Duke Energy

H. B. Barron
Vice President

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May 4, 2000

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

Subject: Duke Energy Corporation

McGuire Nuclear Station Units 1&2
Docket Nos. 50-369 and 50-370

Catawba Nuclear Station Units 1&2
Docket Nos. 50-413 and 50-414

Duke Energy Corporation Relief Request 99-GO-03

Pursuant to 10CFR50.55a(g)(5)(iii), Duke Energy Corporation requests relief from certain ASME Section XI requirements as described in the attached Relief Request 99-GO-03. This request covers preservice limited examinations performed during the steam generator replacement outages at McGuire and Catawba Nuclear Stations.

This transmittal supercedes a previous submittal, addressing the same subject matter, from Duke Energy Corporation to the NRC, dated November 17, 1999. Additional information is included in the attached relief request to address concerns raised by the NRC staff during a telephone conference call on February 9, 2000.

Questions on this matter should be directed to Norman T. Simms, McGuire Licensing and Compliance, at (704) 875-4685.

Sincerely,

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

Duke Energy Corporation
Stations
McGuire Units 1 and 2
Catawba Unit 1

SECOND 10-YEAR INTERVAL REQUEST FOR RELIEF NO. 99-GO-03

Pursuant to 10CFR50.55a(g)(5)(iii), Duke Energy Corporation has determined that compliance with the specified examination requirements of ASME Section XI was impractical for McGuire Nuclear Station Units 1, 2 and Catawba Unit 1. Information is therefore being submitted in support of this determination and request is being sought for relief from the applicable ASME Section XI Preservice Examination requirement(s).

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

ASME Section XI Class 1 Components listed below:

Examination Category B-D, Full Penetration Welds of Nozzles in Vessels

Item B3.140 - Steam Generator (Nozzle Inside Radius Section)

McGuire Unit 1 ID Numbers	Catawba Unit 1 ID Numbers	McGuire Unit 2 ID Numbers
1SGA-INLET	1SGA-INLET	2SGA-INLET
1SGA-OUTLET	1SGA-OUTLET	2SGA-OUTLET
1SGB-INLET	1SGB-INLET	2SGB-INLET
1SGB-OUTLET	1SGB-OUTLET	2SGB-OUTLET
1SGC-INLET	1SGC-INLET	2SGC-INLET
1SGC-OUTLET	1SGC-OUTLET	2SGC-OUTLET
1SGD-INLET	1SGD-INLET	2SGD-INLET
1SGD-OUTLET	1SGD-OUTLET	2SGD-OUTLET

Examination Category B-F, Pressure Retaining Dissimilar Metal Welds

Item B5.70 - Steam Generator (Nozzle-to-Safe End Butt Welds)

McGuire Unit 1 ID Numbers	Catawba Unit 1 ID Numbers	McGuire Unit 2 ID Numbers
1SGA-INLET-SE	1SGA-INLET-SE	2SGA-INLET-SE
1SGA-OUTLET-SE	1SGA-OUTLET-SE	2SGA-OUTLET-SE
1SGB-INLET-SE	1SGB-INLET-SE	2SGB-INLET-SE
1SGB-OUTLET-SE	1SGB-OUTLET-SE	2SGB-OUTLET-SE
1SGC-INLET-SE	1SGC-INLET-SE	2SGC-INLET-SE
1SGC-OUTLET-SE	1SGC-OUTLET-SE	2SGC-OUTLET-SE
1SGD-INLET-SE	1SGD-INLET-SE	2SGD-INLET-SE
1SGD-OUTLET-SE	1SGD-OUTLET-SE	2SGD-OUTLET-SE

ASME Section XI Class 2 Components listed below:

Examination Category C-B, Pressure Retaining Nozzle Welds in Vessels

Item C2.22 - Feedwater (Nozzle Inside Radius Section)

Catawba Unit 1 ID Numbers
1SGA-W258
1SGB-W258
1SGC-W258
1SGD-W258

Note: See Section IV for explanation of why the same McGuire Units 1 & 2, nozzles are not included as part of this Request.

Examination Category C-F-1, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping

Item C5.11 - Auxiliary Feedwater (Piping Circumferential Welds)

McGuire Unit 1 ID Numbers	Catawba Unit 1 ID Numbers	McGuire Unit 2 ID Numbers
1SGA-W261	1SGA-W261	2SGA-W261
1SGB-W261	1SGB-W261	2SGB-W261
1SGC-W261	1SGC-W261	2SGC-W261
1SGD-W261	1SGD-W261	2SGD-W261

II. Code Requirement:

ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition Paragraphs IWB-2200 and IWC-2200.

ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition Table IWB-2500-1 & Table IWC-2500-1, lists the following requirements for each Examination Category as shown below:

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

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

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

"Examination Category C-F-1, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping"; Figure Number IWC-2500-7(a) requires "100% of each weld requiring examination."

III. Code Requirement from which Relief is requested:

Relief is requested from the preservice requirement of examining essentially 100% of the required examination volume for the Inside Radius Sections listed in Section I above for Examination Category B-D. This is due to our inability to obtain complete coverage of the required examination volume as shown in ASME Section XI, Figure IWB-2500-7(d).

Relief is requested from the preservice requirement of examining essentially 100% of the weld length for the welds listed in Section I above for Examination Categories B-F, and C-F-1. This is due to our inability to obtain complete coverage of the required examination volume in two-beam path directions as stated in ASME Section XI, Appendix III, paragraph III-4420, 1989 Edition.

Relief is requested from the preservice requirement of examining essentially 100% of the required examination volume for the Inside Radius Sections listed in Section I above for Examination Category C-B. This is due to our inability to obtain complete coverage of the required examination volume as shown in ASME Section XI, Figure IWC-2500-4(a).

IV. Basis for Relief

Examination Category B-D, Full Penetration Welds of Nozzles in Vessels

Item B3.140 - McGuire Units 1 & 2 / Catawba Unit 1

During the ultrasonic examination of the Steam Generator Primary Inlet and Outlet Nozzle Inside Radius Sections, essentially 100% coverage of the required examination volume could not be obtained. **See Note A**

Note A

The examination coverage on each nozzle was limited during preservice examination to 83.3% of the required examination volume. Limitations were caused by the nozzle OD blend radius which prevents scanning 100% of the examination volume.

Ultrasonic examinations of nozzle inside radius sections were conducted in accordance with ASME Section V, Article 4.

See Attachment 1 for an example of the data sheets, drawings, and calculation sheets for the inlet and outlet nozzles.

Examination Category B-F, Pressure Retaining Dissimilar Metal Welds

Item B5.70 - McGuire Units 1 & 2 / Catawba Unit 1

During the ultrasonic examination of the Steam Generator Primary Inlet and Outlet Nozzle to Safe End Butt Welds, essentially 100% coverage of the required examination volume could not be obtained. **See Note B**

Examination Category C-F-1, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping

Item C5.11 - McGuire Units 1 & 2 / Catawba Unit 1

During the ultrasonic examination of the Steam Generator Auxiliary Feedwater Circumferential Welds, essentially 100% coverage of the required examination volume could not be obtained. **See Note B**

Note B

The subject welds were accessible for preservice examination only from the safe end side resulting in 75% coverage of the required volume for Items B5.70 and 50% coverage of the required volume for Items C5.11. 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 at any angle other than at 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.

$$\text{Sin-1} = (\sin 45° \times Vs) \div VL$$

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

Where: sin-1 is the shear wave angle

Vs is the shear wave velocity of the stainless steel safe end material in inches / usec.

