Duke Power
A Duke Energy Company

W. R. McCollum, Jr.
Vice President

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March 16, 2000

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Duke Power Company
Oconee Nuclear Station, Unit 2
Docket Nos. 50-270
Third Ten Year Inservice Inspection Interval
Request for Relief No. 00-01

Pursuant to 10 CFR 50.55a(g)(6)(i), attached is a Request for Relief from the requirement to examine 100% of the volume specified by the ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition with no Addenda (as modified by Code Case N-460) and ASME Section V, Article 4, T-441.3.2, Scanning Requirements, 1989 Edition with no Addenda. This request is to allow Duke Power to take credit for limited ultrasonic examinations on specific Steam Generator Outlet Nozzle welds described in the attached request, in conjunction with hydrostatic tests and VT-2 visual inspections. During examination of the subject Unit 2 welds, the ultrasonic examination coverages did not meet the 90% examination requirements of Code Case N-460. Achievement of greater than 90% examination coverage for these welds is impractical due to piping/vessel geometry, interferences, and existing examination technology.

If there are any questions or further information is needed you may contact R. P. Todd at (864) 885-3418.

Very truly yours,

W. R. McCollum, Jr.
Site Vice President

Attachment

A047

xc w/att: L. A. Reyes, Regional Administrator
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Atlanta, GA 30303

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Project Directorate II
Division of Licensing Project Management
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U. S. Nuclear Regulatory Commission
Mail Stop O-14 H25
Washington, DC 20555-0001

xc(w/o attch):
M. E. Shannon,
NRC Senior Resident Inspector
Oconee Nuclear Station

Mr. Virgil Autrey
Division of Radioactive Waste Management
Bureau of Land and Waste Management
SC Dept. of Health & Environmental Control
2600 Bull St.
Columbia, SC 29201

Duke Power Company

Station Oconee Unit 2

10-YEAR INTERVAL REQUEST FOR RELIEF NO. 00-01

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

a. Pressurizer Nozzle-to-Vessel Welds:

2-PZR-WP34	Item Number B03.110.002
2-PZR-WP33-3	Item Number B03.110.003
2-PZR-WP33-2	Item Number B03.110.004
2-PZR-WP33-1	Item Number B03.110.005

b. Steam Generator (Primary Side) Nozzle-to-Vessel Weld:

2-SGB-WG25 Item Number B03.130.006

c. Steam Generator (Primary Side) Nozzle Inside Radius Section:

2-SGB-WG25 Item Number B03.140.006

II. Code Requirement:

Figure IWB-2500-7, Examination Category B-D, Full Penetration Welds Of Nozzles In Vessels - Inspection Program B.

III. Code Requirement from which Relief is Requested:

Relief is requested from the requirement of examining essentially 100% of the weld length. The applicable code required is ASME Section V, Article 4, T-441.3.2, Scanning Requirements, 1989 Edition with no Addenda as modified by Code Case N-460. Due to part geometry and actual physical barriers, obtaining greater than 90% coverage of the required volume as outlined in Code Case N-460 is not possible with existing limitations.

The specified Code requirements identified in Section II of this request, require 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 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 more than 90% of the required volume has been examined.

IV. Basis for Relief:

Pressurizer Nozzle-to-Vessel Weld 2-PZR-WP34 (Item Number B03.110.002) was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section XI, Appendix I 1989 Edition, and Appendix VIII of the 1992 Edition with the 1993 Addenda as modified by the Performance Demonstration Initiative (PDI). Reference Attachment A for a drawing of the Pressurizer.

This weld is limited to 36% coverage of the required volume because single sided access of the nozzle configuration. In order to achieve more coverage, the nozzles would have to be re-designed to allow scanning from both sides of the weld.

Pressurizer Nozzle-to-Vessel Welds 2-PZR-WP33-3 2-PZR-WP33-2 and 2-PZR-WP33-1 (Item Numbers B03.110.003 B03.110.004 and B03.110.005 respectively) were examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section XI, Appendix I of the 1989 Edition and Appendix VIII of the 1992 Edition with the 1993 Addenda as modified by the PDI. Reference Attachment A for a drawing of the Pressurizer.

These welds are limited to 37.1% coverage of the required volume because of the nozzle configuration and location of lifting lugs. In order to achieve more coverage, the nozzles would have to be re-designed to allow scanning from both sides of the weld.

Steam Generator Nozzle-to-Vessel Weld 2-SGB-WG25 (Item Number B03.130.006) was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section V, Article 4, and ASME Section XI, Appendix I, of the 1989 Edition.

This weld is limited to 58% coverage of the required volume because of the nozzle configuration. In order to achieve more coverage, the nozzles would have to be re-designed to allow scanning from both sides of the weld. Reference Attachment B for a drawing of the Steam Generator.

Steam Generator Nozzle-to-Vessel Inside Radius Section for weld 2-SGB-WG25 (Item Number B03.140.006) was examined to the maximum extent practical using ultrasonic techniques in accordance with the requirements of ASME Section V, Article 4, and ASME Section XI, Appendix I, of the 1989 Edition.

The Inside Radius Section is limited to 70.21% coverage of the required volume because of the nozzle configuration. In order to achieve more coverage, the nozzles would have to be re-designed to allow scanning from both sides of the weld. Reference Attachment B for a drawing of the Steam Generator.

V. Alternate Examinations or Testing:

The use of radiography as an alternate volumetric examination of the welds/components referenced in this request is not a viable option. Restrictions to performing radiography are primarily due to inability to access the inside of the components to place film or to position a radiographic source.

Duke Energy proposes to use the pressure test and VT-2 visual examination to compliment the limited examination coverage. The Code requires (reference Table IWB-2500-1, Item Number B15.20) that a system leakage test be performed after each refueling outage. Additionally a system hydrostatic test (reference Table IWB-2500-1, Item Number B15.21) 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.

In addition to the above Code required examinations (volumetric and pressure test), there are other activities which provide a high level of confidence that, in the unlikely case that leakage did occur through these welds, it would be detected and isolated. Specifically, leakage from these welds would be detected by monitoring of the Reactor Coolant System (RCS), which is performed once each shift under procedure PT/1,2,3/A/0600/10, "RCS Leakage". This RCS leakage monitoring is a requirement of the Technical Specification 3.4.13, "Reactor Coolant System Leakage". Leakage is also evaluated in accordance with this Technical Specification. The leakage could be detected through several methods. One method is the RCS mass balance calculation. Another method is by use of the Reactor Building air particulate monitor. This monitor is sensitive to low leak rates; the iodine monitor, gaseous monitor and area monitor are capable of detecting any fission products in the coolant and will make these monitors sensitive to coolant leakage. In addition to the radiation monitors, leakage is also monitored by a level indicator in the Reactor Building normal sump. Another check would be a loss of level in the Letdown Storage Tank.

Duke Energy has examined the welds/components referenced in this request to the maximum extent possible utilizing the latest in examination techniques and equipment. Duke Energy will continue to perform ultrasonic examination of all welds/components identified in Section I of this request to the maximum extent practical, within the limits of original design and construction, in accordance with the requirements of ASME Section V, Article 4, and ASME Section XI, Appendix I, of the 1989 Edition, and Code Case N-460. Appendix VIII as modified by the PDI will be used to examine welds within the scope of the PDI Program. This will provide reasonable assurance of weld/component integrity. Thus, an acceptable level of quality and safety will have been achieved, and public health and safety will not be endangered by allowing relief from the aforementioned Code requirements.

VI. Justification for the Granting of Relief:

Duke Power Company will continue to ultrasonically examine the welds, including inside radius, to the extent practical within the limits of original design and construction. This will provide reasonable assurance of weld/component integrity. Thus, an acceptable level of quality and safety will have been achieved and public health and safety will not be endangered by allowing relief from the aforementioned Code requirements.

The Code requires 100% volumetric examination of all Pressurizer Nozzle-to-Vessel Welds, Steam Generator Nozzle-to-Vessel Weld and Steam Generator Nozzle-to-Vessel Inside Radius Section. However, the taper on the nozzle side of the weld restricts scanning and prevents complete volumetric coverage of Pressurizer Nozzle-to-Vessel Welds 2-PZR-WP34, 2-PZR-WP33-3, and 2-PZR-WP33-2 and 2-PZR-WP33-1; and Steam Generator Nozzle-to-Vessel Weld and Inside Radius for weld 2-SGB-WG25. Therefore, the 100% volumetric examination is impractical. To meet Code examination requirements, modifications to the nozzles would be necessary to allow scanning from both sides of the weld. Modification to this portion of the reactor coolant system would create a considerable burden on Duke Energy.

Duke Energy obtained 36% coverage of Pressurizer Nozzle-to-Vessel Weld 2-PZR-WP34 and 37.1% coverage of Pressurizer Nozzle-to-Vessel welds 2-PZR-WP33-3, 2-PZR-WP33-2 and 2-PZR-WP33-1; and 58% coverage of the Steam Generator Nozzle-to-Vessel weld and 70.21% coverage of the inside radius of Steam Generator weld 2-SGB-WG25. It is recognized that this represents a small part of the required Code examination volume. However, in conjunction with the Code required VT-2 visual examination after each refueling outage and the 10-year hydrostatic test; Duke Energy believes this provides reasonable assurance of the continued structural integrity of the subject welds/components.

Pursuant to 10 CFR 50.55a(g)(6)(i), granting this relief will provide reasonable assurance of weld/component integrity, … "is authorized by law and 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:

Unit 2, Refueling Outages 17

The following individuals were involved in the development of this request for relief:

B. W. Carney Jr., Oconee Engineering provided input to Sections VI and V of this request as well.

M. D. Leighton, Oconee Primary Systems provided input to Sections VI and V of this request as well.

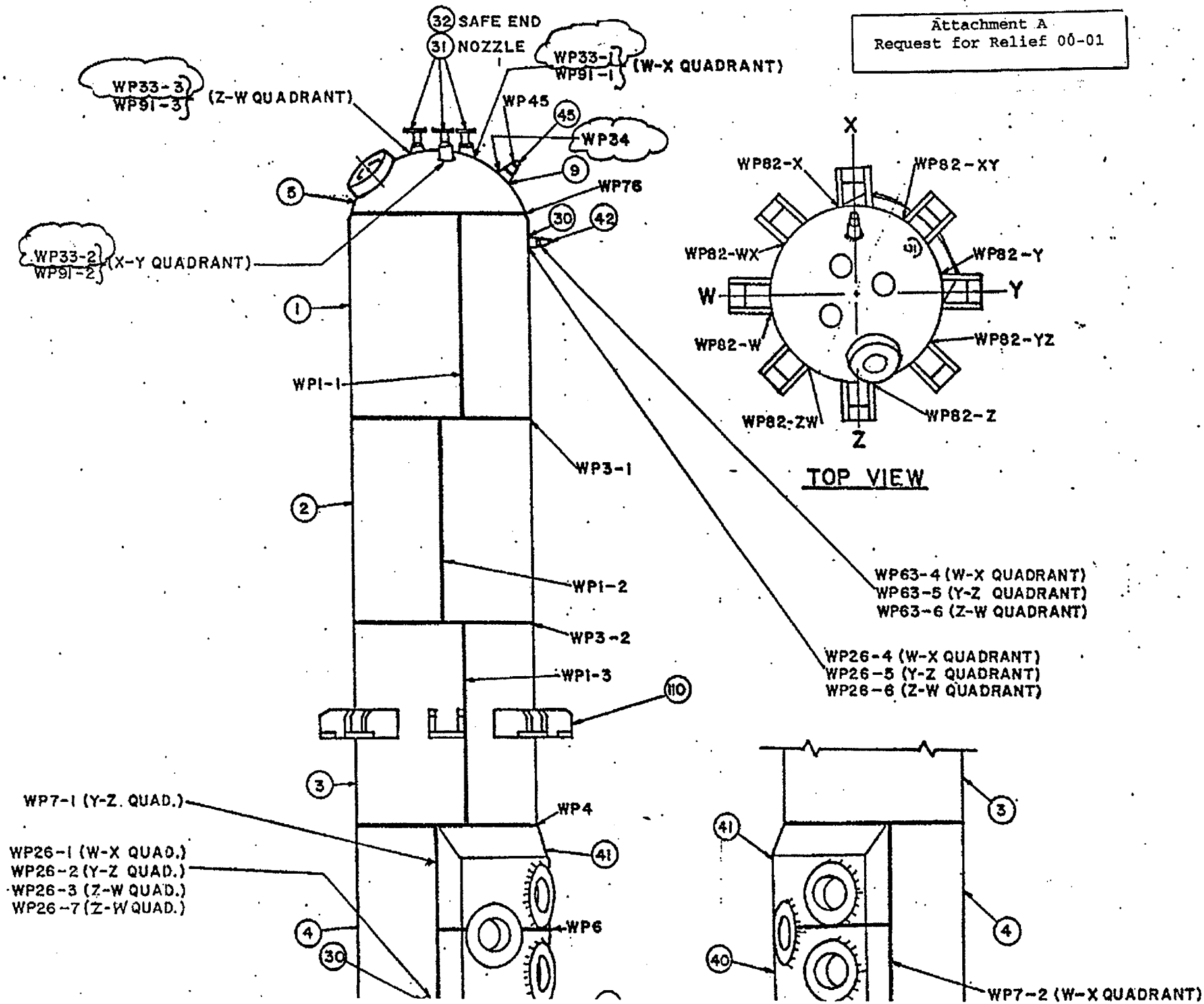
J. J. McArdle III, NDE Level III provided input for Sections III, IV, and V of this request.

R. G. Rouse, Oconee ISI Plan Manager compiled and completed this request.

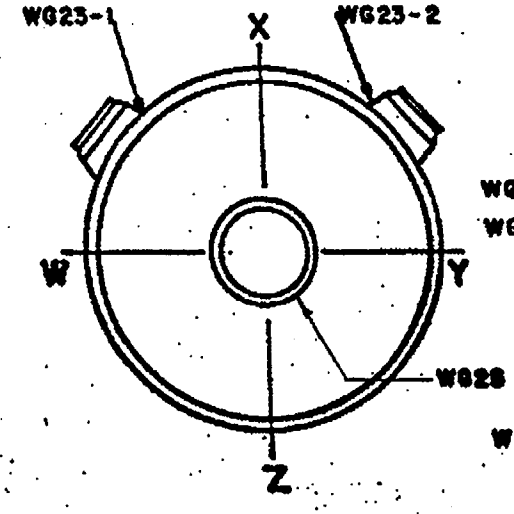
Sponsored By: R G Rouse Date: 2/14/00

Approved By: R. Kevin Rhyne Date: 2/16/00

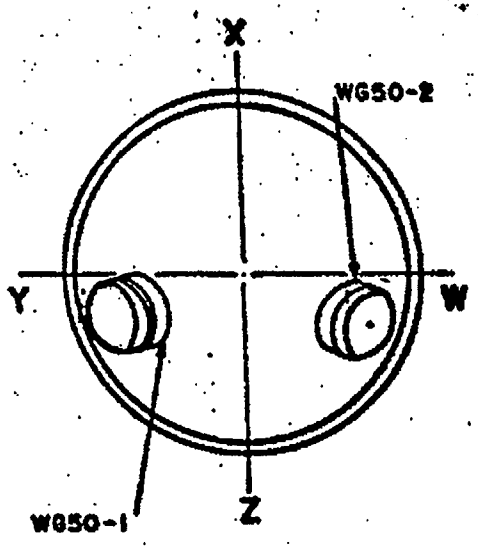
Attachment A
Request for Relief 00-01

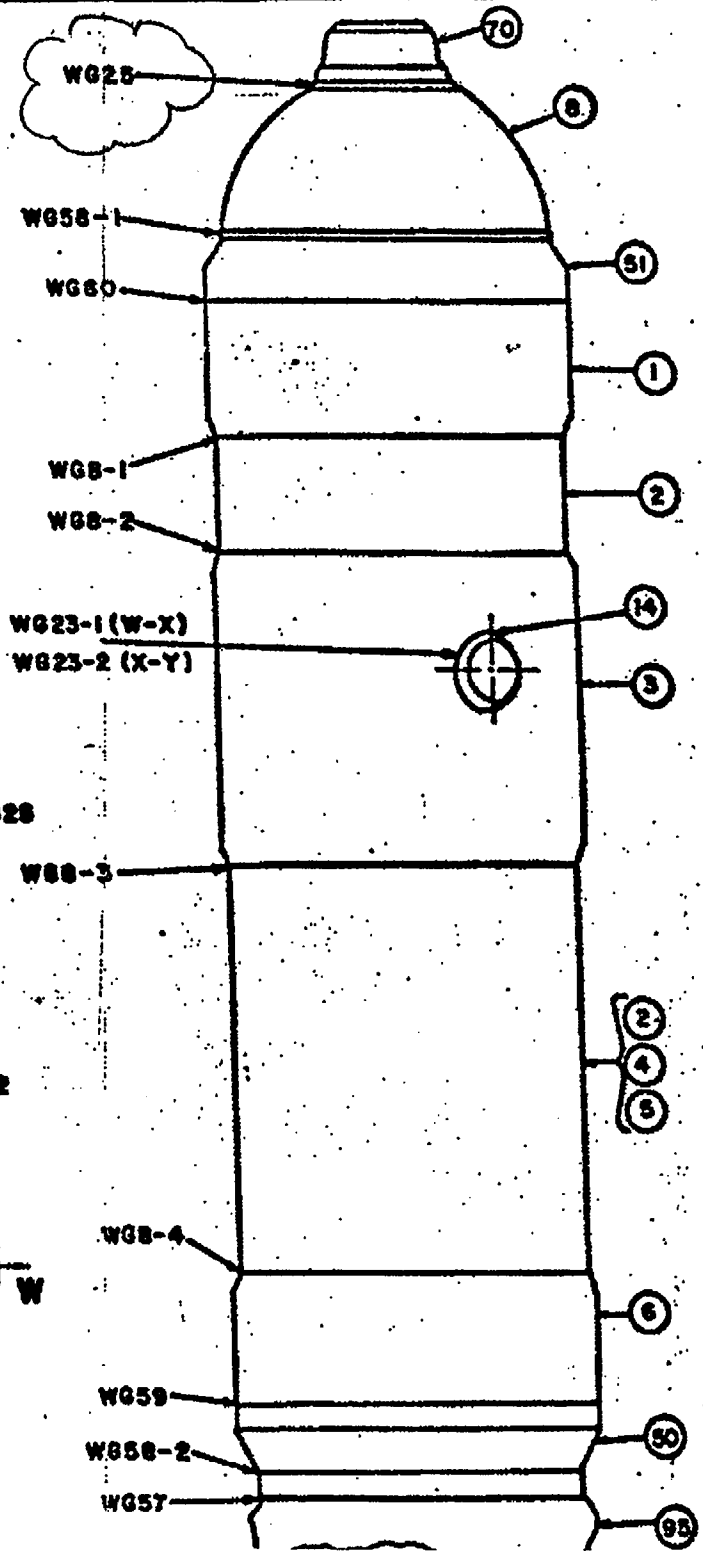


Attachment B
Request for Relief 00-01



TOP VIEW





REFERENCE DWGS
OM 1201-450

Form NDE-620
Revision 0

DUKE POWER COMPANY

ULTRASONIC DATA SHEET FOR PLANAR REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: OCONEE	Unit: 2	Component/Weld ID: 2-PZR-WP34	Date: 12/2/99
Weld Length (in.): 24.4"	Surface Condition: AS GROUND	L_0 9.2.3	Exam Start: 1430 / Exam Finish: 1530

