



Gary R. Peterson  
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May 23, 2000

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Subject: Duke Energy Corporation  
Catawba Nuclear Station, Unit 2  
Docket Number 50-414  
Request for Relief Number 00-001  
Limited Weld Coverage During End-of-Cycle 10  
Refueling Outage

Pursuant to 10 CFR 50.55a(g)(5)(iii), please find attached Request for Relief 00-001. This request for relief is associated with limited weld examinations which were performed during the Unit 2 End-of-Cycle 10 Refueling Outage. The affected welds for which complete coverage could not be achieved are the Steam Generator 2B Inlet and Outlet Nozzle-to-Safe-End and Safe-End-to-Pipe Welds and the Volume Control Tank Lower Head-to-Shell Weld.

The attachment to this letter contains all technical information necessary in support of this request for relief.

If you have any questions concerning this material, please call L.J. Rudy at (803) 831-3084.

Very truly yours,

Gary R. Peterson

LJR/s

Attachment

A047

RGU-001

Document Control Desk  
Page 2  
May 23, 2000

xc (with attachment):

L.A. Reyes, Regional Administrator  
U.S. Nuclear Regulatory Commission, Region II  
Atlanta Federal Center  
61 Forsyth St., SW, Suite 23T85  
Atlanta, GA 30303

D.J. Roberts, Senior Resident Inspector  
U.S. Nuclear Regulatory Commission  
Catawba Nuclear Station

C.P. Patel, Senior Project Manager (addressee only)  
U.S. Nuclear Regulatory Commission  
Mail Stop 013-H3  
Washington, D.C. 20555-0001

## **DUKE ENERGY CORPORATION**

### **STATION: CATAWBA NUCLEAR STATION UNIT 2 10-YEAR INTERVAL REQUEST FOR RELIEF NO. 00-001**

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

ASME Section XI Code Class 1 Examination Category: B-F Pressure Retaining Dissimilar Metal Welds and ASME Section XI Code Class 2 Examination Category: C-A Pressure Retaining Welds in Pressure Vessels.

<u>ID Number</u>	<u>Item Number</u>
2SGB-INLET-SE	B05.070.003
2SGB-OUTLET-SE	B05.070.004
2NC11-02	B05.130.006
2NC11-03	B05.130.007
2VCT-LH-SH	C01.020.010

#### **II. Code Requirement:**

ASME Section XI 1989 Edition; Examination Category B-F Pressure Retaining Dissimilar Metal Welds, Table IWB-2500-1, Item Numbers B05.070 and B05.130 and Examination Category C-A Pressure Retaining Welds in Pressure Vessels, Table IWC-2500-1, Item Number C01.020 require a volumetric examination of essentially 100% of the weld volume. Duke Energy Corporation, with NRC approval, has adopted Code Case N-460 which defines "essentially 100%" as greater than 90% coverage.

#### **III. Code Requirement from which Relief is Requested:**

Relief is requested for the above identified ID Numbers:

- Class 1 Steam Generator 2B Inlet and Outlet Nozzle-to-Safe-End Welds and Safe-End-to-Pipe Welds from meeting the coverage requirements as defined in ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda. "The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed

from two sides of the weld where practical, or from one side of the weld, as a minimum.”

- Class 2 Volume Control Tank Lower Head-to-Shell Weld from meeting the coverage requirements as defined in ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda. “ The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed from two sides of the weld where practical, or from one side of the weld, as a minimum.”

#### IV. Basis for Relief:

During the ultrasonic examination of the 2SGB Inlet and Outlet Nozzle-to-Safe-End and Safe-End-to-Pipe Welds, 2SGB-INLET-SE, 2SGB-OUTLET-SE, 2NC11-02 and 2NC11-03 (Item Numbers B05.070.003, B05.070.004, B05.130.006 and B05.130.007 respectively) shown in Attachments 2, 3, 4 and 5, greater than 90% coverage of the required examination volume could not be obtained. Material characteristics and single sided access caused by component geometry prevents two-beam path direction coverage of the examination volume and limits the examination coverage to 75%. The most effective ultrasonic technique for the examination of dissimilar metal welds and cast stainless steel welds uses refracted longitudinal waves. The longitudinal wave is preferred as the austenitic weld metal and buttering create highly attenuative barriers to shear wave ultrasound. The longitudinal wave is less affected by these difficulties. However, the longitudinal wave is affected by mode conversion when it strikes the inside surface of the safe end or pipe at any angle other than a right angle to the surface.

The calculations below show that a 45<sup>0</sup> refracted longitudinal wave striking the inside surface of a pipe will produce a 22.9<sup>0</sup> refracted shear wave in addition to the normally expected 45<sup>0</sup> reflected longitudinal wave.

$$\sin^{-1} = (\sin 45^0 \times V_s) \div V_L$$

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

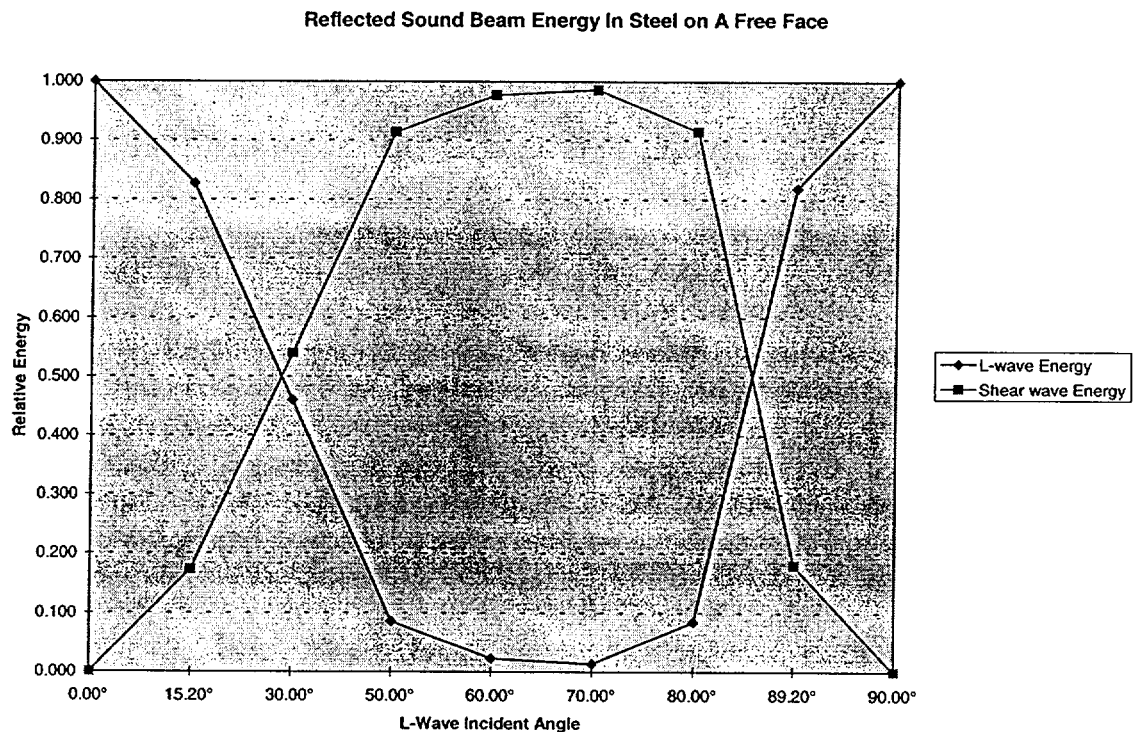
Where;  $\sin^{-1}$  is the shear wave angle

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

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

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

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



1

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

During the ultrasonic examination of the Volume Control Tank Lower Head-to-Shell Weld, 2VCT-LH-SH (Item Number C01.020.010) shown in Attachment 6, greater than 90% coverage of the required examination volume could not be obtained. Coverage was therefore limited to 88.34% of the required examination volume. In order to achieve greater than 90% coverage, more access would have to be provided by moving the support legs.

Ultrasonic examination was performed to the extent practical in accordance with ASME Section XI, Appendix III as allowed by Section XI Code Case N-435-1.

## **V. Alternate Examinations or Testing:**

No additional examinations are planned during the current interval for ID Numbers 2SGB-INLET-SE, 2SGB-OUTLET-SE, 2NC11-02, 2NC11-03 and 2VCT-LH-SH. Duke Energy Corporation will continue to use the most current ultrasonic techniques available to obtain maximum coverage for future examinations of these ID Numbers.

## **VI. Justification for the Granting of Relief:**

### Steam Generator 2B Inlet and Outlet Nozzle-to-Safe-End and Safe-End-to-Pipe Welds

Although the examination volume requirements as defined in ASME Section XI 1989 Edition with no addenda, Figure IWB-2500-8, Examination Volume C-D-E-F for ID Numbers 2SGB-INLET-SE, 2SGB-OUTLET-SE, 2NC11-02 and 2NC11-03 (Item Numbers B05.070.003, B05.070.004, B05.130.006 and B05.130.007 respectively) could not be met, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. For results of the examinations, reference Attachments 2, 3, 4, and 5.

The nozzle to safe-end and safe-end to pipe welds on the Steam Generator Inlet and Outlet Nozzles are located inside containment and are part of the reactor coolant system pressure boundary. General Design Criterion 30, "Quality of Reactor Coolant Pressure Boundary," of Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," mandates that means be provided for detecting and, to the extent practical, identifying the location of the source of reactor coolant leakage. If a leak were to develop at these weld locations discussed in this relief request, the instrumentation available to the operators for detection and monitoring of leakage would provide a prompt and qualitative information necessary to permit them to take immediate corrective action. If a leak should develop in these aforementioned locations, the only corrective action would be

shutdown and depressurize the reactor coolant system, since the welds are non-isolatable.

