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A Duke Energy Company

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November 28, 2001

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

Subject: Duke Energy Corporation
Catawba Nuclear Station, Unit 1
Docket Number 50-413
Request for Relief Number 01-001,
Revision 1
Limited Weld Examinations in End-of-Cycle 12
Refueling Outage

References:
1. Letter from Gary R. Peterson, Duke, to NRC, dated February 5, 2001
2. Letter from Gary R. Peterson, Duke, to NRC, dated August 23, 2001

Please find attached, pursuant to 10 CFR 50.4 and 10 CFR 50.55a(g)(5)(iii), Request for Relief Number 01-001, Revision 1. This Request for Relief was originally submitted via Reference 1. In Reference 2, Duke withdrew the original submittal of this Request for Relief following an August 22, 2001 conference call between Duke and NRC personnel and indicated that it would be resubmitted in its entirety. Therefore, Revision 1 of this Request for Relief supercedes the original submittal in its entirety. Duke is requesting that NRC review and approve Revision 1 of this Request for Relief at your earliest available opportunity.

There are no regulatory commitments contained in this letter or its attachment.

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

A001

Very truly yours,

Gary R. Peterson

LJR/s

Attachment

xc (with attachment):

L.A. Reyes, Regional Administrator
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61 Forsyth St., SW, Suite 23T85
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DUKE ENERGY CORPORATION

STATION: CATAWBA NUCLEAR STATION UNIT 1

10-YEAR INTERVAL REQUEST FOR RELIEF NO. 01-001, Revision 1

Duke Energy Corporation has determined that conformance with certain ASME Section XI Code requirements is impractical. Therefore, pursuant to 10CFR50.55a(g)(5)(iii), Duke Energy requests relief from applicable portions of the code.

Reference Attachment 1 for welds and components addressed by this relief request.

ASME Section XI Code of Record: 1989 Edition with no addenda

Interval: Second Ten-Year Interval; Second Inspection Period

Applicable Code Cases: N-460

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

ASME Section XI Code Class 1 Examination Category B-D Full Penetration Welds of Nozzles In Vessels; Nozzle Inside Radius Section

ID Number	Item Number	Configuration
1SGA-INLET	B03.140.001	Steam Generator (Primary Side) Nozzle Inside Radius Section
1SGA-OUTLET	B03.140.002	Steam Generator (Primary Side) Nozzle Inside Radius Section

II. Code Requirement:

ASME Section XI 1989 Edition, Examination Category B-D, Item No. B03.140, Figure IWB-2500-7 (d), Examination Volume M-N-O-P.

III. Code Requirement from which Relief is Requested:

Relief is being sought from the requirement to examine 100% of the volume M-N-O-P shown in Figure IWB-2500-7 (d).

IV. Basis for Relief:

During the ultrasonic examination of the Steam Generator 1A Inlet and Outlet Nozzle Inside Radius Sections, 1SGA-INLET and 1SGA-OUTLET shown in Attachments 2 and 3, respectively, 100% coverage of the required examination volume could not be obtained. The examination coverage was limited to 83.24%. Limitations are caused by the ratio of the nozzle O.D. to the vessel thickness. When the nozzle O.D. is small in relation to the vessel thickness, more coverage can be obtained when scanning from the vessel side. Conducting examinations from the nozzle boss and OD blend radius using compound angles, determining which angles to use, metal paths to calibrate and area of coverage are not accurate with manual calculations. Duke Energy is investigating the use of computer modeling to solve the limitation problems. Radiography is not practical because of the geometry of the component, which prevents placement of the film and exposure source. Nozzle inner radius sections were examined with the ultrasonic method to the maximum extent practical from the vessel wall. Calibration blocks and procedures were in accordance with ASME Section V, Article 4, Paragraph T-441.3.2.1. The volume was scanned using 60° and 70° beam angles in clock-wise and counter-clockwise directions.

V. Alternate Examinations or Testing:

No additional examinations are planned during the current interval for ID Numbers 1SGA-INLET and 1SGA-OUTLET. Duke Energy Corporation will use the most

effective NDE methods available to obtain maximum coverage for future examinations of these components.

VI. Justification for the Granting of Relief:

Although the Examination Volume M-N-O-P in Figure IWB-2500-7 (d) for ID Numbers 1SGA-INLET and 1SGA-OUTLET could not be covered, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. For results of the examinations, reference Attachments 2 and 3, respectively.

Steam Generator 1A Inlet and Outlet Nozzle Inner Radii 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 the 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 the aforementioned locations, the only corrective action would be shutdown and depressurize the reactor coolant system, since the components are non-isolable.

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. A 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 be 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.

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 1.

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

ASME Section XI Code Class 1 Examination Category B-F Pressure Retaining Dissimilar Metal Welds In Piping

ID Number	Item Number	Configuration
1SGA-INLET-W5SE	B05.070.001	Steam Generator NPS 4 or Larger Inlet Nozzle-to-Safe End Butt Weld
1SGA-OUT-W6SE	B05.070.002	Steam Generator NPS 4 or Larger Outlet Nozzle-to-Safe End Butt Weld

II. Code Requirement:

ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda as modified by Code Case N-460. "The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed from two sides of the weld, where practicable, or from one side of the weld, as a minimum."

III. Code Requirement from which Relief is Requested:

Relief is being sought from the requirement to provide coverage of the required examination volume in two-beam path directions.

IV. Basis for Relief:

During the ultrasonic examination of the Steam Generator 1A Inlet and Outlet Nozzle-to-Safe End Butt Welds; 1SGA-INLET-W5SE and 1SGA-OUT-W6SE shown in Attachments 4 and 5, respectively, 100% coverage of the required examination volume could not be obtained. The

examination coverage was limited to 75.00%. Austenitic weld metal characteristics and single sided access caused by the component geometry prevents two-beam path direction coverage of the examination volume. Obtaining coverage greater than 90% of the weld volume as defined in Code Case N-460, which is used by Duke Energy, is not possible.

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

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

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

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

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

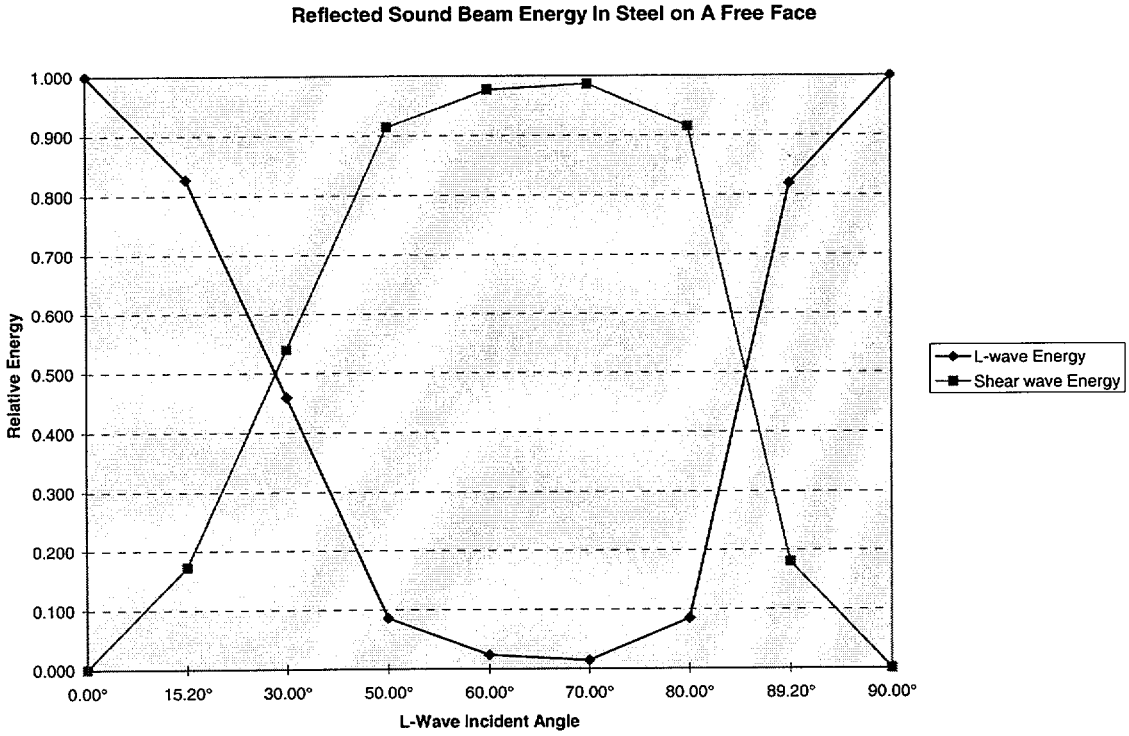
V_S is the shear wave velocity of the stainless steel safe end material in inches / msec.

V_L is the longitudinal wave velocity of the stainless steel safe 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[1]. 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]Firestone, F.A.: Tricks with the Supersonic Reflectoscope, J. Soc. Nondestructive Testing, vol. 7, no. 2, Fall 1948.



V. Alternate Examinations or Testing:

No additional examinations are planned during the current interval for ID Numbers 1SGA-INLET-W5SE and 1SGA-OUT-W6SE. Duke Energy Corporation will use the most effective NDE methods available to obtain maximum coverage for future examinations of these components.

VI. Justification for the Granting of Relief:

Although the examination volume coverage requirements as defined in ASME Section XI 1989 Edition with no addenda, Appendix III, Paragraph III-4420, for ID Numbers 1SGA-INLET-W5SE and 1SGA-OUT-W6SE, could not be covered, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. These welds were examined with an ultrasonic procedure and calibration blocks meeting the requirements of Appendix III. For results of the examinations, reference Attachments 4 and 5, respectively.

Steam Generator 1A Inlet and Outlet Nozzle-to-Safe End Welds 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 components are non-isolable.

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. A 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.

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 1.

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

ASME Section XI Code Class 2 Examination Category C-F-1 Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping; Circumferential Weld

ID Number	Item Number	Configuration
1NS1-1	C05.011.201	Containment Spray Pump 1A-to-Reducer Weld
1NS1-2	C05.011.202	Containment Spray Reducer-to-Flange Weld
1NS2-1	C05.011.203	Containment Spray Valve #1NS018A-to-Pipe Weld

II. Code Requirement:

ASME Section XI, 1989 Edition, Examination Category C-F-1, Item No. C05.11, Figure IWC-2500-7 (a), Examination Volume C-D-E-F.

III. Code Requirement from which Relief is Requested:

Relief is being sought from the requirement to examine 100% of the Volume C-D-E-F shown in Figure IWC-2500-7 (a).

IV. Basis for Relief:

C05.011.201, 1NS1-1, Containment Spray Pump 1A-to Reducer Weld

During the ultrasonic examination of this weld, greater than 90% of the required examination volume as allowed by Code Case N-460 could not be achieved. As shown in Attachment 6, the examination coverage was limited to 60% of the required examination volume. This is an austenitic stainless steel pump to reducer weld where access is limited to the reducer side of the weld only. The percentage of coverage reported represents the aggregate coverage obtained from one scan parallel to the pipe axis and two scans, 180^0 apart in the

circumferential direction on each weld. The weld design prevented any axial scan from the pump side. In order to achieve more coverage the weld would have to be re-designed to allow scanning from both sides.

Duke Energy Corporation does not claim credit for coverage of the far side of austenitic welds. The characteristics of austenitic weld metals attenuate and distort the sound beam when shear wave pass through the weld. Refracted longitudinal waves provide better penetration. Duke Energy Corporation uses a combination of shear waves and longitudinal waves to examine single sided austenitic welds. The procedures, personnel and equipment have been qualified through the Performance Demonstration Initiative (PDI). However, although longitudinal wave search units were used in the qualification and cracks were detected through the weld metal, PDI does not provide a qualification for single sided examinations of austenitic welds.

C05.011.202, 1NS1-2, Containment Spray Reducer-to-Flange Weld

During the ultrasonic examination of this weld, greater than 90% of the required examination volume as allowed by Code Case N-460 could not be achieved. As shown in Attachment 7, the examination coverage was limited to 59.06% of the required examination volume. This is an austenitic stainless steel reducer-to-flange weld where access is limited to the reducer side of the weld only. The percentage of coverage reported represents the aggregate coverage obtained from one scan parallel to the pipe axis and two scans, 180° apart in the circumferential direction on each weld. The weld design prevented any axial scan from the flange side. In order to achieve more coverage the weld would have to be re-designed to allow scanning from both sides.

Duke Energy Corporation does not claim credit for coverage of the far side of austenitic welds. The characteristics of austenitic weld metal attenuate and distort the sound beam when shear waves pass through the weld. Refracted longitudinal waves provide better penetration. Duke Energy Corporation uses a combination of shear waves and longitudinal waves to examine single sided austenitic welds. The procedures, personnel and equipment have been qualified through the Performance Demonstration Initiative (PDI). However,

although longitudinal wave search units were used in the qualification and cracks were detected through the weld metal, PDI does not provide a qualification for single sided examinations of austenitic welds.

