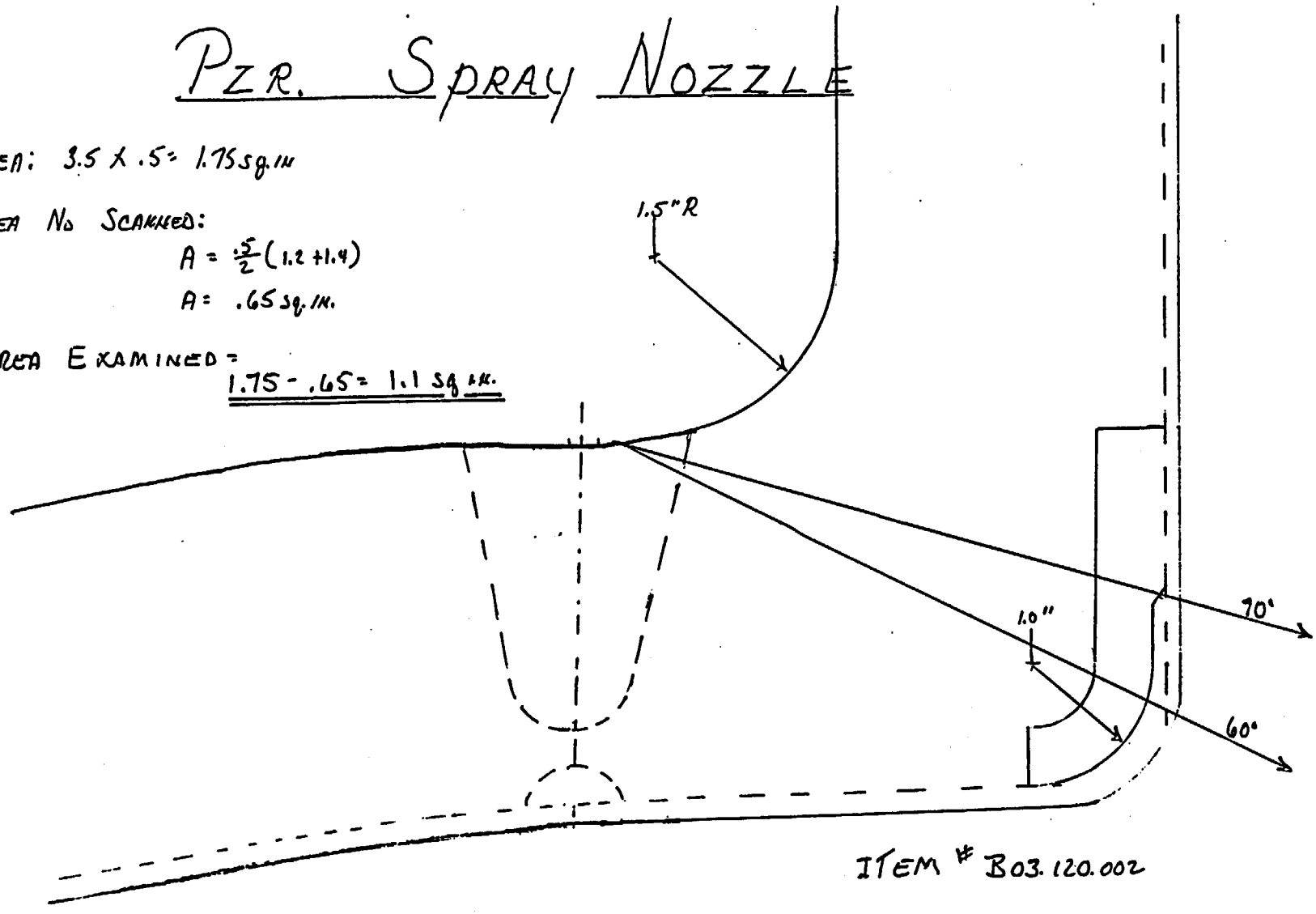
AREA NOT SCANNED:

$A = \frac{.5}{2}(1.2 + 1.4)$

$A = .65$ sq. in.

AREA EXAMINED =

$1.75 - .65 = 1.1$ sq. in.



ITEM # B03.120.002

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1350 | Form NDE-U.

Exam Finish: 1406 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2SGA-INLET-SE | Date: 12-05-94

Weld Length (in.): 97.34" | Surface Condition: As Ground | PER B&W Lo: REF. 1

Surface Temperature: 83 ° F

Pyrometer S/N: MCNDE27020

Cal Due: 951101

Examiner: Terry L. Bibb Level: II

Examiner: W. C. Leaper Level: II

Procedure: NDE 610 Rev: 2 | FC: NONE

Calibration Sheet No: 9402033 ,9402034

Scans:

45 [X] 62.5 dB 70 [ ] ____ dB

45T [X] 61.5 dB 70T [ ] ____ dB

60 [ ] ____ dB

60T [ ] ____ dB

Other: ____ dB

Configuration: CIRC. WELD

S2 Flow S1

SAFE END to Nozzle

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: n/a

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	*Applies only to NDE-620, 640 and 680* W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	DO NOT WRITE IN THIS SPACE			
	45°L	No Recordable Indications (Axial or Circ.)													

Remarks: DUE TO SIGNAL NOISE RATIO CIRC. SCAN WAS PERFORMED AT REF. DB AND AXIAL SCAN WAS AT +6DB

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

Sheet ____ of ____

Reviewed By: Larry Maulden Level: II Date: 12-7-94

Authorized Inspector R D Klein Date 12-12-94

Item No: B05.070.001

SERIAL No. 98-005
Attachment 4
Page 1 of 12

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 2SGA-Inlet-SE Item No: B05.070.001

remarks: NO SCAN DUE TO Nozzle Configuration

[X] NO SCAN SURFACE BEAM DIRECTION

[ ] LIMITED SCAN [X] 1 [ ] 2 [ ] 1 [X] 2 [ ] cw [ ] ccw

FROM L 0" to L 97.34" INCHES FROM ~~WO~~ Centerline to Beyond

ANGLE: [ ] 0 [X] 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

Sketch(s) attached [X] yes [ ] no

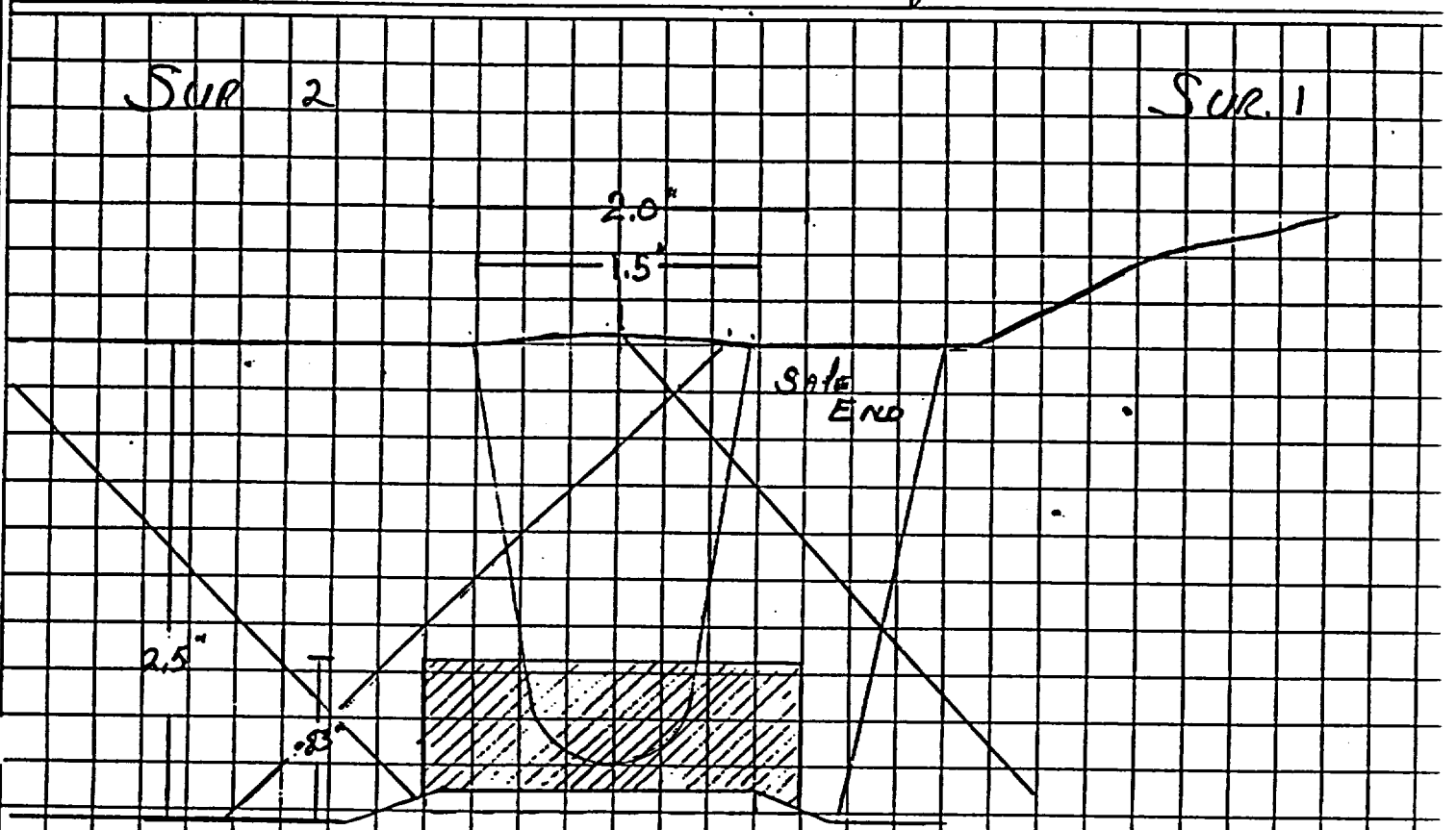
Prepared By: W. C. Leeper Level: II Date: 12-5-94 Sheet ____ of ____

Reviewed By: Larry Maulden Date: 12-7-94 Authorized Inspector: [signature] Date: 12-12-94

Attachment 4 Page 2 of 12

Station McGuire Unit 2 Rev. File No. Sheet Of
Subject 2SGA- INlet-SE

By W.C. Leaper Date 12-5-94
Prob No. B05.070.001 Checked By Larry Mauldin Date 12-7-94



CROSS SECTIONAL AREA =

A 45° L-WAVE WAS USED TO INSPECT WELD. ONE DIRECTION WAS NOT SCANNED DUE TO TAPER ON GENERTOR SIDE.