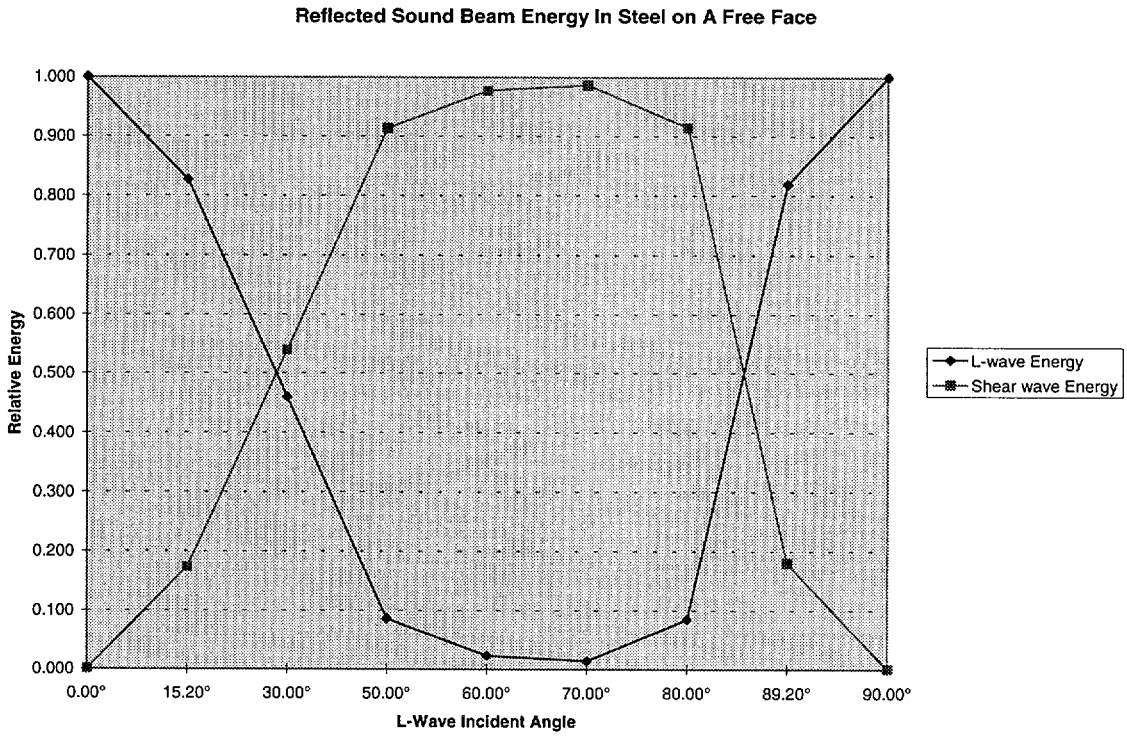
VL is the longitudinal wave velocity of the stainless steel safe end material in inches / usec.

As shown in the graph[1], the mode conversion process creates two sound beams of differing intensities reflecting off of the inside surface. 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, the nozzles would have to be re-designed to allow scanning from both sides of the weld.

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

See Attachment 2 for an example of the data sheets, drawings, and calculation sheets for the inlet and outlet nozzles.



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

Item C2.22 - Catawba Unit 1

During the preservice ultrasonic examination of the Steam Generator Feedwater Nozzle Inside Radius Sections, essentially 100% coverage of the required examination volume could not be obtained.

The examination coverage for each nozzle was limited to 8.4% of the required volume. The nozzle taper adjacent to the vessel wall prevented scanning from the vessel wall. Duke Energy Corporation investigated the use of computer modeling and mock-ups to increase the coverage. The nozzles inside radius sections were examined during an inservice inspection in subsequent outages (EOC-10 and EOC-11). One hundred percent coverage was achieved and no indications were found. **See Note C**

See Attachment 3 for an example of the data sheets, drawings, and calculations for the Feedwater Nozzle Inside Radius Section.

Note C
Computer modeling was applied to the preservice examination of the feedwater nozzles for the McGuire Units 1 & 2 steam generator replacement with 100% coverage.

V. Alternate Examinations or Testing

The use of radiography as an alternate volumetric examination for all of the above listed components is not practical due to component thickness and geometry which prohibit access for placement of source, film and image quality indicator. Duke Energy Corporation will perform ultrasonic examination of the subject items covering the required examination volume to the maximum extent practical as follows:

Category B-D Steam Generator Nozzle Inside Radius Sections in accordance with ASME Section V, Article 4, 1989 Edition.

Category B-F Steam Generator Nozzle-to-Safe End Butt Welds and Category C-F-1 Auxiliary Feedwater Nozzle-to-Safe End Butt Welds in accordance with ASME Section XI, Appendix III, 1989 Edition

Category C-B Steam Generator Feedwater Nozzle Inner Radius Sections in accordance with ASME Section XI, IWA-2240, 1989 Edition.

VI. Justification for the Granting of Relief

Examination Category B-D, Full Penetration Welds of Nozzles in Vessels

Item B3.140 - McGuire Units 1 & 2 / Catawba Unit 1

The examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWB-2500-7(d) could not be met, however the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. **See Note 1**

Examination Category B-F, Pressure Retaining Dissimilar Metal Welds

Item B5.70 - McGuire Units 1 & 2 / Catawba Unit 1

The examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWB-2500-8(c), could not be met; however, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. **See Note 1**

Note 1

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

In addition to the required leakage limits and detection systems, McGuire and Catawba (includes Operations, Maintenance, and Engineering groups) maintains an aggressive monitoring program to detect and trend primary system leakage. As a result, there is added confidence that pressure boundary leakage will be identified within the scope of leak-before-break methodology.

Examination Category C-F-1, Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping

Item C5.11 - McGuire Units 1 & 2 / Catawba Unit 1
The examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWC-2500-7(a), could not be met; however, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. **See Note 2**

Examination Category C-B, Pressure Retaining Nozzle Welds in Vessels

Item C2.22 - Catawba Unit 1

The examination volume requirements as defined in ASME Section XI 1989 Edition, Figure IWC-2500-4(a), could not be met; however, the amount of subsequent inservice inspection coverage (100%) obtained for these examinations provides an acceptable level of quality and integrity. **See Note 2**

Note 2

If a leak were to occur at the welds in question Feedwater (CF) and Auxiliary Feedwater (CA) Nozzles, there are methods by which the leak could be identified for prompt Engineering evaluation.

Both the CF and CA nozzles are equipped with thermal sleeves to limit thermal shock due to cold main feedwater or auxiliary feedwater injections. At McGuire, all main feedwater is supplied to the CF nozzle during heatup and powered operation. At Catawba, main feedwater is supplied to the CA nozzle during heatup/low power operation, then a swap is made to supply all main feedwater to the CF nozzle at 15-25% power. All auxiliary feedwater is supplied to the steam generators via the CA nozzles. At Catawba, a tempering flow is provided to the CA nozzle after main feedwater is swapped to the CF nozzle, whereas, McGuire does not since they utilize the CF nozzle for normal operation. Both McGuire and Catawba operate the CA and CF nozzles consistent with the stress and fatigue qualifications provided by the Replacement S/G Manufacturer (BWI).

A leak at a CF/CA nozzle would result in the following:

Increased containment humidity. This parameter is indicated in the control room and is monitored periodically by Operations and also the Containment Ventilation System Engineer per the associated "Engineering Support Program".

Increased S/G enclosure temperature. This parameter is monitored periodically by the Containment Ventilation System Engineer per the associated "Engineering Support Program".

Increased input into the Ventilation Unit Condensate Drain Tank (VUCDT). This parameter is monitored continuously by Operations via an OAC alarm and also

periodically by the Liquid Radwaste System Engineer and Reactor Coolant System Engineer per the associated "Engineering Support Program".

The above parameters would be used to identify a leak in the steam generator enclosure, but could not specifically identify the CA nozzle as the source of leakage. A containment entry would be required to identify the exact source of the leakage.

Also, a containment walkdown is performed when the unit reaches Mode 3 (full temperature / pressure) during the unit shutdown for each refueling outage. This walkdown should identify any leak at the weld in question.

Concerning the consequences of a leak at the CF/CA nozzle (affects on CF/CA system operation):

Any leakage would result in a portion of the CF/CA flow bypassing the steam generator, and therefore being unavailable to maintain steam generator levels. Very small leaks (< 1 gpm) would have no discernible effect on CA system operation. Leaks that approach 5 gpm would need to be evaluated for system operability effects. Both McGuire and Catawba have specific safety analyses for accidents where minor and major main feedwater system pipe breaks are postulated. These safety analyses meet acceptance criteria as specified in NRC Safety Evaluation Reports.

Additional Supporting Rationale for Requested Relief:
The nozzles of the new steam generators were examined in accordance with ASME Section III, 1986 Edition. This work included ultrasonic examination of the forging using SA-388, "Recommended Practice for The Ultrasonic Examination of Heavy Steel Forgings". Each bottom head, including nozzles, was examined by Magnetic Particle (MP) testing. This MP exam was completed following machining but before cladding. After cladding, each bottom head, including the nozzles, received an ultrasonic examination to determine the clad bond integrity. Finally, the clad surface was inspected by liquid penetrant testing.