C05.011.203, 1NS2-1, Containment Spray Valve #1NS018A-to-Pipe Weld

During the ultrasonic examination of this weld, greater than 90% of the required examination volume as allowed by Code Case N-460 could not be achieved. As shown in Attachment 8, the examination coverage was limited to 58.15% of the required examination volume. This is an austenitic stainless steel pipe-to-valve weld where access is limited to the pipe side of the weld only. The percentage of coverage reported represents the aggregate coverage obtained from one scan parallel to the pipe axis and two scans, 180° apart in the circumferential direction on each weld. The weld design prevented any axial scan from the valve side. In order to achieve more coverage the weld would have to be re-designed to allow scanning from both sides.

Duke Energy Corporation does not claim credit for coverage of the far side of austenitic welds. The characteristics of austenitic weld metal attenuate and distort the sound beam when shear waves pass through the weld. Refracted longitudinal waves provide better penetration. Duke Energy Corporation uses a combination of shear waves and longitudinal waves to examine single sided austenitic welds. The procedures, personnel and equipment have been qualified through the Performance Demonstration Initiative (PDI). However, although longitudinal wave search units were used in the qualification and cracks were detected through the weld metal, PDI does not provide a qualification for single sided examinations of austenitic welds.

V. Alternate Examinations or Testing:

No additional examinations are planned during the current interval for ID Numbers 1NS1-1, 1NS1-2 and 1NS2-1. Duke Energy Corporation will use the most effective NDE methods available to obtain maximum coverage for future examinations of these components.

VI. Justification for the Granting of Relief:

C05.011.201, 1NS1-1, Containment Spray Pump 1A-to-Reducer Weld

Although the Examination Volume C-D-E-F of Figure IWC-2500-7 (a) could not be covered, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. For results of this examination, reference Attachment 6.

Containment Spray Pump (NS System) 1A is used to control pressure inside the containment vessel during a safety injection with high containment pressure. This pump is not used for normal operation of the plant.

The area that contains this pump to reducer weld (small end of the reducer on the pump suction) is surveyed twice a day by Operations during their routine rounds. One of the items that must be checked off is for general condition of the room containing the pump. It is a reasonable expectation for the operator making these rounds to detect any external leaks from this weld.

The same area is also surveyed once a week by a periodic test that is used to specifically look for radioactive leaks outside containment. The area must be surveyed and signed off. If a leak were encountered, it would be written up in a work request and Problem Investigation Process (PIP) form filled out. The Fluid Leak Management Process then examines the leak. The leak is either repaired or set up for periodic monitoring. A leak in the NS system would also have to be entered into the Emergency Core Cooling System Leakage Program managed by Technical Specification 5.5.3.

C05.011.202, 1NS1-2, Containment Spray Pump Reducer-to-Flange Weld

Although the Examination Volume C-D-E-F of Figure IWC-2500-7 (a) could not be covered, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. For results of this examination, reference Attachment 7.

Containment Spray Pump (NS System) 1A is used to control pressure inside the containment vessel during a safety injection with high containment pressure. This pump is not used for normal operation of the plant.

The area that contains the reducer weld (large end of the reducer to pump flange) is surveyed twice a day by Operations during their routine rounds. One of the items that must be checked off is for general condition of the room containing the reducer. It is a reasonable expectation for the operator making these rounds to detect any external leaks from this weld.

The same area is also surveyed once a week by a periodic test that is used to specifically look for radioactive leaks outside containment. The area must be surveyed and signed off. If a leak were encountered, it would be written up in a work request and Problem Investigation Process (PIP) form filled out. The Fluid Leak Management Process then examines the leak. The leak is either repaired or set up for periodic monitoring. A leak in the NS system would also have to be entered into the Emergency Core Cooling System Leakage Program managed by Technical Specification 5.5.3.

C05.011.203, 1NS2-1 Containment Spray Valve #1NS018A-to-Pipe Weld

Although the Examination Volume C-D-E-F of Figure IWC-2500-7 (a) could not be covered, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. For results of this examination, reference Attachment 8.

1NS-18A provides a suction source to Containment Spray Pump (NS System) 1A, which is used to control pressure inside the containment vessel during a safety injection

with high containment pressure. This pump is not used for normal operation of the plant.

The area that contains the weld (NS side of 1NS-18A) is surveyed twice a day by Operations during their routine rounds. One of the items that must be checked off is for general condition of the room containing the valve. It is a reasonable expectation for the operator making these rounds to detect any external leaks from this weld.

The same area is also surveyed once a week by a periodic test that is used to specifically look for radioactive leaks outside containment. The area must be surveyed and signed off. If a leak were encountered, it would be written up in a work request and Problem Investigation Process (PIP) form filled out. The Fluid Leak Management Process then examines the leak. The leak is either repaired or set up for periodic monitoring. A leak in the NS system would also have to be entered into the Emergency Core Cooling System Leakage Program managed by Technical Specification 5.5.3.

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 1.

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

ASME Section XI Code Class 2 Examination Category C-F-1 Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping; Circumferential Weld

ID Number	Item Number	Configuration
1CF34-3	C05.011.251	Feedwater Pipe-to-Valve 1CF042 Weld

II. Code Requirement:

ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda as modified by Code Case N-460. "The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed from two sides of the weld, where practicable, or from one side of the weld, as a minimum."

III. Code Requirement from which Relief is Requested:

Relief is being sought from the requirement to provide coverage of the required examination volume in two-beam path directions.

IV. Basis for Relief:

During the ultrasonic examination of this weld, greater than 90% coverage of the required examination volume as allowed by Code Case N-460 could not be achieved. As shown in Attachment 9, the examination coverage was limited to 75% of the required examination volume. This is a dissimilar metal weld joining a stainless steel pipe to a carbon steel valve. Access is limited to the pipe side only because of the as-cast surface condition of the valve.

The most effective ultrasonic technique for the examination of dissimilar metal welds uses refracted longitudinal waves. The longitudinal wave is preferred as the austenitic weld metal and buttering create

highly attenuative barriers to shear wave ultrasound. The longitudinal wave is less affected by these difficulties. However, the longitudinal wave is affected by mode conversion when it strikes the inside surface of the safe end or pipe at any angle other than a right angle to the surface.

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

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

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

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

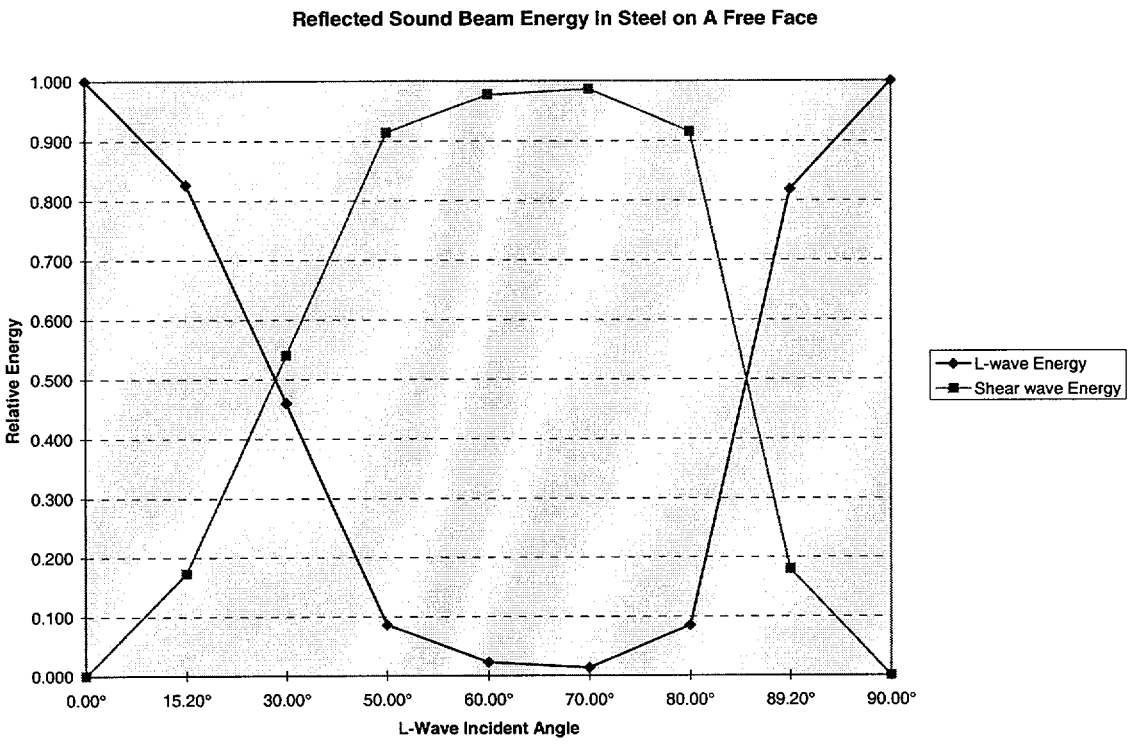
V_s is the shear wave velocity of the stainless steel safe end material in inches /μsec.

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

As shown in the graph on the following page, the mode conversion process creates two sound beams of differing intensities reflecting off the inside surface[1]. 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]Firestone, F.A.: Tricks with the Supersonic Reflectoscope, J. Soc. Nondestructive Testing, vol. 7, no. 2, Fall 1948.



V. Alternate Examinations or Testing:

No additional examinations are planned during the current interval for ID Number 1CF34-3. Duke Energy Corporation will use the most effective NDE methods available to obtain maximum coverage for future examinations of these components.

VI. Justification for the Granting of Relief:

Although the examination volume coverage requirements as defined in ASME Section XI 1989 Edition with no addenda, Appendix III, Paragraph III-4420, for ID Number 1CF34-3 could not be met, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. This weld was examined with an ultrasonic procedure and calibration block meeting the requirements of Appendix III. For results of the examination, reference Attachment 9.

1CF042 is a Feedwater Isolation Valve to a Steam Generator. It has a safety function to close when a Safety Injection or Feedwater Isolation signal is received. This valve is normally open during power operations.

This weld is located on the upstream side of valve 1CF042, which is located in the doghouse of Unit 1. Routine operator rounds inside the doghouse would detect a leak in this area. In the event that the leak was large enough, there are level detectors inside the doghouse to initiate closure of this valve in the event that the water level got high enough. Since the weld is on the upstream side of the valve, it does not effect the safety related auxiliary water supply (CA System) that makes up the heat sink for the reactor coolant system.

VII. Implementation Schedule:

This examination will continue to be scheduled in accordance with the requirements of ASME Section XI for future Inspection Intervals at Catawba Nuclear Station, Unit 1.

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

ASME Section XI Code Class 2 Examination Category C-A Pressure Retaining Welds in Pressure Vessels; Head Circumferential Welds

ID Number	Item Number	Configuration
1BSWINJF-SH-HD	C01.020.018	Seal Water Injection Filter 1B Shell-to-Head Weld

II. Code Requirement:

ASME Section XI, Appendix III, Paragraph III-4420, 1989 Edition with no addenda as modified by Code Case N-460. "The examination shall be performed using a sufficiently long examination beam path to provide coverage of the required examination volume in two-beam path directions. The examination shall be performed from two sides of the weld, where practicable, or from one side of the weld, as a minimum."

III. Code Requirement from which Relief is requested:

Relief is being sought from the requirement to provide coverage of the required examination volume in two-beam path directions.

IV. Basis for Relief:

During the ultrasonic examination of this weld, greater than 90% coverage of the required examination volume as allowed by Code Case N-460 could not be achieved. As shown in Attachment 10, the examination coverage was limited to 59.33% of the required examination volume because the vessel head geometry limits the scanning area. The percentage of coverage reported represents the aggregate coverage obtained from one scan perpendicular to the weld axis and two scans, 180° apart parallel to the weld. This is an austenitic stainless steel weld where access is limited to the

vessel shell side of the weld only. Austenitic weld metal characteristics and single sided access caused by the component geometry prevents two-beam path direction coverage of the examination volume. In order to obtain the required two-beam path direction coverage, the weld would have to be re-designed to allow scanning from both sides of the weld over the required examination volume.

Duke Energy Corporation does not claim credit for coverage of the far side of austenitic welds. The characteristics of austenitic weld metal attenuate and distort the sound beam when shear waves pass through the weld. Refracted longitudinal waves provide better penetration. Duke Energy Corporation uses a combination of shear waves and longitudinal waves to examine single sided austenitic welds.

V. Alternate Examinations or Testing:

No additional examinations are planned during the current interval for ID Number 1BSWINJ-SH-HD. Radiography is not an acceptable alternative because of access restrictions for source and film placement. Duke Energy Corporation will use the most effective ultrasonic techniques available to obtain maximum coverage for future examinations of these components.