AXIAL DIRECTION LOSS - 50%

CIRC. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

50% ÷ 2 = 25%

100 - 25% = 75% COVERAGE

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1411 | Form NDE-U

Exam Finish: 1434 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2SGA-OUTLET-SE | Date: 12-05-94

Weld Length (in.): 97.34" | Surface Condition: As Ground | PER B&W Lo: REF. 1

Surface Temperature: 83 ° F

Pyrometer S/N: MCNDE27020

Cal Due: 951101

Examiner: Amy A. Bebb Level: II

Examiner: W. C. Leaper Level: II

Procedure: NDE 610 Rev: 2 | FC: NONE

Calibration Sheet No: 9402033 ,9402034

Scans:

45 [X] 62.5 dB 70 [ ] ____ dB

45T [X] 61.5 dB 70T [ ] ____ dB

60 [ ] ____ dB

60T [ ] ____ dB

Other: ____ dB

Configuration: CIRC. WELD

S1 Flow S2

SAFE END to Nozzle

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: n/a

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	*Applies only to NDE-620, 640 and 680* W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	DO NOT WRITE IN THIS SPACE			
	45°L	No Recordable Indications (Axial or Circ.)													

Remarks: DUE TO SIGNAL TO NOISE RATO CIRC. SCAN WAS PERFORMED AT REF. DB AND AXIAL SCAN WAS AT +6 DB

Limitations: (see NDE-UT-4) [X] 90% or greater coverage obtained: yes [ ] no [X] Sheet ____ of ____

Reviewed By: Larry Maulden Level: II Date: 12-7-94

Authorized Inspector [signature] Date 12-12-94

Item No: B05.070.002

Attachment 4
Page 4 of 12

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 2SGA-outlet-SE Item No: B05.070.002

remarks: No scan due to nozzle configuration

☒ NO SCAN SURFACE BEAM DIRECTION

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

FROM L 0" to L 97.34" INCHES FROM ~~WO~~ Centerline 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

Sketch(s) attached ☒ yes ☐ no

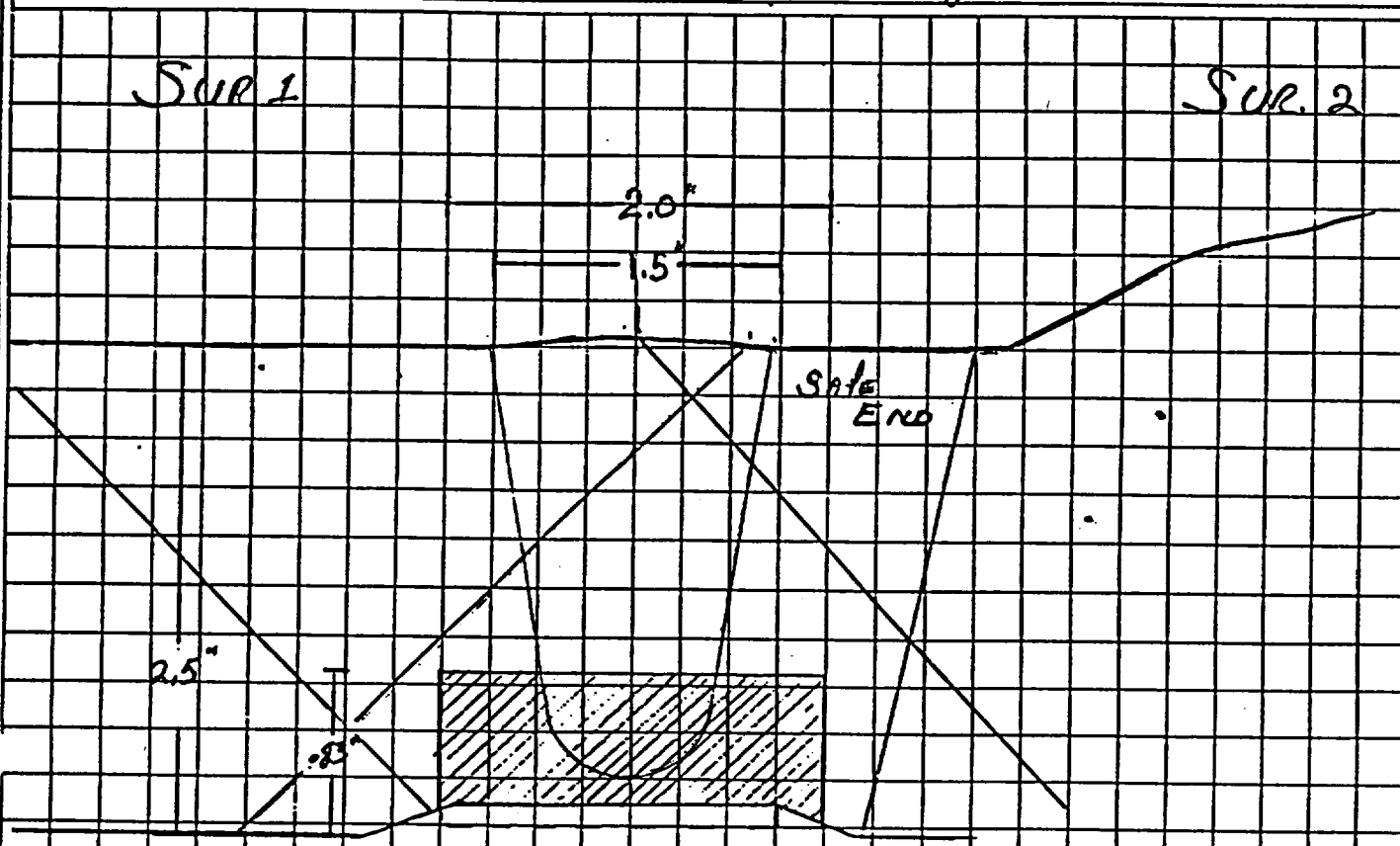
Prepared By: W. C. Leager Level: II Date: 11-5-94 Sheet ____ of ____

Reviewed By: Larry Mauldin Date: 12-7-94 Authorized Inspector: [signature] Date: 12-12-94

Attachment 4 Page 5 of 12

Station McGuire Unit 2 Rev. File No. Sheet Of
Subject 25GA-outlet-SE

By W. C. Leeper Date 12-5-94
Prob No. B05.070.002 Checked By Larry Mauldin Date 12-7-94



CROSS SECTIONAL AREA =

A 45° L-WAVE WAS USED TO INSPECT WELD. ONE DIRECTION WAS NOT SCANNED DUE TO TAPER ON GENERTOR SIDE.

AXIAL DIRECTION LOSS - 50%

CIR. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

50% ÷ 2 = 25%

100 - 25% = 75% COVERAGE

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1350 | Form NDE-U.

Exam Finish: 1406 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2NC2F-1-2 | Date: 12-05-94

Weld Length (in.): 97.34" | Surface Condition: As Ground | PER B&W Lo: REF. 1

Surface Temperature: 83 ° F

Pyrometer S/N: MCNDE27020

Cal Due: 951101

Examiner: Larry D. Bibb Level: II

Examiner: W.C. Legon Level: II

Procedure: NDE 610 Rev: 2

FC: NONE

Calibration Sheet No: 9402033 ,9402034

Scans:

45 [X] 62.5 dB 70 [ ] _____ dB

45T [X] 61.5 dB 70T [ ] _____ dB

60 [ ] _____ dB

60T [ ] _____ dB

Other: _____ dB

Configuration: CIRC. WELD

S2 Flow S1

PIPE to SAFE END

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: n/a

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	*Applies only to NDE-620, 640 and 680* W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	DO NOT WRITE IN THIS SPACE			
	45°L	No Recordable Indications (Axial or Circ.)													

Remarks: DUE TO SIGNAL TO NOISE RATIO CIRC. SCAN WAS PERFORMED AT REF. DB AND AXIAL SCAN WAS AT +6DB

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

Sheet ____ of ____

Reviewed By: Larry Maulden II Level: Date: 12-7-94

Authorized Inspector Date 12-12-94

Item No: B05.130.002

Attachment 4
Page 7 of 12

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 2NC2F-1-2 Item No: B05.130.002