Subsequent to the replacement steam generators being installed, the subject nozzle welds received both radiographic and dye penetrant examinations, the preservice ultrasonic examination to the extent practical, and a hydrostatic test per ASME Section XI requirements. These test were all completed with acceptable results. Successful completion of all these Section III and XI tests ensures the structural integrity of the replaced steam generators.

All examination surfaces listed in this Relief Request for the new steam generators were accessible prior to installation and could have been examined. However, there was no plan for post manufacturing internal examination. ASME Section XI paragraph IWB-2200(b)(2) states, "examinations are to be conducted under conditions and with equipment and techniques equivalent to those expected to be employed for subsequent inservice examinations." As such, the purpose of ASME Section XI preservice is to establish a baseline for the following ISI examination.

Duke recognizes that paragraph IWB-2200(b)(2) specifically addresses shop and field weld examinations in lieu of on-site examinations. However, IWB-2200(b)(2) logically applies to any preservice examination. Duke performed the preservice examinations using the same techniques intended for future required inservice examinations. However, Duke will consider new technology or methodology, which may be available which provides greater coverage in future inservice inspection examinations.

Replacement or re-design of any of these Class 1 or Class 2 nozzles is not a viable alternative. For McGuire and Catawba, the design of major replacement components to fit into existing plant structural support and piping system configurations necessitates the loss of some preservice and inservice examination accessibility. To accommodate the existing plant profile, Duke concludes the coverage obtained for these examinations provides reasonable assurance of the structural integrity of the subject welds.

VII. Implementation Schedule:

The preservice exam is associated with a major component replacement, which should only occur once in plant life. However, inservice examinations will be scheduled in accordance with the requirements of ASME Section XI for future inspection intervals.

VIII. Attachments:

Attachment 1. A generic drawing used as an example of affected weld details including calculation methods for McGuire and Catawba, Examination Category B-D, Item B3.140.

Attachment 2. A generic drawing used as an example of affected weld details including calculation methods for McGuire and Catawba, Examination Category B-F, Item B5.70., and Examination Category C-F-1, Item C5.11.

Attachment 3. A generic drawing used as an example of affected weld details including calculation methods for Catawba, Examination Category C-B, Item C2.22.

The following individuals were involved in the development of this request for relief. Ken Pitser (McGuire Engineering) and Stephen L Mays (Catawba Engineering) provided information contained in Section VI. Jim McArdle (NDE Level III) provided Sections III., IV., and V. Gary Scarboro (McGuire ISI Plan Manager) with assistance from Andy Hogge/Jimmy Cherry (Catawba ISI Plan Managers) compiled and completed the request.

Sponsored By: Gary D. Scarboro Date 5/3/00

Approved By: R. Kevin Rhyne Date 5/3/00

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 0800	NDE UT-3		
Exam Finish: 0815	Revision 2		
Station: Mc GUIRE	Unit: 1	Component/weld ID: 1SG A INLET	Date: 2-13-97
Nominal Material Thickness (in.): 6.625"	Weld Length (in.): N/A	Surface Tepmperature: 53 Deg F	
Measured Material Thickness (in.): 7.0"	Lo: B&W #1	Pyrometer S/N: MCNDE 27017	
Surface Condition: As Ground	Calibration sheet No: MCG1SGRP233	cal due: 980121	
Examiner: Larry Moulder Level: III		Configuration: INNER RADIUS	
Examiner: Richard L Childers Level: II		N/A Flow N/A	
Procedure no: NDE 640 Rev: 1 F/C: 95-18 95-19		N/A to N/A	

IND NO.	∆	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
				No	LAMINAR		RE	FLECTORS						

	L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2
	L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2
	L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2

Remarks:

Limitations: see NDE-UT-4 ☑ None: ☐ sheet____ of____

Reviewed By:	Level:	Date:	Authorized Inspector:	Date	Item No:
Rod Hyfield	II	2-18-97	R Klein	2-20-97	B03.140.001

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0840 | Form NDE-UT-2A

Exam Finish: 0929 | Revision 4

Station: McGuire | Unit: 1 | Component/Weld ID: ISGA INLET | Date: 2-13-97

Weld Length (in.): N/A | Surface Condition: As Ground | Lo: B&W#1 | Surface Temperature: 53 ° F.

Pyrometer S/N: MCNDE 27017

Cal Due: 980121

Examiner: Larry Mauldin Level: III

Examiner: Richard B Childers Level: II

Procedure: NDE 680 Rev: 1

FC: 95-16

Calibration Sheet No: MCGISGRP234

Scans:

45 ☐ ____ dB 70 ☑ 65.5 dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: ____ dB

Configuration: INNER RADIUS S1 Flow S2 VESSEL to NOZZLE

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: 23.5°

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			
	70°			No	RECORDABLE INDICATIONS										

Remarks:

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

Reviewed By:	Level:	Date:	Authorized Inspector	Date	Item No:
Rod Sheffield	II	2-18-97	[signature]	2-20-97	B03.140.001

Attachment 1
Page 2 of 10

1 SGA · INLET NOZZLE

AREA CALCULATION

$$\frac{5in^2 R\pi - 4.5in^2 R\pi}{4} = 3.73in^2$$

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

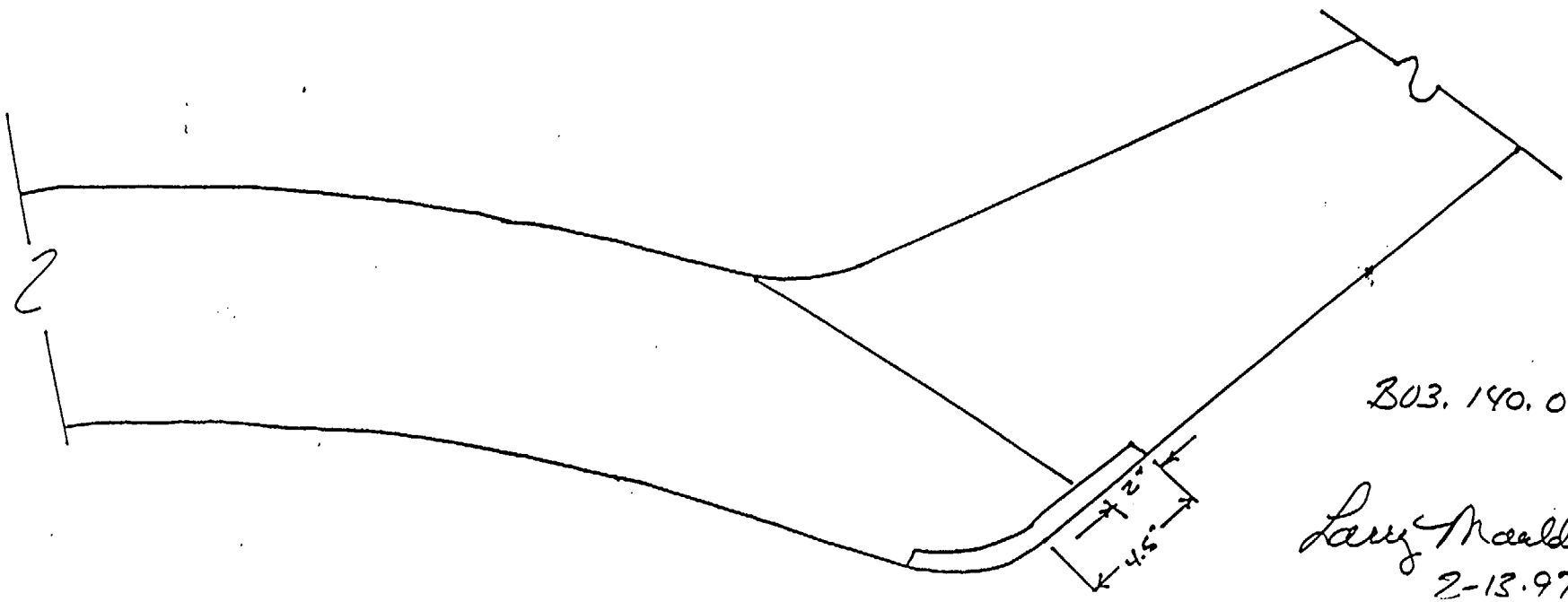
$$\text{TOTAL AREA} = 5.98\ in^2$$

AREA INSPECTED

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

TOTAL % COVERAGE

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



B03.140.001

Larry Maulden III
2-13-97

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

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
$\frac{5 IN^2 R \cdot \pi - 4.5 IN^2 R \cdot \pi}{4} = 3.73 IN^2$	$5.98 IN^2 \times 30 IN$ DIA. $\pi = 563.6 IN^3$
$4.5 IN. \times 0.5 IN = 2.25 IN^2$	
TOTAL AREA $5.98 IN^2$	