Plant Technical Specifications dictate that a reactor coolant system water inventory balance be performed on a regular basis. A normal operating practice is to perform this computer based mass balance on a daily frequency and/or whenever the operators suspect any abnormal changes to other leakage detection systems. Plant Technical Specification requires that if the leak rate cannot be reduced below 1 gpm unidentified that the plant be put in hot standby within 6 hours and in cold shutdown within the following 30 hours. Leakage as a result of a failed weld discussed in this section would show up as unidentified leakage and subject to the 1 gpm limit.

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

- Containment Atmosphere Gaseous and Particulate Radioactivity Monitoring System (EMF monitors 38 & 39) which would detect airborne radiological activity;
- Containment Floor and Equipment Sump Level and Flow Monitoring Subsystem where unidentified accumulated water on the containment floor would be monitored and evaluated as sump level changes;
- Containment Ventilation Unit Condensate Drain Tank Level Monitoring Subsystem which collects and measures as unidentified leakage the moisture removed from the containment atmosphere.

Additionally, other indicators are also available to the operator that a leak exists or may be developing:

- Containment Atmosphere Iodine Monitor (EMF 40)
- Charging / Letdown system mismatches;
- Containment humidity indications;
- Pre-Cycle walkdowns performed each outage while system is at operating temperature and pressure prior to criticality;

- Post-Cycle walkdowns performed at operating temperature and pressure performed during unit shutdown.

#### Volume Control Tank Lower Head-to-Shell Weld

Although the examination volume requirements as defined in ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda, for ID Number 2VCT-LH-SH (Item Number C01.020.010) could not be met, the amount of coverage obtained provides an acceptable level of quality and integrity. For results of the examination, reference Attachment 6.

The Volume Control Tank (VCT) is used in power operations. The VCT is located in the Auxiliary Building adjacent to the unit mechanical penetration room on floor elevation 560 feet. During power operations and unit refueling outages, the VCT is accessible for visual inspections.

If a leak were to occur at the weld in question (lower head to shell weld), there are several periodic tests and evaluations that are performed by established procedures that should identify the leakage for prompt OPS/ENG evaluation:

- During power operation, any leakage from the VCT would be identified as a mass loss in reactor coolant system water inventory balance. As described above, a normal operating practice is to perform this computer based mass balance on a daily frequency and/or whenever the operators suspect any abnormal changes to other leakage detection systems. Plant Technical Specification requires that if the leak rate cannot be reduced below 1 gpm unidentified that the plant be put in hot standby within 6 hours and in cold shutdown within the following 30 hours. Leakage as a result of a failed weld discussed in this section would show up as unidentified leakage and subject to the 1 gpm limit.
- If a leak were to occur at the subject weld, the water would spill on floor in VCT room and flow to floor drain and then to Floor Drain Tank. Our Chemistry department periodically monitors the tank level and evaluates unidentified leakage for correction.
- Weekly visual inspections are made by Operations into the VCT Room per PT/1(2)/A/4150/02 (Visual Inspection of Radioactive Components Outside Containment). Any leaks are required to be reported and evaluated per this Periodic Test.
- Quarterly walkdowns by the System Engineer include a check of the VCT and related components.



- Periodically, visual material condition inspections in accordance with NSD 104 are made in the VCT room by the site owner of the Aux. Bldg. Elev. 560 area. Identified leakage would be reported for evaluation.
- At a frequency of each refueling outage, visual leakage inspections of the VCT and charging system are made per PT procedure PT/1(2)/A/4202/06, "Leak Rate Determination for NV System." Any NV components identified with external leakage are documented for evaluation, including the VCT.

## VII. Implementation Schedule:

These examinations will continue to be scheduled in accordance with the requirements of ASME Section XI for future Inspection Intervals at Catawba Nuclear Station, Unit 2.

The following individuals contributed to the development of this RFR:

Jim McArdle (NDE Level III) provided Sections 3-5

David Goforth (System Engineer) provided Section 6

Andy Hogge and Jimmy Cherry (Sponsors) compiled the remaining sections

Sponsored By:

A. J. Hogge Jr Date 5/8/2000

Approved By:

R. Kevin Rhyme Date 5/8/00

Attachment 1	Description Table
Attachment 2	UT Examination Data B05.070.003
Attachment 3	UT Examination Data B05.070.004
Attachment 4	UT Examination Data B05.130.006
Attachment 5	UT Examination Data B05.130.007
Attachment 6	UT Examination Data C01.020.010

ASME Class 1 & 2 Inservice Inspection Request For Relief No. 00-001  
 For Catawba Unit 2 Based on ASME Section XI - 1989 Code

Item No.	Exam Category /Figure No.	System Or Component	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B05.070.003	B-F IWB-2500-8 (c)	Steam Generator	Steam Generator 2B Inlet Nozzle-to-Safe-End Weld	Limited scan due to material characteristics and single-sided access. Actual coverage obtained = 75% (See Attachment 2)	None
B05.070.004	B-F IWB-2500-8 (c)	Steam Generator	Steam Generator 2B Outlet Nozzle-to-Safe-End Weld	Limited scan due to material characteristics and single-sided access. Actual coverage obtained = 75% (See Attachment 3)	None
B05.130.006	B-F IWB-2500-8 (c)	Steam Generator	Steam Generator 2B Inlet Nozzle Safe-End to Pipe Weld	Limited scan due to material characteristics and single-sided access. Actual coverage obtained = 75% (See Attachment 4)	None

ASME Class 1 & 2 Inservice Inspection Request For Relief No. 00-001  
For Catawba Unit 2 Based on ASME Section XI - 1989 Code

Item No.	Exam Category /Figure No.	System Or Component	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B05.130.007	B-F IWB-2500-8 (c)	Steam Generator	Steam Generator 2B Outlet Nozzle Safe- End to Pipe Weld	Limited scan due to material characteristics and single-sided access. Actual coverage obtained = 75% (See Attachment 5)	None
C01.020.010	C-A IWC-2500-1 (a)	Volume Control Tank	Volume Control Tank Lower Head-to- Shell Weld	Limited scan due to proximity of four support legs. Actual coverage obtained = 88.34% (See Attachment 6)	None

DUKE POWER COMPANY										Exam Start: 1010		Form NDE-UT-2A	
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS										Exam Finish: 1035		Revision 4	
Station: Catawba			Unit: 2		Component/Weld ID: 2SGB-INLET-SE					Date: 3/16/00			
Weld Length (in.): 97.3			Surface Condition: AS GROUND			Lo: 9.1.1.1		Surface Temperature: 91 ° F					
Examiner: Marion T. Weaver <i>Marion T. Weaver</i> Level: II			Scans: 45 <input checked="" type="checkbox"/> 63* dB    70 <input type="checkbox"/> _____ dB 45T <input checked="" type="checkbox"/> 63.5** dB    70T <input type="checkbox"/> _____ dB 60 <input type="checkbox"/> _____ dB 60T <input type="checkbox"/> _____ dB Other: _____ dB					Pyrometer S/N: MCNDE 27205					
Examiner: James L. Panel <i>James L. Panel</i> Level: II								Cal Due: 7/26/00					
Procedure: NDE-610 Rev: 4 FC: *								Configuration: Nozzle to Safe End					
Calibration Sheet No: 0002037, 0002038								S2 _____ Flow _____ S1 _____					
								SAFE END to NOZZLE					
								Scan Surface: OD					
								Applies to NDE-680 only					
								Skew Angle: N/A					

IND #	4	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
						20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA	20%dac HMA				
						50%dac	50%dac	50%dac	50%dac	50%dac	50%dac				
						100%dac	100%dac	100%dac	100%dac	100%dac	100%dac				
NRI	45°														

Remarks: FC 97-01,98-20 * Scanned at Ref. +10 dB due to signal to noise ratio. ** Scanned at ref. +1 dB due to signal to noise ratio.			
Limitations: (see NDE-UT-4) <input type="checkbox"/> 90% or greater coverage obtained: yes <input checked="" type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet 1 of 4
Reviewed By: <i>Aug L. Bibb</i>	Level: TII	Date: 3-18-00	Authorized Inspector: <i>Robert M. Hill</i> Date: 3-28-00
			Item No: B05.070.003

REQUEST FOR RELIEF #00-001 ATTACHMENT 2

4/18/00

# DUKE POWER COMPANY

## ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2SGB-INLET-SE

Item No: B05.070.003

Remarks:

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☒ 1   ☐ 2      ☐ 1   ☒ 2   ☐ cw   ☐ ccw  
 FROM L   N/A   to L   N/A   INCHES FROM WO   1.5"   to   BEYOND    
 ANGLE: ☐ 0   ☒ 45   ☐ 60   ☐ Other        FROM   0   DEG to   360   DEG

DUE TO NOZZLE CONFIGURATION

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

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

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

Prepared By:

*Larry Maudlin*

Level:

*III*

Date:

*3-16-00*

Sketch(s) attached

☒ yes

☐ no

Sheet

*2* of *4*

Reviewed By:

*Larry L. Bell*

Date:

*3-18-00*

Authorized Inspector:

*Robert M. Smith*

Date:

*3-28-00*

*4/18/00*

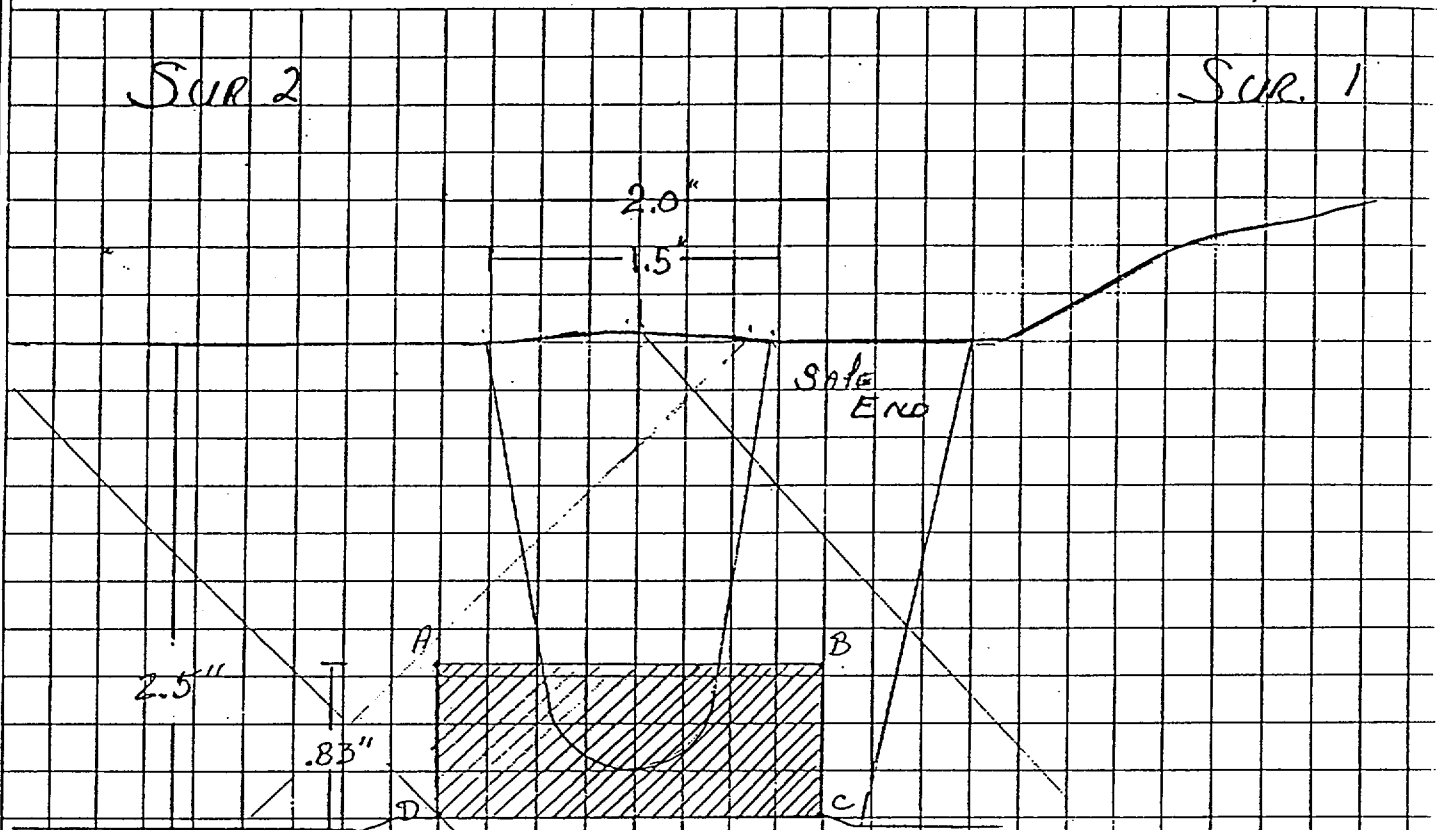
<b>DUKE POWER COMPANY</b> <b>Limited Examination Coverage Worksheet</b>						NDE-91-1	
						Revision 0	
<b>Examination Volume/Area Defined</b>							
<input checked="" type="checkbox"/> Base Metal <input checked="" type="checkbox"/> Weld <input type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius							
Area Calculation				Volume Calculation			
.83" X 2.0" = 1.66 sq. in.				1.66 sq. in. X 116" = 192.56 cu. in.			
<b>Coverage Calculations</b>							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	2	0	116	0	192.56	0.00
2	45	1	1.66	116	192.56	192.56	100.00
3	45	CW	1.66	116	192.56	192.56	100.00
4	45	CCW	1.66	116	192.56	192.56	100.00

(Volume Examined) 577.68 / (Volume Required) 770.24 X 100 = 75% Coverage

		Item No: B05.070.003
Prepared By: <i>Larry Mauldin</i>	Level: <i>III</i>	Date: <i>3-16-00</i>
Reviewed By: <i>Larry S. Bell</i>	Level: <i>III</i>	Date: <i>3-18-00</i>

*OK*  
*4/18/00*

Station CATAWBA Unit 2 Rev. \_\_\_\_\_ File No. \_\_\_\_\_ Sheet 4 Of 4  
 Subject LIMITED EXAM  
2.SGB-INLET-SE By Randy Mauldin Date 3-16-00  
 Prob No. BOS. 070. 003 Checked By Larry L. Bibb Date 3-18-00



CROSS SECTIONAL AREA

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

EXAM AREA:

$$ABCD = .83" \times 2.0" = 1.66 \text{ sq. in.}$$

CRG  
 3/18/00



<b>DUKE POWER COMPANY</b>										Exam Start: 1036		Form NDE-UT-2A				
<b>ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS</b>										Exam Finish: 1059		Revision 4				
Station: Catawba			Unit: 2		Component/Weld ID: 2SGB-OUTLET-SE						Date: 3/16/00					
Weld Length (in.): 97.3			Surface Condition: AS GROUND				Lo: 9.1.1.1		Surface Temperature: 91 ° F							
Examiner: Marion T. Weaver <i>Marion T. Weaver</i> Level: II			Scans: 45 <input checked="" type="checkbox"/> 63* dB    70 <input type="checkbox"/> _____ dB 45T <input checked="" type="checkbox"/> 63.5** dB    70T <input type="checkbox"/> _____ dB 60 <input type="checkbox"/> _____ dB 60T <input type="checkbox"/> _____ dB Other: _____ dB						Pyrometer S/N: MCNDE 27205							
Examiner: James L. Panel <i>James L. Panel</i> Level: II									Cal Due: 7/26/00							
Procedure: NDE-610 Rev: 4									FC: *				Configuration: Nozzle to Safe End			
Calibration Sheet No: 0002037, 0002038													S2 Flow S1 NOZZLE to SAFE END Scan Surface: OD Applies to NDE-680 only Skew Angle: N/A			

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

Remarks: FC 97-01, 98-20 * Scanned at Ref. +10 dB due to signal to noise ratio. ** Scanned at ref. +1 dB due to signal to noise ratio.			
Limitations: (see NDE-UT-4) <input type="checkbox"/> 90% or greater coverage obtained: yes <input checked="" type="checkbox"/> no <input checked="" type="checkbox"/> <i>add 3-18-00</i>			Sheet 1 of 4
Reviewed By: <i>Aug L. Bell</i>	Level: III	Date: 3-18-00	Authorized Inspector: <i>Robert McMill</i> Date: 3-28-00 Item No: B05.070.004

REQUEST FOR RELIEF #00-001 ATTACHMENT 3

*Q70*  
4/18/00

# DUKE POWER COMPANY

## ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2SGB-OUTLET-SE

Item No: B05.070.004

Remarks:

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☐ 1 ☒ 2      ☒ 1 ☐ 2 ☐ cw ☐ ccw  
 FROM L   N/A   to L   N/A   INCHES FROM WO   1.5"   to   BEYOND    
 ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other            FROM   0   DEG to   360   DEG

DUE TO NOZZLE CONFIGURATION

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

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

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

Prepared By: Larry Maalder      Level: III      Date: 3-16-00      Sketch(s) attached ☒ yes ☐ no      Sheet 2 of 4

Reviewed By: Larry S. Bill      Date: 3-18-00      Authorized Inspector: Robert McNeil      Date: 3-28-00

*Handwritten signature and date: 4/18/00*

<b>DUKE POWER COMPANY</b> <b>Limited Examination Coverage Worksheet</b>	NDE-91-1
	Revision 0

<b>Examination Volume/Area Defined</b> <input checked="" type="checkbox"/> Base Metal <input checked="" type="checkbox"/> Weld <input type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius	
<b>Area Calculation</b> .83" X 2.0" = 1.66 sq. in.	<b>Volume Calculation</b> 1.66 sq. in. X 116" = 192.56 cu. in.