remarks: No SCAN DUE To Nozzle Configuration

[X] NO SCAN — SURFACE — BEAM DIRECTION

[ ] LIMITED SCAN — [X] 1 [ ] 2 — [ ] 1 [X] 2 [ ] cw [ ] ccw

FROM L 0" to L 97.34" INCHES FROM ~~WO~~ Center Line to Beyond

ANGLE: [ ] 0 [X] 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

Sketch(s) attached [X] yes [ ] no

Prepared By: W. C. Leeper Level: II Date: 12-5-94

Sheet ______ of ______

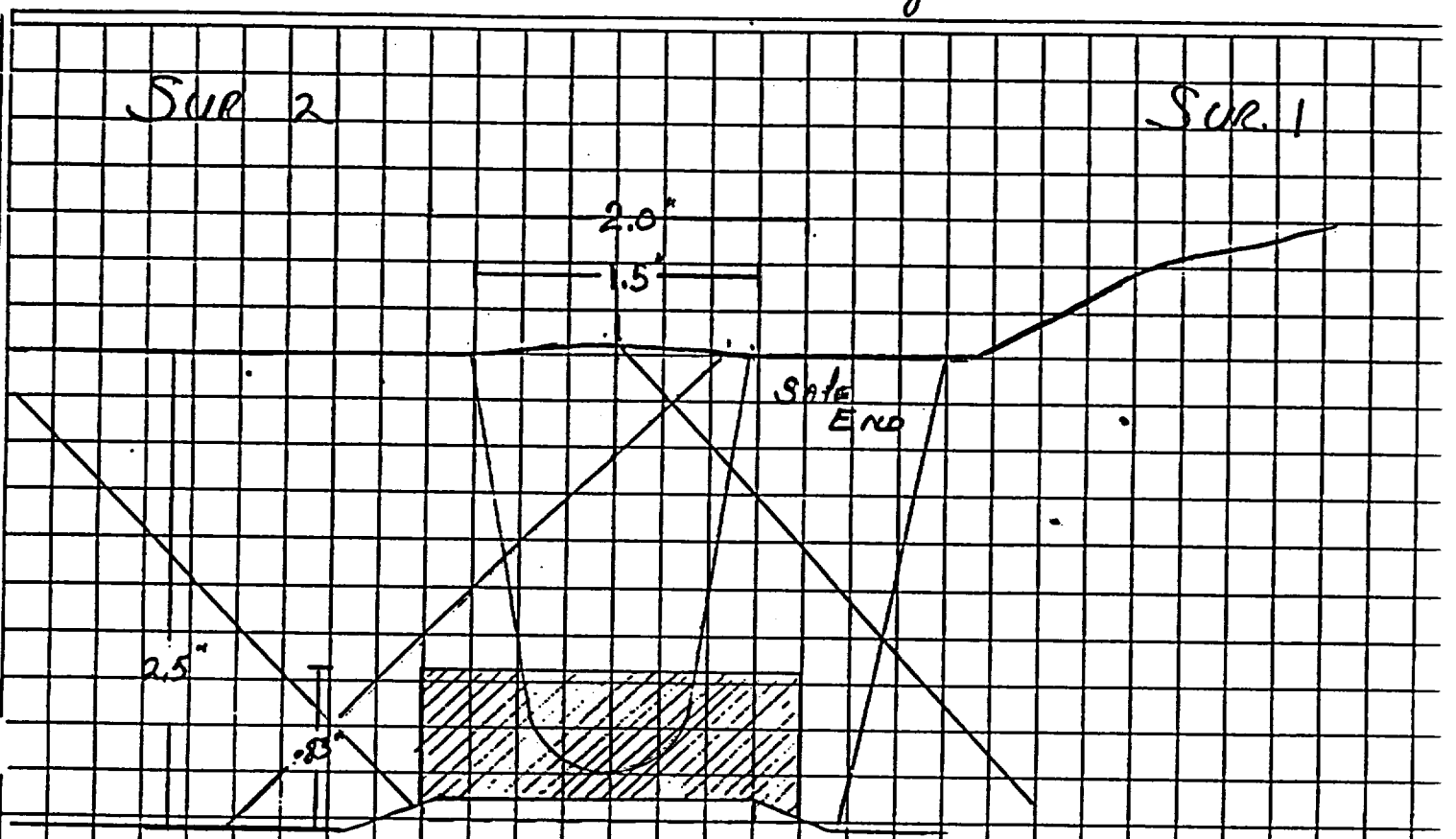
Reviewed By: Larry Mauldin Date: 12.7.94

Authorized Inspector: [signature] Date: 12-12-94

Attachment 4
Page 8 of 12

Station McGuire Unit 2 Rev. ____ File No. ____ Sheet ____ Of ____
Subject 25GA- 2NC2F-1-2

By W.C. Leeper Date 12-5-94
Prob No. BOS. 130. 002 Checked By Larry Maulden Date 12-7-94



CROSS SECTIONAL AREA =

A 45° L-WAVE WAS USED TO INSPECT WELD. ONE DIRECTION WAS NOT SCANNED DUE TO TAPER ON GENERTOR SIDE.

AXIAL DIRECTION LOSS - 50%

CIR. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

50% ÷ 2 = 25%

100 - 25% = 75% COVERAGE

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1411 | Form NDE-UT-2A

Exam Finish: 1434 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2NC2F-1-3 | Date: 12-05-94

Weld Length (in.): 97.34" | Surface Condition: As Ground | PER B&W Lo: REF. 1

Surface Temperature: 83 ° F

Pyrometer S/N: MCNDE27020

Cal Due: 951101

Examiner: Guy L. Bell Level: II

Examiner: W. C. Leeper Level: III

Procedure: NDE 610 Rev: 2 | FC: NONE

Calibration Sheet No: 9402033 ,9402034

Scans:

45 [X] 62.5 dB 70 [ ] ____ dB

45T [X] 61.5 dB 70T [ ] ____ dB

60 [ ] ____ dB

60T [ ] ____ dB

Other: ____ dB

Configuration: CIRC. WELD

S1 Flow S2

PIPE to SAFE END

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: n/a

IND #		Max % Ref	Mp Max	W Max	L Max	L1	L2	*Applies only to NDE-620, 640 and 680* W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	DO NOT WRITE IN THIS SPACE			
	45°L	No Recordable Indications (Axial or Circ.)													

Remarks: DUE TO SIGNAL TO NOISE RATO CIRC. SCAN WAS PERFORMED AT REF. DB AND AXIAL SCAN WAS AT +6 DB

Limitations: (see NDE-UT-4) [X] 90% or greater coverage obtained: yes [ ] no [X] Sheet ____ of ____

Reviewed By: Larry Maulden II 12-7-94

Authorized Inspector ____ Date 12-12-94

Item No: B05.130.003

Attachment 4
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DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 2NC2F-63 Item No: B05.130.003

remarks: No scan Due To Nozzle Configuration

[X] NO SCAN — SURFACE — BEAM DIRECTION

[ ] LIMITED SCAN — [ ] 1 [X] 2 — [X] 1 [ ] 2 [ ] cw [ ] ccw

FROM L 0 to L 97.34 INCHES FROM WO centerline ~~to~~ AND Beyond

ANGLE: [ ] 0 [X] 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

Sketch(s) attached [–] yes [ ] no

Prepared By: W. C. Leeper Level: II Date: 12-5-94

Sheet ____ of ____

Reviewed By: Larry Maulden Date: 12-7-94

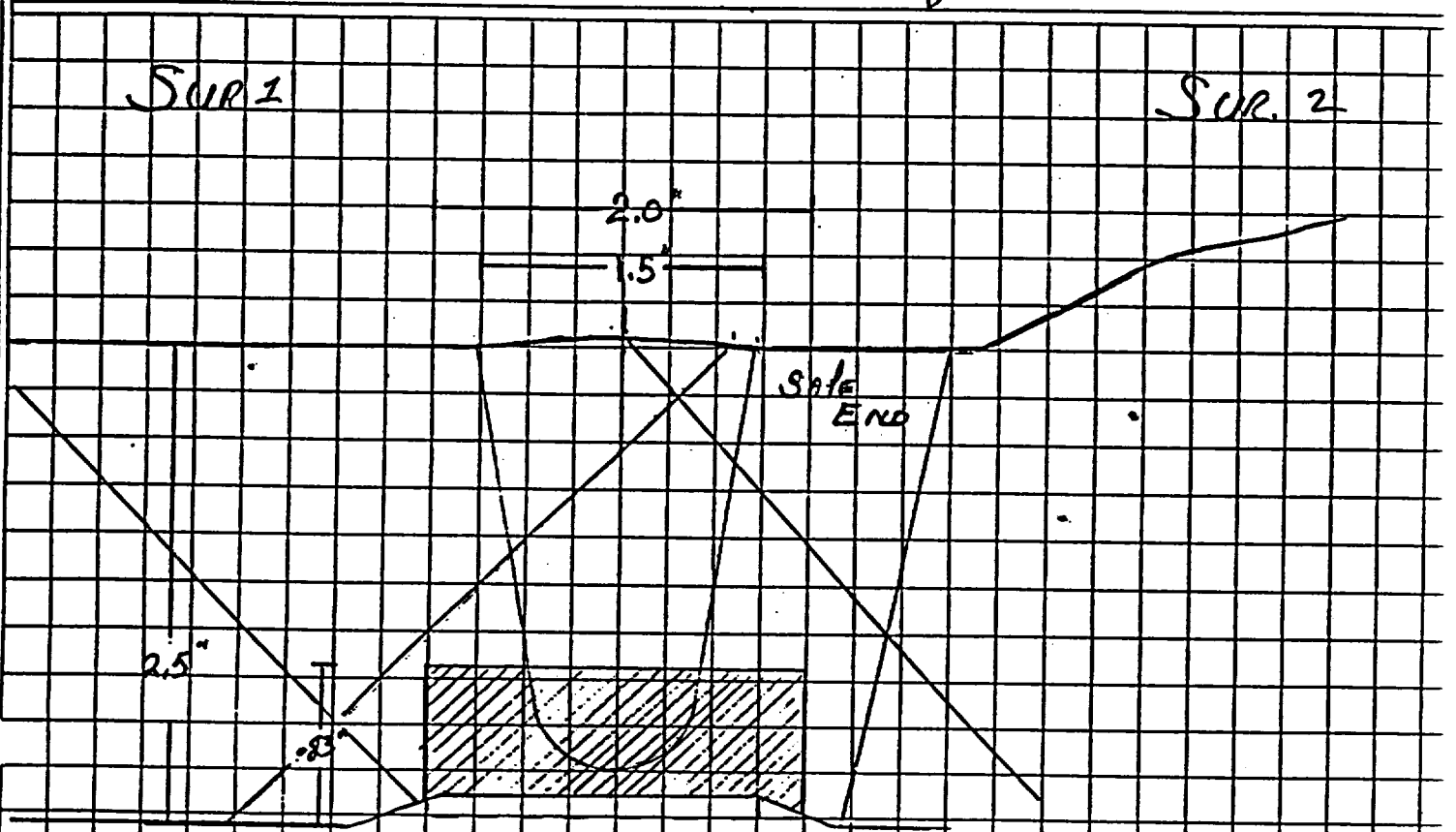
Authorized Inspector: [signature] Date: 12-12-94

Attachment 4 Page 11 of 12

Station McGuire Unit 2 Rev. File No. Sheet Of
Subject 2SGA- 2NC2F-1-3

By W. C. Leeper Date 12-5-94

Prob No. B05. 130.003 Checked By Larry Maulden Date 12-7-94



CROSS SECTIONAL AREA =

A 45° L-WAVE WAS USED TO INSPECT WELD. ONE DIRECTION WAS NOT SCANNED DUE TO TAPER ON GENERTOR SIDE.