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°	23.5 SKEW	$4.98 IN^2$	94.25 IN	$469.37 IN^3$	$563.6 IN^3$	83.3%

Item No: 803.140.001

Prepared BY: Larry Maaldri Level: III Date: 2-13-97

Reviewed By: Rod Sheffield Level: II Date: 2-18-97

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 1SGA INLET Item No: B03.140.001

remarks: #1 Support Corner is 1.0" from ℄ of Nozzle O.D. Radius

#2 Sensor Plate is from 4.5" to 0.5" from ℄ of Nozzle O.D Radius

☐ NO SCAN	SURFACE	BEAM DIRECTION			
☑ LIMITED SCAN	☑ 1 ☐ 2	☐ 1 ☑ 2	☑ cw ☑ ccw		
FROM L 22.0 to L 42.5	INCHES FROM WO N/A #1 to N/A #1				
ANGLE: ☑ 0 ☐ 45 ☐ 60 other 70°	FROM N/A DEG to N/A DEG				
☐ NO SCAN	SURFACE	BEAM DIRECTION			
☑ LIMITED SCAN	☑ 1 ☐ 2	☐ 1 ☑ 2	☑ cw ☑ ccw		
FROM L 85.8" to L 90.8"	INCHES FROM WO N/A #2 to N/A #2				
ANGLE: ☑ 0 ☐ 45 ☐ 60 other 70°	FROM N/A DEG to N/A 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 Rawlins Level: III Date: 2-13-97 Sheet ____ of ____

Reviewed By: Rod Sheffield Date: 2-18-97 Authorized Inspector: [illegible] Date: 2-20-97

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 0816			NDE UT-3
Exam Finish: 0832			Revision 2
Station: McGuire	Unit: 1	Component/weld ID: 1SGA Outlet Nozzle	Date: 2-13-97
Nominal Material Thickness (in.): 6.625"		Weld Length (in.): N/A	Surface Tepmperature: 53 Deg F
Measured Material Thickness (in.): 7.0"		Lo: B&W #1	Pyrometer S/N: MCNDE 27017
Surface Condition: As Ground		Calibration sheet No: MCG1SGRP233	cal due: 980121
Examiner: Larry Rawlins	Level: III		Configuration: Inner Radius
Examiner: Richard B Glidden	Level: II		N/A Flow N/A
Procedure no: NDE 640 Rev: 1	F/C: 95-18 95-19		N/A to N/A

IND NO.	∆	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
				No	Laminar		Reflectors							

	L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2
	L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2
	L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2

Remarks:

Limitations: see NDE-UT-4 ☑ None: ☐

sheet____ of____

Reviewed By:	Level:	Date:	Authorized Inspector	Date	Item No:
Rod Sheffield	II	2-18-97	[illegible]	2-20-97	B03.140.002

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0934 | Form NDE-UT-2A
Exam Finish: 1035 | Revision 4

Station: McGUIRE | Unit: 1 | Component/Weld ID: 1SGA OUTLET NOZZLE | Date: 2-13-97

Weld Length (in.): N/A | Surface Condition: AS GROUND | Lo: B&W#1 | Surface Temperature: 53 °F.

Examiner: Larry Maulden Level: III | Pyrometer S/N: MCNDE 27017

Examiner: Richard B. Childers Level: II | Cal Due: 98 0121

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

Calibration Sheet No: MCG1SGRP234

Scans:
45 ☐ ____ dB 70 ☑ 65.5 dB
45T ☐ ____ dB 70T ☐ ____ dB
60 ☐ ____ dB
60T ☐ ____ dB
Other: ____ dB

Configuration: INNER RADIUS
S1 Flow S2
VESSEL to NOZZLE
Scan Surface: OD
Applies to NDE-680 only
Skew Angle: 23.5°

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			
	70		No	Recordable		Indications									

Remarks:

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

Reviewed By: Rod Sheffield | Level: II | Date: 2-18-97 | Authorized Inspector: [signature] | Date: 2-20-97 | Item No: 803.140.002

Attachment 1
Page 7 of 10

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
$\frac{5 in^2 R\ \pi - 4.5 in^2 R\ \pi}{4} = 3.73 in^2$ $4.5 in \times 0.5 in = 2.25 in^2$ TOTAL AREA $5.98 in^2$	$5.98 in^2 \times 30 in$ DIA. $\pi = 563.6 in^3$

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°	23.5 SKEW	$4.98 in^2$	94.25"	$469.37 in^3$	$563.6 in^3$	83.3%

Item No: B03.140.002

Prepared BY: Larry Maulden Level: III Date: 2-13-97

Reviewed By: Rod Sheffield Level: II Date: 2-18-97

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 1SG A. Outlet Item No: B03.140.002

remarks: #1 - Support Corner is 1.0" from ℄ of Nozzle O.D. Radius

☐ NO SCAN SURFACE BEAM DIRECTION

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

FROM L 23.5 to L 43.8 INCHES FROM WO N/A #1 to N/A #1

ANGLE: ☑ 0 ☐ 45 ☐ 60 other 70° 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

☐ 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 Maulden Level: III Date: 2-13-97 Sheet ____ of ____

Reviewed By: Rod Sheffield Date: 2-18-97 Authorized Inspector: [illegible] Date: 2-20-97

1 SGA - OUTLET NOZZLE

AREA CALCULATION

$$\frac{5in^2 R\pi - 4.5in^2 R\pi}{4} = 3.73in^2$$

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

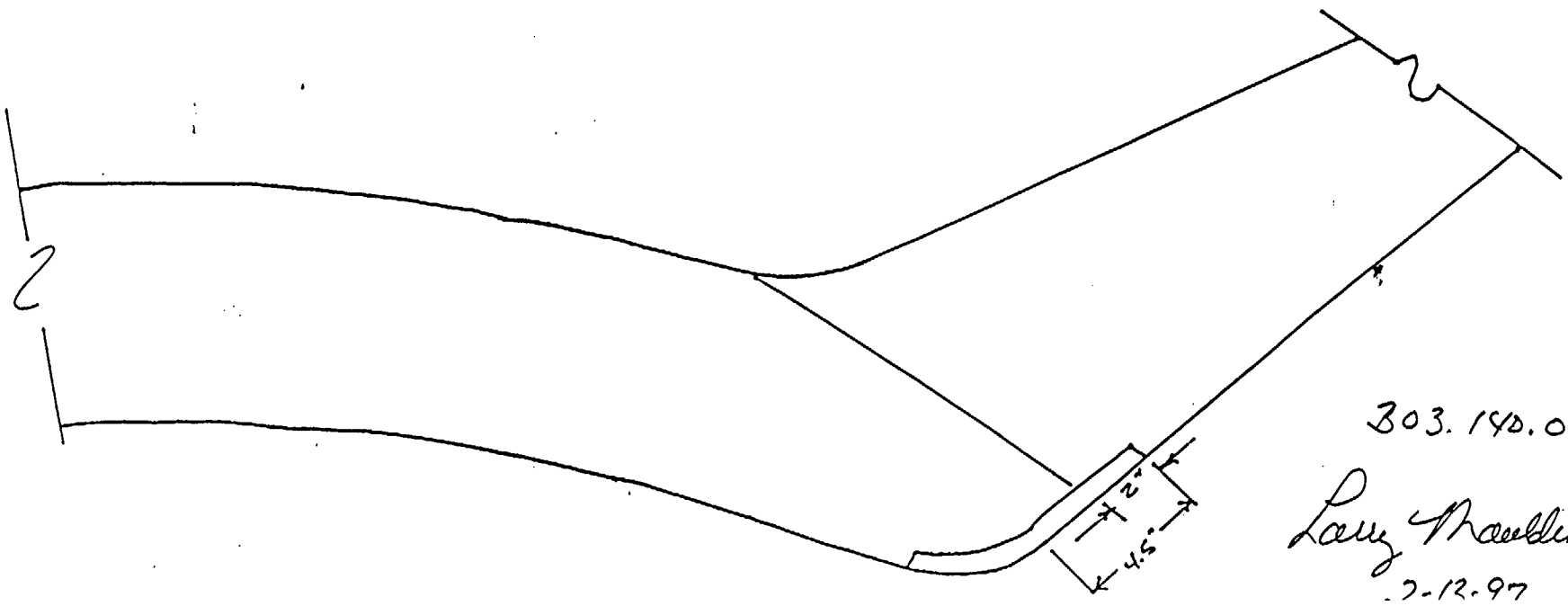
$$\text{TOTAL AREA} = 5.98\ in^2$$

AREA INSPECTED

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

TOTAL % COVERAGE

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



303.140.002

Larry Mauldin III
7-12-97

Attachment 1
Page 10 of 10

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1041 | Form NDE-UT-2A

Exam Finish: 1153 | Revision 4

Station: CATAWBA | Unit: 1 | Component/Weld ID: 1SGB-INLET-SE | Date: 8-8-96

Weld Length (in.): 121.0" | Surface Condition: AS GROUND | Lo: R.T. LAYOUT | Surface Temperature: 63 ° F