VI. Justification for the Granting of Relief:

Although the examination volume requirements as defined in ASME Section XI 1989 Edition with no addenda, Appendix III, Paragraph III-4420, for ID Number 1BSWINJF-SH-HD could not be met, the amount of coverage obtained for this examination provides an acceptable level of quality and integrity. This weld was examined with an ultrasonic procedure and calibration block meeting the requirements of Appendix III. For results of the examination, reference Attachment 10.
The Seal Water Injection Filter 1B is used in power operations. The Seal Water Injection Filter 1B is located in the Auxiliary Building in a filter pit. During power operations and unit refueling outages, the Seal Water Injection Filter 1B is accessible for visual

inspections by pulling a concrete plug out of the Auxiliary Building Floor on the 577' elevation.

If a leak were to occur at the weld in question (shell to head 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 Seal Water Injection Filter 1B would be identified as a mass loss in the 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. A 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 be subject to the 1 gpm limit.

- If a leak were to occur at the subject weld, the water would spill on the floor in the Seal Water Injection Filter 1B room and flow to the floor drain and then to the Floor Drain Tank. The Plant Chemistry Department periodically monitors the tank level and evaluates unidentified leakage for correction.

VII. Implementation Schedule:

This examination will continue to be scheduled in accordance with the requirements of ASME Section XI for future Inspection Intervals at Catawba Nuclear Station, Unit 1.

Finally, for all of the welds and components covered by this request for relief, in the event that a through wall leak were discovered, the affected component would be subjected to an operability determination as required by existing plant processes. Should the affected component be determined to be inoperable, the applicable technical specification remedial actions would be followed.

The following individuals contributed to the development of this RFR:

Jim McArdle (NDE Level III) provided Sections II-V

David Goforth (Systems Engineer) provided Section VI

Andy Hogge (Sponsor) compiled the remaining sections

Sponsored By: A. J. Hogge, Jr. **Date** 11/19/2001

Approved By: R. Kevin Rhyne **Date** 11/19/01

Attachment 1	Description Table
Attachment 2	UT Examination Data B03.140.001
Attachment 3	UT Examination Data B03.140.002
Attachment 4	UT Examination Data B05.070.001
Attachment 5	UT Examination Data B05.070.002
Attachment 6	UT Examination Data C05.011.201
Attachment 7	UT Examination Data C05.011.202
Attachment 8	UT Examination Data C05.011.203
Attachment 9	UT Examination Data C05.011.251
Attachment 10	UT Examination Data C01.020.018

ASME Class 1 & 2 Inservice Inspection Request For Relief No. 01-001 Revision 1
For Catawba Unit 1 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
B03.140.001	B-D IWB-2500-7 (d)	Steam Generator	Steam Generator 1A Inlet Nozzle Inside Radius	Limited scan due to the ratio of the nozzle OD to the vessel thickness. Actual coverage obtained = 83.24% (See Attachment 2)	None
B03.140.002	B-D IWB-2500-7 (d)	Steam Generator	Steam Generator 1A Outlet Nozzle Inside Radius	Limited scan due to the ratio of the nozzle OD to the vessel thickness. Actual coverage obtained = 83.24% (See Attachment 3)	None
B05.070.001	B-F Appendix III, Paragraph III-4420	Steam Generator	Steam Generator 1A Inlet Nozzle-to-Safe End 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. 01-001 Revision 1
For Catawba Unit 1 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
B05.070.002	B-F Appendix III, Paragraph III-4420	Steam Generator	Steam Generator 1A Outlet Nozzle-to-Safe End Weld	Limited Scan due to material characteristics and single-sided access. Actual coverage obtained = 75% (See Attachment 5)	None
C05.011.201	C-F-1 IWC-2500-7 (a)	Containment Spray Pump 1A	Containment Spray Pump 1A-to-Reducer Weld	Limited scan due to singled-sided access. Actual coverage obtained = 60% (See Attachment 6)	None
C05.011.202	C-F-1 IWC-2500-7 (a)	Containment Spray System	Containment Spray Reducer to-Flange Weld	Limited scan due to singled-sided access. Actual coverage obtained = 59.06% (See Attachment 7)	None
C05.011.203	C-F-1 IWC-2500-7 (a)	Containment Spray System	Containment Spray Valve 1NS018A to-Pipe Weld	Limited scan due to singled-sided access. Actual coverage obtained = 58.15% (See Attachment 8)	None

ASME Class 1 & 2 Inservice Inspection Request For Relief No. 01-001 Revision 1
For Catawba Unit 1 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
C05.011.251	C-F-1 Appendix III, Paragraph III-4420	Feedwater System	Feedwater Pipe-to-Valve 1CF042 Weld	Limited scan due to: Access is limited to the pipe side only because of the as-cast surface condition of the valve. Actual coverage obtained = 75% (See Attachment 9)	None
C01.020.018	C-A Appendix III, Paragraph III-4420	Seal Water Injection Filter	Seal Water Injection Filter 1B Shell-to-Head Weld	Limited scan due to single-sided access. Actual coverage obtained = 59.33% (See Attachment 10)	None

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1138 | Form NDE-UT-2A

Exam Finish: 1205 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1SGA-INLET | Date: 11/1/00

Weld Length (in.): 122.5 | Surface Condition: AS GROUND | Lo: 9.2.3

Surface Temperature: 77 ° F

Examiner: David Zimmerman Level: II

Examiner: James L. Panel Level: II

Pyrometer S/N: MCNDE 27010

Cal Due: 3/27/01

Procedure: NDE-680 Rev: 2

FC: N/A

Calibration Sheet No: 0001050, 0001051

Scans:

45 ☐ ____ dB 70 ☒ 73.5 dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☒ 59 dB

60T ☐ ____ dB

Other: ____ dB

Configuration: INNER RADIUS

S1 Flow S2

VESSEL to NOZZLE

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: 23.0, 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			
NRI	60°														
NRI	70°														

Remarks:

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

Sheet 1 of 4

Reviewed By: Larry Moulder Level: III Date: 11-2-00

Authorized Inspector: Robert McGill Date: 11-13-00

Item No: B03.140.001

REQUEST FOR RELIEF # 01-001 ATTACHMENT 2

AH 11/21/00

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

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

☐ NO SCAN
☒ LIMITED SCAN

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

FROM L 22.0 to L 42.5 INCHES FROM WO N/A to N/A

ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other 70° FROM N/A DEG to N/A DEG

Remarks: SUPPORT CORNER IS 1.0" FROM C/L OF NOZZLE RADIUS

☐ NO SCAN
☒ LIMITED SCAN

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

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

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

Remarks: SENSOR PLATE IS 4.5" TI 10.5" FROM C/L OF NOZZLE OD RADIUS.

☒ NO SCAN
☐ LIMITED SCAN

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

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

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

Remarks: LIMITED ON NOZZLE C/L OF BLEND RADIUS

☐ NO SCAN
☐ LIMITED SCAN

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

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

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

Remarks:

Prepared By: David K. B Level: II Date: 11/1/00 **Sketch(s) attached** ☐ yes ☒ no Sheet 2 of 4

Reviewed By: Larry Moulder Date: 11-2-00 Authorized Inspector: Robert McGill Date: 11-13-00

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

3 of 4

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
5 IN. SQ. x PI - 4.5 IN. SQ. / 4 + .5 / 2 x (3.2 + 3.1) = 5.31 SQ. IN.	5.31 SQ. IN x 36.625 IN. = 194.48 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60/70°	CW	4.42	36.625	161.88	194.48	83.24
2	60/70°	CCW	4.42	36.625	161.88	194.48	83.24
					323.76	388.96	83.24

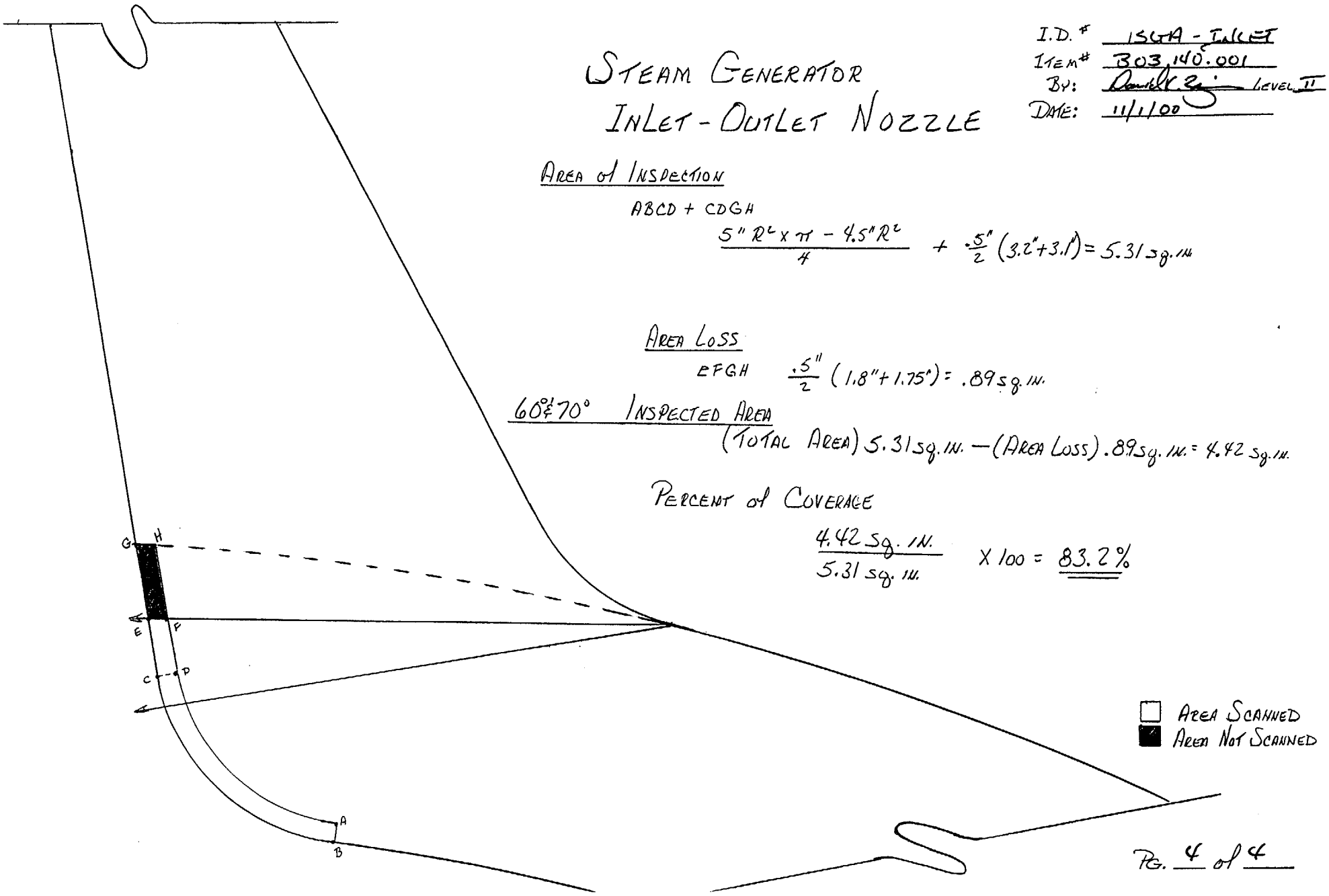
Item No: B03.140.001

Prepared By: David K. Z... Level: II Date: 11/1/00

Reviewed By: Larry Rawlins Level: III Date: 11-2-00

I.D. # 1SGA - INLET
ITEM# 303.140.001
BY: [signature] LEVEL II
DATE: 11/1/00

STEAM GENERATOR INLET - OUTLET NOZZLE



AREA of INSPECTION

ABCD + CDGH

$$\frac{5'' R^2 \times \pi - 4.5'' R^2}{4} + \frac{.5''}{2}(3.2''+3.1'') = 5.31 \text{ sq. in.}$$

AREA LOSS

EFGH $\frac{.5''}{2}(1.8''+1.75'') = .89$ sq. in.

60° & 70° INSPECTED AREA

(TOTAL AREA) 5.31 sq. in. — (AREA LOSS) .89 sq. in. = 4.42 sq. in.