AXIAL DIRECTION LOSS - 50%

CIRC. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

50% ÷ 2 = 25%

100 - 25% = 75% COVERAGE

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1302 | Exam Finish: 1319 | Form NDE-UT-2A | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2NC16-WN8A | Date: 4/9/96

Weld Length (in.): 54" | Surface Condition: AS GROUND | Lo: 9.1.1.6

Surface Temperature: 70 °

Examiner: Guy G. Bibb Guy G Bibb Level: III

Examiner: James H. Reso James H Reso Level: I

Pyrometer S/N: MCNDE 27029

Cal Due: 6/14/96

Procedure: NDE-610 Rev: 2

FC:

Calibration Sheet No: 9602033

Scans:

45 ☐ _____ dB 70 ☐ _____ dB

45T ☐ _____ dB 70T ☐ _____ dB

60 ☐ _____ dB

60T ☐ _____ dB

Other: 45L 52* dB

Configuration: Pipe (P1) to Nozzle (PC. B)

S1 Flow S2

COOL LOOP to NOZZLE

Scan Surface: OD

Applies to NDE-680 only

Skew Angle:

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

Remarks: DID NOT SCAN WITH + 14db DUE TO SIGNAL TO NOISE RATIO

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

Sheet ____ of ____

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
Wayne C. Lapp	II	4-15-96	[illegible]	4-26-96	B09.031.001

SERIAL No. 98-005
Attachment 5
Page 1 of 17

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2NC16-WN8A | Item No: B09.031.001 | Remarks:

☐ NO SCAN
☒ LIMITED SCAN
SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw
FROM L _____ to L _____
INCHES FROM WO 0.0 to 2.0
ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other _____
FROM 0 DEG to 360 DEG

Remarks: DUE TO BRANCH CONNECTION WELD

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

WELD JOINT CONFIGURATION

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

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

Prepared By: Larry L. Bibb | Level: III | Date: 4/9/96 | Sketch(s) attached ☒ yes ☐ no | Sheet ____ of ____

Reviewed By: Wayne R. Leazer | Date: 4-15-96 | Authorized Inspector: _____ | Date: 4-26-96

Attachment 5
Page 2 of 17

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
	DRWG #1 - .77" x 2.2 " x 27" = 45.7 DRWG #2 - .77" x 2.2" x 27" = 45.7 TOTAL WELD LENGTH = 54"

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
DRWG #1	45°	1 TO 2	1.69	27	45.7	45.7	100.00
DRWG #1	45°	2 TO 1	0	27	0	45.7	0.00
DRWG #1	45°	CW	1.69	27	45.7	45.7	100.00
DRWG #1	45°	CCW	1.69	27	45.7	45.7	100.00
DRWG #2	45°	1 TO 2	1.61	27	43.47	45.7	95.12
DRWG #2	45°	2 TO 1	0	27	0	45.7	0.00
DRWG #2	45°	CW	0	27	0	45.7	0.00
DRWG 2	45°	CCW	0	27	0	45.7	0.00
					180.57 ÷	365.6	

Aggregate % : 49.4 %

Item No: B09.031.001

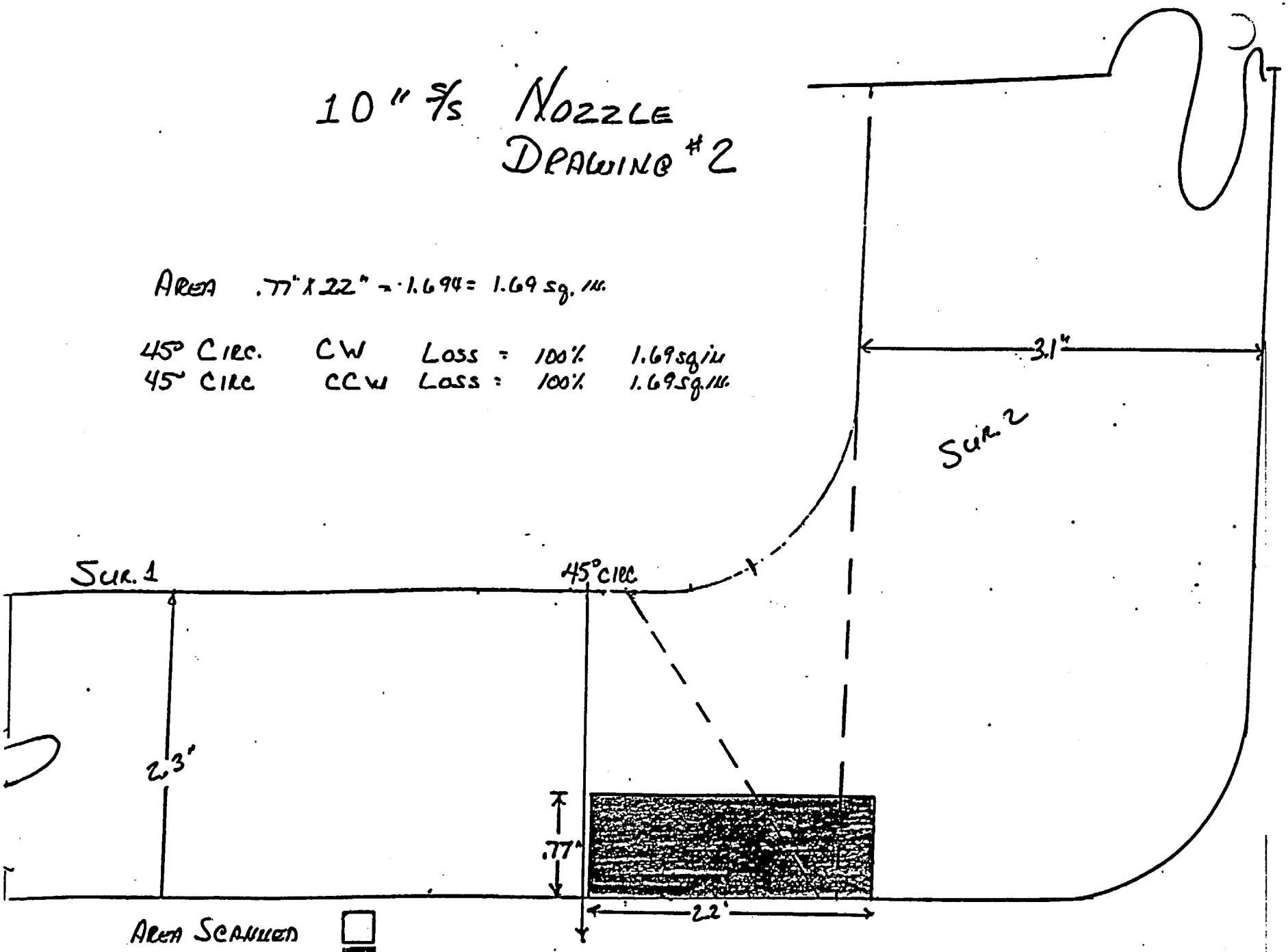
Prepared By: Suzy L Bibb Level: III Date: 4/9/96

Reviewed By: Wayne C. Leeper Level: II Date: 4-15-96

10" S/S Nozzle
Drawing #2

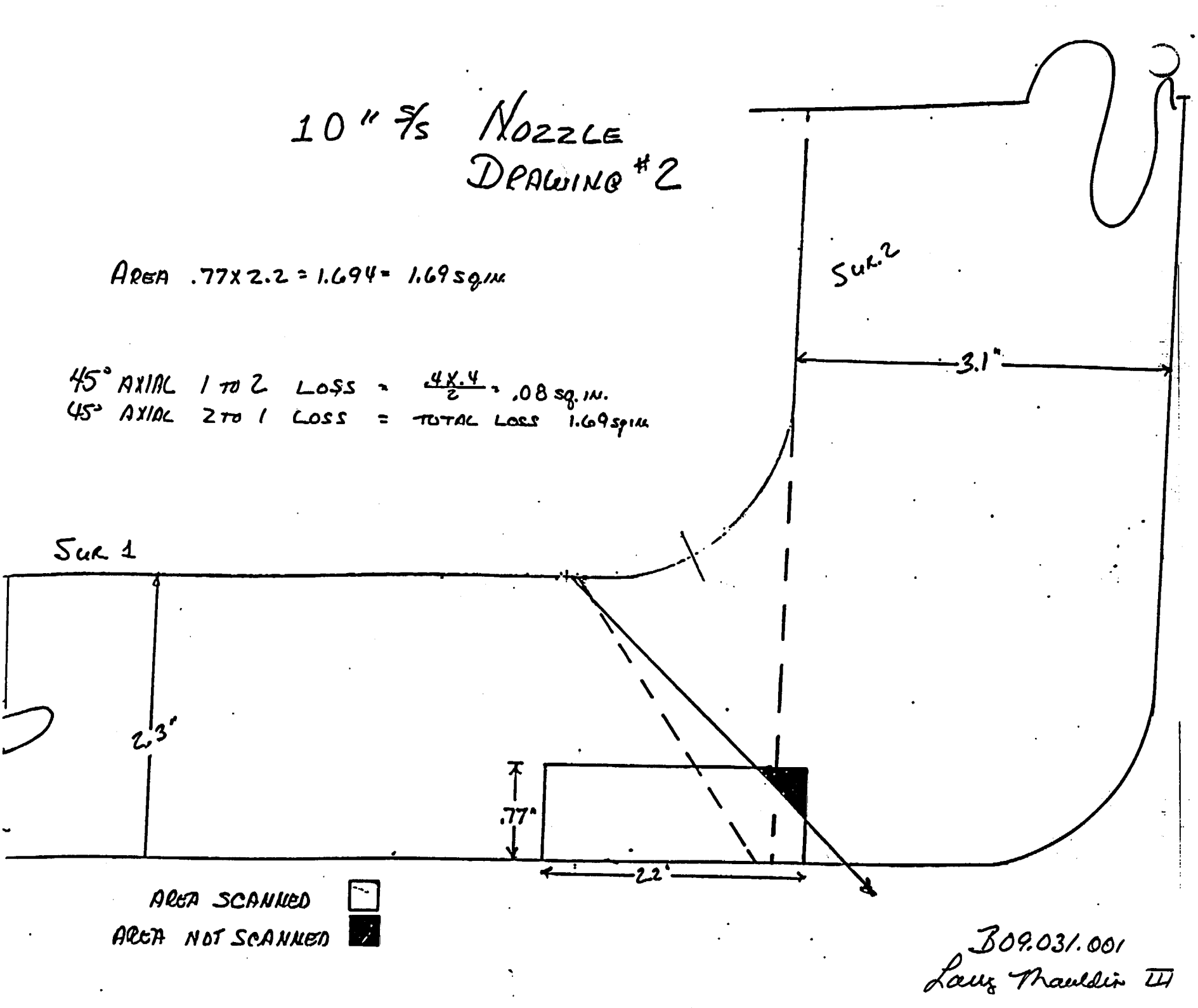
Area .77" x 22" = 1.694 = 1.69 sq. in.