Procedure No:	Scans	Configuration		Calibration Sheet No:
NDE-620 Revision: 8 FC N/A	70° 58 dB Zone I 60° 80 dB Zone II 60° 80 dB Zone III Axial 60° 80 dB Zone III Circ.	NOZZLE TO U. HEAD Scan Surface: OD	Surface Temp. 73 °F Pyrometer s/n: MCNDE-27010 Cal. Due Date: 4/27/00	9902106 9902107 9902108

Indication #	∠	MP_{max}	% FSH	L_{max}	W_{max}	SU LOCATION	BEAM DIRECTION	SCAN ⊥ =	REMARKS
NRI	60°								
NRI	70°								

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

Examiner: [signature] Level: II Date: 12/2/99 Examiner: Gary Moss Level: II Date: 12-3-99 Item No: B03.110.002

Reviewed by: [signature] Level: II Date: 12/3/99 Authorized Inspector: MBC Date: 12-6-99

Attachment C
Page 1 of 52
Request for Relief 00-01

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2-PZR-WP34 | Item No: B03.110.002 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

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

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

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

Nozzle Configuration

☐ NO SCAN
☐ LIMITED SCAN

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

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

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

☐ NO SCAN
☐ LIMITED SCAN

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

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

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

☐ NO SCAN
☐ LIMITED SCAN

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

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

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

Prepared By: Jay Eaton [signature] Level: II Date: 12/2/99 | Sketch(s) attached ☒ yes ☐ no | Sheet 2 of 9

Reviewed By: David C [signature] Date: II DLZ 12/3/99 | Authorized Inspector: MBC Date: 12-6-99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
	70				34.1		0.00
	60				37.8		0.00
							0.00

Aggregate % 71.9 / 2 = 35.95 = 36%

Item No: B03.110.002

Prepared By: Larry Mauldin Level: III Date: 12/2/99

Reviewed By: David K. Level: II Date: 12/3/99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 1 7.4 sq.in.	7.4 sq.in. X 24.4 in.= 180.56 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	70	2	3.6	24.4	87.84	180.56	48.65
2	70	1	1.3	24.4	31.72	180.56	17.57
3	70	CW	2.6	24.4	63.44	180.56	35.14
4	70	CCW	2.6	24.4	63.44	180.56	35.14
					246.44	722.24	34.12

34.1%

Item No: B03.110.002

Prepared By: Larry Mauldin Larry Mauldin Level: III Date: 12/2/99

Reviewed By: David K. [illegible] Level: II Date: 12/3/99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 2 & 3 23.2 sq.in.	23.2 sq.in. X 24.4 in.= 566.08 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	2	19.8	24.4	483.12	566.08	85.34
2	60	1	.1	24.4	2.44	566.08	0.43
3	60	CW	7.6	24.4	185.44	566.08	32.76
4	60	CCW	7.6	24.4	185.44	566.08	32.76
					856.44	2264.32	37.82

37.8%

Item No: B03.110.002

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *David K. [illegible]* Level: II Date: 12/3/99

OCONEE PRESSURE SPRAY NOZZLE

EXAM AREAS:

ZONE 1:

ABHG = 2.9" X 1.0" = 2.9 sq.in.

HGMN = $\pi 4.5^2 - \pi 3.5^2 \times 14.7\% = 3.69$ sq.in.

LMNO = $\frac{1.0"}{2}(.55 + 1.15) = .85$ sq.in.

7.44 = 7.4 sq.in.

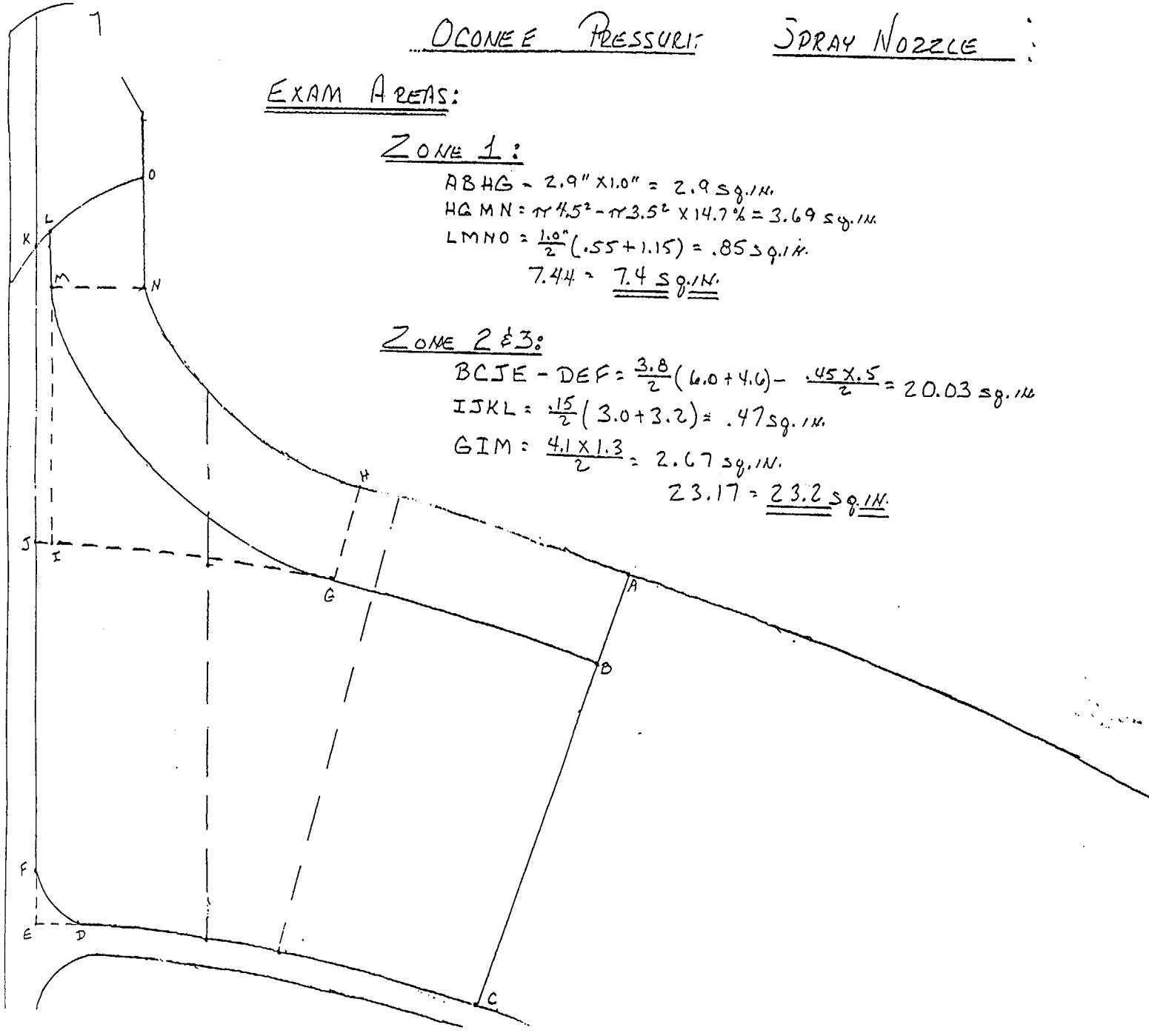
ZONE 2 & 3:

BCJE − DEF = $\frac{3.8}{2}(6.0 + 4.6) - \frac{.45 \times .5}{2} = 20.03$ sq.in.

IJKL = $\frac{.15}{2}(3.0 + 3.2) = .47$ sq.in.

GIM = $\frac{4.1 \times 1.3}{2} = 2.67$ sq.in.

23.17 = 23.2 sq.in.



NOTE: AREA HGMN HAS A MULTIPLIER of 14.7%. ZONE 1 RADIUS IS 53° WHICH IS 14.7% of 360°.

ITEM # B03.110.002

I.D. # 2PZR-WP34

BY: Larry Mauldin

DATE: 12-2-99

SCALE = 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

PG. 6 of PG. 9

Attachment C
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Request for Relief 00-01

OCONEE PRESSURI · SPRAY NOZZLE

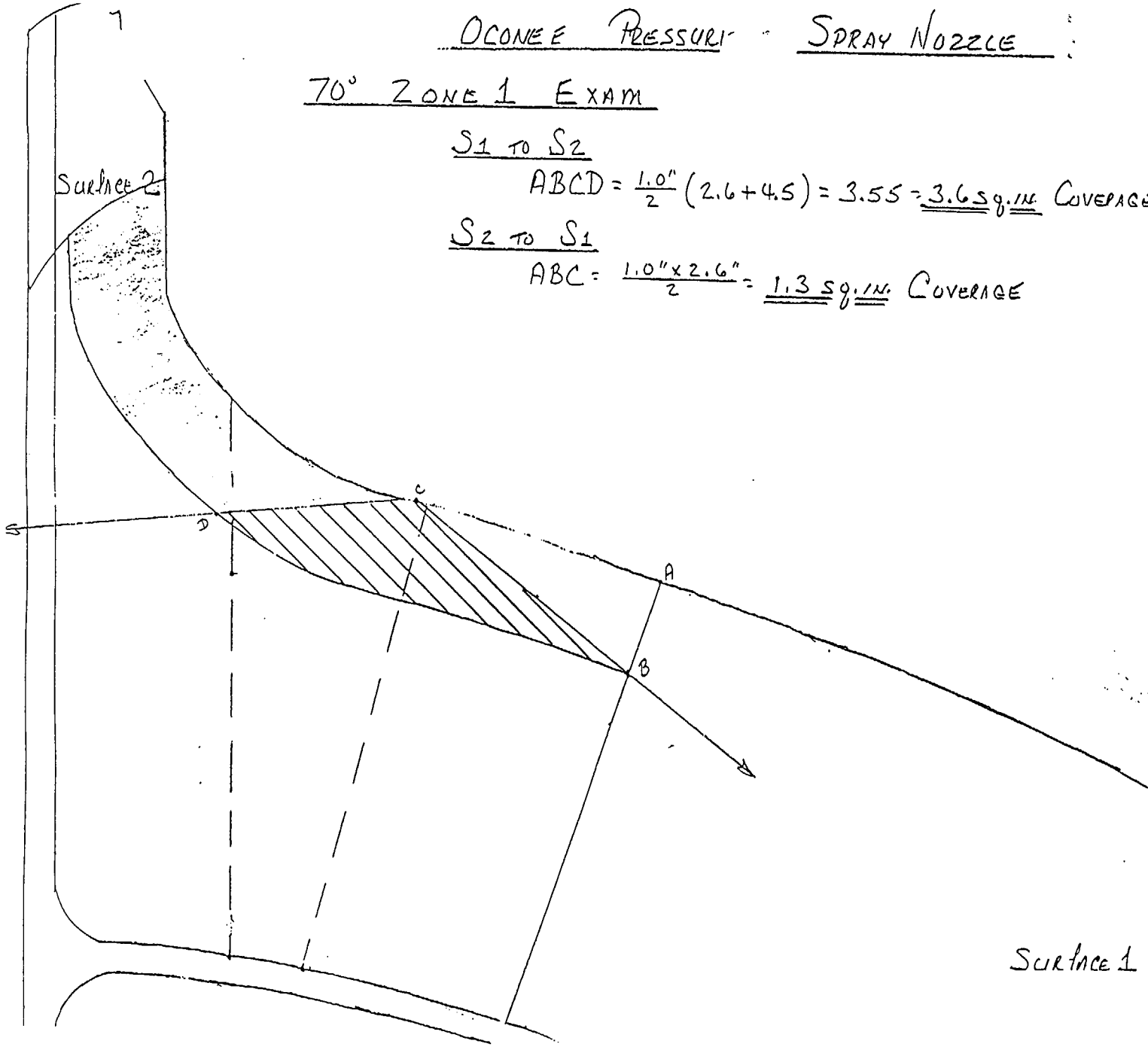
70° ZONE 1 EXAM

S1 TO S2

$ABCD = \frac{1.0''}{2}(2.6+4.5) = 3.55 = \underline{3.6 \text{ sq. in.}}$ COVERAGE

S2 TO S1

$ABC = \frac{1.0'' \times 2.6''}{2} = \underline{1.3 \text{ sq. in.}}$ COVERAGE



ITEM # 303.110.002
I.D. # 2-PZR-WP34
BY: Larry Thowden
DATE: 12-2-99

SCALE = 1.0" = 1.0"
- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

PG. 7 of PG. 9

OCONEE PRESSURI SPRAY NOZZLE

60° ZONE 2 & 3 EXAM

S1 TO S2

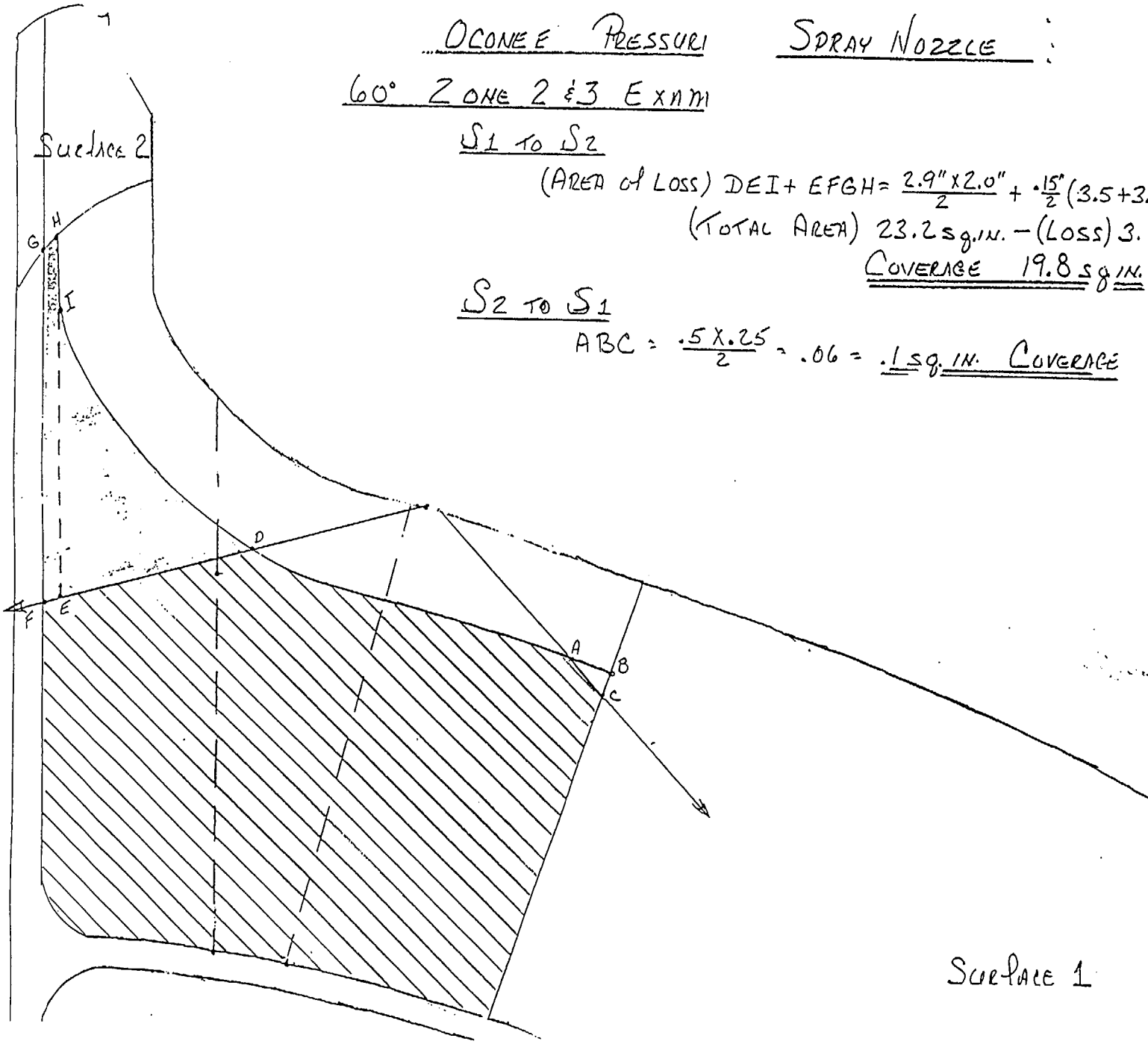
(AREA of LOSS) DEI + EFGH = $\frac{2.9'' \times 2.0''}{2} + \frac{.15''}{2}(3.5+3.6) = 3.43 = 3.4$ sq. in.

(TOTAL AREA) 23.2 sq. in. − (LOSS) 3.4 sq. in. =

COVERAGE 19.8 sq. in.