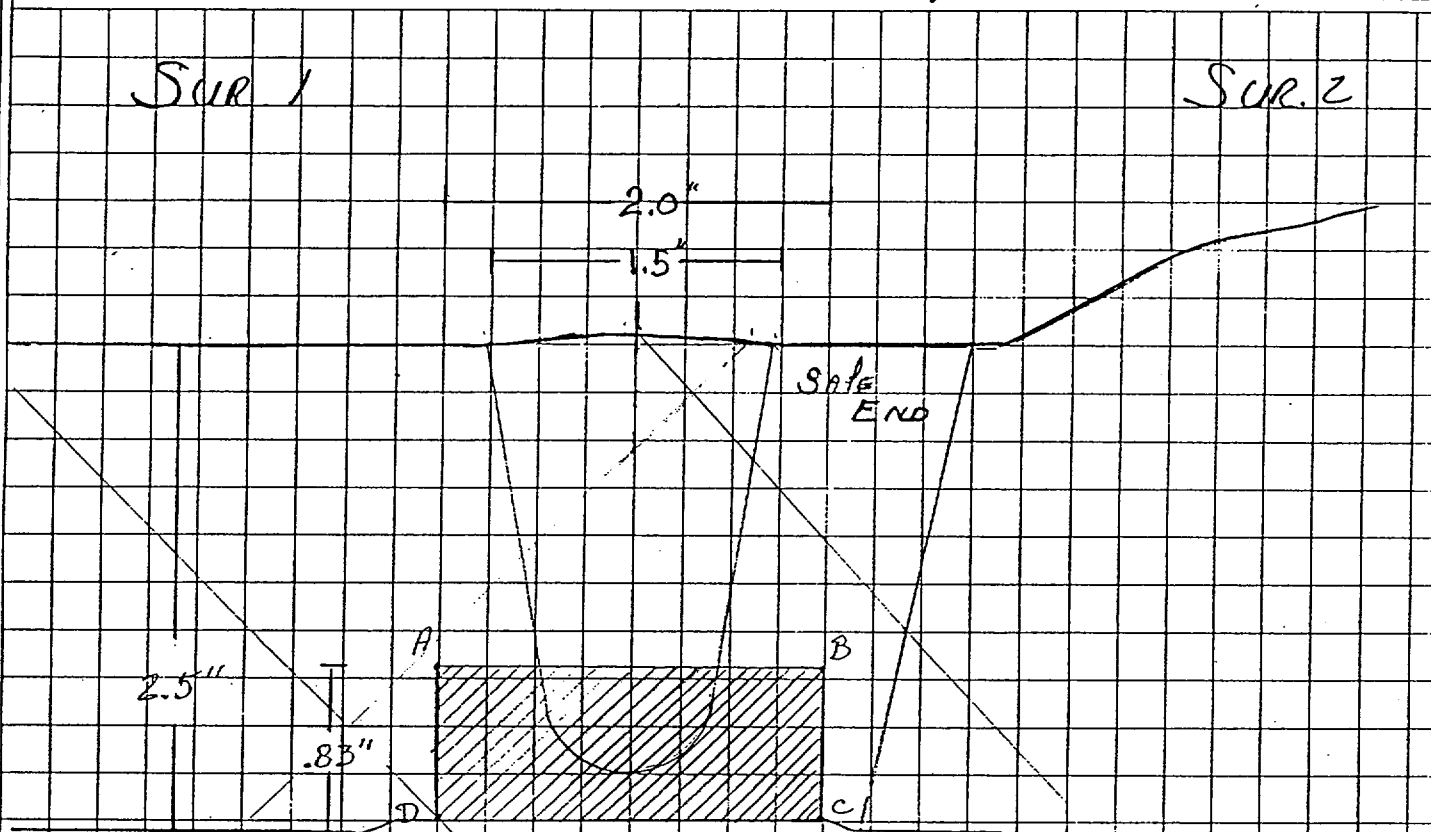
Coverage Calculations							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	2	1.66	116	192.56	192.56	100.00
2	45	1	0	116	0	192.56	0.00
3	45	CW	1.66	116	192.56	192.56	100.00
4	45	CCW	1.66	116	192.56	192.56	100.00

(Volume Examined) 577.68 / (Volume Required) 770.24 X 100 = 75% Coverage

		Item No:	B05.070.004
Prepared By:	<i>Larry Mauldin</i>	Level:	<i>III</i>
Date:	<i>3-16-00</i>		
Reviewed By:	<i>Larry S. Bill</i>	Level:	<i>III</i>
Date:	<i>3-18-00</i>		

*JOC*  
*4/18/00*

Station CATAWBA Unit 2 Rev. \_\_\_\_\_ File No. \_\_\_\_\_ Sheet 4 Of 4  
 Subject LIMITED EXAM  
25GB-OUTLET-SE By Larry Naulton Date 3-16-00  
 Prob No. 305.070.004 Checked By Larry L. Bell Date 3-18-00



CROSS SECTIONAL AREA

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

EXAM AREA:

$$ABCD = .83" \times 2.0" = 1.66 \text{ sq. in.}$$

*[Signature]*  
 3/18/00

<b>DUKE POWER COMPANY</b>										Exam Start: 1010		Form NDE-UT-2A	
<b>ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS</b>										Exam Finish: 1035		Revision 4	
Station: Catawba			Unit: 2		Component/Weld ID: 2NC11-02						Date: 3/16/00		
Weld Length (in.): 97.3			Surface Condition: AS GROUND				Lo: 9.1.1.1		Surface Temperature: 91 ° F				
Examiner: Marion T. Weaver <i>Marion T. Weaver</i>			Level: II		Scans: 45 <input checked="" type="checkbox"/> 63* dB    70 <input type="checkbox"/> _____ dB 45T <input checked="" type="checkbox"/> 63.5** dB    70T <input type="checkbox"/> _____ dB 60 <input type="checkbox"/> _____ dB 60T <input type="checkbox"/> _____ dB Other: _____ dB				Pyrometer S/N: MCNDE 27205				
Examiner: James L. Panel <i>James L. Panel</i>			Level: II						Cal Due: 7/26/00				
Procedure: NDE-610    Rev: 4			FC: *						Configuration: Safe End to Pipe				
Calibration Sheet No: 0002037, 0002038									S2 _____ Flow _____ S1 _____				
									PIPE _____ to _____ SAFE END				
									Scan Surface: OD				
									Applies to NDE-680 only				
									Skew Angle: N/A				

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

Remarks: FC 97-01, 98-20 * Scanned at Ref. +10 dB due to signal to noise ratio. ** Scanned at ref. +1 dB due to signal to noise ratio.			
Limitations: (see NDE-UT-4) <input type="checkbox"/> 90% or greater coverage obtained: yes <input checked="" type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet 1 of 4
Reviewed By: <i>Larry S. Babb</i>	Level: III	Date: 3-18-00	Authorized Inspector: <i>Robert McNeil</i> Date: 3-28-00 Item No: B05.130.006

REQUEST FOR RELIEF # 00-001 ATTACHMENT 4

*QC*  
4/18/00

# DUKE POWER COMPANY ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2NC11-02

Item No: B05.130.006

Remarks:

☒ NO SCAN                      SURFACE                      BEAM DIRECTION  
☐ LIMITED SCAN                      ☒ 1   ☐ 2                      ☐ 1 ☒ 2   ☐ cw   ☐ ccw  
 FROM L   N/A   to L   N/A   INCHES FROM WO   1.5"   to   BEYOND    
 ANGLE: ☐ 0   ☒ 45   ☐ 60   ☐ Other            FROM   0   DEG to   360   DEG