45° Circ. CW Loss = 100% 1.69 sq/in
45° Circ CCW Loss = 100% 1.69 sq.in.



309.031.001
Larry Maddin III

10" S/S Nozzle
Drawing #2



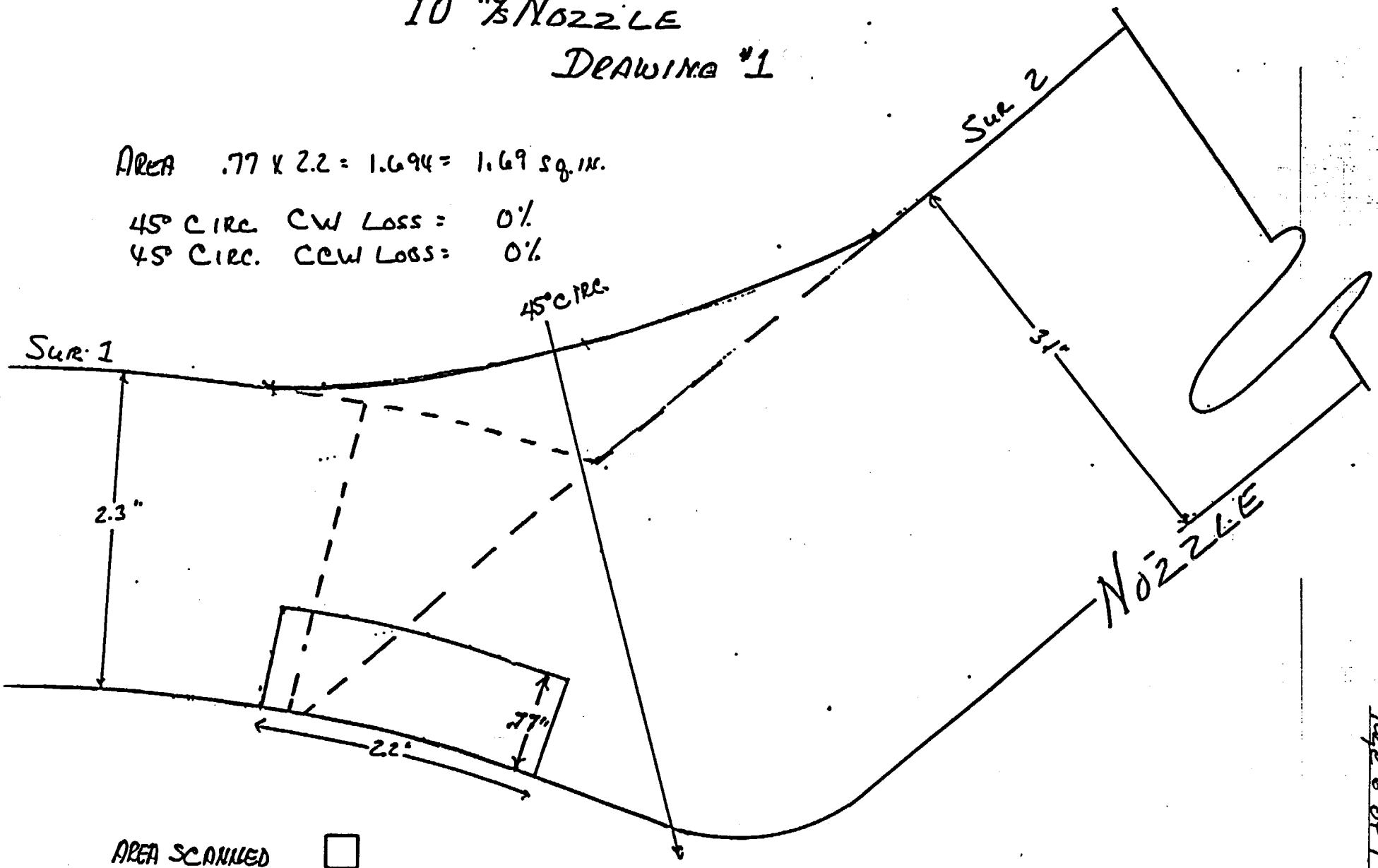
B09.031.001
Larry Mauldin III

Attachment 5
Page 5 of 17

10 "S NOZZLE
DRAWING #1

AREA .77 X 2.2 = 1.694 = 1.69 sq. in.

45° CIRC. CW LOSS = 0%
45° CIRC. CCW LOSS = 0%



AREA SCANNED
AREA NOT SCANNED

309.031.001
Larry Mauldin III

Attachment 5
Page 6 of 17

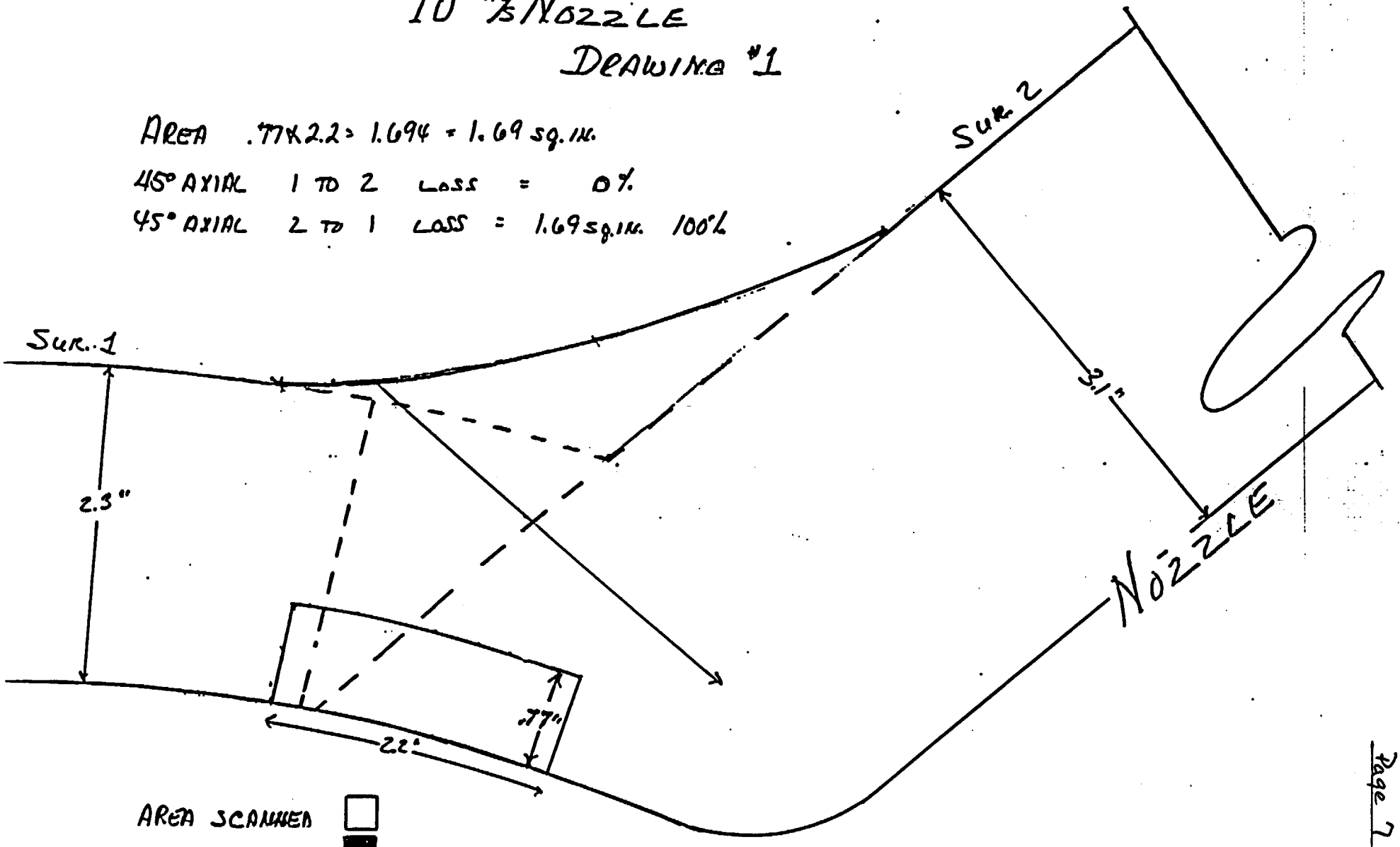
10 "S NOZZLE

DRAWING #1

AREA .77 X 2.2 = 1.694 = 1.69 SQ. IN.

45° AXIAL 1 TO 2 LOSS = 0%

45° AXIAL 2 TO 1 LOSS = 1.69 SQ. IN. 100%



AREA SCANNED □

AREA NOT SCANNED ■

B09.031.001

Larry Mauldin III

Attachment 5
Page 7 of 17

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1341 | Form NDE-U A

Exam Finish: 1353 | Revision 4

Station: McGuire | Unit: 2 | Component/Weld ID: 2NC22-WN 4 | Date: 11-29-94

Weld Length (in.): 63" | Surface Condition: As Ground | NDE 90 Lo 9.1.1.6

Surface Temperature: 75 ° F

Examiner: Larry Moulder Level: II

Examiner: Wilfred C. Logan Level: II

Pyrometer S/N: MCNDE27023

Cal Due: 951101

Procedure: NDE 610 Rev: 2

FC: NONE

Calibration Sheet No: 9402024

Scans:

45 [X] 64 dB 70 [ ] ____ dB

45T [X] 64 dB 70T [ ] ____ dB

60 [ ] ____ dB

60T [ ] ____ dB

Other: ____ dB

Configuration: Branch Connection

S1 Flow S2

Coolant Loop to Nozzle

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: n/a

IND #	∠	Max % Ref	Mp Max	W Max	L Max	L1	L2	*Applies only to NDE-620, 640 and 680* W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	20%dac HMA 50%dac	DO NOT WRITE IN THIS SPACE			
	45°L	No Recordable Indications (Axial or Circ.)													