PERCENT of COVERAGE

$$\frac{4.42 \text{ sq. in.}}{5.31 \text{ sq. in.}} \times 100 = 83.2\%$$

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1103 | Form NDE-UT-2A

Exam Finish: 1134 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1SGA-OUTLET | Date: 11/1/00

Weld Length (in.): 122.5 | Surface Condition: AS GROUND | Lo: 9.2.3

Surface Temperature: 77 ° F

Examiner: David Zimmerman Level: II

Examiner: James L. Panel Level: II

Pyrometer S/N: MCNDE 27010

Cal Due: 3/27/01

Procedure: NDE-680 Rev: 2

FC: N/A

Calibration Sheet No: 0001050, 0001051

Scans:

45 ☐ ____ dB 70 ☒ 73.5 dB

45T ☐ ____ dB 70T ☐ ____ dB

60 ☒ 59 dB

60T ☐ ____ dB

Other: ____ dB

Configuration: INNER RADIUS

S1 Flow S2

VESSEL to NOZZLE

Scan Surface: OD

Applies to NDE-680 only

Skew Angle: 23.0, 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			
NRI	60°														
NRI	70°														

Remarks:

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

Sheet 1 of 4

Reviewed By: Larry Maulden Level: III Date: 11-2-00

Authorized Inspector: Robert McGill Date: 11-13-00

Item No: B03.140.002

REQUEST FOR RELIEF #01-001 ATTACHMENT 3

AJH 11/21/00

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1SGA-OUTLET | Item No: B03.140.002 | Remarks:

☐ NO SCAN
☒ LIMITED SCAN

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

FROM L 22.0 to L 42.5 | INCHES FROM WO N/A to N/A

ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other 70° | FROM N/A DEG to N/A DEG

Remarks: SUPPORT CORNER IS 1.0" FROM C/L OF NOZZLE RADIUS

☐ NO SCAN
☒ LIMITED SCAN

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

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

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

Remarks: SENSOR PLATE IS 4.5" TI 10.5" FROM C/L OF NOZZLE OD RADIUS.

☒ NO SCAN
☐ LIMITED SCAN

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

FROM L N/A to L N/A | INCHES FROM WO C/L to BEYOND

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

Remarks: LIMITED ON NOZZLE C/L OF BLEND RADIUS

☐ NO SCAN
☐ LIMITED SCAN

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

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

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

Remarks:

Prepared By: David K. [illegible] | Level: II | Date: 11/1/00 | **Sketch(s) attached** ☐ yes ☒ no | Sheet 2 of 4

Reviewed By: Larry Maulden | Date: 11-2-00 | Authorized Inspector: Robert McGill | Date: 11-13-00

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	Volume Calculation
5 IN. SQ. x PI - 4.5 IN. SQ. / 4 + .5 / 2 x (3.2 + 3.1) = 5.31 SQ. IN.	5.31 SQ. IN x 36.625 IN. = 194.48 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	60/70°	CW	4.42	36.625	161.88	194.48	83.24
2	60/70°	CCW	4.42	36.625	161.88	194.48	83.24
					323.76	388.96	83.24

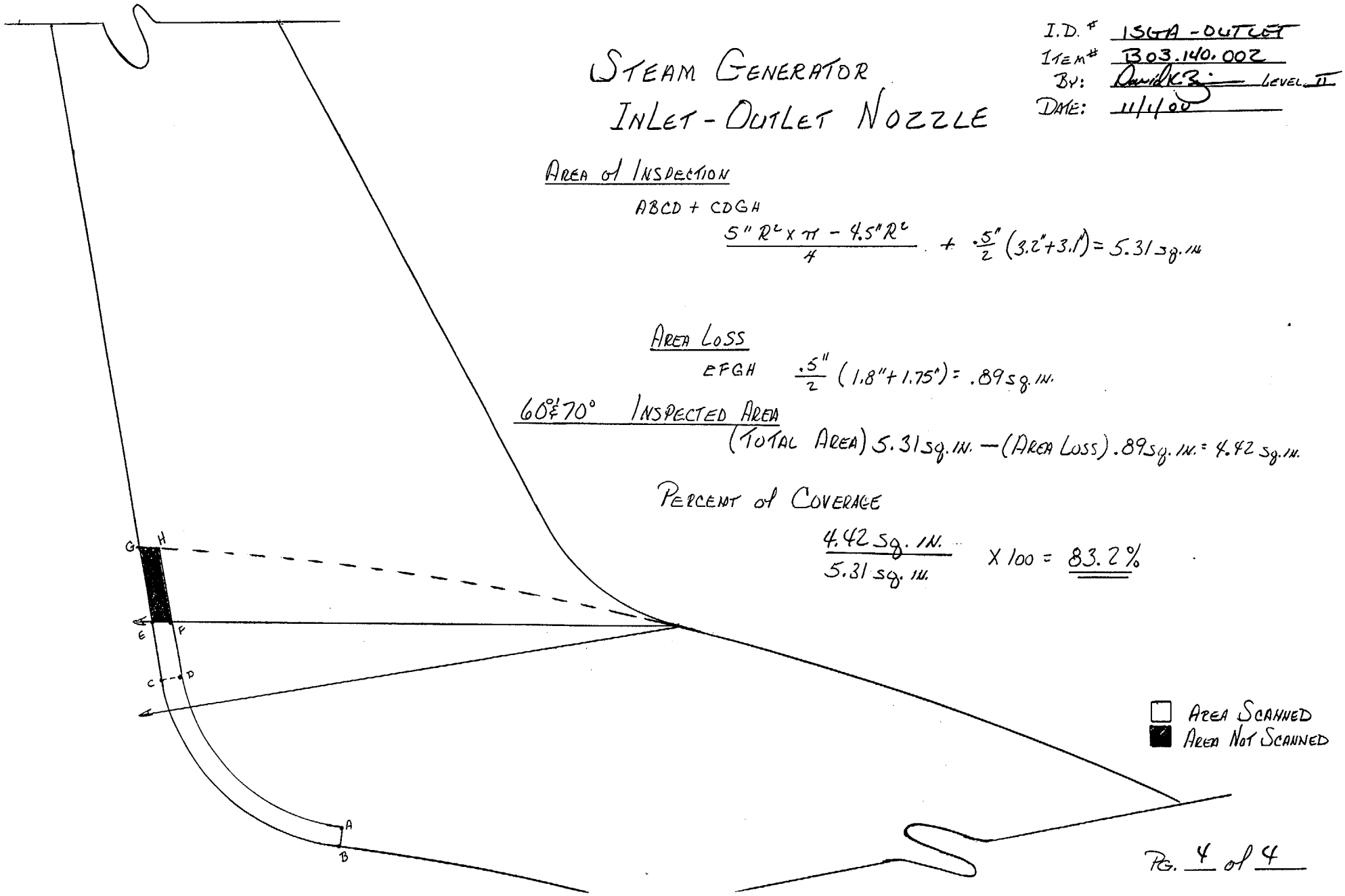
Item No: B03.140.002

Prepared By: Daniel K. B... Level: II Date: 11/1/00

Reviewed By: Larry Maulden Level: III Date: 11.2.00

I.D. # 1SGA-OUTLET
Item # B03.140.002
By: David K Z Level II
Date: 11/4/00

Steam Generator Inlet-Outlet Nozzle



Area of Inspection

ABCD + CDGH

$$\frac{.5" R^2 \times \pi - .4.5" R^2}{4} + \frac{.5"}{2}(3.2" + 3.1") = 5.31 \text{ sq. in.}$$

Area Loss

EFGH $\frac{.5"}{2}(1.8" + 1.75") = .89 \text{ sq. in.}$

60° & 70° Inspected Area

(Total Area) 5.31 sq. in. − (Area Loss) .89 sq. in. = 4.42 sq. in.

Percent of Coverage

$$\frac{4.42 \text{ sq. in.}}{5.31 \text{ sq. in.}} \times 100 = 83.2\%$$

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1125 | Form NDE-UT-2A

Exam Finish: 1148 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1SGA-INLET-W5SE | Date: 10/31/00

Weld Length (in.): 121.0 | Surface Condition: AS MACHINED | Lo: 9.1.1.1

Surface Temperature: 78 ° F

Examiner: David Zimmerman David K. Z. · Level: II

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

Pyrometer S/N: MCNDE 27010

Cal Due: 3/27/01

Procedure: NDE-930 Rev: 1

FC: N/A

Calibration Sheet No: 0001044, 0001045

Scans:

45 ☐ ____ dB 70 ☐ ____ dB

45T ☒ 65.5 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: 33L - 59 dB

Configuration: CIRC.

S2 Flow S1

Safe End to Nozzle

Scan Surface: OD

Applies to NDE-680 only

Skew Angle:

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

Remarks:

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

Sheet 1 of 4

Reviewed By: Larry Maulden Level: III Date: 11-14-00

Authorized Inspector: Robert McGill Date: 11.14.00

Item No: B05.070.001

REQUEST FOR RELIEF #01-001 ATTACHMENT 4

AJH 11/21/00

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1SGA-INLET-W5SE Item No: B05.070.001

Remarks:

Scan	Surface	Beam Direction	Location	Angle	Remarks
☒ NO SCAN ☐ LIMITED SCAN	☒ 1 ☐ 2	☐ 1 ☒ 2 ☐ cw ☐ ccw	FROM L ____ to L ____ INCHES FROM WO 0 to BEYOND	ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other ____ FROM 0 DEG to 360 DEG	NOZZLE TO SAFE END CONFIGURATION
☐ NO SCAN ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	FROM L ____ to L ____ INCHES FROM WO ____ to ____	ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other ____ FROM ____ DEG to ____ DEG	
☐ NO SCAN ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	FROM L ____ to L ____ INCHES FROM WO ____ to ____	ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other ____ FROM ____ DEG to ____ DEG	
☐ NO SCAN ☐ LIMITED SCAN	☐ 1 ☐ 2	☐ 1 ☐ 2 ☐ cw ☐ ccw	FROM L ____ to L ____ INCHES FROM WO ____ to ____	ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other ____ FROM ____ DEG to ____	

Prepared By: *David K. [signature]* Level: *II* Date: *11/1/00* **Sketch(s) attached** ☒ yes ☐ no Sheet *2* of *4*

Reviewed By: *Larry Mauldin* Date: *11-14-00* Authorized Inspector: *Robert McGill* Date: *11-14-00*

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

3 of 4

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
1.17 IN. x 2.55 IN. = 2.98 SQ. IN.	2.98 SQ. IN. x 119.4 IN. = 355.81 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	33	1	2.98	119.4	355.81	355.81	100.00
2	45	2	0	119.4	0	355.81	0.00
3	45	CW	2.98	119.4	355.81	355.81	100.00
4	45	CCW	2.98	119.4	355.81	355.81	100.00
					1067.43	1423.24	75.00

Item No: B05.070.001

Prepared By: David K. [illegible] Level: II Date: 11/1/00

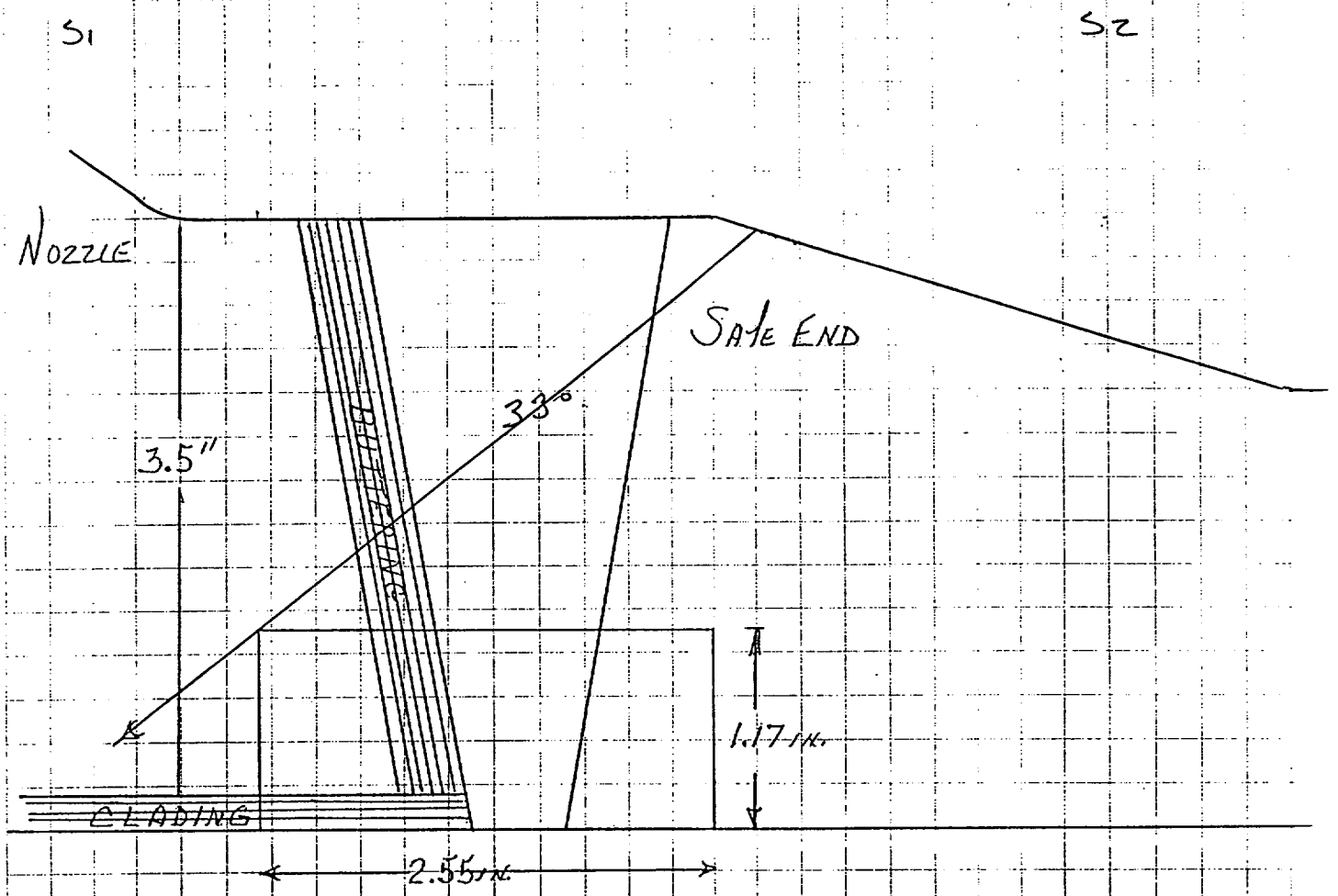
Reviewed By: Larry Maulden Level: III Date: 11-14-00