DUE TO NOZZLE CONFIGURATION

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

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

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

Prepared By: Larry McQuinn

Level: III

Date: 3-16-00

Sketch(s) attached ☒ yes   ☐ no

Sheet 2 of 4

Reviewed By: Larry S. Bell

Date: 3-18-00

Authorized Inspector: Robert McNeil

Date: 3-28-00

*Handwritten signature and date:*  
4/18/00

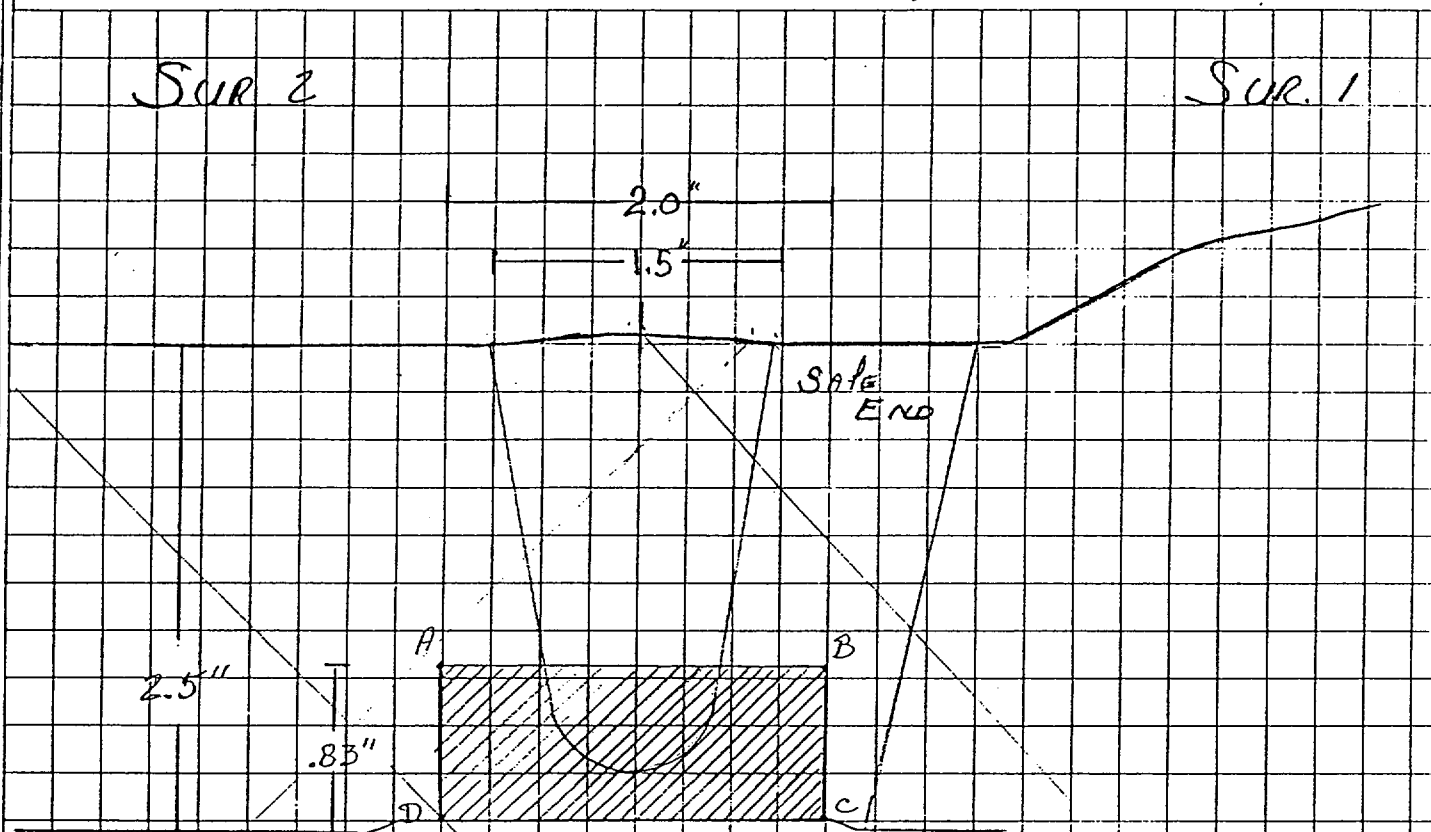
<b>DUKE POWER COMPANY</b> <b>Limited Examination Coverage Worksheet</b>						NDE-91-1	
						Revision 0	
<b>Examination Volume/Area Defined</b>							
<input checked="" type="checkbox"/> Base Metal <input checked="" type="checkbox"/> Weld <input type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius							
Area Calculation				Volume Calculation			
.83" X 2.0" = 1.66 sq. in.				1.66 sq. in. X 116" = 192.56 cu. in.			
<b>Coverage Calculations</b>							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	2	0	116	0	192.56	0.00
2	45	1	1.66	116	192.56	192.56	100.00
3	45	CW	1.66	116	192.56	192.56	100.00
4	45	CCW	1.66	116	192.56	192.56	100.00

(Volume Examined) 577.68 / (Volume Required) 770.24 X 100 = 75% Coverage

		Item No: B05.130.006
Prepared By: <i>Rory Maudlin</i>	Level: <i>III</i>	Date: <i>3-16-00</i>
Reviewed By: <i>Greg S. Bibb</i>	Level: <i>III</i>	Date: <i>3-18-00</i>

*Doc*  
*4/18/00*

Station CATAWBA Unit 2 Rev. \_\_\_\_\_ File No. \_\_\_\_\_ Sheet 4 Of 4  
 Subject LIMITED EXAM  
2NC11-02 By Larry Maults Date 3-16-00  
 Prob No. B05.130.006 Checked By Suz L. Bell Date 3-18-00



CROSS SECTIONAL AREA

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

EXAM AREA:

$$ABCD = .83" \times 2.0" = 1.66 \text{ sq. in.}$$

*[Signature]*  
 4/18/00



<b>DUKE POWER COMPANY</b>										Exam Start: 1036		Form NDE-UT-2A	
<b>ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS</b>										Exam Finish: 1059		Revision 4	
Station: Catawba			Unit: 2		Component/Weld ID: 2NC11-03						Date: 3/16/00		
Weld Length (in.): 97.3			Surface Condition: AS GROUND				Lo: 9.1.1.1		Surface Temperature: 91 ° F				
Examiner: Marion T. Weaver <i>Marion T. Weaver</i> Level: II			Scans: 45 <input checked="" type="checkbox"/> 63* dB    70 <input type="checkbox"/> _____ dB 45T <input checked="" type="checkbox"/> 63.5** dB    70T <input type="checkbox"/> _____ dB 60 <input type="checkbox"/> _____ dB 60T <input type="checkbox"/> _____ dB Other: _____ dB				Pyrometer S/N: MCNDE 27205						
Examiner: James L. Panel <i>James L. Panel</i> Level: II							Cal Due: 7/26/00						
Procedure: NDE-610 Rev: 4							Configuration: Safe End to Pipe						
Calibration Sheet No: 0002037, 0002038			FC: *		S2 _____ Flow _____ S1 _____								
					SAFE END to PIPE								
					Scan Surface: OD								
					Applies to NDE-680 only								
					Skew Angle: N/A								

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

Remarks: FC 97-01, 98-20 * Scanned at Ref. +10 dB due to signal to noise ratio. ** Scanned at ref. +1 dB due to signal to noise ratio.			
Limitations: (see NDE-UT-4) <input type="checkbox"/> 90% or greater coverage obtained: yes <input checked="" type="checkbox"/> no <input checked="" type="checkbox"/>			Sheet 1 of 4
Reviewed By: <i>Aug L. Babb</i>	Level: <i>III</i>	Date: <i>3-18-00</i>	Authorized Inspector: <i>Robert McNeil</i> Date: <i>3-28-00</i>
			Item No: B05.130.007

*REQUEST FOR RELIEF #00-001 ATTACHMENT 5*

*3/18/00*

# DUKE POWER COMPANY

## ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2NC11-03

Item No: B05.130.007

Remarks:

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☐ 1 ☒ 2      ☒ 1 ☐ 2 ☐ cw ☐ ccw  
 FROM L   N/A   to L   N/A   INCHES FROM WO   1.5"   to   BEYOND    
 ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other            FROM   0   DEG to   360   DEG

DUE TO NOZZLE CONFIGURATION

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

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

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

Prepared By: Randy Mauldin      Level: III      Date: 3-16-00      Sketch(s) attached ☒ yes ☐ no      Sheet 2 of 4

Reviewed By: Doug L. Bebb      Date: 3-18-00      Authorized Inspector: Robert M. Hill      Date: 3-28-00

*Handwritten signature and date:*  
4/18/00

<b>DUKE POWER COMPANY</b> <b>Limited Examination Coverage Worksheet</b>						NDE-91-1	
						Revision 0	
<b>Examination Volume/Area Defined</b>							
<input checked="" type="checkbox"/> Base Metal <input checked="" type="checkbox"/> Weld <input type="checkbox"/> Near Surface <input type="checkbox"/> Bolting <input type="checkbox"/> Inner Radius							
Area Calculation				Volume Calculation			
.83" X 2.0" = 1.66 sq. in.				1.66 sq. in. X 116" = 192.56 cu. in.			
<b>Coverage Calculations</b>							
Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	2	1.66	116	192.56	192.56	100.00
2	45	1	0	116	0	192.56	0.00
3	45	CW	1.66	116	192.56	192.56	100.00
4	45	CCW	1.66	116	192.56	192.56	100.00

(Volume Examined) 577.68 / (Volume Required) 770.24 X 100 = 75% Coverage

Item No: B05.130.007	
Prepared By: <i>Larry Mauldin</i>	Level: <i>III</i> Date: <i>3-16-00</i>
Reviewed By: <i>Larry S. Bibb</i>	Level: <i>III</i> Date: <i>3-18-00</i>

*Joe*  
*4/18/00*

Station CATAWBA Unit 2 Rev. \_\_\_\_\_ File No. \_\_\_\_\_ Sheet 4 Of 4  
 Subject LIMITED EXAM  
2 NC 11-03 By Larry Mumbie Date 3-16-00  
 Prob No. BOS. 130.007, Checked By Larry S. Bell Date 3-18-00

SUR 1

SUR. 2

2.0"

1.5"

SAFE  
END

A

B

2.5"

.83"

D

C

CROSS SECTIONAL AREA

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

EXAM AREA:

$$ABCD = .83" \times 2.0" = 1.66 \text{ sq. in.}$$

1/10/00  
 [Signature]

DUKE POWER COMPANY										Exam Start: 1027		NDE-UT-3A		
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS										Exam Finish: 1047		Revision 2		
Station: Catawba			Unit: 2		Component/Weld ID: 2VCT-LH-SH						Date: 3/22/00			
Nominal Material Thickness (in): 0.312				Weld Length (in.): 282.7				Surface Temperature: 82° Deg F						
Measured Material Thickness (in): .241				Lo: 9.2.1				Pyrometer S/N: MCNDE 27205						
Surface Condition: AS GROUND				Calibration Sheet No: 0002053				Cal Due: 7/26/00						
Examiner: Larry Mauldin <i>Larry Mauldin</i> Level: III								Configuration: Head to Shell						
Examiner: James L. Panel <i>James L. Panel</i> Level: II								S2 Flow S1						
Procedure: NDE-640 Rev: 1 FC: *								HEAD to SHELL						
IND NO.	4	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
NRI	0°													

Remarks: *FC 95-18, 95-19		
Limitations: see NDE-UT-4 <input checked="" type="checkbox"/> None: <input type="checkbox"/>		Sheet <u>1</u> of <u>11</u>
Reviewed By: <i>Larry L. Bell</i> Level: <i>III</i> Date: <i>3-24-00</i>	Authorized Inspector: <i>Robert McNeil</i> Date: <i>3-28-00</i>	Item No: C01.020.010