Remarks:

Limitations: (see NDE-UT-4) [X] 90% or greater coverage obtained: yes [ ] no [X] Sheet ____ of ____

Reviewed By: Marion T. Weaver Level: II Date: 12-7-94

Authorized Inspector [signature] Date 12-12-94

Item No: B09.031.002

Attachment 5
Page 8 of 17

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 2NC 22-WN4 Item No: B09.031.002

remarks:

Due to Branch Connection weld

☐ NO SCAN SURFACE BEAM DIRECTION

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

FROM L_____ to L_____ INCHES FROM WO 0.0" to 2.0"

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

☒ NO SCAN SURFACE BEAM DIRECTION

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

Not Required by ISI Plan

FROM L_____ to L_____ INCHES FROM WO_____ to _____

ANGLE: ☐ 0 ☒ 45L ☐ 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

Sketch(s) attached ☑ yes ☐ no

Prepared By: Larry Mauldin Level: II Date: 11.29.94 Sheet _____ of _____

Reviewed By: Marion T. Weaver Date: 12-7-94

Authorized Inspector: [signature] Date: 12-12-94

Attachment 5
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Limited Exam Data Sheet

Station McGuire Unit 2 I.D. # 2NC22-WN4
By L Moulder Date 11-29-94 Item # B09.031.002
Checked By Marion T. Warner Date 12-7-94 Page ___ Of ___

DETERMINING THE CUMULATIVE TOTAL OF WELD VOLUME INSPECTED
(in percentage)

Total Cross Sectional Area 2.112 x (Number of Scans) 2 = 4.224 (% Factor)

Vessels:

Area Loss : Zone #1 _____
Zone #2 _____
Zone #3 _____
Total Zone Loss _____ /(% Factor) N/A x 100 = _____ % of Loss
Lump Sum Loss From Other Limitations ± _____ %
Total Loss _____ %

100% - (Total Loss) _____ = _____ % of Coverage
(Additional ____ % of Partial Coverage)
Qualifies for Request for Relief ☐ Yes ☐ No

Piping:

Axial Scan 45°L WAVE (Loss) ____ / ____ (% Factor) x 100 = ____ % of Loss
Circumferential Scan Over Root Area ☐ Yes ☐ No ____ % of Loss
Axial Loss _____ + Circ. Loss _____ = _____ /2 = _____ % Loss
Additional Losses (Due to hangers, restraints, etc.) ± _____ % Loss
Explain: _____ _____ Total % Loss
SEE ATTACHMENT FOR PER CENTAGES

100% - (Total Loss) 50.19 = 49.81 % of Coverage
Qualifies for Request for Relief ☑ Yes ☐ No

Disposition: _____

By: _____ Date: _____

Station MC GUIRE Unit 2 Rev. ____ File No. ____ Sheet ____ C

Subject LIMITED EXAM DATA
10" S/S NOZZLE By P Moulder Date 11-29-94

Prob No. B09.031.002 Checked By ____ Date ____

DRAWING #1

CROSS SECTIONAL AREA: .88" X 2.4" = 2.112 sq.in.
X 2 SCANS
4.224 sq.in.

AREA of LOSS:

AXIAL: 2.112 ÷ 4.224 X 100 = 50%

CIRC: NO LOSS

DRAWING #2

CROSS SECTIONAL AREA: .88" X 2.4 = 2.112 sq in
X 2 SCANS
4.224 sq.in.

AREA of LOSS:

AXIAL: $\frac{.25 \times .25}{2}$ + 2.112 = 2.14325
2.14325 ÷ 4.224 X 100 = 50.73982
50.74%

CIRC: 100%

	AXIAL		CIRC		
DRAWING #1	50	+	0	÷ 2	= 25
DRAWING #2	50.74	+	100	÷ 2	= 75.37
					100.37

∴ 100.37 ÷ 2 = 50.185 = 50.19 LOSS

WITH NO LIMITATIONS
100 - 50.19 = 49.81% COVERAGE

∴ A 45° L-WAVE WAS USED TO SCAN WELD FROM 1 DIRECTION ONLY. NO SCAN WAS PERFORMED FROM SUR 2 (NOZZLE WELD) DUE TO NOZZLE WELD CONFIGURATION.