S2 TO S1

ABC = $\frac{.5 \times .25}{2} = .06 = .1$ sq. in. COVERAGE



ITEM # B03.110.002
I.D. # 2-PZR-VJP34
BY: Louis Maulden
DATE: 12-2-99

SCALE = 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

PG. 8 of PG. 9

OCONEE PRESSUR SPRAY NOZZLE

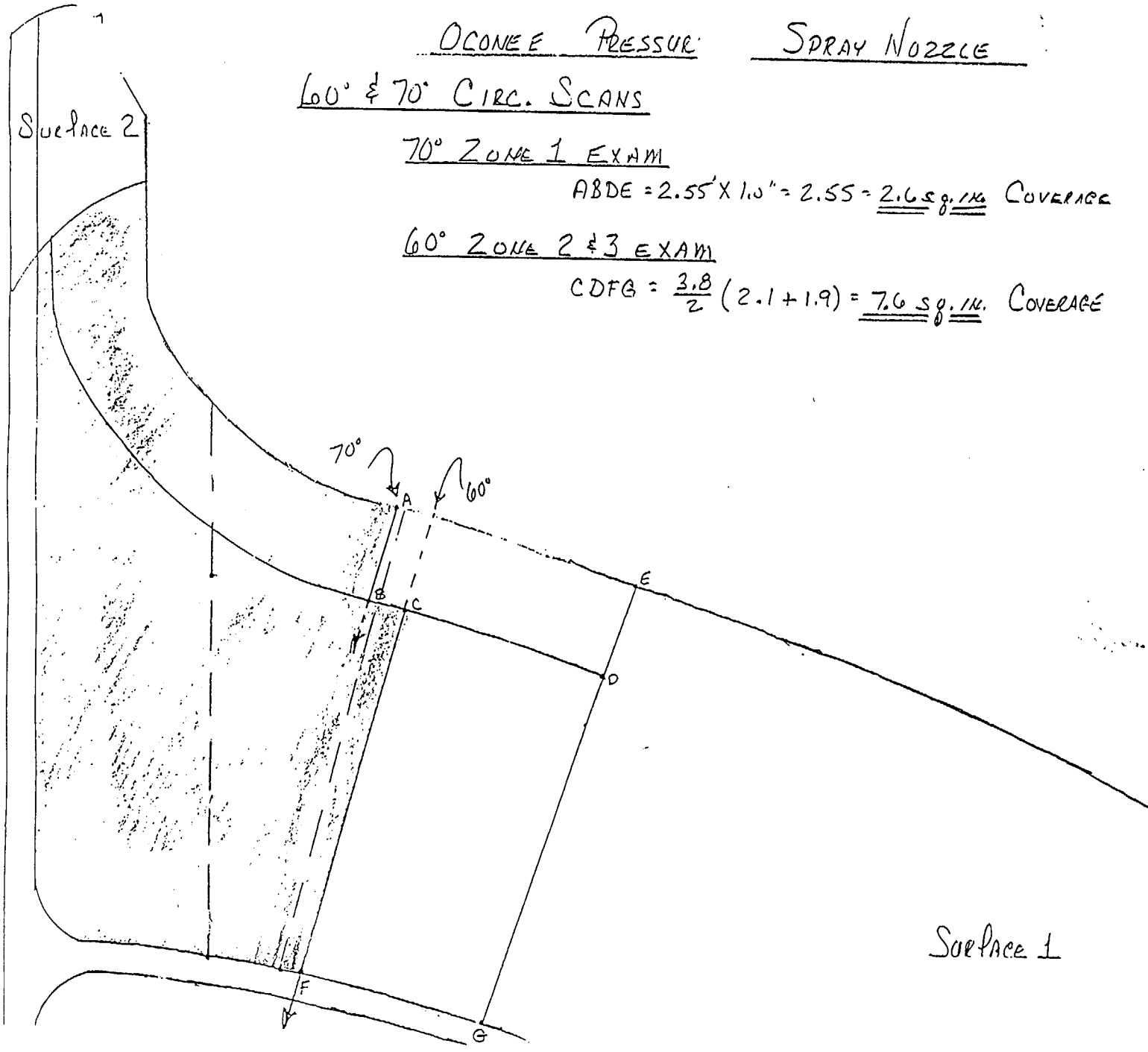
60° & 70° CIRC. SCANS

70° ZONE 1 EXAM

ABDE = 2.55" X 1.0" = 2.55 = 2.6 sq. in. COVERAGE

60° ZONE 2 & 3 EXAM

CDFG = $\frac{3.8}{2}$ (2.1 + 1.9) = 7.6 sq. in. COVERAGE



ITEM # B03.110.002
I.D. # 2P2R.WP34
BY: Larry Mauldin
DATE: 12-2-99

SCALE = 1.0" = 1.0"
- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

PG. 9 of PG. 9

Form NDE-620
Revision 0

DUKE POWER COMPANY

ULTRASONIC DATA SHEET FOR PLANAR REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: OCONEE	Unit: 2	Component/Weld ID: 2-PZR-WP33-3	Date: 12/2/99
Weld Length (in.): 21.6"	Surface Condition: AS GROUND	Lo 9.2.3	Exam Start: 1430 / Exam Finish: 1530

Procedure No:	Scans	Configuration		Calibration Sheet No:
NDE-620 Revision: 8 FC N/A	70° 58 dB Zone I 60° 80 dB Zone II 60° 80 dB Zone III Axial 60° 80 dB Zone III Circ.	NOZZLE TO U. HEAD Scan Surface: OD	Surface Temp. 73 °F Pyrometer s/n: MCNDE-27010 Cal. Due Date: 4/27/00	9902106 9902107 9902108

Indication #	∠	MP_{max}	% FSH	L_{max}	W_{max}	SU LOCATION	BEAM DIRECTION	SCAN ⊥ ∥	REMARKS
NRI	60°								
NRI	70°								

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

Examiner: [signature] Level: II Date: 12/2/99 Examiner: Gary Moss Level: II Date: 12-2-99 Item No: B03.110.003

Reviewed by: [signature] Level: II Date: 12/3/99 Authorized Inspector: MBC Date: 12-6-99

Attachment C
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Request for Relief 00-01

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2-PZR-WP33-3 | Item No: B03.110.003 | Remarks:

	SURFACE	BEAM DIRECTION	Remarks
☒ NO SCAN ☐ LIMITED SCAN	☐ 1 ☒ 2	☒ 1 ☒ 2 ☒ cw ☒ ccw	Nozzle Configuration
FROM L N/A to L N/A		INCHES FROM WO C/L to Beyond	
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☒ Other 70°		FROM 0 DEG to 360 DEG	
☐ NO SCAN ☒ LIMITED SCAN	☒ 1 ☐ 2	☐ 1 ☒ 2 ☐ cw ☐ ccw	Lifting Lug
FROM L N/A to L N/A		INCHES FROM WO C/L+10" to Beyond	
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☒ Other 70		FROM 190 DEG to 230 DEG	
☐ NO SCAN ☐ 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 ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	
FROM L to L		INCHES FROM WO to	
ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other		FROM DEG to	

Prepared By: Jay Eaton Level: II Date: 12/2/99 | **Sketch(s) attached** ☒ yes ☐ no | Sheet 2 of 9

Reviewed By: David G. B. Date: 12/3/99 | Authorized Inspector: MBC Date: 12-6-99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
	60				38.7		0.00
	70				35.5		0.00
					72.2		0.00

Aggregate % 74.2 / 2 = 37.1%

Item No: B03.110.003

Prepared By: Larry Mauldin Level: III Date: 12/2/99

Reviewed By: Level: II Date: 12/3/99

30P9

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 2 & 3 23.6 sq.in.	23.6 sq.in. X 21.6 in.= 509.76 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	2	19.2	21.6	414.72	509.76	81.36
2	60	1	.1	21.6	2.16	509.76	0.42
3	60	CW	8.6	21.6	185.76	509.76	36.44
4	60	CCW	8.6	21.6	185.76	509.76	36.44
					788.4	2039.04	38.67

38.7%

Item No: B03.110.003

Prepared By: Larry Mauldin Larry Mauldin Level: III Date: 12/2/99

Reviewed By: David K. [illegible] Level: II Date: 12/3/99

4 of 9

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 1 7.4 sq.in.	7.4 sq.in. X 21.6 in.= 159.84 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	70	2	3.7	21.6	79.92	159.84	50.00
2	70	1	1.4	21.6	30.24	159.84	18.92
3	70	CW	2.7	21.6	58.32	159.84	36.49
4	70	CCW	2.7	21.6	58.32	159.84	36.49
					226.8	639.36	35.47

35.5%

Item No: B03.110.003

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *Daniel R. [illegible]* Level: II Date: 12/3/99

OCONEE . SSURIZER RELIEF NOZZLE

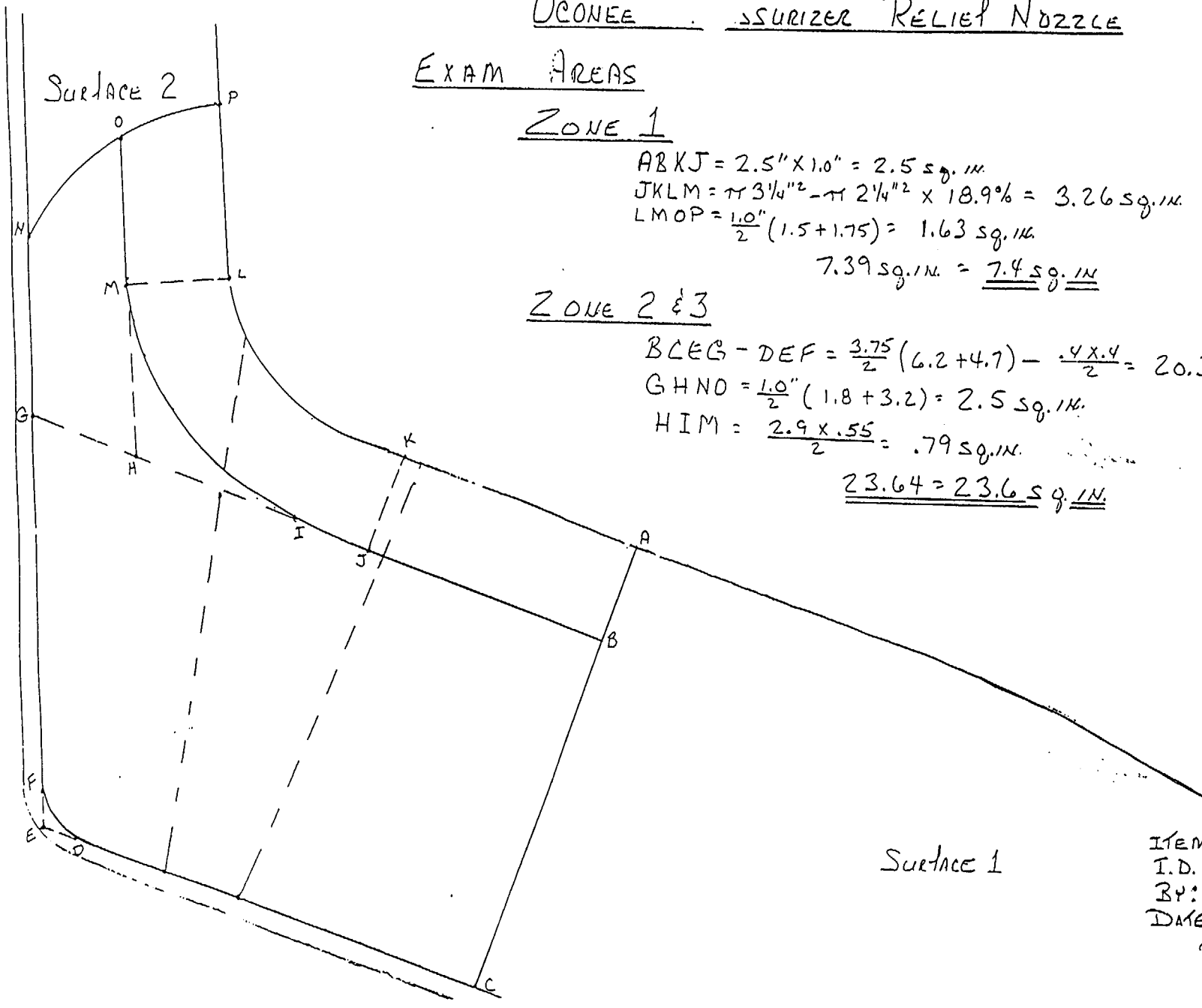
EXAM AREAS

ZONE 1

ABKJ = 2.5" X 1.0" = 2.5 sq. in.
JKLM = π 3¼"^{2} − π 2¼"^{2} X 18.9% = 3.26 sq. in.
LMOP = $\frac{1.0"}{2}$ (1.5 + 1.75) = 1.63 sq. in.
7.39 sq. in. = 7.4 sq. in

ZONE 2 & 3

BCEG − DEF = $\frac{3.75}{2}$ (6.2 + 4.7) − $\frac{.4 \times .4}{2}$ = 20.35 sq. in.
GHNO = $\frac{1.0"}{2}$ (1.8 + 3.2) = 2.5 sq. in.
HIM = $\frac{2.9 \times .55}{2}$ = .79 sq. in.
23.64 = 23.6 sq. in.



NOTE:
JKLM HAS A MULTIPIER of 18.9%. THE RADIUS of ZONE IS 68° OR 18.9% of 360°.

SCALE 1.0" = 1.0"
- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

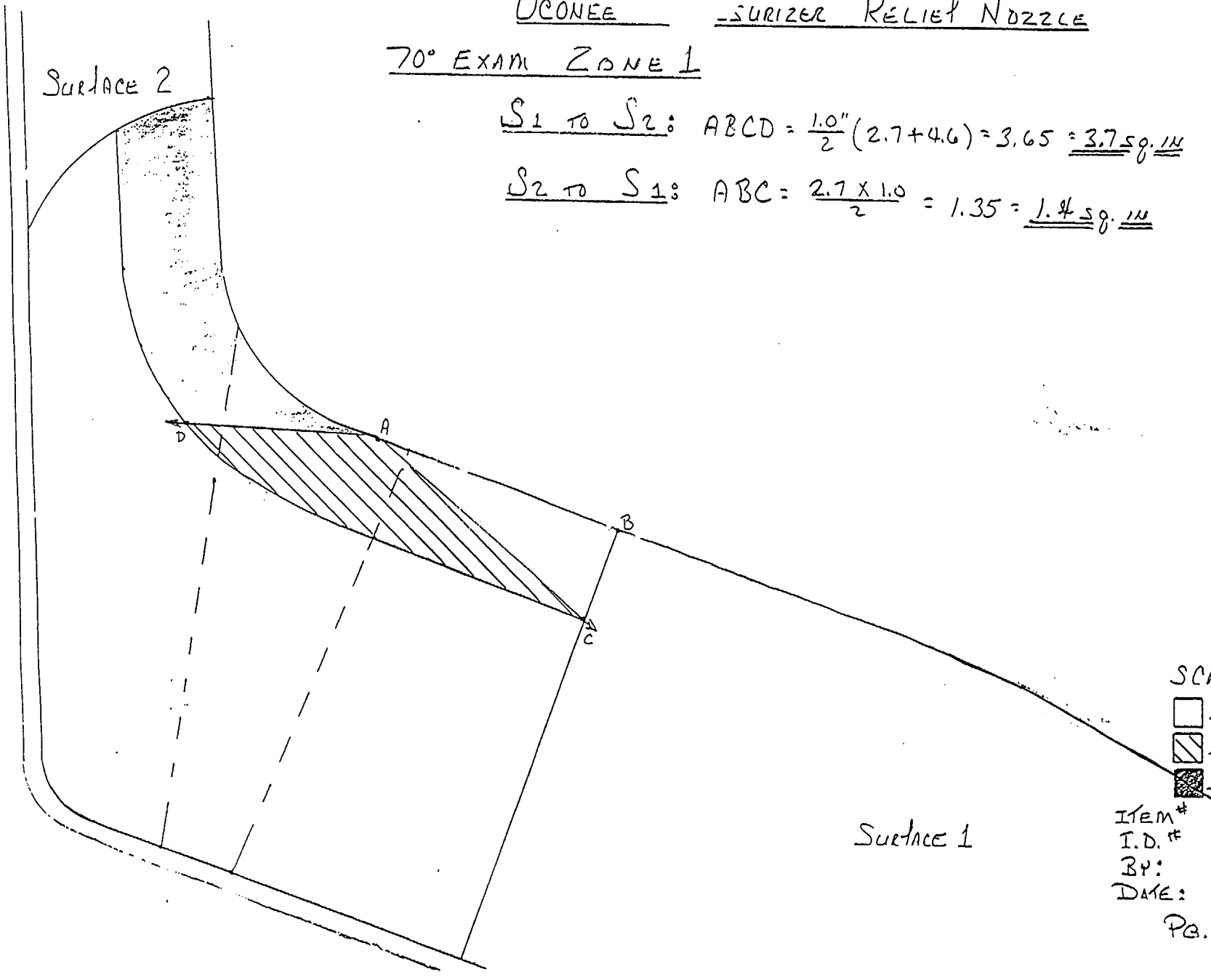
ITEM # B03.110.003
I.D. # 3 PZR. WP 33.3
BY: Lane Moulder
DATE: 92.2.95

OCONEE _SURIZER RELIEF NOZZLE

70° EXAM ZONE 1

S_1 TO S_2: $ABCD = \frac{1.0''}{2}(2.7+4.6) = 3.65 = \underline{3.7 \text{ sq. in}}$

S_2 TO S_1: $ABC = \frac{2.7 \times 1.0}{2} = 1.35 = \underline{1.4 \text{ sq. in}}$



SCALE 1.0" = 1.0"

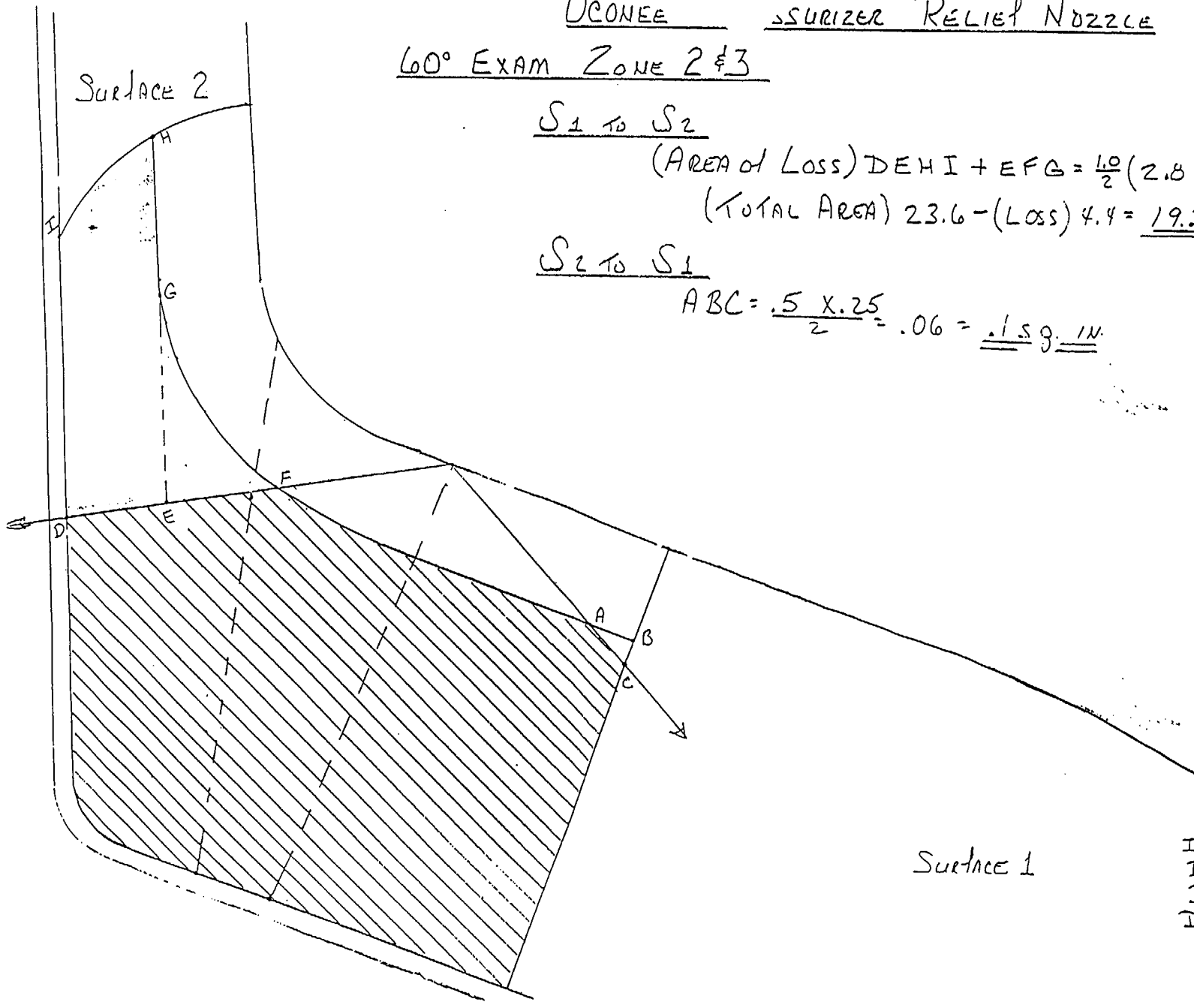
- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # B03.110.003
I.D. # 2B2RWP33.3
BY: Larry Mandlin
DATE: 12-2-99

PG. 7 of PG. 9

OCONEE PRESSURIZER RELIEF NOZZLE

60° EXAM ZONE 2 & 3



S_1 TO S_2

(AREA of LOSS) DEHI + EFG = $\frac{1.0}{2}(2.8+3.7) + \frac{2.1 \times 1.1}{2} = 4.4$ sq. in.