REQUEST FOR RELIEF #00-001 ATTACHMENT 6

*Joe*  
*4/19/00*

DUKE POWER COMPANY  
UT PROFILE/PLOT SHEET

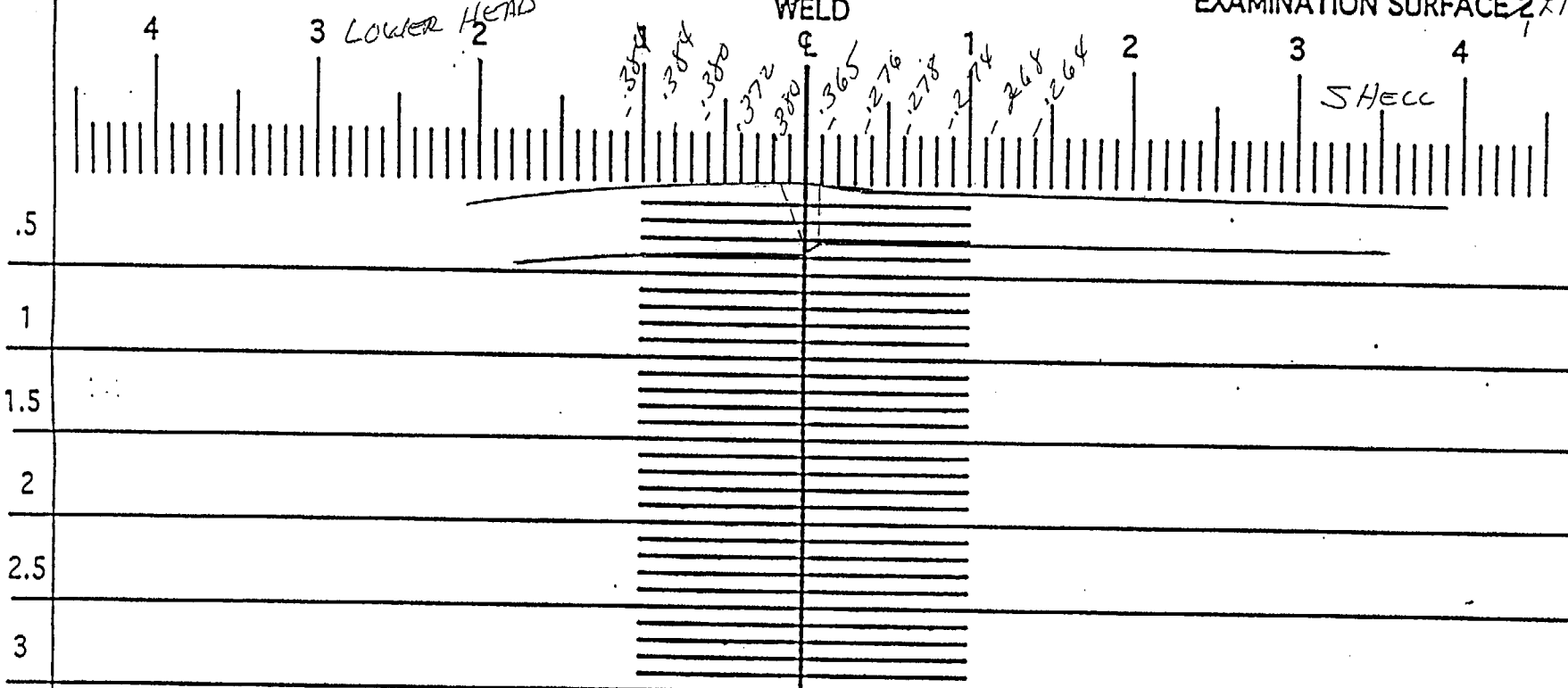
NDE-UT-5

Revision 1

EXAMINATION SURFACE 1  $\frac{1}{2}$ "

WELD

EXAMINATION SURFACE 2  $\frac{1}{2}$ "



Component ID/Weld No. 2 VCT-LH-SH

Remarks:

Examiner:

*Ray McQuinn*

Item No:

CO1.020.010

Level: III

Date: 3-22-00

Reviewed By:

*Greg A. Bello*

Level: III

Date: 3-24-00

Authorized Inspector:

*Robert M. Smith*

Date: 3-28-00

270

Profile taken  
at: 0° - 10"

90

180 Sheet 2 of 11

*760*  
*4/17/00*

DUKE POWER COMPANY										Exam Start: 1050		Form NDE-UT-2A	
ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS										Exam Finish: 1150		Revision 4	
Station: Catawba			Unit: 2		Component/Weld ID: 2VCT-LH-SH					Date: 3/22/00			
Weld Length (in.): 282.7			Surface Condition: AS GROUND			Lo: 9.2.1		Surface Temperature: 82 ° F					
Examiner: Larry Mauldin <i>Larry Mauldin</i> Level: III			Scans: 45 <input checked="" type="checkbox"/> 45 dB 70 <input type="checkbox"/> _____ dB 45T <input checked="" type="checkbox"/> 42 dB 70T <input type="checkbox"/> _____ dB 60 <input type="checkbox"/> _____ dB 60T <input type="checkbox"/> _____ dB Other: _____ dB					Pyrometer S/N: MCNDE 27205					
Examiner: James L. Panel <i>James L. Panel</i> Level: II								Cal Due: 7/26/00					
Procedure: NDE-630 Rev: 2								Configuration: Head to Shell					
FC: 99-02								S2 Flow S1					
Calibration Sheet No: 0002053, 0002054, 0002055								Lower Head to Shell					
								Scan Surface: OD					
								Applies to NDE-680 only					
								Skew Angle: N/A					


  

IND #	<input checked="" type="checkbox"/>	Max % Ref	Mp Max	W Max	L Max	L1	L2	W1	Mp1	W2	Mp2	Beam Dir.	Exam Surf.	Scan	Damps
		DO NOT WRITE I 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 I THIS SPACE			
1	45°	70	.363	.1	272"	360°	INT.					1	2	AX	NO
2	45°	45	1.3	.9	272"	360°	INT.					1	2	AX	NO
3	45°	25	.384	.45	272"	360°	INT.					2	1	AX	NO

Remarks:	
Limitations: (see NDE-UT-4) <input checked="" type="checkbox"/> 90% or greater coverage obtained: yes <input type="checkbox"/> no <input checked="" type="checkbox"/>	
Reviewed By: <i>Larry L. Bibb</i>	Level: <i>III</i> Date: <i>3-24-00</i>
Authorized Inspector: <i>Robert McFarland</i>	Date: <i>3-28-00</i>
Item No: C01.020.010	

*QAC*  
*3/19/00*

DUKE POWER COMPANY ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS (continuation)													Form NDE-UT-2B			
													Revision 3			
Station: Catawba					Unit: 2		Component/Weld ID: 2VCT-LH-SH						Date: 3/22/00			
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 IN THIS SPACE		WRITE SPACE	
4	45°	32	1.15	1.05	272"	360°	INT.					2	1	AX	NO	

Examiner: Larry Mauldin <i>Larry Mauldin</i>			Level: III		Examiner: James L. Panel <i>James L. Panel</i>			Level: II	
Remarks:								Sheet <u>4</u> of <u>11</u>	
Reviewed By:		Level:		Date:		Authorized Inspector:		Date:	
<i>Greg S. Bell</i>		III		3-24-00		<i>Robert McNeil</i>		3-28-00	
Item No:								C01.020.010	