Pyrometer S/N: MCNDE27025

Cal Due: 961003

Examiner: Marion T. Weaver Level: II

Examiner: Gary J Moss Level: II

Procedure: NDE930 Rev: 0 | FC: NONE

Calibration Sheet No:
CNS1SG-RP-265
CNS1SG-RP 266

Scans:
45 ☒ 64 dB 70 ☐ ____ dB
45T ☒ 64 dB 70T ☐ ____ dB
60 ☐ ____ dB
60T ☐ ____ dB
Other: 33 & 33T 68 dB

Configuration: CIRC
S-2 Flow S-1
SAFE END to NOZZEL
Scan Surface: OD

Skew Angle: Applies to NDE-680 only

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			
	45		NO	RECORDABLE INDICATIONS											
	33		NO	RECORDABLE INDICATIONS											

Remarks:

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

Reviewed By:	Level:	Date:	Authorized Inspector	Date	Item No:
Richard B. Childers	II	8-9-96	Robert McGill	8-2-96	B05.070.003

Serial no. GO-99-03
Attachment 2
Page 1 of 11

DUKE POWER COMPANY

NDE-91-1
Revision 0

Limited Examination Coverage Worksheet

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
3.2" x 1.25" = 4 sq. in.	4 sq. in. x 121" (weld length) = 484 cu. In.

Coverage Calculations

Scan #	Angle	Beam direction	Area Examined	Length Examined	Volume Examined	Volume Required	Percent Coverage
1	33	1	4 sq. in.	121 in.	484 cu. In.	484 cu. In.	100
2	45	2	0	121 in.	0	484 cu. In.	0
3	45	CW	4 sq. in.	121 in.	484 cu. In.	484 cu. In.	100
				121 in.	484 cu. In.	484 cu. In.	100
Total	Aggregate	Coverage			1452 cu. In.	1936 cu. In.	75

James J. McArdle III
Prepared by: James J. McArdle III

Level: III

Item No: B05.070.003

Date: 5/6/99

Stock Code No. 89203

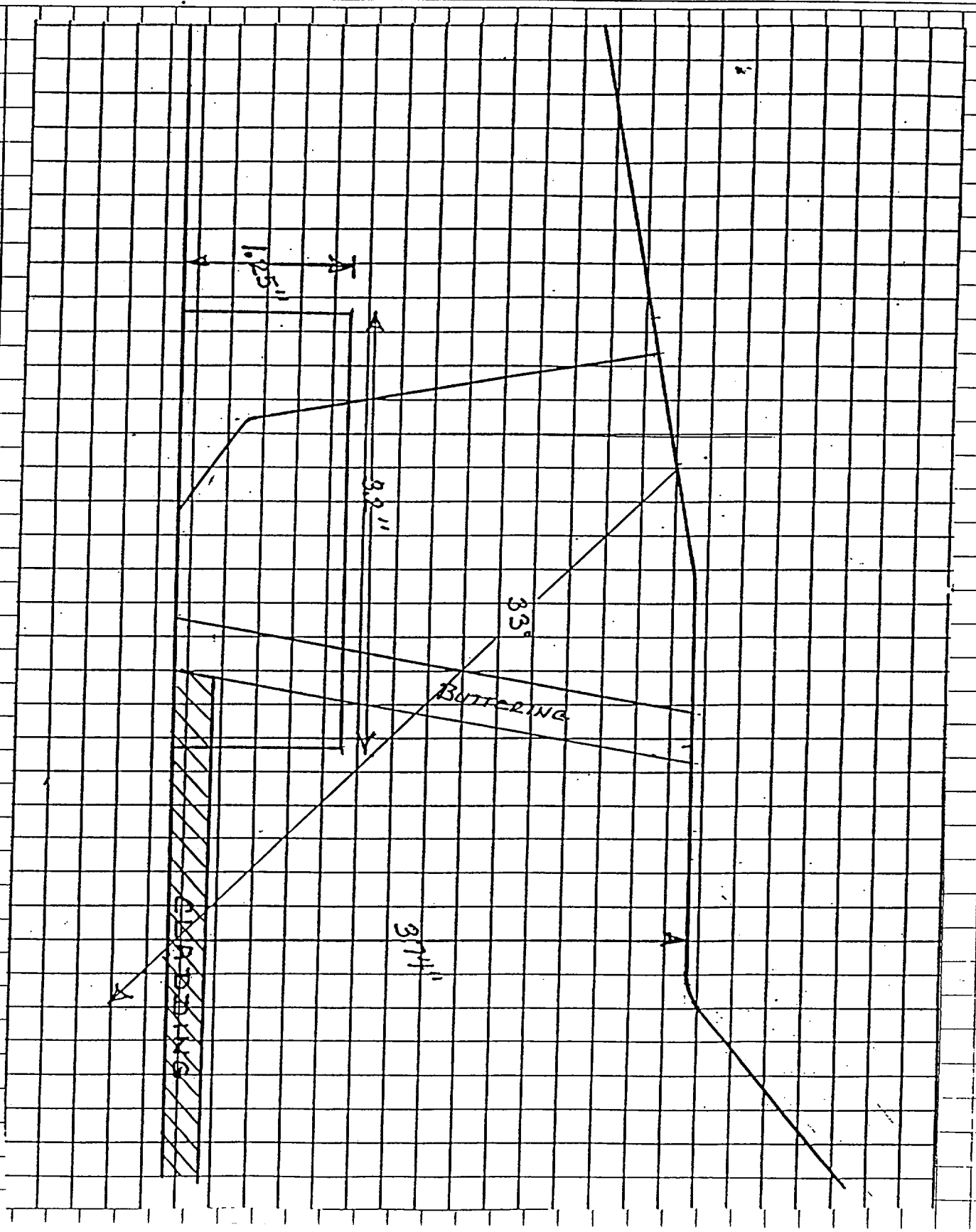
Form # 00184(

Station CNS Unit 1 Rev. ____ File No. ____ Sh

Subject 1SGB-INLET-SE

By James J. McQuillen Date 5/6/99

Prob No. B05.070.003 Checked by ____ Date ____



DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1113 | Exam Finish: 1142 | Form NDE-UT-2A | Revision 4

Station: CATAWBA | Unit: 1 | Component/Weld ID: 1SG-B-OUTLET-SE | Date: 8-8-96

Weld Length (in.): 121.0" | Surface Condition: As GROUND | Lo: LAYOUT R.T | Surface Temperature: 63 °F

Examiner: Marion T. Weng | Level: II

Examiner: Gary Moss | Level: II

Procedure: NDE930 | Rev: 0 | FC: NONE

Calibration Sheet No: CNS.1SG-RP-265, CNS.1SG-RP-266

Scans:
45 ☒ 64 dB | 70 ☐ ____ dB
45T ☒ 64 dB | 70T ☐ ____ dB
60 ☐ ____ dB
60T ☐ ____ dB
Other: 33 & 33T 68 dB

Pyrometer S/N: MCNDE 27025
Cal Due: 961003

Configuration: CIRC.
S-2 Flow S-1
NOZZEL to SAFE END

Scan Surface: OD
Applies to NDE-880 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			
	45		NO RECORDABLE INDICATIONS												
	33		NO RECORDABLE INDICATIONS												