(TOTAL AREA) 23.6 − (LOSS) 4.4 = 19.2 sq. in. COVERAGE

S_2 TO S_1

ABC = $\frac{.5 \times .25}{2} = .06 = .1$ sq. in.

SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # 303.110.003
I.D. # 2PZR WP-33-3
BY: Larry Marden
DATE: 12-8-99

PG. 8 of PG. 9

Attachment C
Page 17 of 52
Request for Relief 00-01

OCONEE PRESSURIZER RELIEF NOZZLE

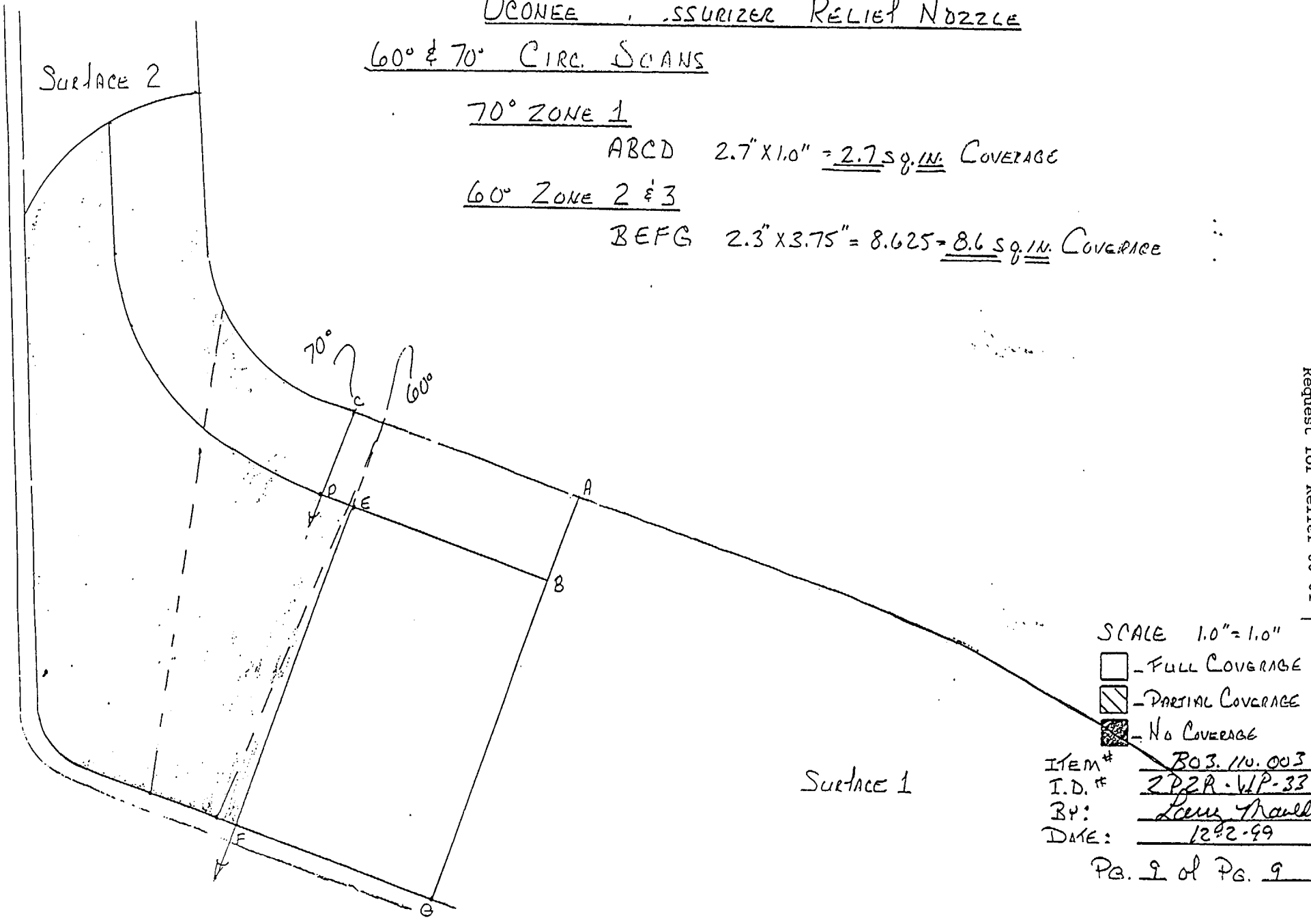
60° & 70° CIRC. SCANS

70° ZONE 1

ABCD 2.7" X 1.0" = 2.7 sq. IN. COVERAGE

60° ZONE 2 & 3

BEFG 2.3" X 3.75" = 8.625 = 8.6 sq. IN. COVERAGE



SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # B03.110.003
I.D. # 2PZR-VIP-33-3
BY: Larry Moulder
DATE: 12-2-99

PG. 9 of PG. 9

Form NDE-620
Revision 0

DUKE POWER COMPANY

ULTRASONIC DATA SHEET FOR PLANAR REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: OCONEE	Unit: 2	Component/Weld ID: 2-PZR-WP33-2	Date: 12/2/99
Weld Length (in.): 21.6"	Surface Condition: AS GROUND	Lo 9.2.3	Exam Start: 1430 / Exam Finish: 1530

Procedure No:	Scans	Configuration		Calibration Sheet No:
NDE-620 Revision: 8 FC N/A	70° 58 dB Zone I 60° 80 dB Zone II 60° 80 dB Zone III Axial 60° 80 dB Zone III Circ.	NOZZLE TO U. HEAD Scan Surface: OD	Surface Temp. 73 °F Pyrometer s/n: MCNDE-27010 Cal. Due Date: 4/27/00	9902106 9902107 9902108

Indication #	∠	MP_{max}	% FSH	L_{max}	W_{max}	SU LOCATION	BEAM DIRECTION	SCAN ⊥ ∥	REMARKS
NRI	60°								
NRI	70°								

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

Examiner: [signature] Level: II Date: 12/2/99 Examiner: Gary A Moss Level: II Date: 12-2-99 Item No: B03.110.004

Reviewed by: [signature] Level: II Date: 12/3/99 Authorized Inspector: MNBC Date: 12-6-99

Attachment C
Page 19 of 52
Request for Relief 00-01

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2-PZR-WP33-2 | Item No: B03.110.004 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN
SURFACE: ☐ 1 ☒ 2
BEAM DIRECTION: ☒ 1 ☒ 2 ☒ cw ☒ ccw
FROM L N/A to L N/A INCHES FROM WO C/L to Beyond
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☒ Other 70° FROM 0 DEG to 360 DEG
Remarks: Nozzle Configuration

☐ NO SCAN
☒ LIMITED SCAN
SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw
FROM L N/A to L N/A INCHES FROM WO C/L+5" to Beyond
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☒ Other 70 FROM 160 DEG to 200 DEG
Remarks: Lifting Lug

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

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

Prepared By: Jay Eaton Level: II Date: 12/2/99 | Sketch(s) attached ☒ yes ☐ no | Sheet 2 of 9

Reviewed By: David C. [illegible] Date: 12/3/99 | Authorized Inspector: MBC Date: 12-6-99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
	60				38.7		0.00
	70				35.5		0.00
					72.2		0.00

Aggregate % 74.2 / 2 = 37.1%

Item No: B03.110.004

Prepared By: Larry Mauldin Level: III Date: 12/2/99

Reviewed By: Level: II Date: 12/3/99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 2 & 3 23.6 sq.in.	23.6 sq.in. X 21.6 in.= 509.76 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	2	19.2	21.6	414.72	509.76	81.36
2	60	1	.1	21.6	2.16	509.76	0.42
3	60	CW	8.6	21.6	185.76	509.76	36.44
4	60	CCW	8.6	21.6	185.76	509.76	36.44
					788.4	2039.04	38.67

38.7%

Item No: B03.110.004

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *David K. [illegible]* Level: II Date: 12/3/99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 1 7.4 sq.in.	7.4 sq.in. X 21.6 in.= 159.84 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	70	2	3.7	21.6	79.92	159.84	50.00
2	70	1	1.4	21.6	30.24	159.84	18.92
3	70	CW	2.7	21.6	58.32	159.84	36.49
4	70	CCW	2.7	21.6	58.32	159.84	36.49
					226.8	639.36	35.47

35.5%

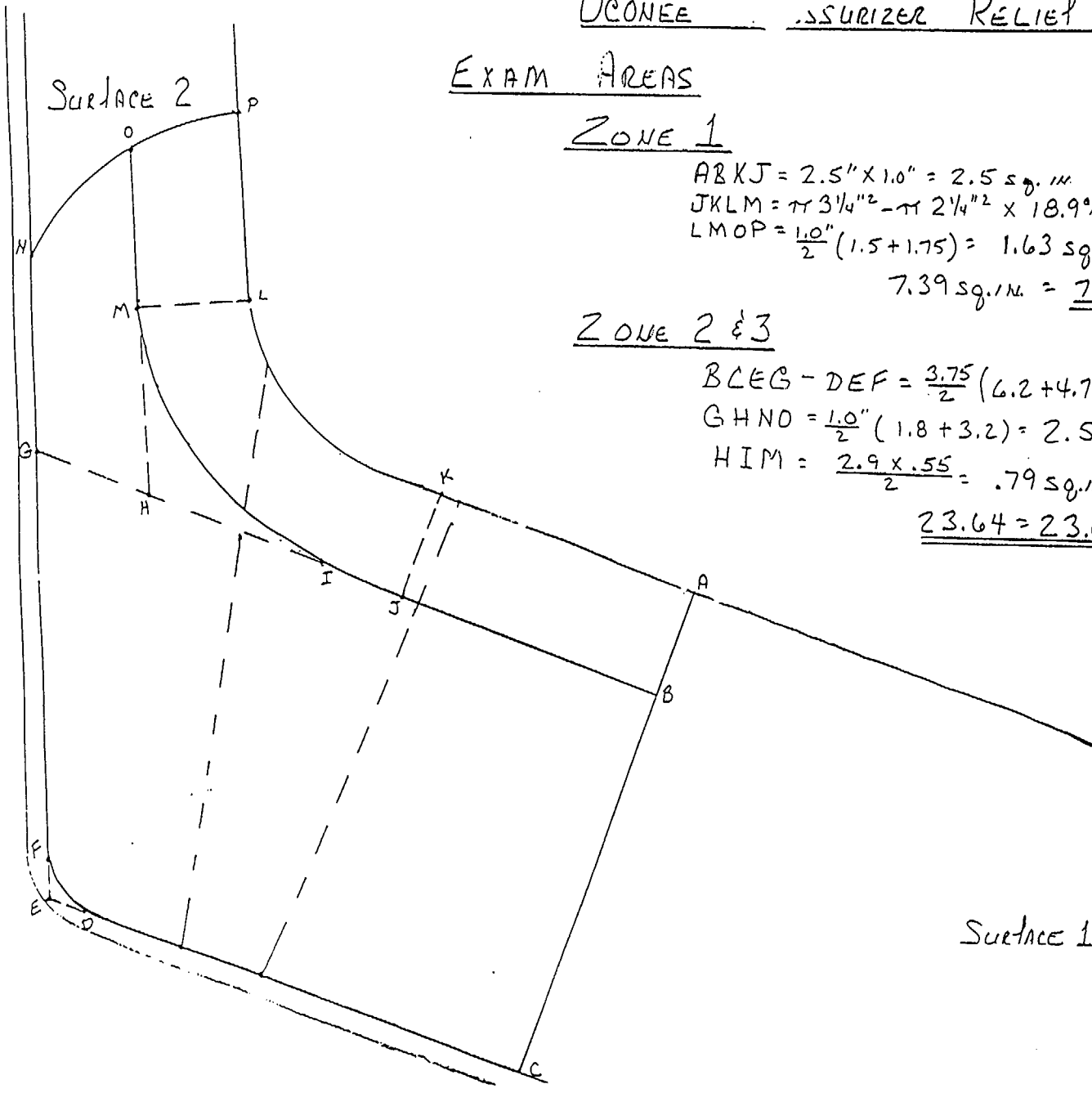
Item No: B03.110.004

Prepared By: Larry Mauldin Larry Mauldin Level: III Date: 12/2/99

Reviewed By: David K. [illegible] Level: II Date: 12/3/99

OCONEE PRESSURIZER RELIEF NOZZLE

EXAM AREAS



ZONE 1

ABKJ = 2.5" X 1.0" = 2.5 sq. in.

JKLM = π 3¼"^{2} − π 2¼"^{2} X 18.9% = 3.26 sq. in.

LMOP = $\frac{1.0"}{2}$ (1.5 + 1.75) = 1.63 sq. in.

7.39 sq. in. = 7.4 sq. in.

ZONE 2 & 3

BCEG − DEF = $\frac{3.75}{2}$ (6.2 + 4.7) − $\frac{.4 \times .4}{2}$ = 20.35 sq. in.

GHNO = $\frac{1.0"}{2}$ (1.8 + 3.2) = 2.5 sq. in.

HIM = $\frac{2.9 \times .55}{2}$ = .79 sq. in.

23.64 = 23.6 sq. in.

NOTE:
JKLM HAS A MULTIPLIER of 18.9%. THE RADIUS of ZONE IS 68° OR 18.9% of 360°.

SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # 303.110.004
I.D. # 2PZR-WP33.2
BY: Larry Mauldin
DATE: 12-2-99

PG. 6 of PG. 9

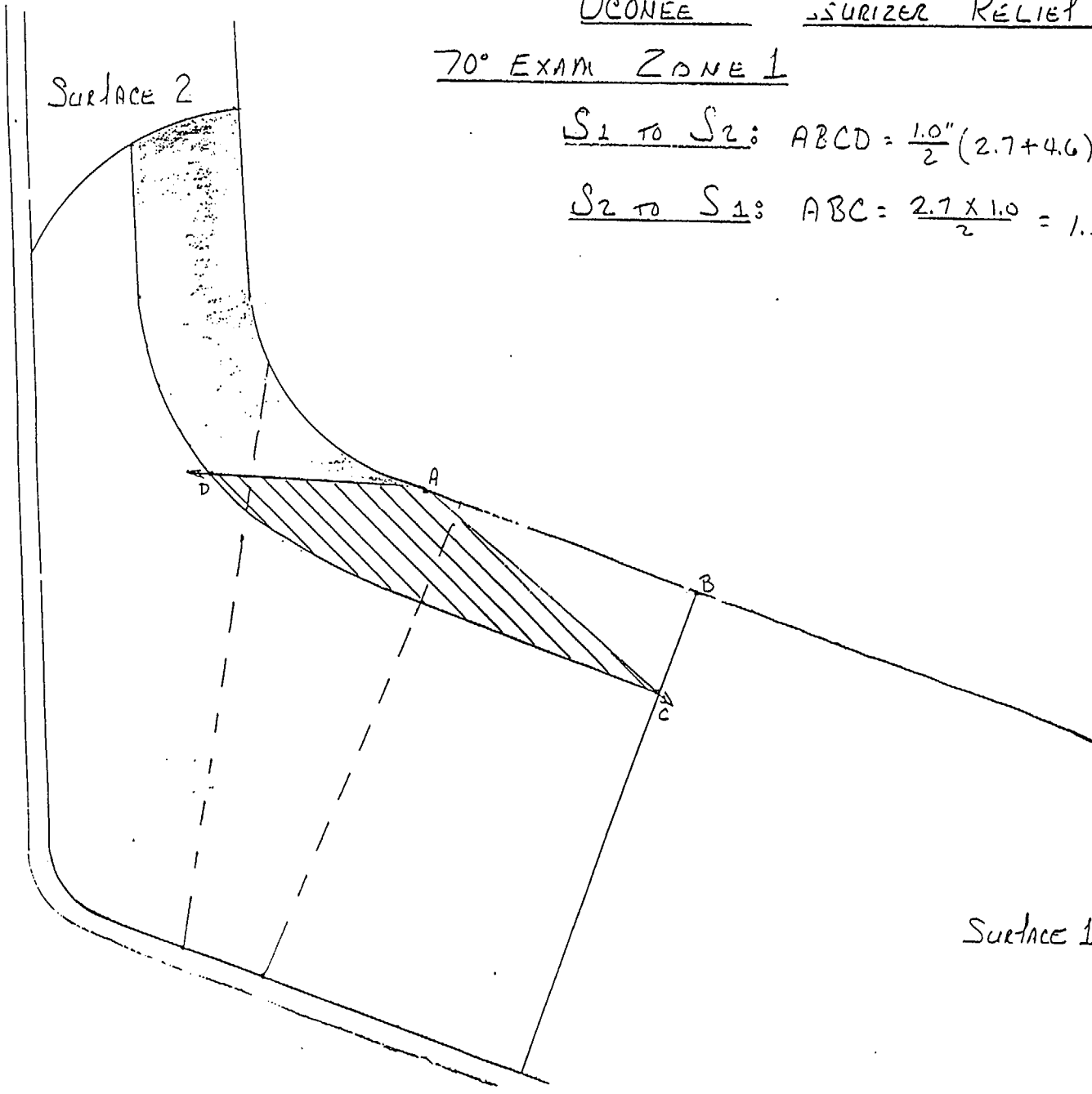
Attachment C
Page 24 of 52
Request for Relief 00-01