Station CATAWBA Unit Rev. File No. Sheet 4 Of 4

Subject SAFE END TO NOZZLE

By David K. Z Date 10/31/00

Prob No. B05.070.001 Checked by Larry Madden Date 11-14-00



EXAM AREA:

1.17 IN. X 2.55 IN. = 2.98 SQ. IN.

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1236 | Form NDE-UT-2A

Exam Finish: 1259 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1SGA-OUT-W6SE | Date: 10/31/00

Weld Length (in.): 121.0 | Surface Condition: AS MACHINED | Lo: 9.1.1.1

Surface Temperature: 78 ° F

Examiner: David Zimmerman Level: II

Examiner: James L. Panel Level: II

Pyrometer S/N: MCNDE 27010

Cal Due: 3/27/01

Procedure: NDE-930 Rev: 1

FC: N/A

Calibration Sheet No: 0001044, 0001045

Scans:

45 ☐ ____ dB 70 ☐ ____ dB

45T ☒ 65.5 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: 33L - 59 dB

Configuration: CIRC.

S2 Flow S1

Nozzle to Safe End

Scan Surface: OD

Applies to NDE-680 only

Skew Angle:

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

Remarks:

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

Sheet 1 of 4

Reviewed By: Larry Maudlin Level: III Date: 11-14-00

Authorized Inspector: Robert McGill Date: 11-14-00

Item No: B05.070.002

REQUEST FOR RELIEF #01-001 ATTACHMENT 5

AH 11/21/00

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1SGA-OUT-W6SE   Item No: B05.070.002

Remarks:

☒ NO SCAN ☐ LIMITED SCAN FROM L ______ to L ______ ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other ______	SURFACE ☐ 1 ☒ 2	BEAM DIRECTION ☒ 1 ☐ 2 ☐ cw ☐ ccw INCHES FROM WO 0 to BEYOND FROM 0 DEG to 360 DEG	NOZZLE TO SAFE-END CONFIGURATION
☐ NO SCAN ☐ LIMITED SCAN FROM L ______ to L ______ ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other ______	SURFACE ☐ 1 ☐ 2	BEAM DIRECTION ☐ 1 ☐ 2 ☐ cw ☐ ccw INCHES FROM WO ______ to ______ FROM ____ DEG to ____ DEG	
☐ NO SCAN ☐ LIMITED SCAN FROM L ______ to L ______ ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other ______	SURFACE ☐ 1 ☐ 2	BEAM DIRECTION ☐ 1 ☐ 2 ☐ cw ☐ ccw INCHES FROM WO ______ to ______ FROM ____ DEG to ____ DEG	
☐ NO SCAN ☐ LIMITED SCAN FROM L ______ to L ______ ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other ______	SURFACE ☐ 1 ☐ 2	BEAM DIRECTION ☐ 1 ☐ 2 ☐ cw ☐ ccw INCHES FROM WO ______ to ______ FROM ____ DEG to ____	

Prepared By: *[signature]*   Level: II   Date: 11/1/00   **Sketch(s) attached** ☒ yes ☐ no   Sheet 2 of 4

Reviewed By: *[signature]*   Date: 11-14-00   Authorized Inspector: *Robert McGill*   Date: 11-14-00

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

3 of 4

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
1.17 IN. x 2.55 IN. = 2.98 SQ. IN.	2.98 SQ. IN. x 119.4 IN. = 255.81 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	33	2	2.98	119.4	355.81	355.81	100.00
2	45	1	0	119.4	0	355.81	0.00
3	45	CW	2.98	119.4	355.81	355.81	100.00
4	45	CCW	2.98	119.4	355.81	355.81	100.00
					1067.43	1423.24	75.00

Item No: B05.070.002

Prepared By: Daniel K. [illegible] Level: II Date: 11/1/00

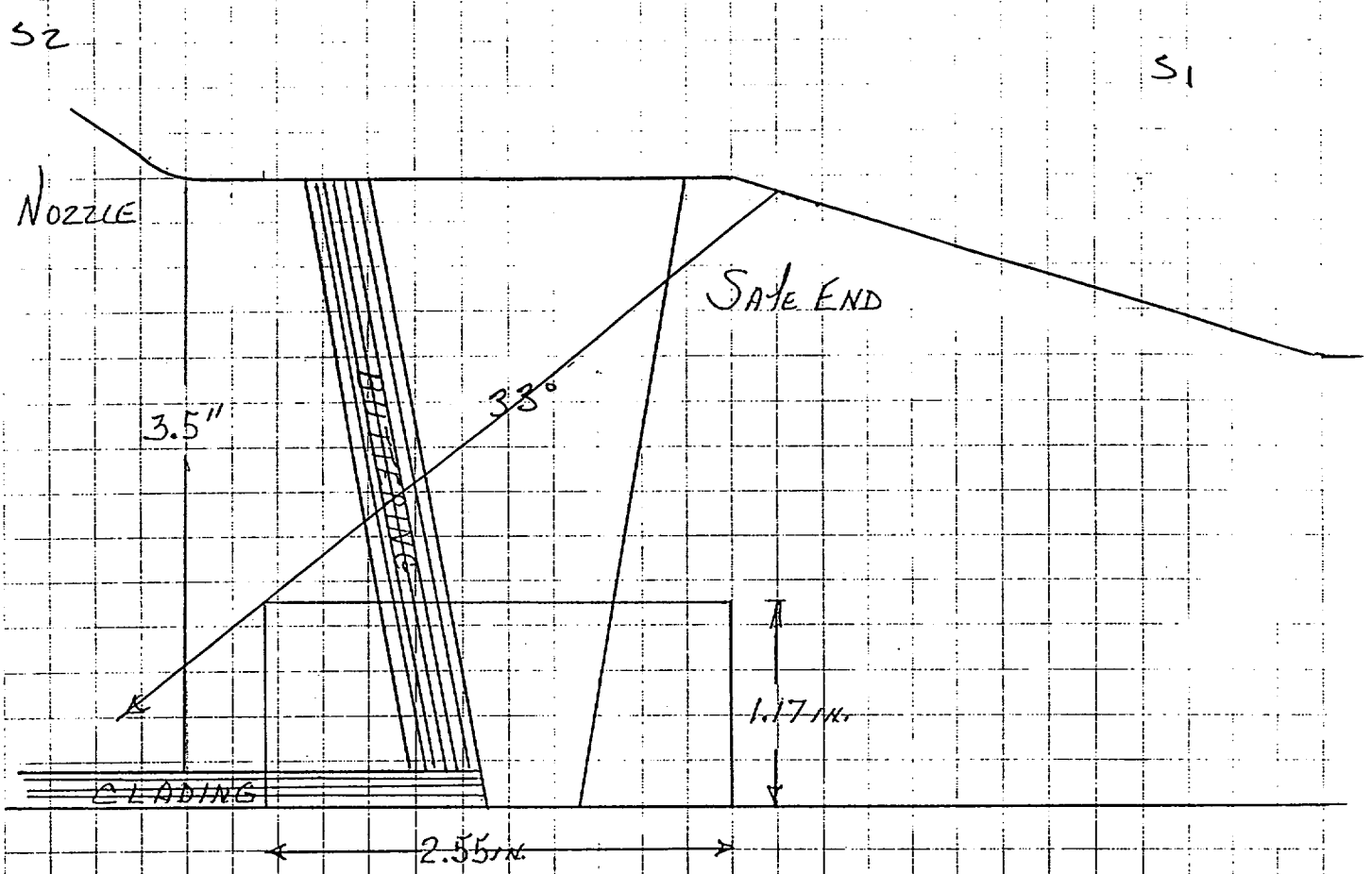
Reviewed By: Larry Maulden Level: III Date: 11-14-00

Station CATAWBA Unit Rev. File No. Sheet 4 Of 4

Subject SAFE END TO NOZZLE

By David K. B. Date 10/31/00

Prob No. B05.070.002 Checked by Larry Braudlen Date 11-14-00



EXAM AREA:

1.17 IN. X 2.55 IN. = 2.98 SQ. IN.

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1219			NDE-UT-3A
Exam Finish: 1221			Revision 2
Station: Catawba	Unit: 1	Component/Weld ID: 1NS1-1	Date: 10/25/00
Nominal Material Thickness (in): 0.5		Weld Length (in.): 33.8	Surface Temperature: 82° Deg F
Measured Material Thickness (in): .462		Lo: 9.1.1.4	Pyrometer S/N: MCNDE 27205
Surface Condition: AS GROUND		Calibration Sheet No: 0001031	Cal Due: 1/17/01
Examiner: David Zimmerman Level: II			Configuration: CIRC. WELD
Examiner: Gary J. Moss Level: II			S2 Flow S1
Procedure: NDE-640 Rev: 1 FC: *			Reducer to Pipe

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
NRI	0°													

Remarks: *FC 95-18, 95-19

Limitations: see NDE-UT-4 ☐ None: ☒

Sheet 1 of 5

Reviewed By: Level: III Date: 11-1-00

Authorized Inspector: Date:

Item No: C05.011.201

REQUEST FOR RELIEF #01-001 ATTACHMENT 6

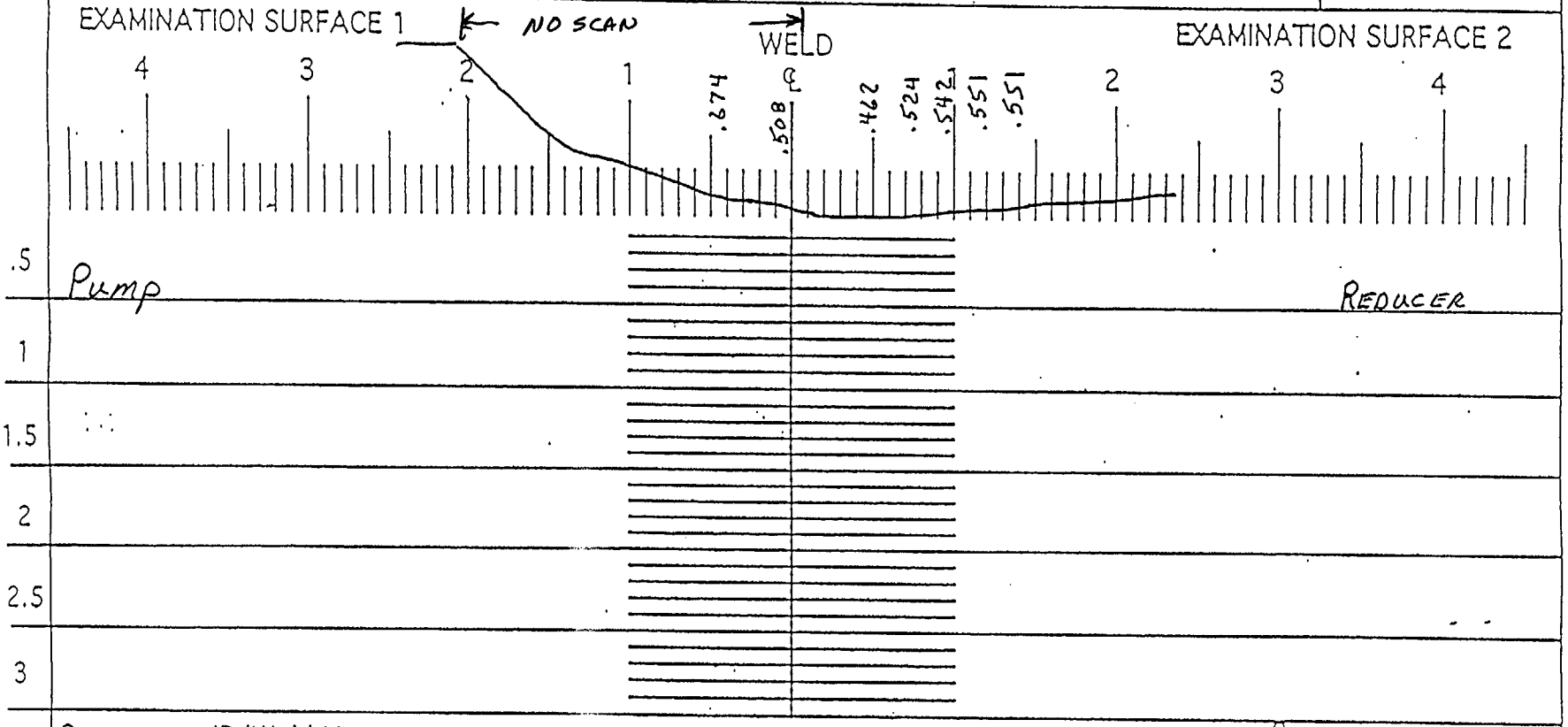
11/9/00

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

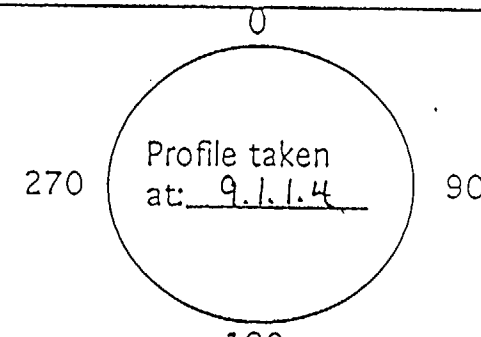


Component ID/Weld No. 1N51-1

: Remarks: NO SCAN FROM SURFACE -1

Item No: C05.011.201

Examiner: Gary Moss	Level: II	Date: 10-26-00
Reviewed By: Gary Thaubler	Level: III	Date: 11-1-00
Authorized Inspector:		Date:



Sheet 2 of 25

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1NS1-1 | Item No: C05.011.201 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN
SURFACE: ☒ 1 ☐ 2
BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw
FROM L N/A to L N/A
INCHES FROM WO 0 to BEYOND
ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other _____
FROM 0 DEG to 360 DEG
Remarks: DUE TO PUMP CONFIGURATION

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

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

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

Prepared By: Gary Moss | Level: II | Date: 10-25-00 | **Sketch(s) attached** ☒ yes ☐ no | Sheet 3 of 5

Reviewed By: Gary Maulden | Date: 11-1-00 | Authorized Inspector: Robert McGill | Date: 11-13-00

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

4 of 5

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
1.0 IN. x .167 IN. = .167 SQ. IN.	.167 SQ. IN. x 33.8 IN. = 5.65 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°	CW	.167	33.8	5.65	5.65	100.00
2	45°	CCW	.167	33.8	5.65	5.65	100.00
3	60°	S1	.067	33.8	2.26	5.65	40.00
4	60°	S2	0	33.8	0	5.65	0.00
	SHEAR	WAVE	AGGREGATE	COVERAGE	13.56	22.6	60.00
3	60RL	S1	0.10	33.8	3.38	5.65	59.82

RL WAVE COVERAGE 59.8% x 25% (1 SCAN) = 14.95 = 15%

Item No: C05.011.201

Prepared By: David K. Z... Level: II Date: 10/25/00

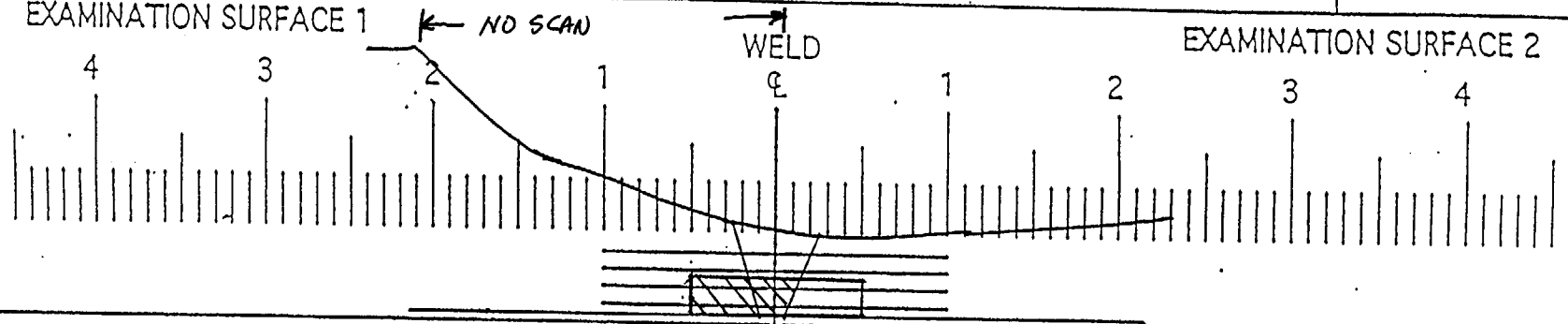
Reviewed By: Larry Maddox Level: III Date: 11-1-00

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



.5

1 — TOTAL AREA OF INTEREST
1.0in × .167in = .167in²

1.5

2 — AREA INSPECTED - 60° SHEAR

SUPPLEMENTAL COVERAGE - 60° RL

2.5 — $\left(\frac{.35in + .45in}{2}\right)$ .167in = 0.067in²

$\left(\frac{.65in + .55in}{2}\right)$ .167in = 0.100in²

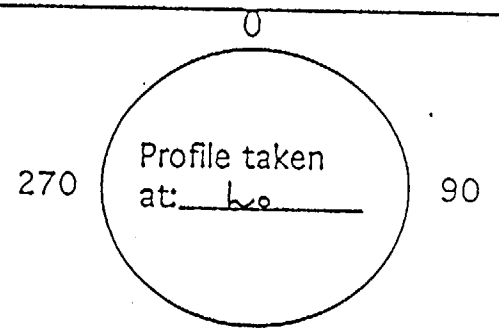
3

Component ID/Weld No. INS1-1

Remarks: LIMITED CALCULATION
NO SCAN FROM SURFACE -1

Item No: C05.011.201

Examiner: David C. Z	Level: II	Date: 10/25/00
Reviewed By: Larry Saulden	Level: III	Date: 11-1-00
Authorized Inspector: Robert McGill		Date: 11-13-00



Sheet 5 of 5

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1216			NDE-UT-3A
Exam Finish: 1219			Revision 2
Station: Catawba	Unit: 1	Component/Weld ID: 1NS1-2	Date: 10/25/00
Nominal Material Thickness (in): 0.5		Weld Length (in.): 40.0	Surface Temperature: 82° Deg F
Measured Material Thickness (in): .458		Lo: 9.1.1.4	Pyrometer S/N: MCNDE 27205
Surface Condition: AS GROUND		Calibration Sheet No: 0001032	Cal Due: 1/17/01
Examiner: David Zimmerman	Level: II		Configuration: CIRC. WELD
Examiner: Gary J. Moss	Level: II		S2 Flow S1
Procedure: NDE-640	Rev: 1 FC: *		FLANGE to REDUCER

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 ☐ None: ☒

Sheet 1 of 5

Reviewed By: Larry Maulden Level: III Date: 11-1-00

Authorized Inspector: Date:

Item No: C05.011.202

REQUEST FOR RELIEF #01-001 ATTACHMENT 7

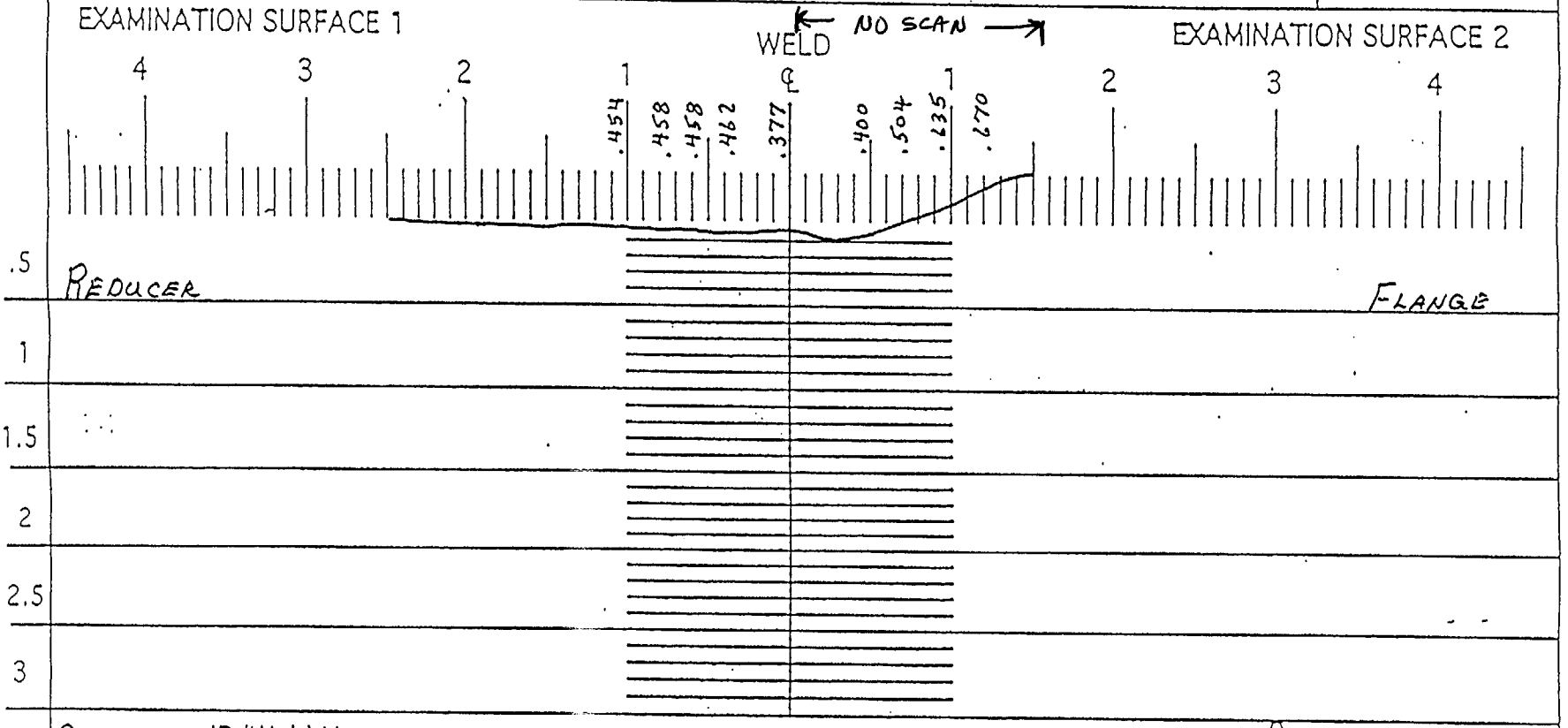
AH 11/29/00

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

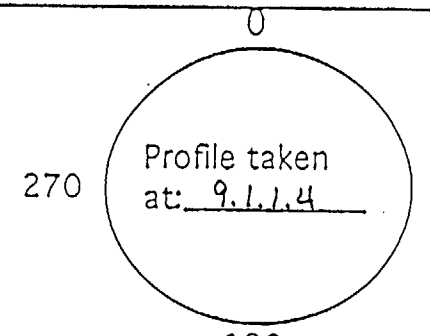


Component ID/Weld No. 1NS1-2

: Remarks: NO SCAN FROM SURFACE 2

Item No: C05.011.202

Examiner: Gary Moss	Level: II	Date: 10-25-00
Reviewed By: Larry Maulden	Level: III	Date: 11-1-00
Authorized Inspector:		Date:



Sheet 2 of 5

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1NS1-2 Item No: C05.011.202

Remarks:

DUE TO FLANGE CONFIGURATION

☒ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☒ 2

BEAM DIRECTION: ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A INCHES FROM WO 0 to BEYOND

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

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2

BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L ____ to L ____ INCHES FROM WO ____ to ____

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

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2

BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L ____ to L ____ INCHES FROM WO ____ to ____

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

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2

BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L ____ to L ____ INCHES FROM WO ____ to ____

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

Prepared By: Gary A Moss Level: II Date: 10.25.00

Sketch(s) attached ☒ yes ☐ no Sheet 3 of 5

Reviewed By: Larry Chandler Date: 11.1.00

Authorized Inspector: Robert McGill Date: 11.13.00

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

4 of 5

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
.9 x .153 = .138 SQ. IN	.138 SQ. IN. x 40 IN. = 5.52 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	CW	.138	40	5.52	5.52	100.00
2	45	CCW	.138	40	5.52	5.52	100.00
3	60	S2	.050	40	2	5.52	36.23
4	60	S1	0	40	0	5.52	0.00
	SHEAR	WAVE	AGGREGATE	COVERAGE	13.04	22.08	59.06
3	60RL	S1	.088	40	3.52	5.52	63.77

RL WAVE COVERAGE 64% x 25% (1 SCAN) = 16% OF TOTAL WELD.