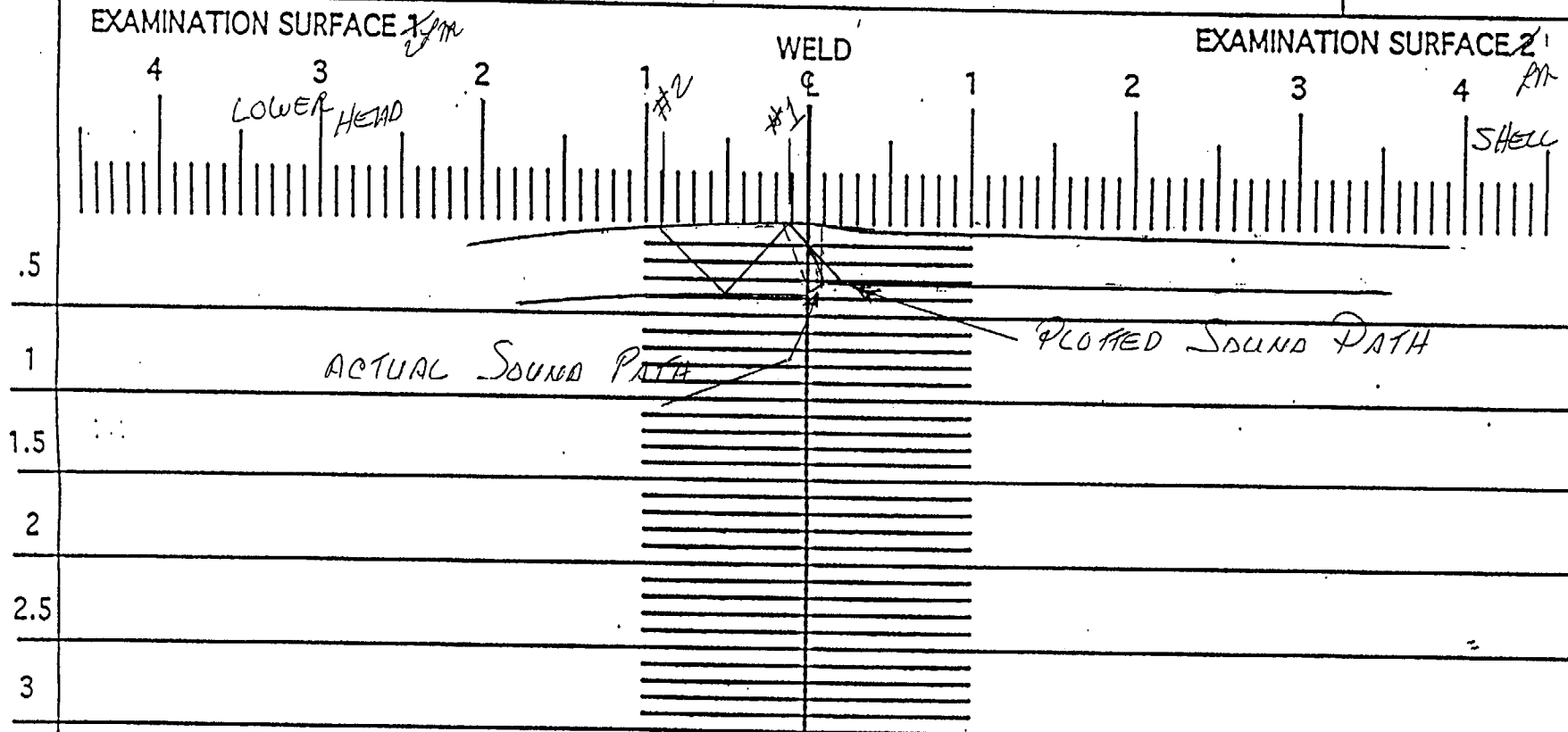
*QAC*  
*4/9/00*



DUKE POWER COMPANY  
UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



Component ID/Weld No. *2 VCT-LH-SH*

Remarks: *INDICATIONS 1 & 2 ARE SAME INDICATION*

Examiner: *Larry Moulden*

Reviewed By: *Shirley L. Bell*

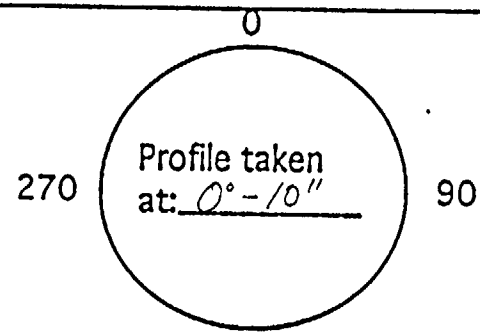
Authorized Inspector: *Robert M. Bell*

Item No: *COI. 020. 010*

Level: *III* Date: *3-22-00*

Level: *IV* Date: *3-24-00*

Date: *3-28-00*



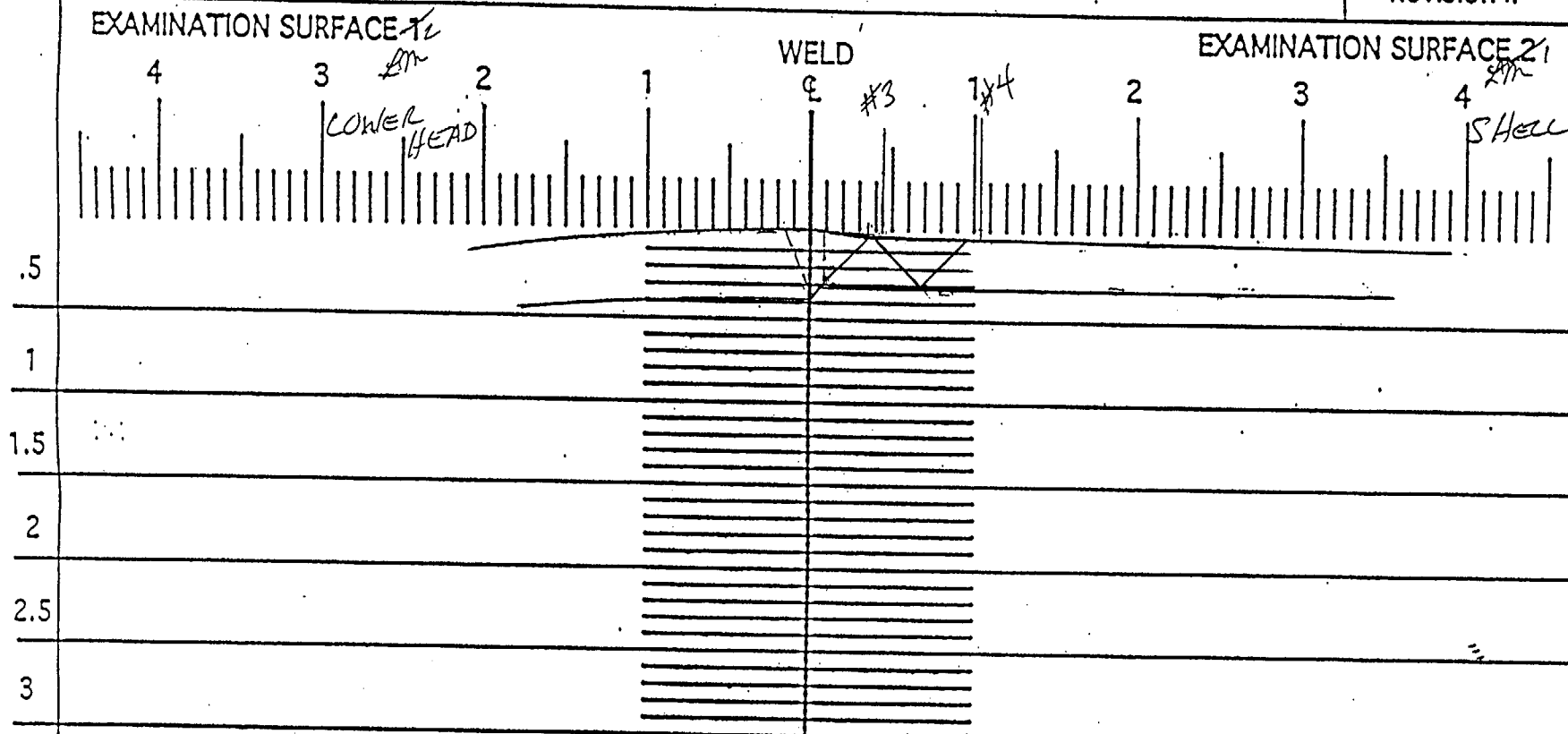
Sheet *5* of *11*

*Joe*  
*4/19/00*

DUKE POWER COMPANY  
UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



Component ID/Weld No. 2 VCT-LH-SH

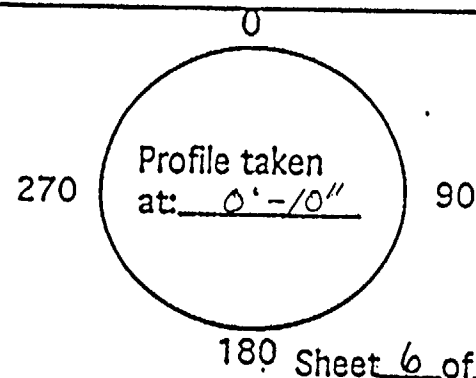
Remarks: INDICATIONS 3 & 4 ARE SAME INDICATION

Examiner: Larry Thoniller Item No: COI. 020.010

Reviewed By: Ray L. Burt Level: III Date: 3-22-00

Authorized Inspector: Robert Miller Level: III Date: 3-24-00

Date: 3-28-00



Sheet 6 of 11

Joe  
4/19/00

**DUKE POWER COMPANY**  
**ULTRASONIC INDICATION RESOLUTION SHEET**

Form NDE-UT-8

Revision 1

Acceptance Standard:

AFTER PLOTTING INDICATIONS #1 & #2 WERE DETERMINED TO BE THE SAME INDICATION. THIS INDICATION IS A GEOMETRIC REFLECTOR DUE TO THE REDIRECTION OF THE SHEAR WAVE CAUSED BY THE AUSTENITIC WELD MATERIAL BENDING THE SOUND TO THE WELD/BASE MATERIAL INTERFACE. AFTER PLOTTING INDICATIONS #3 & #4 WERE DETERMINED TO BE THE SAME INDICATION. THIS INDICATION IS A GEOMETRIC REFLECTOR DUE TO WELD/BASE INTERFACE. ALL INDICATIONS WERE CONFIRMED BY THE USE OF MULTIPLE ANGLES. 45° & 60° SHEAR SIGNAL WOULD NOT HOLD A SKEW. 60° RL WOULD NOT SHOW AND REFLECTORS NEITHER WOULD THE WSY-70.