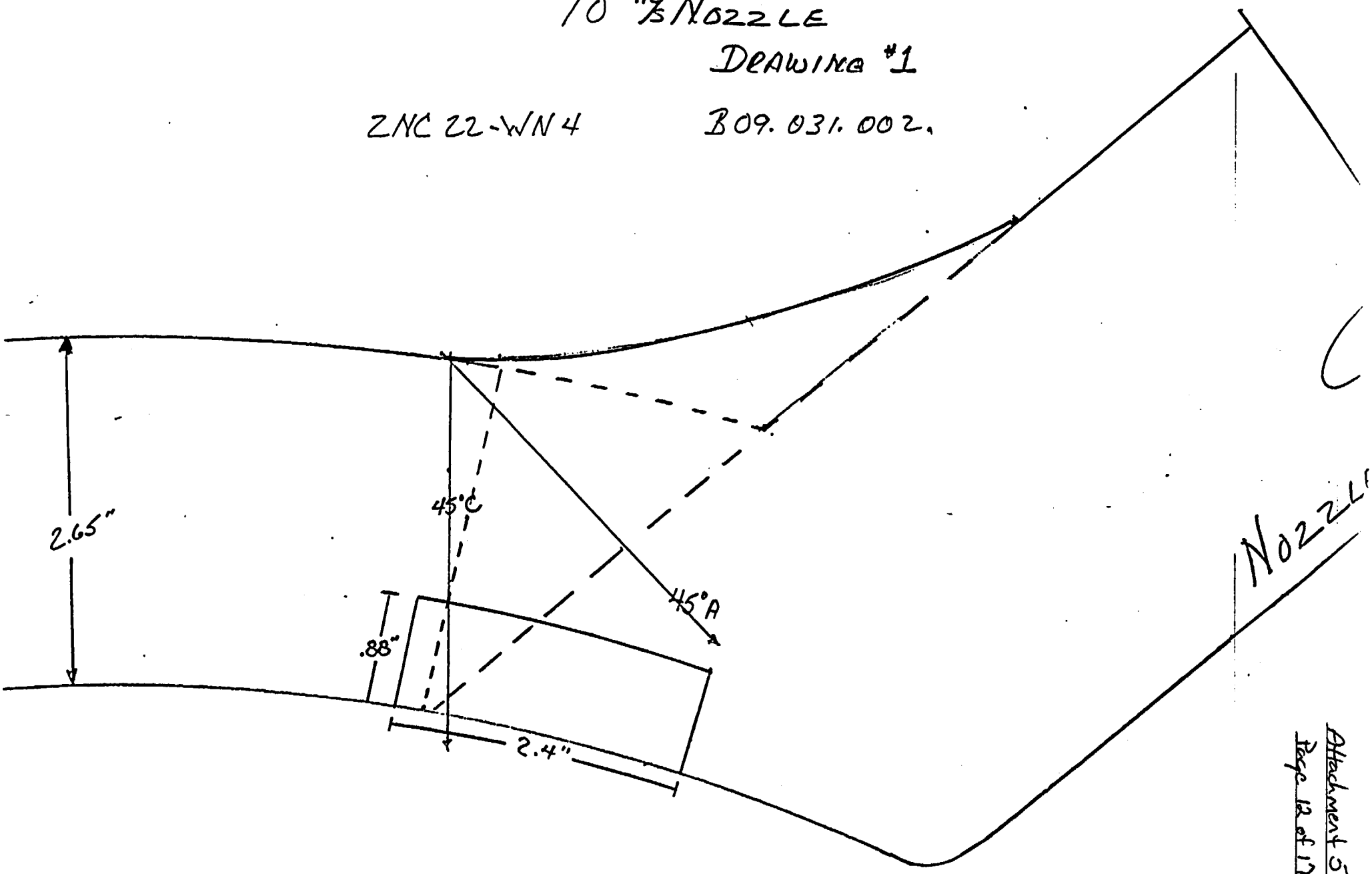
∴ OTHER LIMITATIONS: NO

49.81% COVERAGE

10 "S" NOZZLE

DRAWING #1

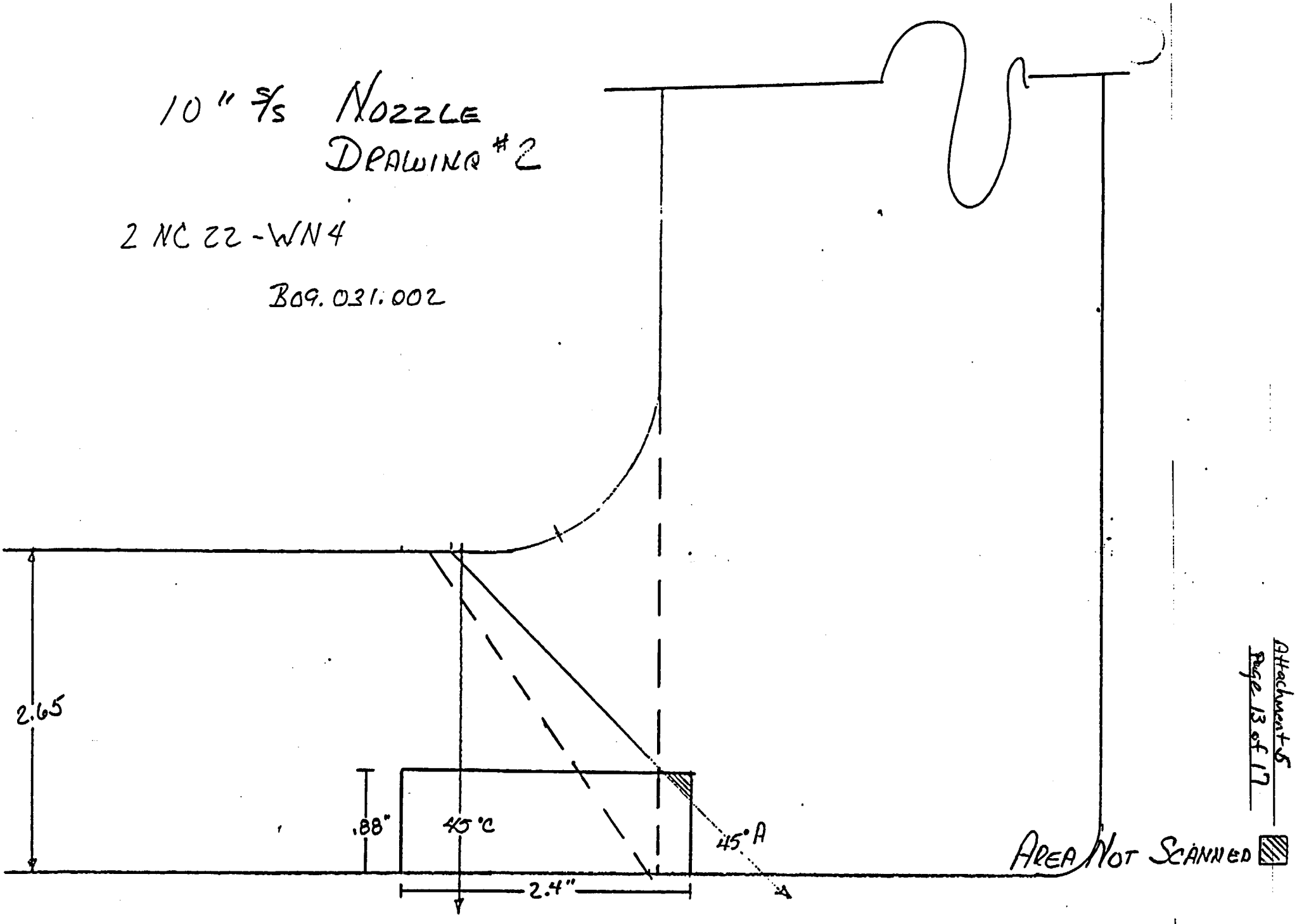
ZNC 22-WN4 B09.031.002.



10" S/S Nozzle
Drawing #2

2 NC 22-WN4

B09.031.002



DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1410 | Form NDE-UT-2A

Exam Finish: 1430 | Revision 4

Station: MCGUIRE | Unit: II | Component/Weld ID: 2NC22 - WN8 | Date: 12/5/94

Weld Length (in.): 20.8" | Surface Condition: Flush | Lo: 9.1.1(b)

Surface Temperature: 83 ° F

Pyrometer S/N: 27023

Cal Due: 951101

Examiner: JE Howell | Level: II

Examiner: | Level:

Procedure: NDE 610 Rev: 2 | FC:

Calibration Sheet No: 9402035, 9402036 | NONE

Scans:

45L ☐ 69 dB | 70 ☐ ____ dB

45T ☐ 77 dB (L WAVE) | 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: ____ dB

Configuration: CIRC.

2 Flow 1

Nozzle to Pipe

Scan Surface: OD

Applies to NDE-680 only

Skew Angle:

IND #	Δ	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	DO NOT WRITE IN THIS SPACE			
	45L					NO	RECORDABLE		INDICATIONS						

Remarks:

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

Reviewed By: Larry Maddox | Level: II | Date: 12-7-94

Authorized Inspector: [signature] | Date: 12-12-94

Item No: B09.031.003

Attachment 5
Page 14 of 17

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE- UT-4
Revision 1

Component/Weld ID: 2NC22-WN8 Item No: B09.031.003

remarks: No Scan due to Nozzle

[X] NO SCAN	SURFACE	BEAM DIRECTION
[ ] LIMITED SCAN	[ ] 1 [X] 2	[X] 1 [ ] 2 [X] cw [X] ccw
FROM L 0 to L 20.80"		~~INCHES FROM WO~~ Cell From CL to Beyond
ANGLE: [ ] 0 [X] 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

Sketch(s) attached [X] yes [ ] no

Prepared By: DE Hauser	Level: II	Date: 12.5.94	Sheet ____ of ____
Reviewed By: Larry Maulden	Date: 12.7.94	Authorized Inspector: [signature]	Date: 12-12-94

Attachment 5
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Limited Exam Data Sheet

Station McGuire Nuclear Unit II I.D. # 2NC 22-WN8
By DE Howser Date 12-5-94 Item # B09.031.003
Checked By Larry Mauldin Date 12-7-94 Page ___ Of ___

DETERMINING THE CUMULATIVE TOTAL OF WELD VOLUME INSPECTED (in percentage)

Total Cross Sectional Area ____ x (Number of Scans) ____ = ____ (% Factor)

Vessels:

Area Loss : Zone #1 ____
Zone #2 ____
Zone #3 ____

Total Zone Loss ____ /(% Factor) ____ x 100 = ____ % of Loss

Lump Sum Loss From Other Limitations ± ____ %

Total Loss ____ %

100% - (Total Loss) ____ = ____ % of Coverage

(Additional ____ % of Partial Coverage)

Qualifies for Request for Relief ☐ Yes ☐ No

Piping:

Axial Scan ____ (Loss) ____ / ____ (% Factor) x 100 = ____ % of Loss

Circumferential Scan Over Root Area ☐ Yes ☐ No ____ % of Loss

Axial Loss ____ + Circ. Loss ____ = ____ /2 = ____ % Loss

Additional Losses (Due to hangers, restraints, etc.) ± ____ % Loss

Explain: see attached drawing for Limited Information ____ Total % Loss

100% - (Total Loss) 50% = 50% % of Coverage

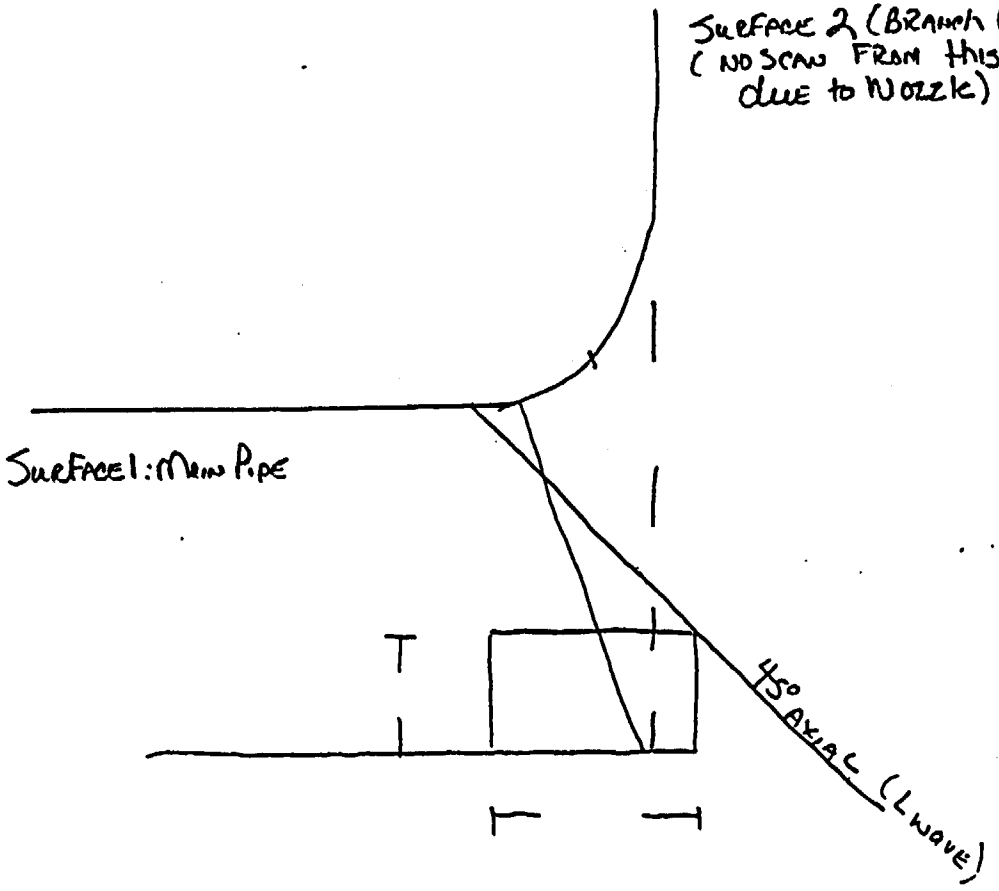
Qualifies for Request for Relief ☑ Yes ☐ No

Disposition: ____

By: ____ Date: ____

6" SIS Nozzle
Item#: B09.031.003
2NC 22-WN8

MNS #2
Bldt Leg



Required Coverage:
100% (25% in 4 Directions) or
88.52" (.760 x 1.4 x 360° in 4 Directions)

Actual Area Covered = 25% + 12.5% + 12.5% = 50%
or 22.13" + 11.06" + 11.06" = 44.25 ÷ 88.52 = 49.98%
See Below

45° Axial (1st direction) = .760 x 1.4 x 20.80 x 1 dir = 22.1
or 25% coverage

45° Axial (2nd direction) = No Scan due to Noz:
0° coverage

45° Circ (3rd direction) = .760 x (1.4 ÷ 2) x 20.80 x
1 direction = 11.06". Transducer only
Covered up to 1/2 the weld width Resulting
in 50% coverage of the 25% Required.
25% x 50% = 12.5%

45° Circ (4th direction) = Same Situation as in
the 45° Circ (3rd direction Coverage
equals 12 1/2% or 11.06"

Checked By: Larry Chandler 12.7.94 By: M. E. Hancock II 12.5.94

Attachment 5
Page 12 of 17

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1519 | Form NDE-UT-2A

Exam Finish: 1539 | Revision 4

Station: McGUIRE | Unit: 2 | Component/Weld ID: 2SGA-SB-02 | Date: 12-12-94

Weld Length (in.): 94.25" | Surface Condition: As GROUND | L0: TOP OF NOZZLE PER B&W #1 REF.