Remarks:

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

Reviewed By: Richard B Childers | Level: II | Date: 8-9-96

Authorized Inspector: Robert McNeil | Date: 8-26-96

Item No: B05.070.004

Attachment 2 Page 4 of 11

Stock Code No. 89203

Form # 00184(R

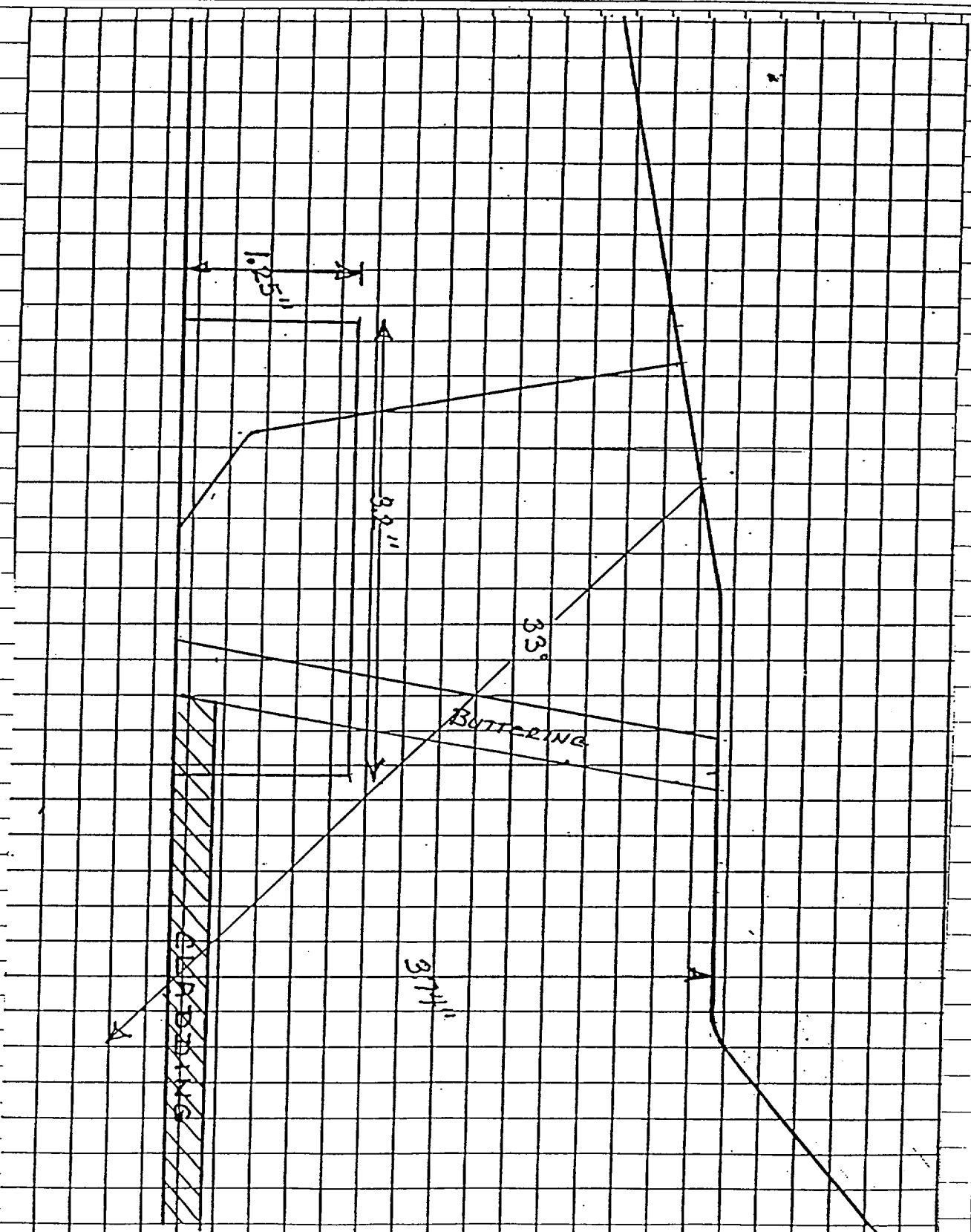
Station CNS Unit 1 Rev. ____ File No. ____ S

Attachment 2
Page 5 of 11

Subject 1SGB- OUTLET -SE

By Jane J. McCulle Date 5/6/99

Prob No. B05.070.004 Checked by ____ Date ____



DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 0820	NDE 1		
Exam Finish: 0823	Revision 2		
Date: 2/13/97			

Station: MNS	Unit: 1	Component/weld ID: 15GA-N261	
Nominal Material Thickness (in.): 1.13		Weld Length (in.): 23.55	Surface Tepmperature: 53 Deg F
Measured Material Thickness (in.): 1.08		Lo: 9.1.1.1	Pyrometer S/N: MCNDE 27017
Surface Condition: As Ground		Calibration sheet No: MCG15GRP 241	cal due: 980121
Examiner: [illegible]	Level: II		Configuration: Nozzle to Safe End
Examiner: [illegible]	Level: II		2 Flow 1
Procedure no: NDE640	Rev: 1	F/C 95-18 95-19	Safe End to Nozzle

IND NO.	∡	Ampl ≥ rem BW LOB	L1 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	L2 ≥ rem BW LOB	W1 ≥ rem BW LOB	Mp1 ≥ rem BW LOB	W2 ≥ rem BW LOB	Mp2 ≥ rem BW LOB	Exam Surf.	Damps
	0°		No Recordable Indications											
			L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2		
			L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2		
			L	W1	Mp1	W2	Mp2	L	W1	Mp1	W2	Mp2		

Remarks:

Limitations: see NDE-UT-4 ☐ None: ☒ sheet_____of_____

Reviewed By: Rod Sheffield Level: II Date: 2-13-97

Authorized Inspector: [illegible] Date 2-20-97

Item No: C05.011.001

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
3.2" x 1.25" = 4 sq. in.	4 sq. in. x 121" (weld length) = 484 cu. In.

Coverage Calculations

Scan #	Angle	Beam direction	Area Examined	Length Examined	Volume Examined	Volume Required	Percent Coverage
1	33	1	4 sq. in.	121 in.	484 cu. In.	484 cu. In.	100
2	45	2	0	121 in.	0	484 cu. In.	0
3	45	CW	4 sq. in.	121 in.	484 cu. In.	484 cu. In.	100
				121 in.	484 cu. In.	484 cu. In.	100
Total	Aggregate	Coverage			1452 cu. In.	1936 cu. In.	75

James J. McArdle III

Prepared by: James J. McArdle III

Level: III

Item No: B05.070.004

Date: 5/6/99

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0828 | Form NDE-UT-2A
Exam Finish: 0847 | Revision 4

Station: MNS | Unit: 1 | Component/Weld ID: ISGA -W261 | Date: 2/13/97

Weld Length (in.): 23.55 | Surface Condition: As Ground | Lo: 9.1.1.1 | Surface Temperature: 53 °F

Examiner: DE Hauser | Level: II | Pyrometer S/N: MCNDE 27017

Examiner: [signature] | Level: II | Cal Due: 980121

Procedure: NDE 610 Rev: 4 | FC: None

Calibration Sheet No: MCGISGRP 242, MCGISGRP 243

Scans:
45L [X] 60 dB 70 [ ] ____ dB
45T [ ] ____ dB 70T [ ] ____ dB
60 [ ] ____ dB
60T [ ] ____ dB
Other: 38° Circ 60 / 38° Tan 60 dB

Configuration: Nozzle to Safe End
2 Flow 1
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	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			
	38°	Circ				NO	Recordable Indications								
	38°	Tangential				NO	Recordable Indications								
	45L	ax				NO	Recordable Indications								