Item No: C05.011.202

Prepared By: Gary Moss Level: III Date: 10-25-00

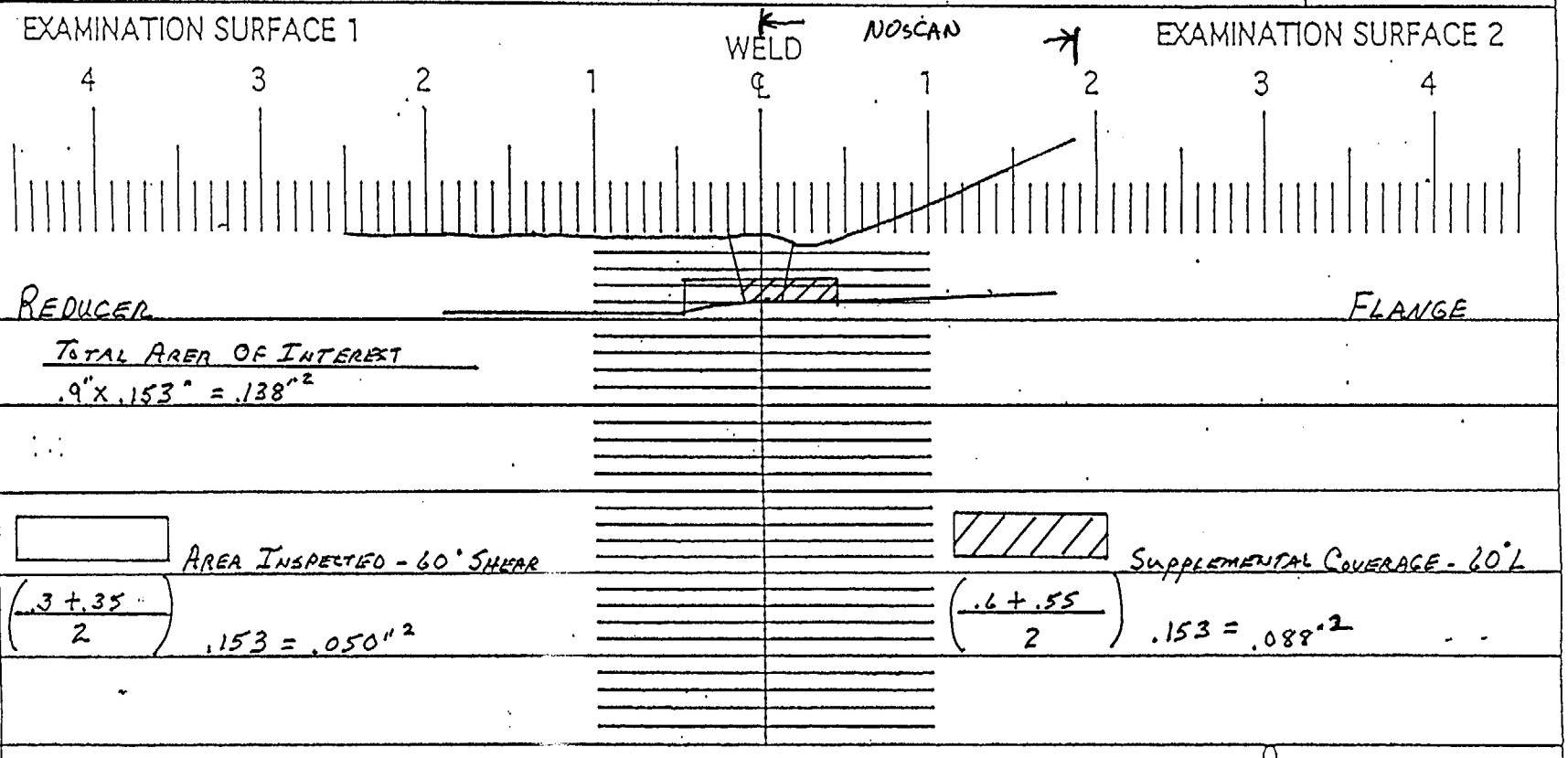
Reviewed By: Larry Maulden Level: III Date: 11-1-00

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

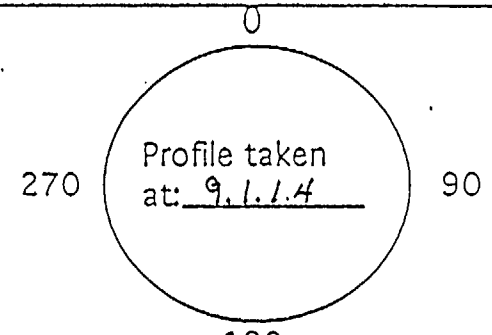
NDE-UT-5

Revision 1



Component ID/Weld No. 1N51-2

: Remarks: NO SCAN FROM SURFACE 2



Item No: C05.011.202

Examiner: David G. Boyd	Level: II	Date: 10/25/00
Reviewed By: Larry Moulder	Level: III	Date: 11-1-00
Authorized Inspector: Robert McGill		Date: 11-13-00

Sheet 5 of 5

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1123			NDE-UT-3A
Exam Finish: 1128			Revision 2
Station: Catawba	Unit: 1	Component/Weld ID: 1NS2-1	Date: 10/25/00
Nominal Material Thickness (in): 0.375		Weld Length (in.): 40.0	Surface Temperature: 82° Deg F
Measured Material Thickness (in): .377		Lo: 9.1.1.1	Pyrometer S/N: MCNDE 27205
Surface Condition: AS GROUND		Calibration Sheet No: 0001033	Cal Due: 1/17/01
Examiner: David Zimmerman	Level: II		Configuration: CIRC. WELD
Examiner: Gary J. Moss	Level: II		S2 Flow S1
Procedure: NDE-640	Rev: 1 FC: *		VALVE to PIPE

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 ☒ None: ☐

Sheet 1 of 5

Reviewed By: Larry Moulder Level: III Date: 11-1-00

Authorized Inspector: Date:

Item No: C05.011.203

REQUEST FOR RELIEF #01-001 ATTACHMENT 8

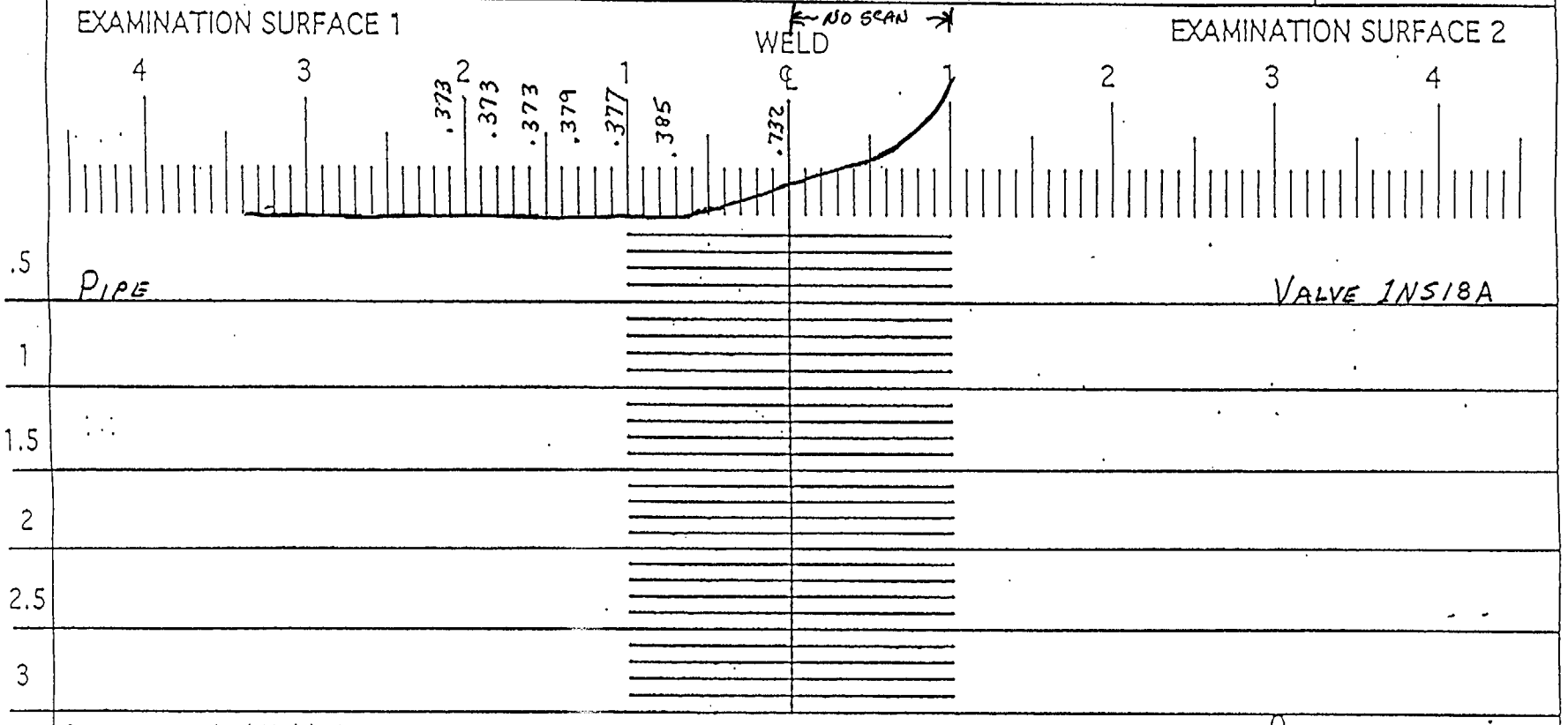
A-4 .100

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1

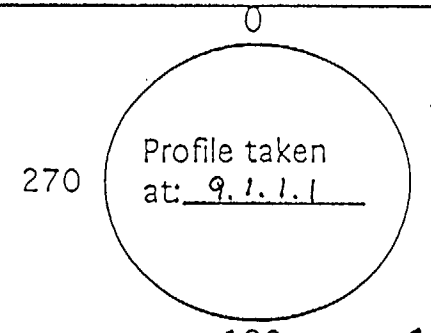


Component ID/Weld No. 1N52-1

: Remarks: NO SCAN FROM SURFACE 2

Item No: C05.011.203

Examiner: Gary Moss	Level: II	Date: 10-25-00
Reviewed By: Larry Maulden	Level: III	Date: 11-1-00
Authorized Inspector:		Date:



Sheet 2 of 5

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1NS2-1 | Item No: C05.011.203 | Remarks:

Limitation 1

☒ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☒ 2

BEAM DIRECTION: ☒ 1 ☐ 2 ☐ cw ☐ ccw

FROM L N/A to L N/A

INCHES FROM WO 0 to BEYOND

ANGLE: ☐ 0 ☐ 45 ☒ 60 ☐ Other _____

FROM 0 DEG to 360 DEG

Remarks: DUE TO VALVE CONFIGURATION

Limitation 2

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2

BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____

INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____

FROM _____ DEG to _____ DEG

Limitation 3

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2

BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____

INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____

FROM _____ DEG to _____ DEG

Limitation 4

☐ NO SCAN
☐ LIMITED SCAN

SURFACE: ☐ 1 ☐ 2

BEAM DIRECTION: ☐ 1 ☐ 2 ☐ cw ☐ ccw

FROM L _____ to L _____

INCHES FROM WO _____ to _____

ANGLE: ☐ 0 ☐ 45 ☐ 60 ☐ Other _____

FROM _____ DEG to _____

Prepared By: Gary Moss | Level: II | Date: 10-25-00 | **Sketch(s) attached** ☒ yes ☐ no | Sheet 3 of 5

Reviewed By: Larry Maulden | Date: 11-1-00 | Authorized Inspector: Robert Mitchell | Date: 11-13-00

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

4 of 5

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
.60 x .10/ 2 + .2 x .1 = .230 SQ. IN.	.230 SQ. IN. x 40.0 IN. = 9.2 CU. IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45	CW	.23	40	9.2	9.2	100.00
2	45	CCW	.23	40	9.2	9.2	100.00
3	60	S1	0	40	0	9.2	0.00
4	60	S2	.075	40	3	9.2	32.61
	SHEAR	WAVE	AGGREGATE	COVERAGE	21.4	36.8	58.15
4	60RL	S2	.155	40	6.2	9.2	67.39

RL WAVE COVERAGE 67.4% x 25% (1 SCAN) = 16.85% OF TOTAL WELD.