OCONEE PRESSURIZER RELIEF NOZZLE

70° EXAM ZONE 1

S1 TO S2: ABCD = $\frac{1.0''}{2}(2.7+4.6) = 3.65 = 3.7$ sq. in

S2 TO S1: ABC = $\frac{2.7 \times 1.0}{2} = 1.35 = 1.4$ sq. in



SCALE 1.0" = 1.0"

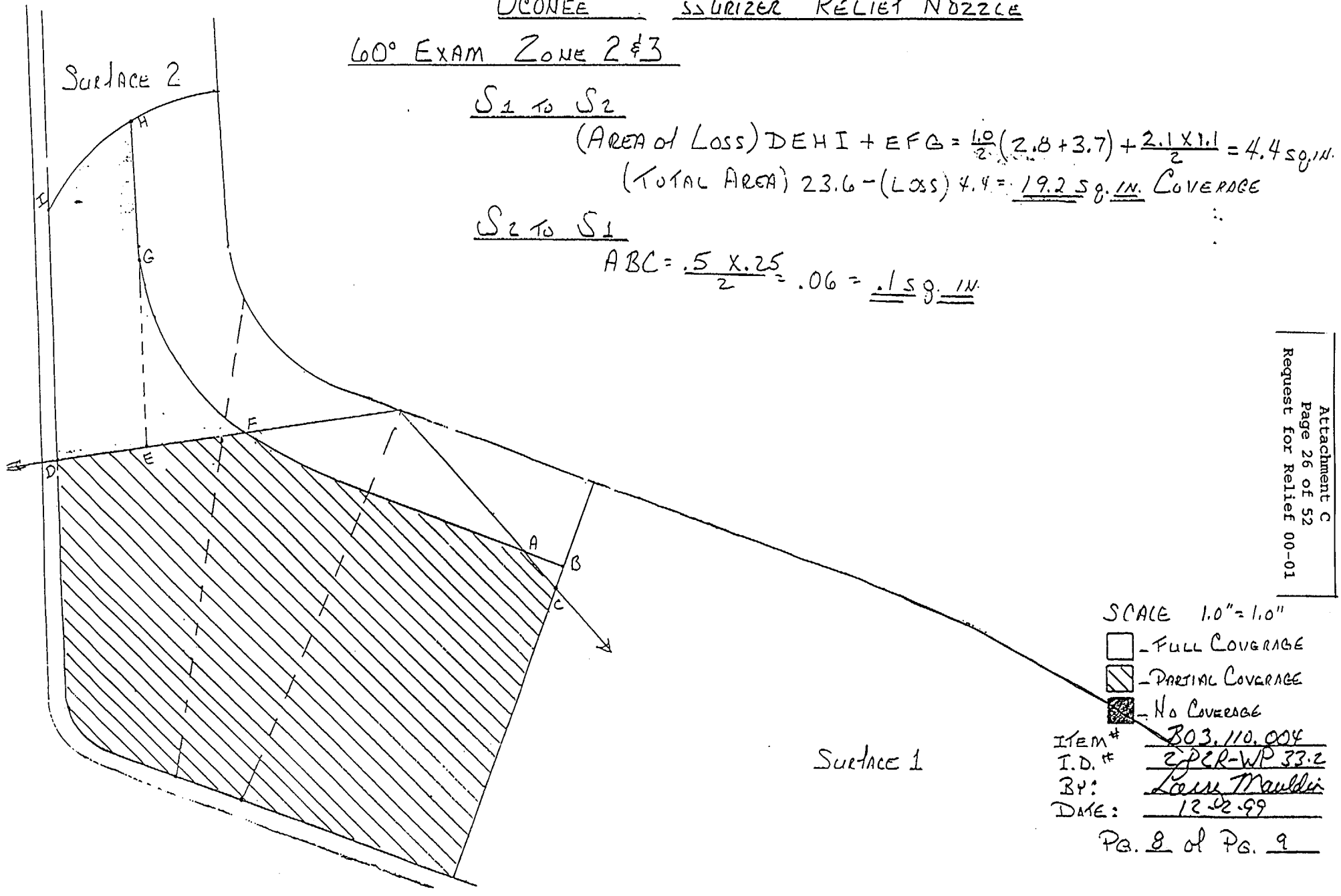
- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # 303.110.004
I.D. # 2PZR-WP-33.2
BY: Larry Maulden
DATE: 12-2-99

PG. 7 of PG. 9

OCONEE PRESSURIZER RELIEF NOZZLE

60° EXAM ZONE 2 & 3



S_1 TO S_2

(AREA of LOSS) DEHI + EFG = $\frac{1.0}{2}(2.8 + 3.7) + \frac{2.1 \times 1.1}{2} = 4.4$ sq. IN.

(TOTAL AREA) 23.6 − (LOSS) 4.4 = 19.2 sq. IN. COVERAGE

S_2 TO S_1

ABC = $\frac{.5 \times .25}{2} = .06 = .1$ sq. IN.

SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # B03.110.004
I.D. # 2PER-WP 33.2
BY: Larry Mauldin
DATE: 12-02-99

PG. 8 of PG. 9

Attachment C
Page 26 of 52
Request for Relief 00-01

OCONEE PRESSURIZER RELIEF NOZZLE

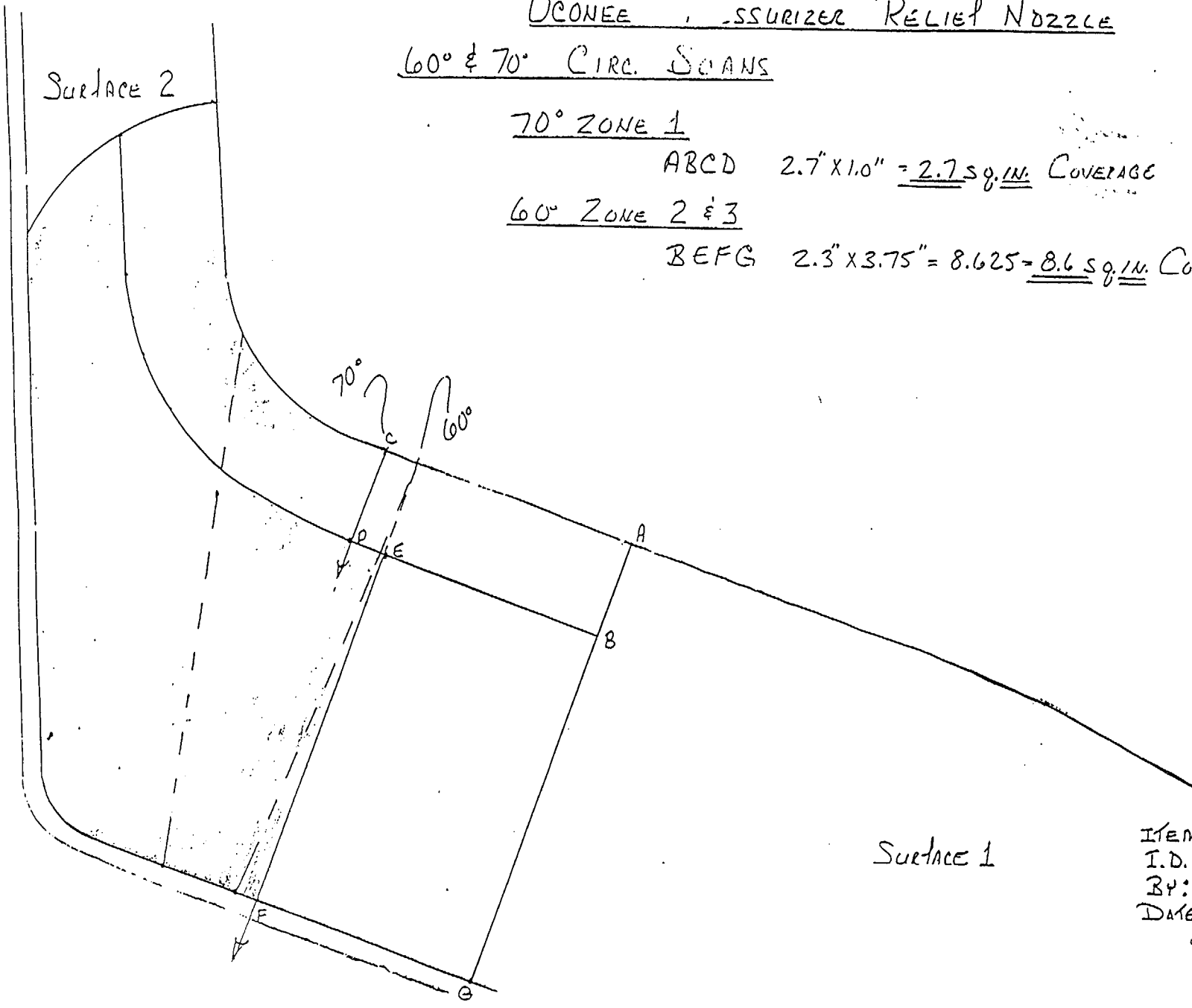
60° & 70° CIRC. SCANS

70° ZONE 1

ABCD 2.7" X 1.0" = 2.7 sq. IN. COVERAGE

60° ZONE 2 & 3

BEFG 2.3" X 3.75" = 8.625 = 8.6 sq. IN. COVERAGE



SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # B03.110.004
I.D. # 2PZR-WP33-2
BY: Larry Moulder
DATE: 12-2-99

Form NDE-620
Revision 0

DUKE POWER COMPANY

ULTRASONIC DATA SHEET FOR PLANAR REFLECTORS IN FERRITIC PRESSURE VESSELS

Station: OCONEE | Unit: 2 | Component/Weld ID: 2-PZR-WP33-1 | Date: 12/2/99

Weld Length (in.): 21.6" | Surface Condition: AS GROUND | L_0 9.2.3 | Exam Start: 1430 | Exam Finish: 1530

Procedure No: NDE-620
Revision: 8
FC N/A

Scans
70° 58 dB Zone I 60° 80 dB Zone II
60° 80 dB Zone III Axial
60° 80 dB Zone III Circ.

Configuration
NOZZLE TO U. HEAD
Scan Surface: OD

Surface Temp. 73 °F
Pyrometer s/n: MCNDE-27010
Cal. Due Date: 4/27/00

Calibration Sheet No:
9902106
9902107
9902108

Indication #	∠	MP_{max}	% FSH	L_{max}	W_{max}	SU LOCATION	BEAM DIRECTION	SCAN ⊥ ∥	REMARKS
NRI	60°								
NRI	70°								

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

Examiner: [signature] Level: II Date: 12/2/99 Examiner: Gary A Moss Level: II Date: 12-2-99 Item No: B03.110.005

Reviewed by: [signature] Level: II Date: 12/3/99 Authorized Inspector: MBC Date: 12-6-99

Attachment C
Page 28 of 52
Request for Relief 00-01

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2-PZR-WP33-1 | Item No: B03.110.005 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L N/A to L N/A
INCHES FROM WO C/L to Beyond
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☒ Other 70°
FROM 0 DEG to 360 DEG

Nozzle Configuration

☐ NO SCAN
☐ LIMITED SCAN

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

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

☐ NO SCAN
☐ LIMITED SCAN

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

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

☐ NO SCAN
☐ LIMITED SCAN

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

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

Prepared By: Jay Eaton | Level: II | Date: 12/2/99 | Sketch(s) attached ☒ yes ☐ no | Sheet 2 of 9

Reviewed By: David K. [illegible] | Date: 12/3/99 | Authorized Inspector: MBC | Date: 12-6-99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
	60				38.7		0.00
	70				35.5		0.00
					72.2		0.00

Aggregate % 74.2 / 2 = 37.1%

		Item No:	B03.110.005
Prepared By: Larry Mauldin	Level: III		Date: 12/2/99
Reviewed By:	Level: II		Date: 12/3/99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 2 & 3 23.6 sq.in.	23.6 sq.in. X 21.6 in.= 509.76 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	2	19.2	21.6	414.72	509.76	81.36
2	60	1	.1	21.6	2.16	509.76	0.42
3	60	CW	8.6	21.6	185.76	509.76	36.44
4	60	CCW	8.6	21.6	185.76	509.76	36.44
					788.4	2039.04	38.67

38.7%

Item No: B03.110.005

Prepared By: Larry Mauldin Larry Mauldin Level: III Date: 12/2/99

Reviewed By: Daniel E. [illegible] Level: II Date: 12/3/99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) Zone 1 7.4 sq.in.	7.4 sq.in. X 21.6 in.= 159.84 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	70	2	3.7	21.6	79.92	159.84	50.00
2	70	1	1.4	21.6	30.24	159.84	18.92
3	70	CW	2.7	21.6	58.32	159.84	36.49
4	70	CCW	2.7	21.6	58.32	159.84	36.49
					226.8	639.36	35.47

35.5%

Item No: B03.110.005

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *David C. Z.* Level: II Date: 12/3/99

OCONEE ...SSURIZER RELIEF NOZZLE

EXAM AREAS

ZONE 1

$ABKJ = 2.5'' \times 1.0'' = 2.5$ sq. in.

$JKLM = \pi 3\frac{1}{4}''^2 - \pi 2\frac{1}{4}''^2 \times 18.9\% = 3.26$ sq. in.

$LMOP = \frac{1.0''}{2}(1.5 + 1.75) = 1.63$ sq. in.

7.39 sq. in. $= \underline{\underline{7.4}}$ sq. in.

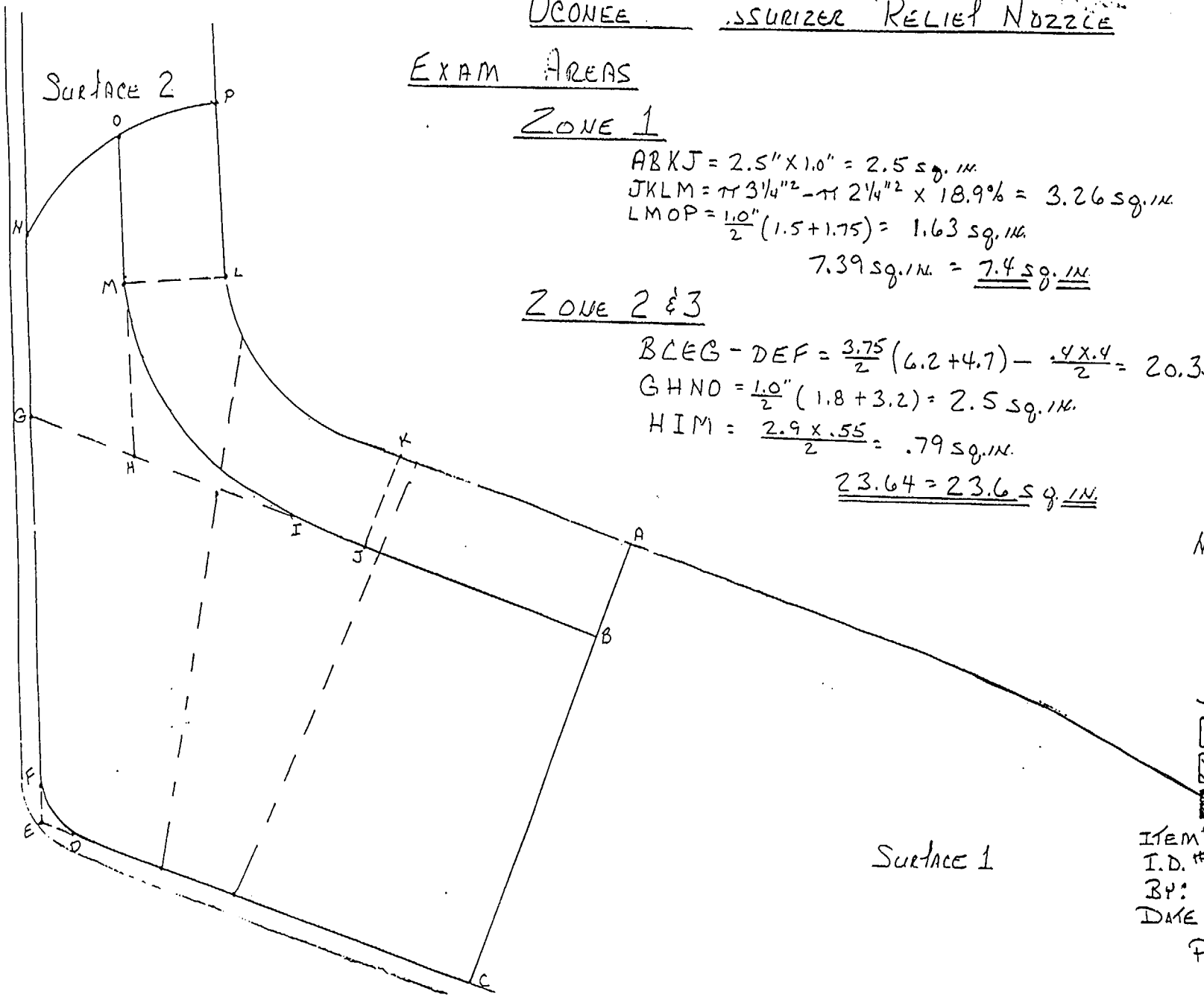
ZONE 2 & 3

$BCEG - DEF = \frac{3.75}{2}(6.2 + 4.7) - \frac{.4 \times .4}{2} = 20.35$ sq. in.

$GHNO = \frac{1.0''}{2}(1.8 + 3.2) = 2.5$ sq. in.

$HIM = \frac{2.9 \times .55}{2} = .79$ sq. in.

$\underline{\underline{23.64 = 23.6}}$ sq. in.