Remarks: 45L scanned at Ref + 1.6 dB due to Excessive Signal / Noise Ratio

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

Sheet ____ of ____

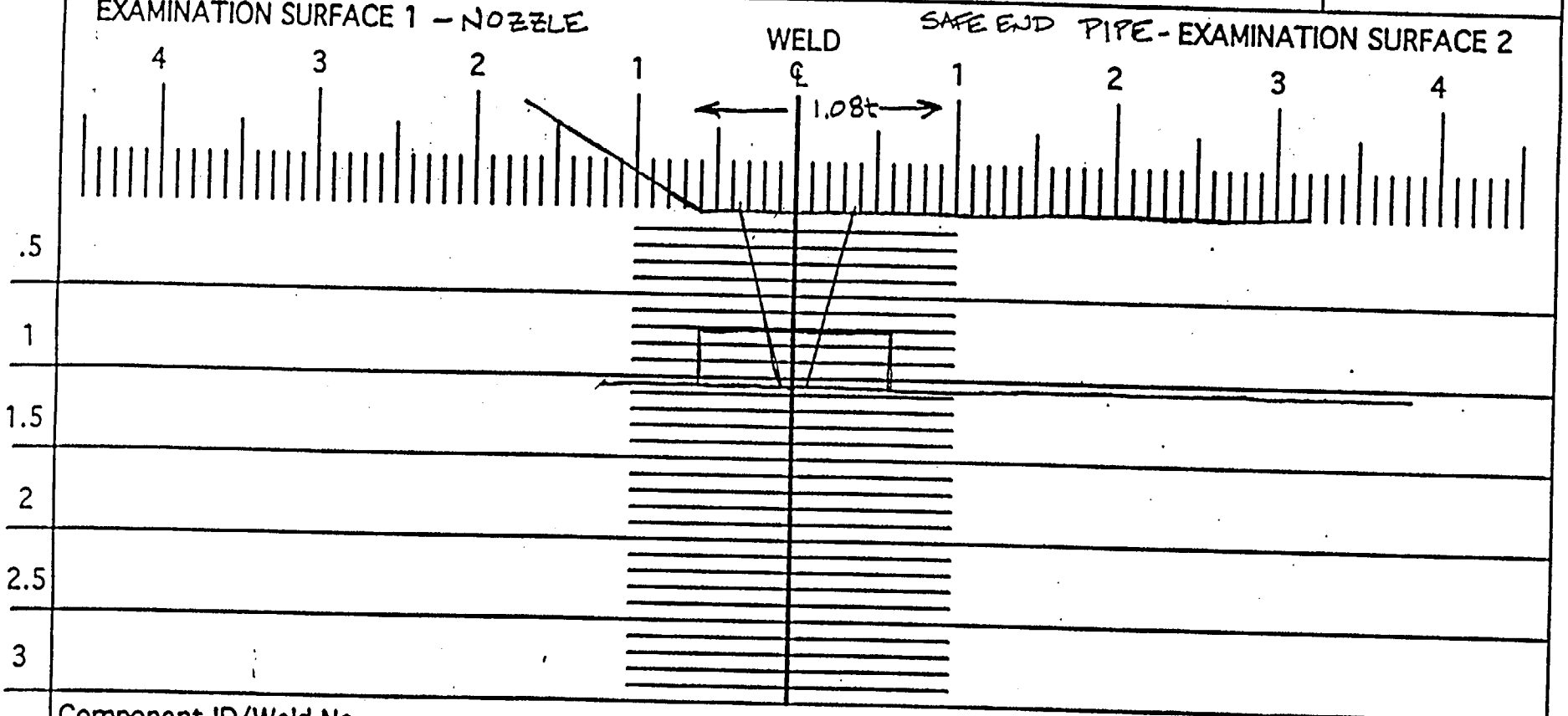
Reviewed By: Rod Sheffield | Level: II | Date: 2-13-97 | Authorized Inspector: [signature] | Date: 2-20-97 | Item No: C05.011.001

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

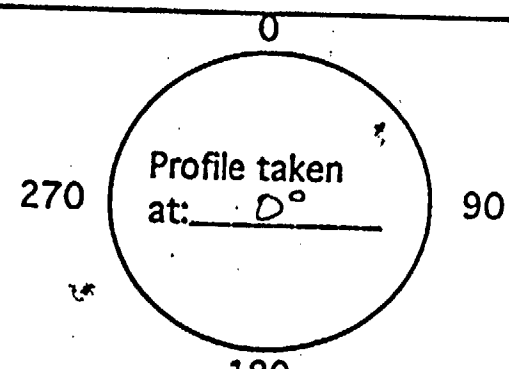
NDE-UT-5

Revision 1



Component ID/Weld No. 1SGA-W261

: Remarks:



Item No: C05.011.001

Examiner:	Level: II	Date: 2/13/97
Reviewed By: Rod Sheffield	Level: II	Date: 2-13-97
Authorized Inspector:		Date: 2-20-97

Sheet ___ of ___

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 15GA-W261 Item No: C05.011.001

remarks: Nozzle Configuration

☑ NO SCAN SURFACE BEAM DIRECTION

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

FROM L N/a to L N/a INCHES FROM WO CL + 0" to CL + 6"

ANGLE: ☐ 0 ☑ 45 ☐ 60 other 38° 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: D E Hauser Level: II Date: 2/13/97 Sheet ____ of ____

Reviewed By: Rod Sheffield Date: 2-13-97 Authorized Inspector: [illegible] Date: 2-20-97

Attachment 2
Page 10 of 11

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

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
1.2" x .38" = 0.456 in^2	0.456 in^2 x 23.5" = 10.72 in^3

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
S1 ①	45°	S2	0	0	0	10.72	0%
S2 ②	45°	S1	0.456	23.5	10.72	10.72	100%
S1 ③	45°	CW&CCW	0	0	0	10.72	0%
S2 ④	45°	CCW&CW	0.456	23.5	10.72	10.72	100%

50% AGGREGATE COVERAGE

Item No: COS.011.001

Prepared BY: [signature] Level: II Date: 2/13/97

Reviewed By: Rod Sheffield Level: II Date: 2-13-97

DUKE POWER COMPANY

ULTRASONIC CALIBRATION SHEET FOR USK-7D INSTRUMENTS

FORM NDE-UT-1E

REVISION 2

ation: Catawba | Unit: 1 | Date: 8-16-96 | Shee lumber: CNSISGRP-275

ocedure: NDE 680 | Rev: 1 | F/C: 95-16 | Couplant: Ultragel II | Batch umber: 093001

aminer: Winfred C. Keeper | Level: II | Calibration Block ID: 5139385 | Pyrometer S/N: MCNDE27021

kaminer: David K. [illegible] | Level: II | Calibration Block Temp: 75° | Cal. due: 961003

REFERENCE BLOCK

: 96-6518

pe: Rompas | Material: C/S

SIMULATOR BL K

ID: 91-6518 | Refl or Type: Radius

Gain: 58.5 | Signal Ampl: 60% | Metal Path: 7.0

INSTRUMENT

Manufacturer: Krautkramer

Serial No: 32810-922

TRANSDUCEF

Type: Single ☒ Dual ☐ Size: 1.0 Freq 2.25 Mhz Wedge SWS

Manufacturer: KBA | Ser no: F21877 | Meas. ∠ 70°

STRUMENT SETTINGS

Gain	49.5/58.5
Range	25.0"
MTVEL	128.6
Delay	24.8
Pulser	High
Reject	OFF
Freq	1-5
Zero	24.93
Display	Full
PRF	High

ack: T ☒ R ☐

CALIBRATION

Reflector Type Hole	Amplitude %FSH	Metal Path Inches
1/8 node	80	2.61
2/8 node	47	5.99
3/8 node	80/26	9.28
5/8 node	58	16.46
other		

Cal Direction: axial ☐ circ. ☐

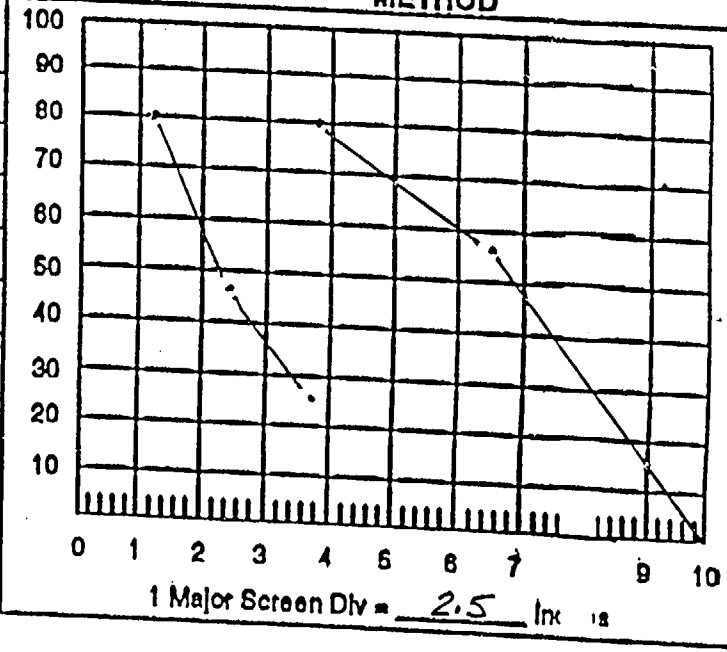
Wave Mode: Long. ☐ shear ☒ surf. ☐

Remarks: MEMORY #1

SKEW 38°

Item No: C02.022.001

METHOD



1 Major Screen Div = 2.5 Inc s

CABLES

RG58 ☐

RG174 ☒

Length: 6'