Surface Temperature: 78 ° F

Pyrometer S/N: MCNDE 27023

Cal Due: 951101

Examiner: [signature] Level: II

Examiner: Level:

Procedure: NDE-680 Rev: 1 | FC: NA

Calibration Sheet No: 9402063

Scans:

45 ☐ ____ dB 70 ☐ ____ dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☑ 53.5 dB (Intermdius)

Other: ____ dB

Configuration: INNER RADIUS

Sz ____ Flow Sl ____

NOZZLE to STUD BARREL

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: 25.06°

IND #	Δ	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	DO NOT WRITE IN THIS SPACE			
60°			NO RECORDABLE INDICATIONS												

Remarks:

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

Sheet ____ of ____

Reviewed By: [signature] Level: II Date: 12/21/94

Authorized Inspector [signature] Date 12/28/94

Item No: C02.022.002

SERIAL No. 98-005
Attachment 6
Page 1 of 5

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1156 | Form NDE-UT-2A

Exam Finish: 1228 | Revision 4

Station: McGUIRE | Unit: 2 | Component/Weld ID: 2SGA-SB-02 | Date: 12-14-94

Weld Length (in.): 94.25 | Surface Condition: As GROUND | TOP OF NOZZLE PER BOW L0: #1 REF.

Surface Temperature: 78 ° F

Pyrometer S/N: MCNOE 27023

Cal Due: 951101

Examiner: David K Zimmerman Level: II

Examiner: Level:

Procedure: NDE-680 Rev: 1 | FC: NA

Calibration Sheet No: 9402072

Scans:

45 ☐ ____ dB 70 ☐ ____ dB

45T ☐ ____ dB 70T ☑ 59.5 dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: ____ dB

Configuration: INNER RADIUS S2 Flow S1 NOZZLE to STUD BARREL

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: 17.49°

IND #	Δ	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir	Exam surf.	Scan	Damps
	DO NOT WRITE IN THIS SPACE					20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	20%dac HMA 50%dac 100% dac	DO NOT WRITE IN THIS SPACE			
70°		NO RECORDABLE INDICATIONS													

Remarks: SCANNED WITH 70° TO SUPPLEMENT 60° COVERAGE

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

Reviewed By: Level: II Date: 12/21/94

Authorized Inspector Date 12-28-94

Item No: C02.022.002

Attachment 6
Page 2 of 5

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE- UT-4
Revision 1

Component/Weld ID: 2SGA-SB-02 Item No: C02.022.002

remarks:

[X] LIMITED SCAN — SURFACE: [ ] 1 [X] 2 — BEAM DIRECTION: [X] 1 [ ] 2 [ ] cw [ ] ccw

FROM L ____ to L ____ INCHES FROM W0 +2.7" to BEYOND

ANGLE: [ ] 0 [ ] 45 [X] 60 other 70 FROM 0 DEG to 360 DEG

Remarks: NOZZLE CONFIGURATION 84.3% coverage obtained

Block	NO SCAN	LIMITED SCAN	SURFACE	BEAM DIRECTION	FROM L … to L …	INCHES FROM W0 … to …	ANGLE	other	FROM … DEG to … DEG
1	[ ]	[X]	[ ] 1 [X] 2	[X] 1 [ ] 2 [ ] cw [ ] ccw	____ to ____	+2.7" to BEYOND	[ ] 0 [ ] 45 [X] 60	70	0 to 360
2	[ ]	[ ]	[ ] 1 [ ] 2	[ ] 1 [ ] 2 [ ] cw [ ] ccw	____ to ____	____ to ____	[ ] 0 [ ] 45 [ ] 60		____ to ____
3	[ ]	[ ]	[ ] 1 [ ] 2	[ ] 1 [ ] 2 [ ] cw [ ] ccw	____ to ____	____ to ____	[ ] 0 [ ] 45 [ ] 60		____ to ____
4	[ ]	[ ]	[ ] 1 [ ] 2	[ ] 1 [ ] 2 [ ] cw [ ] ccw	____ to ____	____ to ____	[ ] 0 [ ] 45 [ ] 60		____ to ____

Sketch(s) attached [X] yes [ ] no

Prepared By: David K. [signature] Level: II Date: 12-14-94

Sheet ____ of ____

Reviewed By: [signature] II Date: 12/21/94

Authorized Inspector: [signature] Date: 12-25-94

Attachment 6 Page 3 of 5

Limited Exam Data Sheet

Station McGuire Unit 2 I.D. # 2SGA-SB-02

By David K. Zumpano Date 12-14-94 Item # C02.022.002

Checked By _____ Date 12/21/94 Page ___ Of ___

DETERMINING THE CUMULATIVE TOTAL OF WELD VOLUME INSPECTED (in percentage)

Total Cross Sectional Area _____ x (Number of Scans) ____ = _____ (% Factor)

Vessels:

Area Loss : Zone #1 N/A

Zone #2 N/A

Zone #3 N/A

Total Zone Loss N/A /(% Factor) N/A x 100 = N/A % of Loss

Lump Sum Loss From Other Limitations +15.7 %

SEE ATTACHED SKETCH Total Loss 15.7 %

100% - (Total Loss) 15.7 = 84.3 % of Coverage

(Additional ____ % of Partial Coverage)

Qualifies for Request for Relief ☑ Yes ☐ No

Piping:

Axial Scan _____ (Loss) ____ / ____ (% Factor) x 100 = ____ % of Loss

Circumferential Scan Over Root Area ☐ Yes ☐ No ____ % of Loss

Axial Loss _____ + Circ. Loss _____ = _____ /2 = _____ % Loss

Additional Losses (Due to hangers, restraints, etc.) + _____ % Loss

Explain: _____ _____ Total % Loss

100% - (Total Loss) _____ = _____ % of Coverage

Qualifies for Request for Relief ☐ Yes ☐ No

Disposition: _____

By: _____ Date: _____

I.D. NO. 2SGA-SB-02

McGUIRE UNIT 2

AREA OF LOSS

$$\frac{1.6\text{ in} \times 1.4\text{ in}}{2} = 1.12\text{ in}^2$$

$$\frac{1.12\text{ in}^2}{7.14\text{ in}^2} \times 100 = 15.7\%$$

TOTAL AREA OF INNER RADIUS

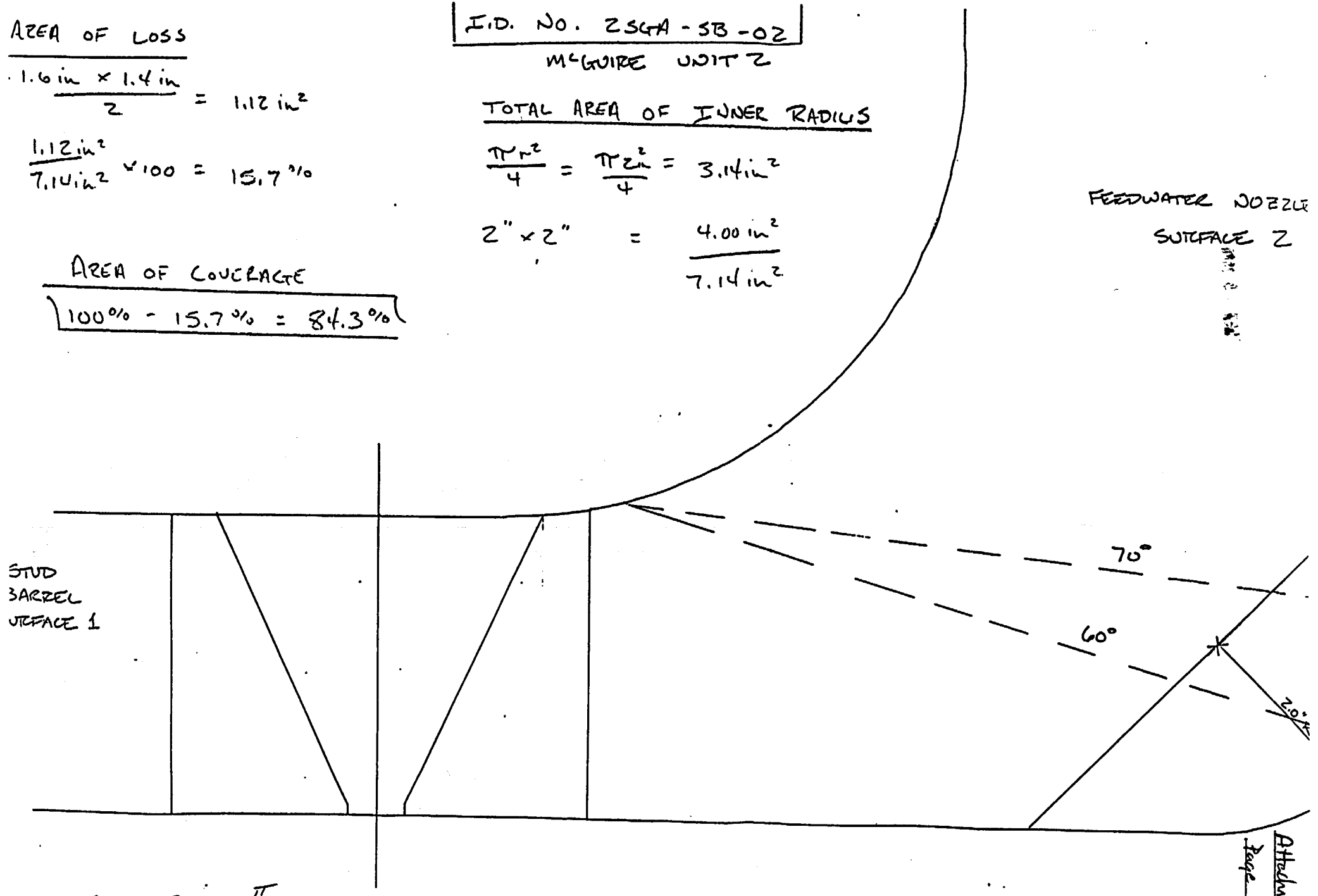
$$\frac{\pi r^2}{4} = \frac{\pi 2^2_{\text{in}}}{4} = 3.14\text{ in}^2$$

$$2" \times 2" = 4.00\text{ in}^2$$

$$7.14\text{ in}^2$$

AREA OF COVERAGE

100% - 15.7% = 84.3%



David K. Zimmerman II
12-12-94

CHECKED BY 12/21/94

Attachment 6
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