NOTE:
JKLM HAS A MULTIPIER of 18.9%. THE RADIUS of ZONE IS 68° OR 18.9% of 360°.

SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

ITEM # 305.110.005
I.D. # 2P2R-WP33-1
BY: Larry Maulden
DATE: 12-2-99

PG. 6 of PG. 9

Attachment C
Page 33 of 52
Request for Relief 00-01

Attachment C
Page 34 of 52
Request for Relief 00-01

OCONEE , ..SSURIZER RELIEF NOZZLE

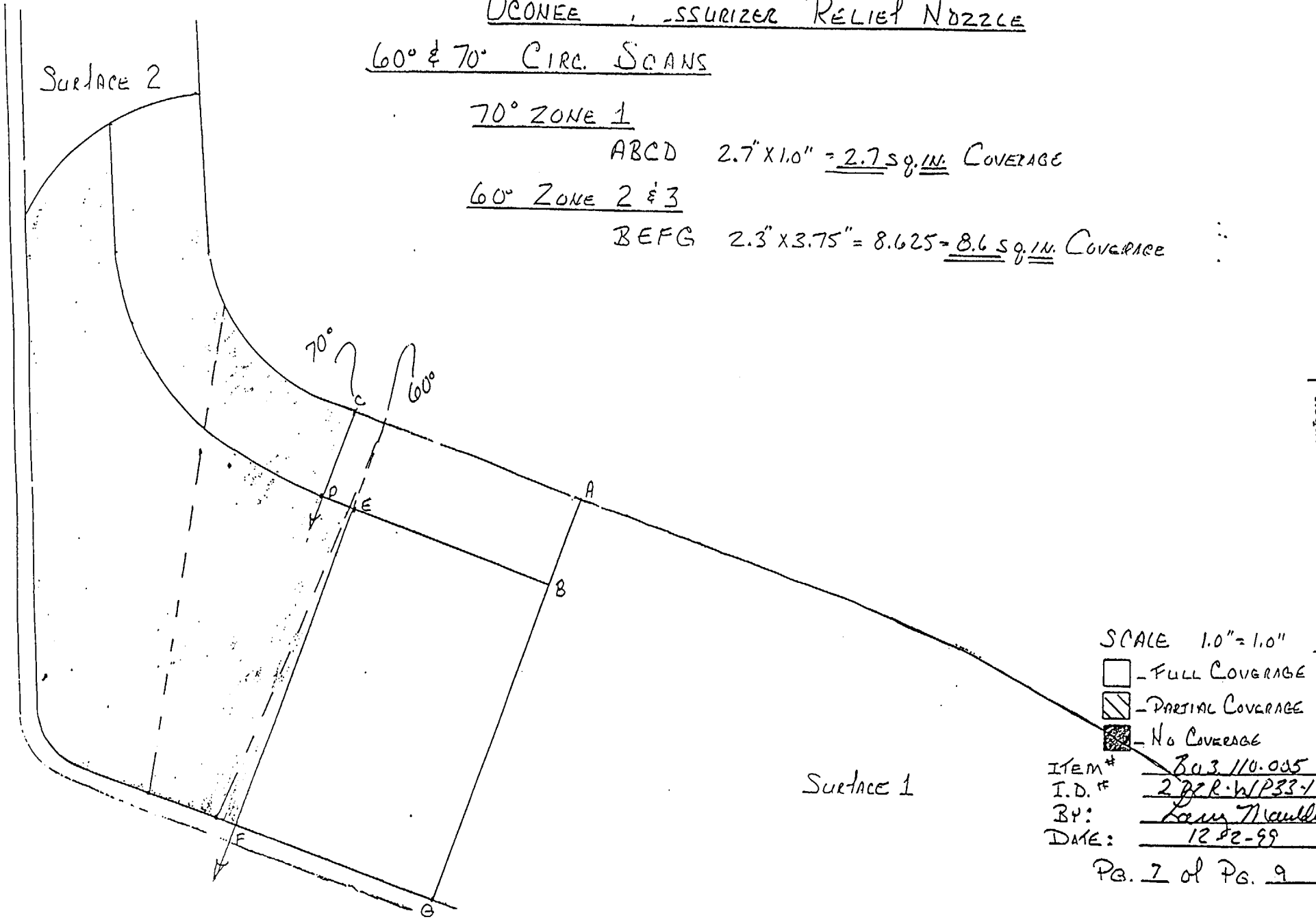
60° & 70° CIRC. SCANS

70° ZONE 1

ABCD 2.7" X 1.0" = 2.7 sq. IN. COVERAGE

60° ZONE 2 & 3

BEFG 2.3" X 3.75" = 8.625 = 8.6 sq. IN. COVERAGE



ITEM # 803.110.005
I.D. # 2 DZR-WP33-1
BY: Larry Mauldin
DATE: 12-2-99

PG. 7 of PG. 9

Attachment C
Page 35 of 52
Request for Relief 00-01

OCONEE ...SSURIZER RELIEF NOZZLE

60° EXAM ZONE 2 & 3

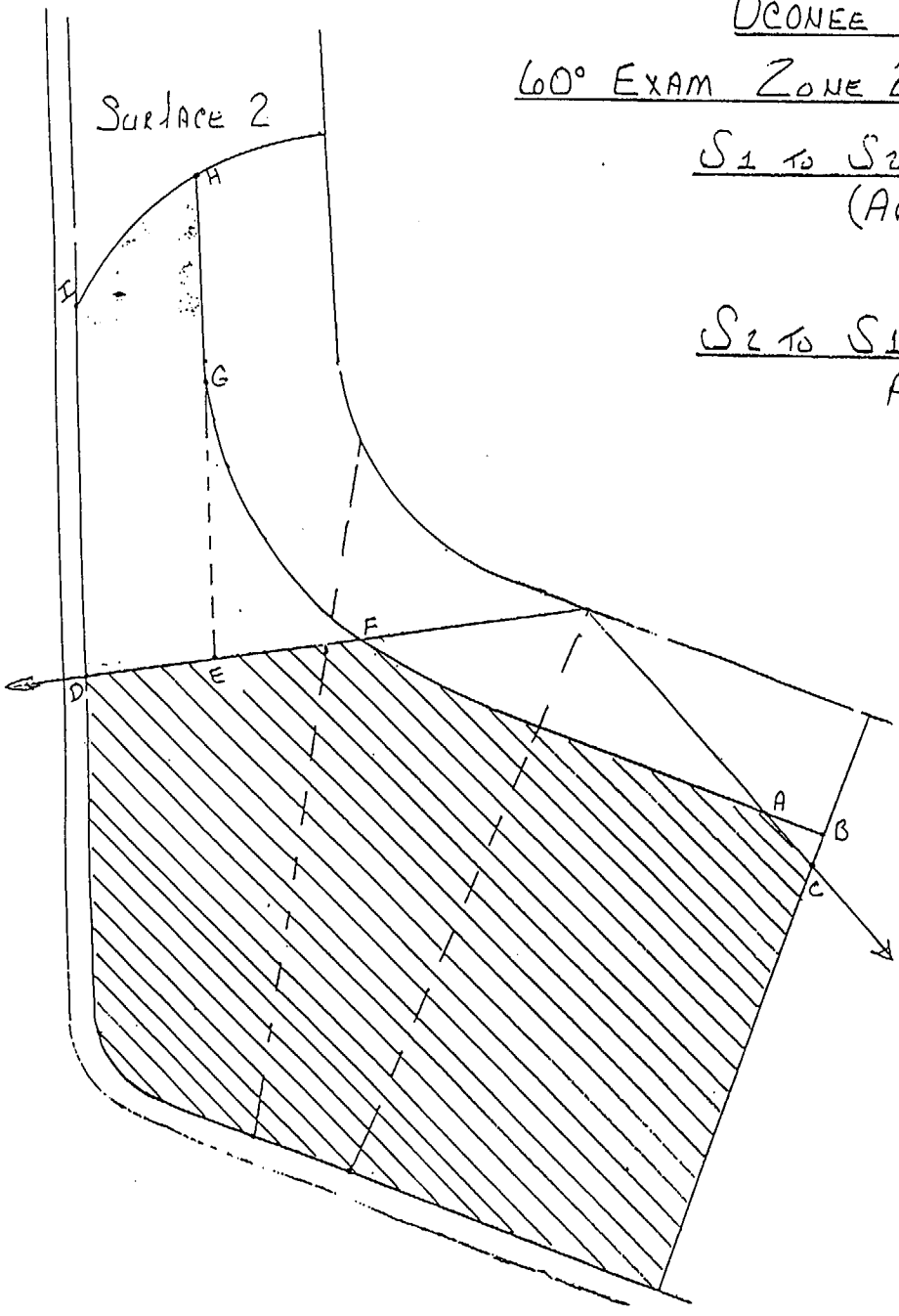
S1 TO S2

(AREA of LOSS) DEHI + EFG = $\frac{1.0}{2}(2.8+3.7) + \frac{2.1 \times 1.1}{2} = 4.4$ sq. in.

(TOTAL AREA) 23.6 − (LOSS) 4.4 = 19.2 sq. in. COVERAGE

S2 TO S1

ABC = $\frac{.5 \times .25}{2} = .06 = .1$ sq. in.



SCALE 1.0" = 1.0"

- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

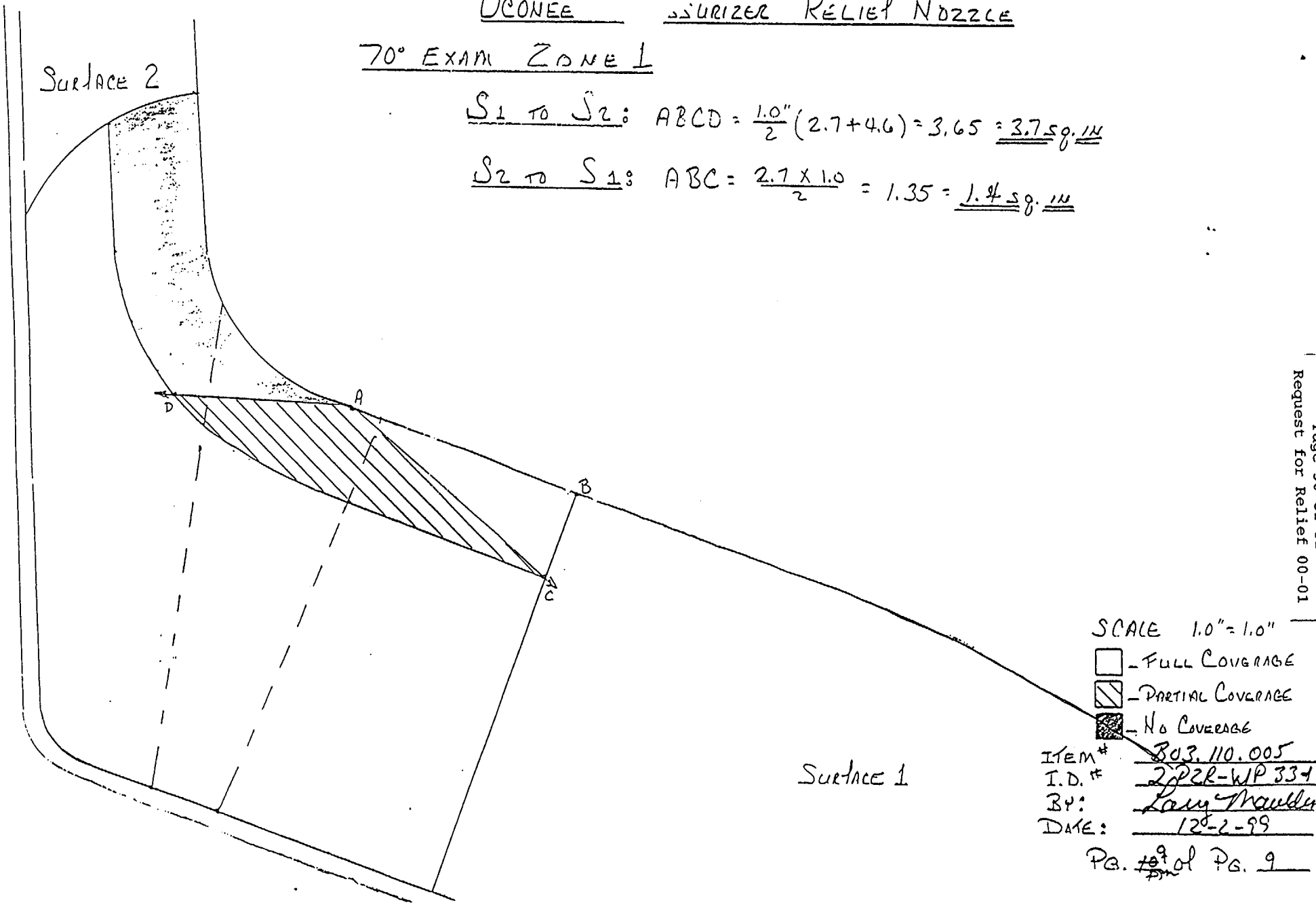
ITEM # B03.110.005
I.D. # 2P2R-WP33-1
BY: Laura Maulden
DATE: 12-02-99

OCONEE PRESSURIZER RELIEF NOZZLE

70° EXAM ZONE 1

S1 TO S2: ABCD = $\frac{1.0''}{2}(2.7+4.6) = 3.65$ = 3.7 sq. in

S2 TO S1: ABC = $\frac{2.7 \times 1.0}{2} = 1.35$ = 1.4 sq. in



DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0831	Form NDE-UT-2A	
Exam Finish: 0903	Revision 4	

Station: OCONEE	Unit: 2	Component/Weld ID: 2-SGB-WG25	Date: 12/2/99
Weld Length (in.): 152.8"	Surface Condition: AS GROUND	Lo: 9.2.3	Surface Temperature: 73 ° F

Examiner: David Zimmerman Level: II

Examiner: Jay A. Eaton Level: II

Procedure: NDE-970 Rev: 0
NDE-640 1

FC: NA *

Calibration Sheet No: 9902101, 9902102

Scans:

45 ☒ 51.5 dB 70 ☐ ____ dB

45T ☒ 51.5 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: 0°-22.5 dB dB

Pyrometer S/N: MCNDE 27206

Cal Due: 1/21/00

Configuration: Nozzle to Head

S2 Flow S1

NOZZLE to HEAD

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			
	0°	NRI													
	45°	NRI													

Remarks: * 95-18, 95-19

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

Sheet 1 of 13

Reviewed By:	Level:	Date:	Authorized Inspector:	Date:	Item No:
Gary Moore	II	12.03.99	YMBC	12-6-99	B03.130.006

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0830	Form NDE-UT-2A	
Exam Finish: 0843	Revision 4	

Station: OCONEE	Unit: 2	Component/Weld ID: 2-SGB-WG25	Date: 12/2/99
Weld Length (in.): 152.8"	Surface Condition: AS GROUND	Lo: 9.2.3	Surface Temperature: 73 ° F

Examiner: Larry Mauldin *Larry Mauldin* Level: III

Examiner: James L. Panel *James L. Panel* Level: II

Procedure: NDE-970 Rev: 0

FC: NA

Calibration Sheet No: 9902103

Scans:

45 ☐ _____ dB 70 ☐ _____ dB

45T ☐ _____ dB 70T ☐ _____ dB

60 ☒ 70 dB

60T ☒ 70 dB

Other: _____ dB

Pyrometer S/N: MCNDE 27206

Cal Due: 1/21/00

Configuration: Nozzle to Head

S2 Flow S1

NOZZLE to HEAD

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: NA

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													

Remarks:

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

Sheet 2 of 13

Reviewed By: *Gary Moss*	Level: II	Date: 12-3-99	Authorized Inspector: *MBC*	Date: 12-6-99

Item No: B03.130.006

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 2-SGB-WG25 | Item No: B03.130.006 | Remarks:

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

Remarks: DUE TO NOZZLE CONFIGURATION

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

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

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

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99 | Sketch(s) attached ☒ yes ☐ no | Sheet 3 of 13

Reviewed By: *Gary Moss* Date: 12-3-99 | Authorized Inspector: *MBC* Date: 12-6-99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) 73.7 sq. in.	73.7 sq.in. X 152.8n in.= 11261.36 = 11261.4 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°	NA	40.6	152.8	6203.7	11261.4	55.09
2	45°	1 &/or 2	48.9	152.8	7471.9	11261.4	66.35
3	60°	1 &/or 2	53	152.8	8098.4	11261.4	71.91
4	45°/60°	CW	39.2	152.8	5989.8	11261.4	53.19
5	45°/60°	CCW	39.2	152.8	5989.8	11261.4	53.19
					33753.6	56307	59.95

59.95 = 60 %

Item No: B03.130.006

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *Gary Moss* Level: II Date: 12-3-99

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Exam Area Drwg.) 18 sq.in.	18 sq.in. X 152.8 in. = 2750.4 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°	NA	15.7	152.8	2399	2750.4	87.22
2	45°	2	16.1	152.8	2460.1	2750.4	89.45
3	45°°	1	3.4	152.8	519.5	2750.4	18.89
4	60°	2	16.9	152.8	2582.3	2750.4	93.89
5	60°	1	1.0	152.8	15.3	2750.4	0.56
6	45°	CW	8.4	152.8	1283.5	2750.4	46.67
7	45°	CCW	8.4	152.8	1283.5	2750.4	46.67
8	60°	CW	8.4	152.8	1283.5	2750.4	46.67
9	60°	CCW	8.4	152.8	1283.5	2750.4	46.67
					13247.7	24753.6	53.52
							53.5%

Item No: B03.130.006

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *Gary Moss* Level: II Date: 12-3-99

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
	Base				33753.6	56307	59.95
	Weld				13247.7	24753.6	53.52
					47001.3	81060.6	57.98

Aggregate 58%

Item No: B03.130.006

Prepared By: Larry Mauldin *Larry Mauldin* Level: III Date: 12/2/99

Reviewed By: *Gary A Moss* Level: II Date: 12-3-99

OCONEE NOZZLE TO UPPER H. (GENERATOR)

CAM. AREAS:

BASE MATERIAL:

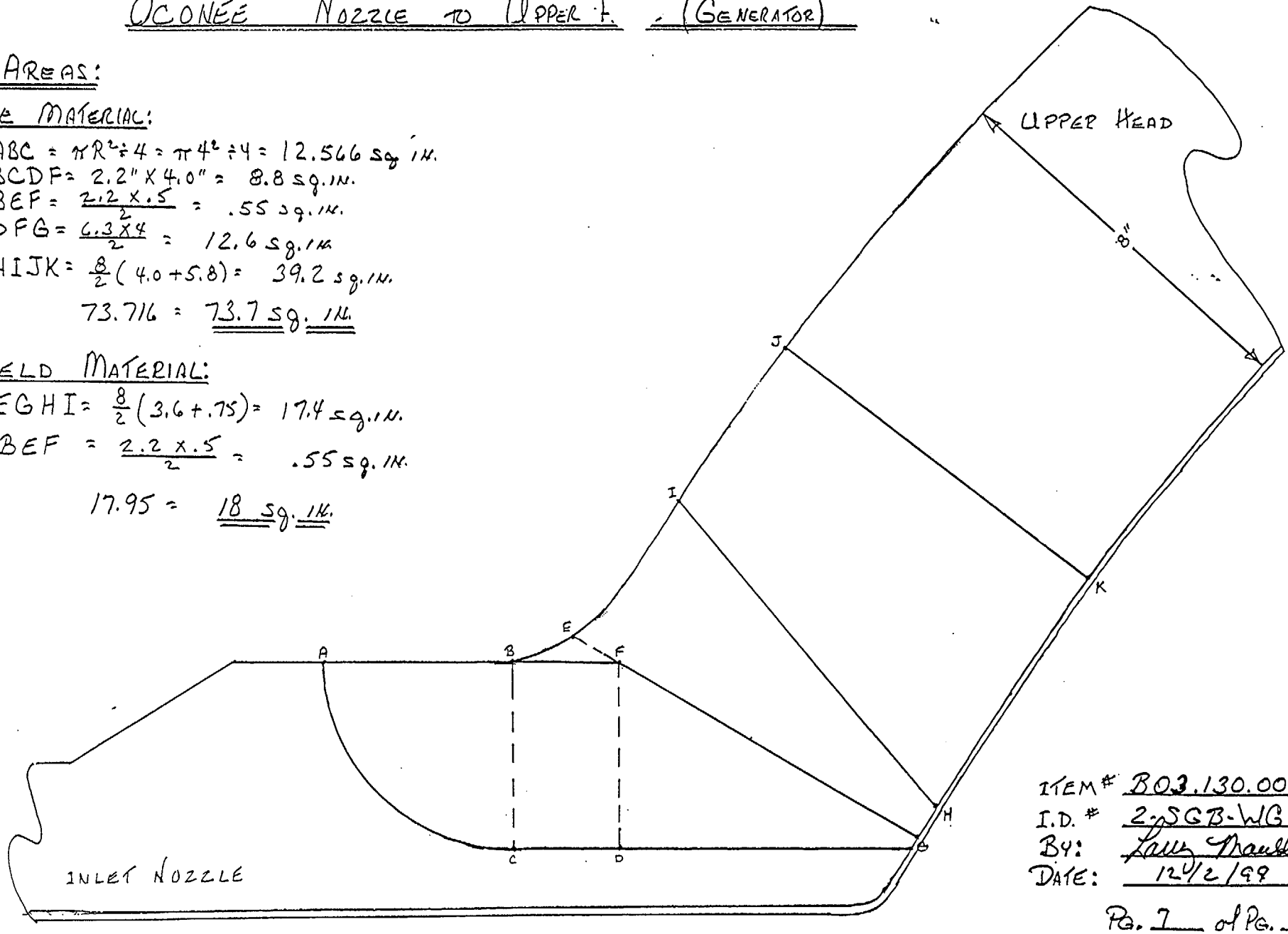
ABC = $\pi R^2 \div 4 = \pi 4^2 \div 4 = 12.566$ sq. in.
BCDF = 2.2" X 4.0" = 8.8 sq. in.
BEF = $\frac{2.2 \times .5}{2}$ = .55 sq. in.
DFG = $\frac{6.3 \times 4}{2}$ = 12.6 sq. in.
HIJK = $\frac{8}{2}(4.0 + 5.8)$ = 39.2 sq. in.

73.716 = **73.7 sq. in.**

WELD MATERIAL:

EGHI = $\frac{8}{2}(3.6 + .75)$ = 17.4 sq. in.
BEF = $\frac{2.2 \times .5}{2}$ = .55 sq. in.

17.95 = **18 sq. in.**



ITEM # B03.130.006
I.D. # 2-SGB-WG25
BY: Larry Mauldin
DATE: 12/2/99

PG. 7 of PG. 13

OCONEE NOZZLE TO UPPER [illegible] (GENERATOR)

0° SCAN COVERAGE

BASE MATERIAL:

$ABCE = \frac{8}{2}(4.0+5.8)$ 39.2 sq. in.

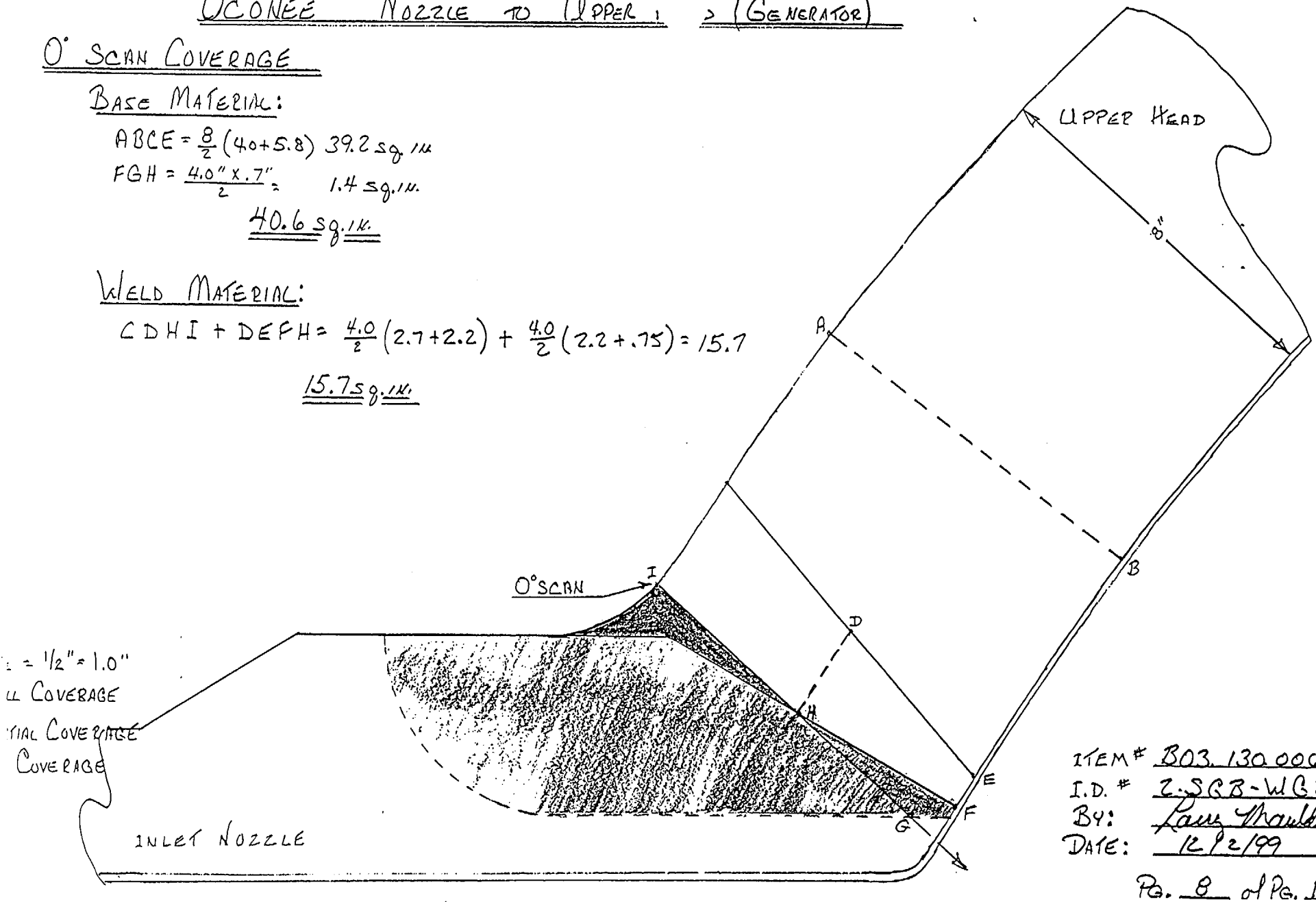
$FGH = \frac{4.0'' \times .7''}{2} =$ 1.4 sq. in.

40.6 sq. in.

WELD MATERIAL:

$CDHI + DEFH = \frac{4.0}{2}(2.7+2.2) + \frac{4.0}{2}(2.2+.75) = 15.7$

15.7 sq. in.



ITEM # B03.130.006
I.D. # 2-SGB-WG25
BY: Larry Thoulder
DATE: 12/2/99

Pg. 8 of Pg. 13

Attachment C
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Request for Relief 00-01

OCONEE NOZZLE TO UPPER (GENERATOR)

45° SCANS (AXIAL)

BASE MATERIAL

S1 TO S2

$ACDF = \frac{8}{2}(4.0+5.8) = 39.2$ sq. in.

$GHI = \frac{6.7 \times 2.9}{2} = 9.715$ sq. in.

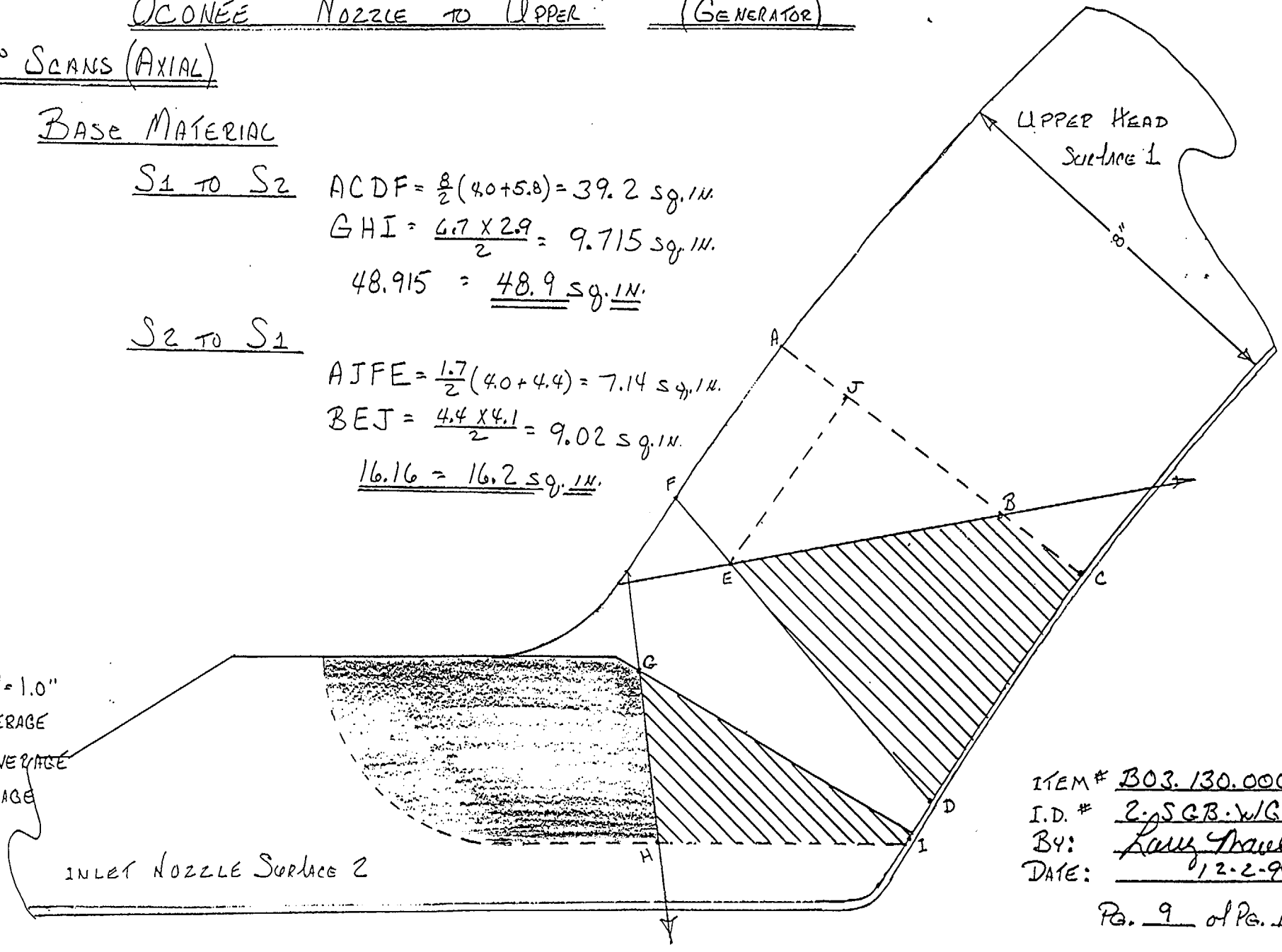
$48.915 = \underline{48.9}$ sq. in.

S2 TO S1

$AJFE = \frac{1.7}{2}(4.0+4.4) = 7.14$ sq. in.

$BEJ = \frac{4.4 \times 4.1}{2} = 9.02$ sq. in.

$\underline{16.16 = 16.2}$ sq. in.



ITEM # B03.130.006
I.D. # 2-SGB-WG25
BY: Larry Mauble
DATE: 12-2-99

Pg. 9 of Pg. 13

Attachment C
Page 45 of 52
Request for Relief 00-01

OCONEE NOZZLE TO UPPER - (GENERATOR)

45° SCANS (AXIAL)

WELD MATERIAL:

S1 TO S2:

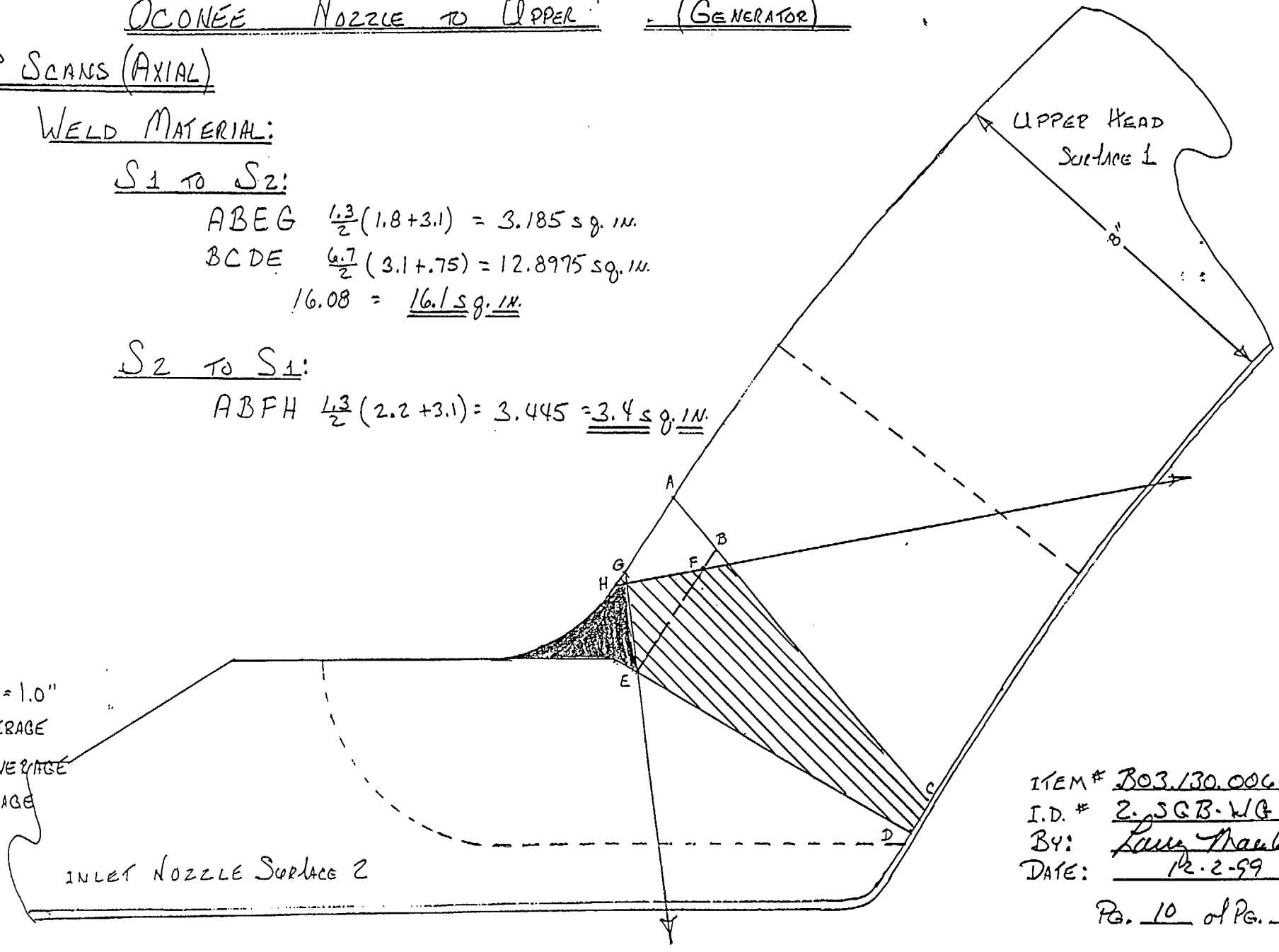
ABEG $\frac{1.3}{2}(1.8+3.1) = 3.185$ sq. in.

BCDE $\frac{6.7}{2}(3.1+.75) = 12.8975$ sq. in.

16.08 = **16.1 sq. in.**

S2 TO S1:

ABFH $\frac{1.3}{2}(2.2+3.1) = 3.445 = 3.4$ sq. in.



= 1/2" = 1.0"
ILL COVERAGE
RTIAL COVERAGE
, COVERAGE

ITEM # B03.130.006
I.D. # 2-SGB-WG25
BY: Larry Mauldin
DATE: 12-2-99

PG. 10 of PG. 13

Attachment C
Page 46 of 52
Request for Relief 00-01

OCONEE NOZZLE TO UPPER (GENERATOR)

60° SCANS (AXIAL)

BASE MATERIAL:

S1 TO S2:

$ADEG = \frac{8}{2}(4.0 + 5.8) = 39.2$ sq. in.

$HIJ = \frac{7.1 \times 3.9}{2} = 13.845$ sq. in.