Item No: C01.020.010

Acceptable Indications: #1, #2, #3, #4

Rejectable Indications:

These indications have been compared with previous ultrasonic data    ☐ Yes    ☒ No previous data available

Examiner:

Larry Mauldin

Level:

III

Date:

3/22/00

Sheet 7 of 11

Reviewer:

*Larry L. Bill*

Level:

III

Date:

3-24-00

Authorized Inspector:

*Robert M. Miller*

Date:

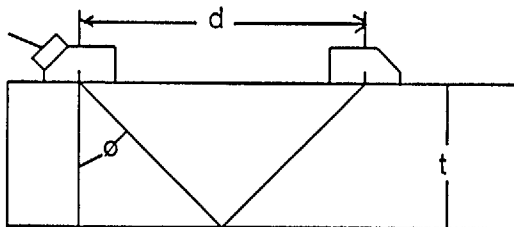
3-28-00

*1/1/01*

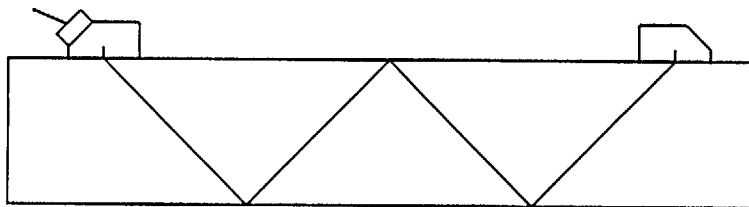
**DUKE POWER COMPANY**  
**ULTRASONIC BEAM ANGLE MEASUREMENT RECORD**

Form NDE-UT-9

Revision 3



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



For thin wall pipe use 2nd Vee path

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

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

Pipe Size:           90.0"          

Pipe Schedule:    NA (.312)   

Nominal 45 deg: d=   0.5   ; t=  0.242  ; measured angle=  45.93  deg

Nominal 60 deg: d=   0   ; t=   0   ; measured angle=  0.00  deg

Nominal 70 deg: d=   0   ; t=   0   ; measured angle=  0.00  deg

Item No.  
C01.020.010

Examiner Larry Mauldin	Level III	Date 3/22/00	Examiner James L. Panel	Level II	Date 3/22/00
Reviewed By L. L. Bibb	Level III	Date 3-24-00	Authorized Inspector Robert M. [Signature]	Date 3-28-00	

# DUKE POWER COMPANY

## ISI LIMITATION REPORT

FORM NDE-UT-4

Revision 1

Component/Weld ID: 2VCT-LH-SH

Item No: C01.020.010

Remarks:

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☒ 1   ☒ 2      ☒ 1   ☒ 2   ☒ cw   ☒ ccw  
 FROM L 31.21" to L 39.46"      INCHES FROM WO N/A to N/A  
 ANGLE: ☒ 0   ☒ 45   ☐ 60   ☐ Other      FROM 39.75 DEG to 50.25 DEG

SUPPORT LEG 8.25" WIDE

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☒ 1   ☒ 2      ☒ 1   ☒ 2   ☒ cw   ☒ ccw  
 FROM L 101.90" to L 110.15"      INCHES FROM WO N/A to N/A  
 ANGLE: ☒ 0   ☒ 45   ☐ 60   ☐ Other      FROM 129.75 DEG to 140.25 DEG

SUPPORT LEG 8.25" WIDE

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☒ 1   ☒ 2      ☒ 1   ☒ 2   ☒ cw   ☒ ccw  
 FROM L 172.59" to L 180.83"      INCHES FROM WO N/A to N/A  
 ANGLE: ☒ 0   ☒ 45   ☐ 60   ☐ Other      FROM 219.75 DEG to 230.25 DEG

SUPPORT LEG 8.25" WIDE

☒ NO SCAN      SURFACE      BEAM DIRECTION  
☐ LIMITED SCAN      ☒ 1   ☐ 2      ☒ 1   ☒ 2   ☒ cw   ☒ ccw  
 FROM L 243.27" to L 251.52"      INCHES FROM WO N/A to N/A  
 ANGLE: ☒ 0   ☒ 45   ☐ 60   ☐ Other      FROM 309.75 DEG to 320.25

SUPPORT LEG 8.25" WIDE

Prepared By: Larry Mauldin

Level: III

Date: 3-22-00

Sketch(s) attached ☒ yes   ☐ no

Sheet 9 of 11

Reviewed By: Greg L. Bulb

Date: 3-24-00

Authorized Inspector: Robert McNeil

Date: 3-28-00

*Handwritten initials and date:*  
JEC  
4/19/00

**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**

$1.4 / 2 (.360 + .330) = .483 \text{ SQ. IN.}$

**Volume Calculation**

$.483 \text{ SQ. IN.} \times 283 \text{ IN} = 136.69 \text{ CU. IN.}$

**Coverage Calculations**

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	1	.483	250	120.75	136.69	88.34
2	45	2	.483	250	120.75	136.69	88.34
3	45	CW	.483	250	120.75	136.69	88.34
4	45	CCW	.483	250	120.75	136.69	88.34
					483	546.76	88.34

Item No: C01.020.010

Prepared By: *Larry Mauldin*

Level: *III*

Date: *3-22-00*

Reviewed By: *Larry L. Bilal*

Level: *III*

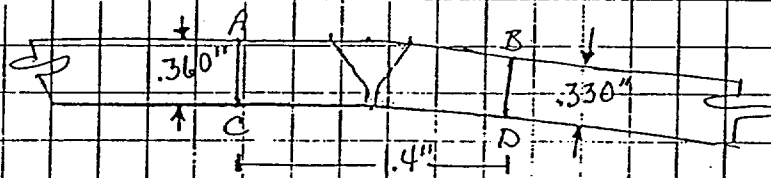
Date: *3-24-00*

*JAC*  
*4/19/00*

Station CATAXRA Unit 2 Rev. \_\_\_\_\_ File No. \_\_\_\_\_ Sheet 11 Of 11  
 Subject VOLUME CONTRA TANK LOWER HEAD TO SHELL  
I.D. # 2 VCT-LH-SH By Lenny Mander Date 3-22-00  
 Prob No. C01.020.010 Checked by Shy L Bell Date 3-24-00

INSPECTION AREA:

$$ABCD \quad \frac{1.4}{2} (.300 + .330) = .483 \text{ sq. in.}$$

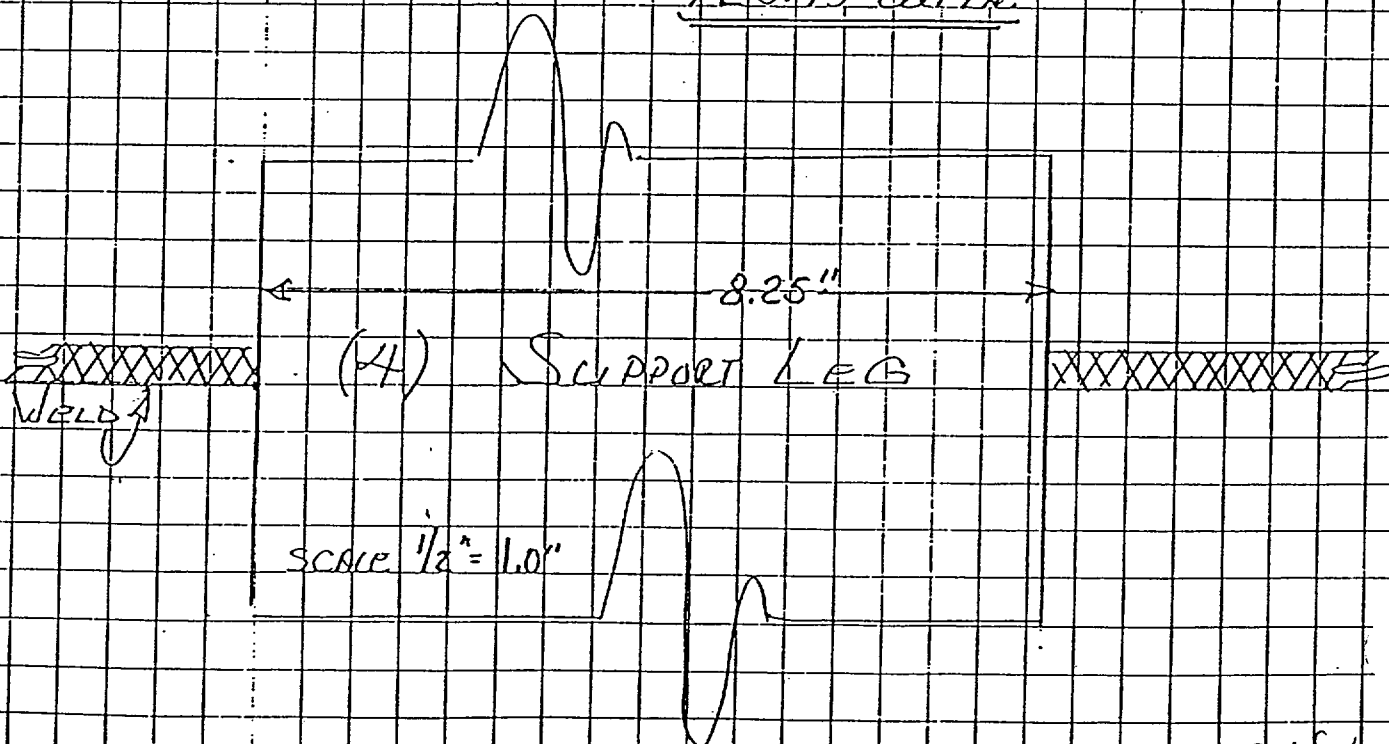


(WELD LENGTH)  $283 \text{ in.} \times .483 \text{ sq. in. (INSPECTION AREA)} = 136.689$   
WELD VOLUME 136.69 cu. in.

AREA NOT SCANNED  $8.25" \times 4 = 33 \text{ in.}$

$283" - 33" = 250" \text{ (LENGTH INSPECTED)}$

AREA INSPECTED:  $250 \text{ in.} \times .483 \text{ sq. in.} =$   
120.75 cu. in.



136.69  
3/24/00