Initial Cal Time 0203

Cal Checks

Time	Initials
0231	WCL
0405	WCL
Final	

viewer: Richard B. Childers | Level: II | Date: 8-16-96 | Authorized Inspector Robert McGill | Date: 8-26-96

Serial no. GO-99-

Attachment 3

Page 1 of 5

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0232 | Form NDE-UT-2A
Exam Finish: 0308 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: C02.022.001 - ISGA W258 | Date: 8-16-96

Weld Length (in.): N/A | Surface Condition: As Ground | Lo: R.T Interval | Surface Temperature: 71 ° F

Examiner: [signature] Level: II | Pyrometer S/N: MCNDE-27021

Examiner: [signature] Level: II | Cal Due: 961003

Procedure: NDE 680 Rev: 1 | FC: 95-16 | Configuration: Circ. INNER RADIUS Nozzle Flow Vessel 2 to 1

Calibration Sheet No: CNSISGRP-275

Scans:
45 ☐ ____ dB 70 ☑ 72.5 dB
45T ☐ ____ dB 70T ☐ ____ dB
60 ☐ ____ dB
60T ☐ ____ dB
Other: ____ dB

Scan Surface: OD
Applies to NDE-680 only
Skew Angle: 38°

IND #	∡	Max % Rel	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:

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

Sheet ____ of ____

Reviewed By: Richard B Childers | Level: II | Date: 8-16-96 | Authorized Inspector: Robert McGill | Date: 8-26-96 | Item No: C02.022.001

Attachment 3
Page 2 of 5

DUKE POWER COMPANY

ISI LIMITATION REPORT

FORM NDE- UT-4

Revision 1

Component/Weld ID: 1SGA-W258 Item No: C02.022.001

remarks: NOZZLE CONFIGURATION

☐ NO SCAN SURFACE BEAM DIRECTION

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

FROM L NA to L NA INCHES FROM WO NA to NA

ANGLE: ☐ 0 ☐ 45 ☐ 60 other 70 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: David K [illegible] Level: II Date: 8-16-96 Sheet _____ of _____

Reviewed By: Richard A Childers II Date: 8-16-96 Authorized Inspector: Robert McKee Date: 8-26-96

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

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
AREA OF INTEREST $\frac{(4.9in \times 4.9in)}{2} - \frac{(1.75in \times .63in)}{2} = 11.45in^2$ AREA OF COVERAGE $\frac{(2.0in \times .70in)}{2} + \frac{(.75in \times .70in)}{2} = .96in^2$	VOLUME OF INTEREST $11.45in^2 \times 55.92in = 640.28in^3$ VOLUME OF COVERAGE $.96in^2 \times 55.92in = 53.68in^3$

Coverage Calculations

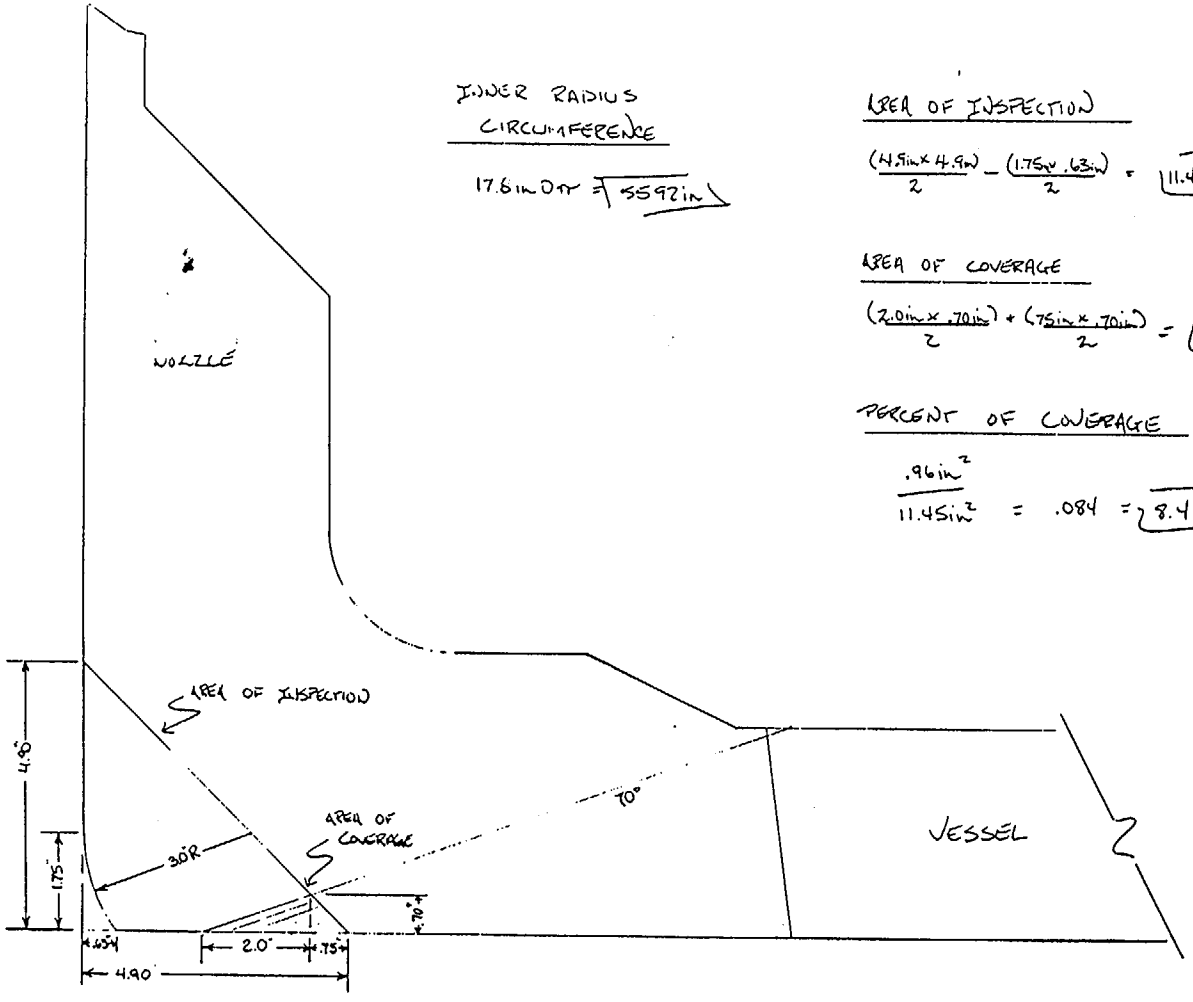
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	70°	S2	$.96in^2$	55.92in	$53.68in^3$	$640.28in^3$	8.4%

Item No: C02.022.001

Prepared BY: David K. [illegible] Level: II Date: 8-16-96

Reviewed By: Richard B. Childers Level: II Date: 8-16-96

MAIN FEEDWATER NOZZLE - INNER RAD



INNER RADIUS CIRCUMFERENCE

17.6 in DIA = 55.92 in

AREA OF INSPECTION

$\frac{(4.9in \times 4.9in)}{2} - \frac{(1.75in \times .63in)}{2} = 11.45 in^2$

AREA OF COVERAGE

$\frac{(2.0in \times .70in)}{2} + \frac{(.75in \times .70in)}{2} = .96 in^2$

PERCENT OF COVERAGE

$\frac{.96 in^2}{11.45 in^2} = .084 = 8.4\%$

GENERATOR - "A"
WELD NO. 15GA-W12
ITEM NO. C02.022.C

INSP. - [signature]
DATE - 8/6/96

SCALE: ½" = 1"