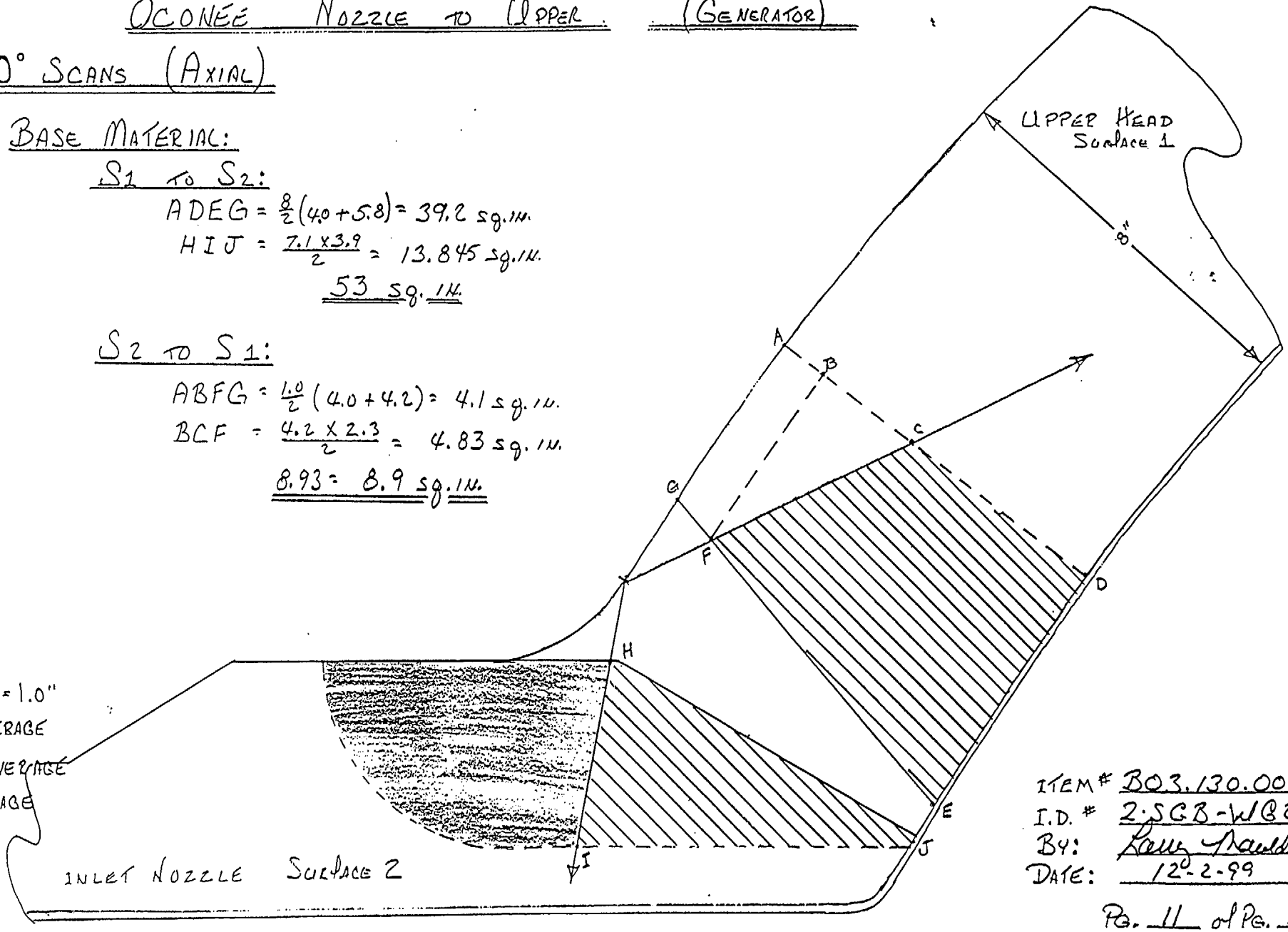
53 sq. in.

S2 TO S1:

$ABFG = \frac{1.0}{2}(4.0 + 4.2) = 4.1$ sq. in.

$BCF = \frac{4.2 \times 2.3}{2} = 4.83$ sq. in.

8.93 = 8.9 sq. in.



= 1/2" = 1.0"
ILL COVERAGE
RTIAL COVERAGE
COVERAGE

ITEM # B03.130.006
I.D. # 2-SGB-WB25
BY: Larry Hawkins
DATE: 12-2-99

PG. 11 of PG. 13

Attachment C
Page 48 of 52
Request for Relief 00-01

OCONEE NOZZLE TO UPPER (GENERATOR)

60° SCANS (AXIAL)

WELD MATERIAL:

S1 TO S2:

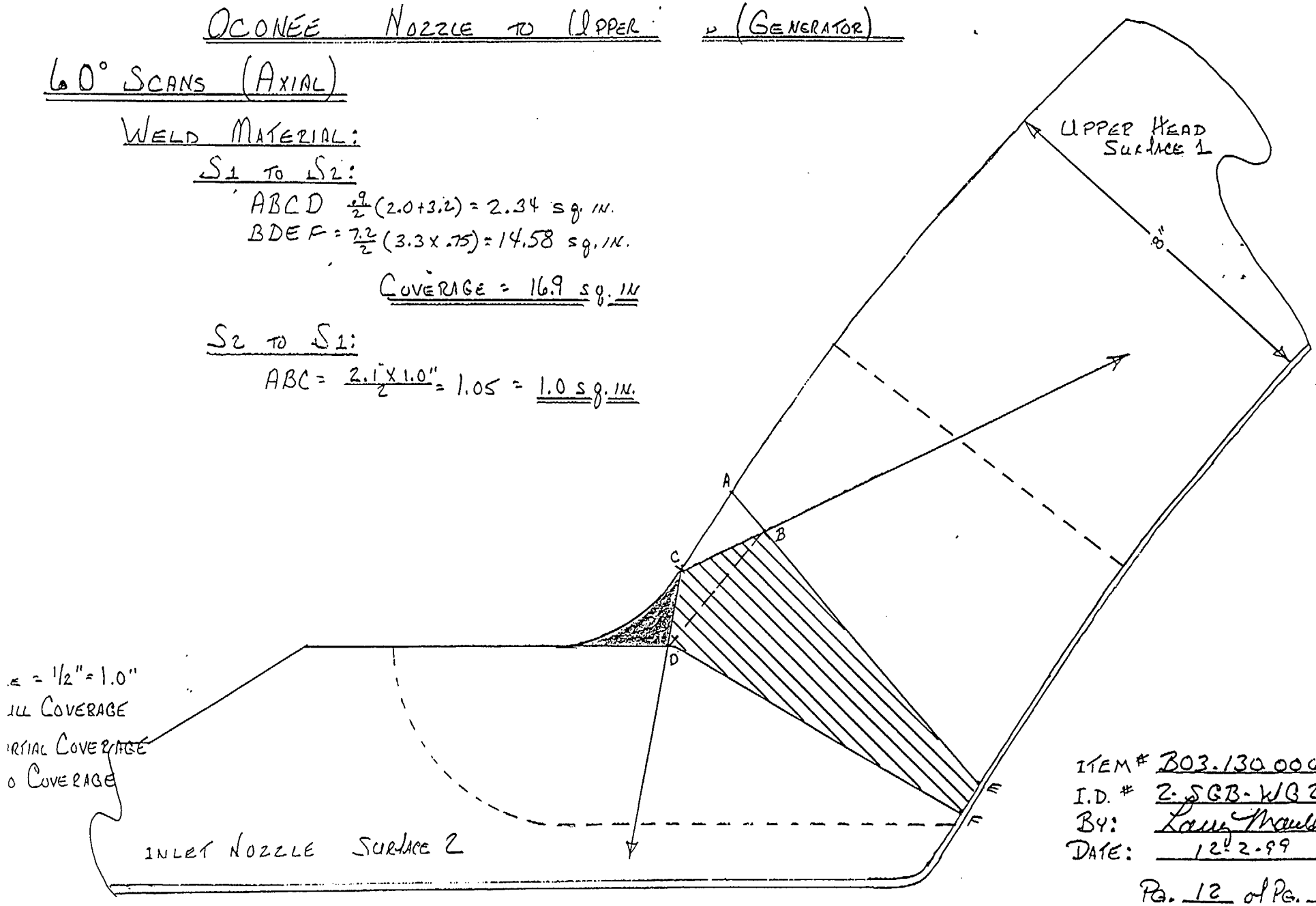
ABCD $\frac{.9}{2}(2.0+3.2) = 2.34$ sq. in.

BDEF $= \frac{7.2}{2}(3.3 \times .75) = 14.58$ sq. in.

COVERAGE = 16.9 sq. in

S2 TO S1:

ABC $= \frac{2.1 \times 1.0''}{2} = 1.05 = 1.0$ sq. in.



ITEM # B03.130.006
I.D. # 2-SGB-WG25
BY: Larry Maulles
DATE: 12-2-99

Pg. 12 of Pg. 13

OCONEE NOZZLE TO UPPER - (GENERATOR)

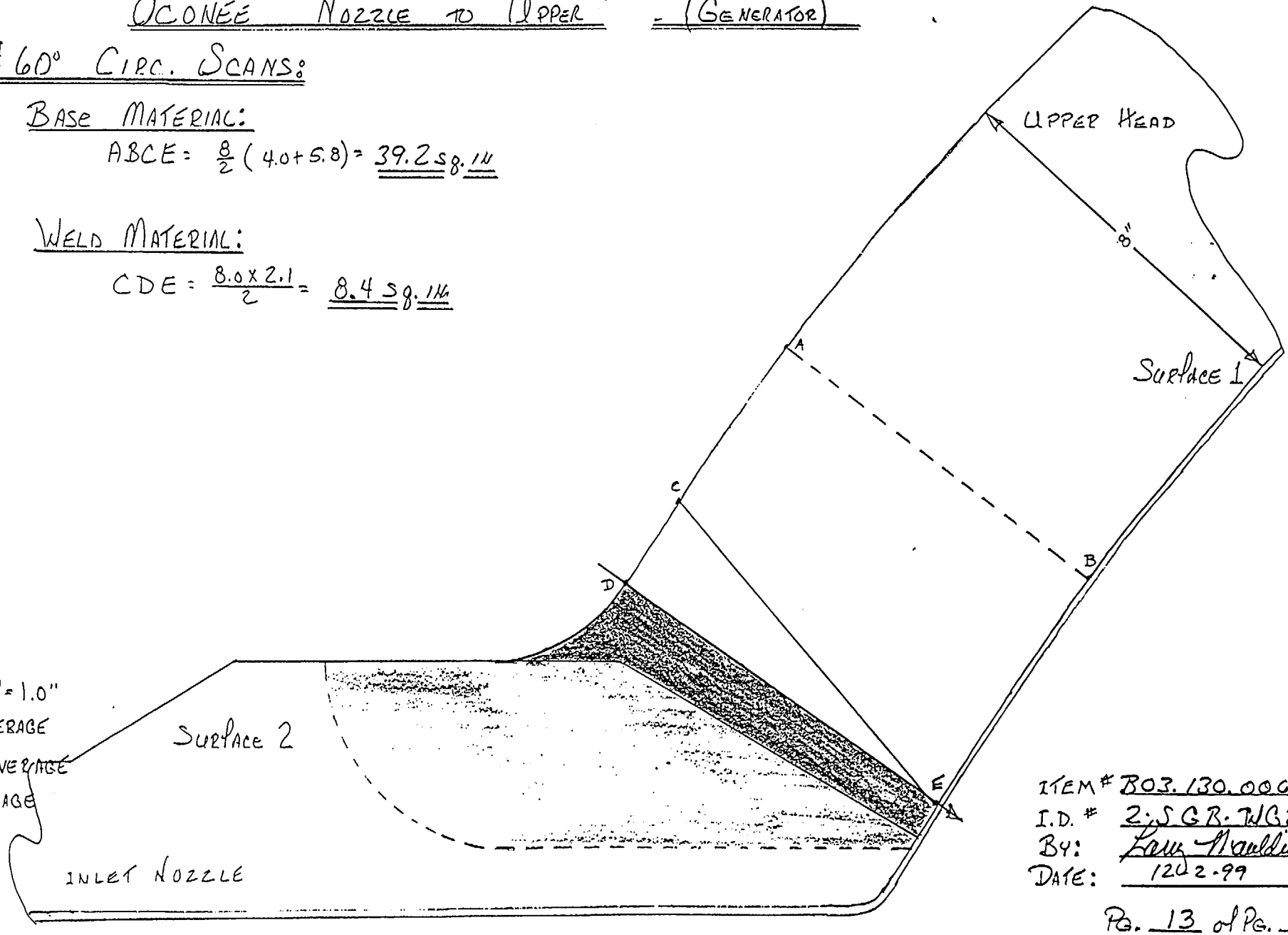
45° & 60° CIRC. SCANS:

BASE MATERIAL:

ABCE = $\frac{8}{2}(4.0 + 5.8) = 39.2$ sq. in

WELD MATERIAL:

CDE = $\frac{8.0 \times 2.1}{2} = 8.4$ sq. in



= 1/2" = 1.0"
ILL COVERAGE
RIAL COVERAGE
COVERAGE

ITEM # B03.130.006
I.D. # 2-SGB-WG25
BY: Larry Mauldin
DATE: 12-2-99

PG. 13 of PG. 13

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0830	Form NDE-UT-2A	
Exam Finish: 0901	Revision 4	

Station: OCONEE	Unit: 2	Component/Weld ID: 2-SGB-WG25	Date: 12/2/99
Weld Length (in.): NA	Surface Condition: AS GROUND	Lo: 9.2.3	Surface Temperature: 73 ° F

Examiner: Larry Mauldin Level: III

Examiner: James L. Panel Level: II

Procedure: NDE-680 Rev: 2

FC: N/A

Calibration Sheet No: 9902104, 9902105

Scans:

45 ☐ ____ dB 70 ☒ 79 dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☒ 70 dB

60T ☐ ____ dB

Other: ____ dB

Pyrometer S/N: MCNDE 27206

Cal Due: 1/21/00

Configuration: NOZZLE TO UPPER HEAD

NA Flow NA

NA to NA

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: 23°& 20.5°

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 1 of 3

Reviewed By: Gary Moss	Level: II	Date: 12-3-99	Authorized Inspector: MBC	Date: 12-6-99

Item No: B03.140.006

DUKE POWER COMPANY
Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
(See Attachment) 4.7sq.in.	4.7sq.in. X 152.8 in. = 718.16 cu.in.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60°/70°	CW	3.3	152.8	504.24	718.2	70.21
2	60°/70°	CCW	3.3	152.8	504.24	718.2	70.21
					1008.48	1436.4	70.21

70.21%

		Item No:	B03.140.006
Prepared By: Larry Mauldin Larry Mauldin	Level: III		Date: 12/2/99
Reviewed By: Gary Moss	Level: II		Date: 12-3-99

INLET NOZZLE T[illegible] PER HEAD

INNER RADIUS INSPECTION AREA

I.D# 2-SGB-WG25
ITEM# B03.140.006
BY: Larry Mauldin
DATE: 12-2-99

A·B·CD + CDGH ABCD $(\pi \times 1.0^2) - (\pi \times .5^2) \times .18 = .424$ sq.in
(65° = 18% of A CIRCLE)

CDGH $\frac{.5}{2}(8.4+8.6) = 4.25$ sq.in.

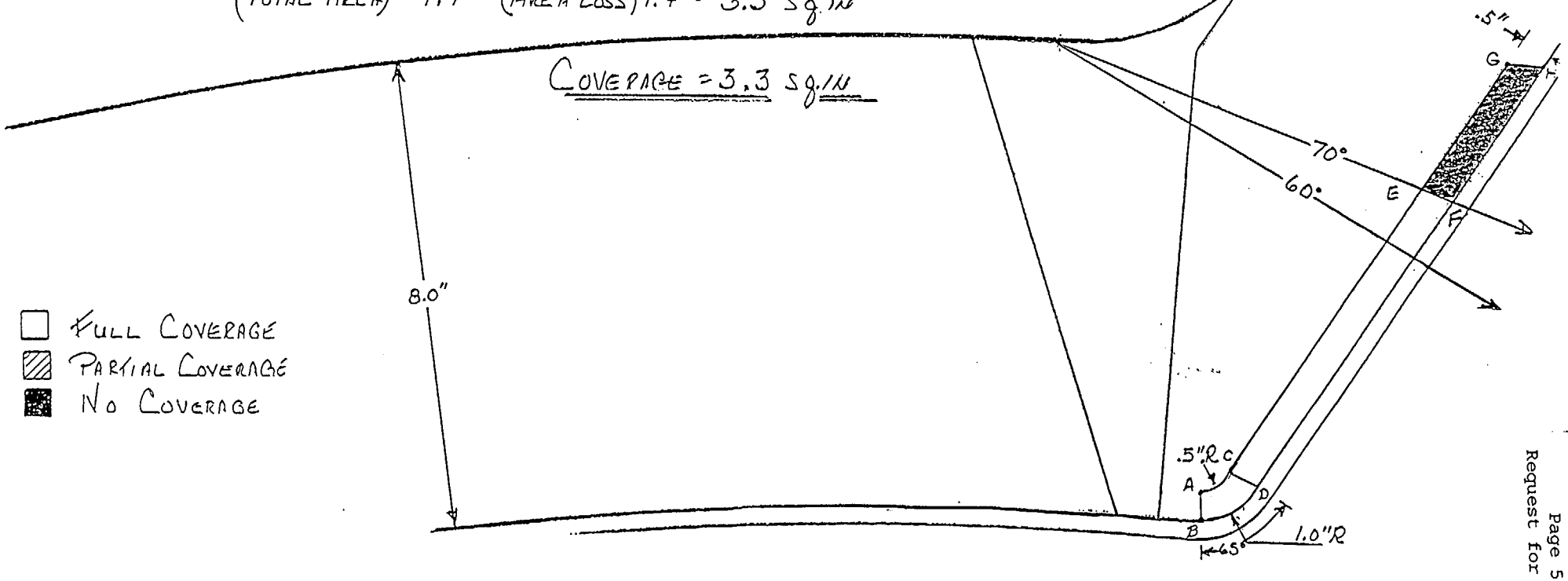
TOTAL AREA = 4.674 = 4.7 sq.in.

INSPECTED AREA

(AREA of LOSS) EFGH $\frac{.5}{2}(2.6+2.8) = 1.35 = 1.4$ sq.in.

(TOTAL AREA) 4.7 − (AREA LOSS) 1.4 = 3.3 sq.in

COVERAGE = 3.3 sq.in



- FULL COVERAGE
- PARTIAL COVERAGE
- NO COVERAGE

Attachment C
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Request for Relief 00-01