Item No: C05.011.203

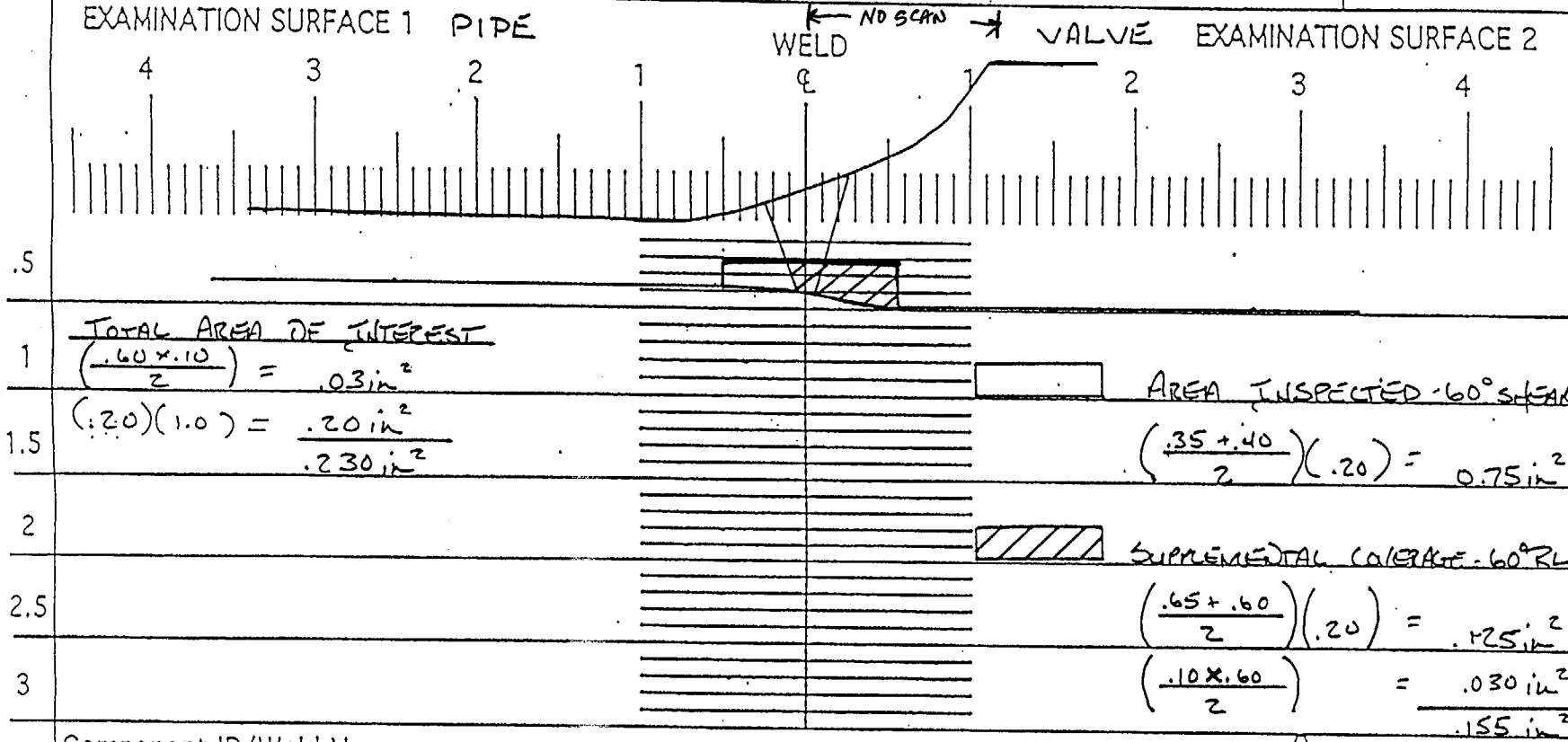
Prepared By:	David K. [illegible]	Level: II	Date: 10/25/00
Reviewed By:	Larry Rawlins	Level: III	Date: 11-1-00

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

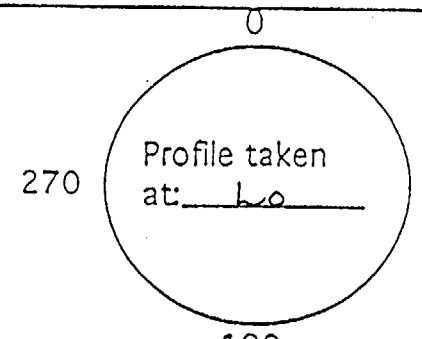
NDE-UT-5

Revision 1



Component ID/Weld No. WS2-1

: Remarks: LIMITED CALCULATION
NO SCAN FROM SURFACE 2



Item No: C05.011.203

Examiner: Donald K Bo	Level: II	Date: 10/26/00
Reviewed By: Larry Maulden	Level: III	Date: 11-1-00
Authorized Inspector: Robert McGill		Date: 11-13-00

Sheet 5 of 5

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 1030			NDE-UT-3A
Exam Finish: 1040			Revision 2
Station: Catawba	Unit: 1	Component/Weld ID: 1CF34-3	Date: 10/19/00
Nominal Material Thickness (in): 0.938		Weld Length (in.): 56.5	Surface Temperature: 78° Deg F
Measured Material Thickness (in): 0.963		Lo: 9.1.1.1	Pyrometer S/N: MCNDE 27205
Surface Condition: AS GROUND		Calibration Sheet No: 0001008	Cal Due: 1/17/01
Examiner: James L. Panel *James L Panel* Level: II			Configuration: Pipe to Valve (1CF042)
Examiner: Gary J. Moss *Gary J Moss* Level: II			S2 Flow S1
Procedure: NDE-640 Rev: 1 FC: *			VALVE to PIPE

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	NRI												

Remarks: * FC 95-18 & 95-19

Limitations: see NDE-UT-4 ☐ None: ☒

Sheet 1 of 7

Reviewed By: *Larry Mauldin* Level: III Date: 10-20-00

Authorized Inspector: *Robert McGill* Date: 10-29-00

Item No: C05.011.251

REQUEST FOR RELIEF #01-001 ATTACHMENT 9

AJH 11/29/00

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 1050 | Form NDE-UT-2A

Exam Finish: 1112 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1CF34-3 | Date: 10/19/00

Weld Length (in.): 56.5" | Surface Condition: AS GROUND | Lo: 9.1.1.1

Surface Temperature: 78 ° F

Examiner: James L. Panel Level: II

Examiner: Gary J. Moss Level: II

Pyrometer S/N: MCNDE 27205

Cal Due: 1/17/01

Procedure: NDE-610 Rev: 4

FC: *

Calibration Sheet No: 0001009, 0001010

Scans:

45 ☒ 41.5 dB 70 ☐ _____ dB

45T ☐ _____ dB 70T ☐ _____ dB

60 ☐ _____ dB

60T ☐ _____ dB

Other: 45 RL@64.5 dB

Configuration: Pipe to Valve (1CF042)

PIPE Flow VALVE

S1 to S2

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			
1	45	40%	1.39"	1.0"	10.0"	360°	INT.	IND.				2	1	AX	NO

Remarks: * 97-01 & 98-02

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

Sheet 2 of 7

Reviewed By: Larry Maulden Level: III Date: 10-20-00

Authorized Inspector: Robert McGill Date: 10-29-00

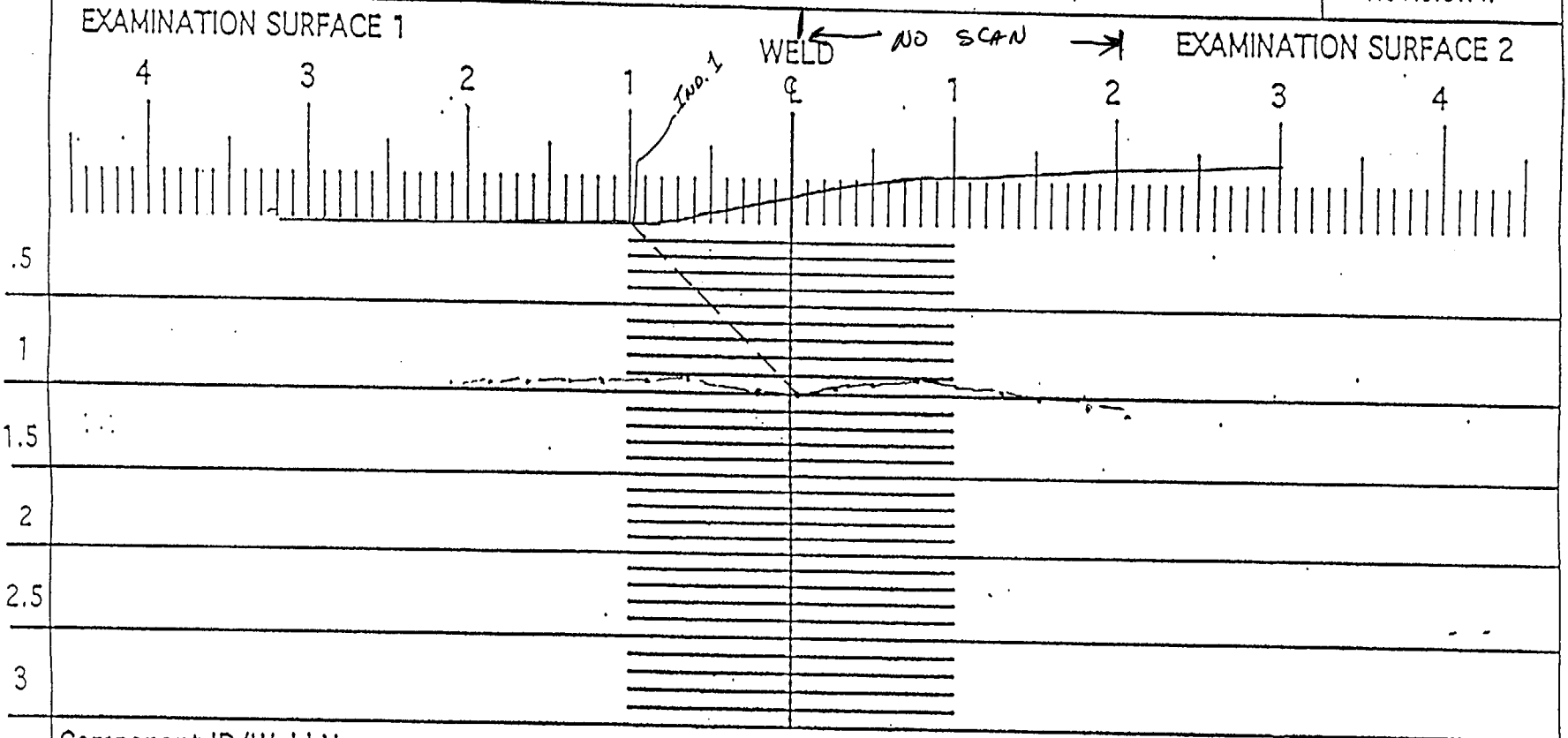
Item No: C05.011.251

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

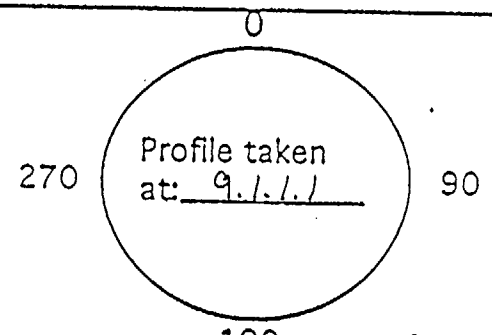
NDE-UT-5

Revision 1



Component ID/Weld No. 1CF34-3

: Remarks: NO SCAN FROM SURFACE 2 DUE TO AS CAST SURFACE CONDITION.



Item No: C05.011.251

Examiner: James E Powell	Level: II	Date: 10/19/00
Reviewed By: Larry Maulden	Level: III	Date: 10-20-00
Authorized Inspector: Robert Mitchell		Date: 10-29-00

Sheet 3 of 7

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1CF34-3 | Item No: C05.011.251 | Remarks:

☒ NO SCAN
☐ LIMITED SCAN
SURFACE: ☐ 1 ☒ 2
BEAM DIRECTION: ☒ 1 ☐ 2 ☐ cw ☐ ccw
FROM L N/A to L N/A
INCHES FROM WO .5" to BEYOND
ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other _____
FROM 0 DEG to 360 DEG
Remarks: DUE TO VALVE CONFIGURATION

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

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

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

Prepared By: James D Lamb | Level: II | Date: 10/19/00 | **Sketch(s) attached** ☒ yes ☐ no | Sheet 4 of 7

Reviewed By: Larry Maulden | Date: III 10-20-00 | Authorized Inspector: Robert McGiv | Date: 10-29-00

DUKE POWER COMPANY

Limited Examination Coverage Worksheet

NDE-91-1

Revision 0

5 of 7

Examination Volume/Area Defined

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

Area Calculation	Volume Calculation
.32 IN. X 2.0 IN. = 0.64 SQ.IN.	0.64 SQ.IN. X 56.5 IN. = 36.16 CU.IN.

Coverage Calculations

Scan #	Angle	Beam Direction	Area Examined (sq.in.)	Length Examined (in.)	Volume Examined (cu.in.)	Volume Required (cu.in.)	Percent Coverage
1	45S	CW	.64	56.5	36.16	36.16	100.00
2	45S	CCW	.64	56.5	36.16	36.16	100.00
3	45L	2	.64	56.5	36.16	36.16	100.00
4	45L	1	0	56.5	0	36.16	0.00
					108.48	144.64	75.00

AGGREGATE COVERAGE = 75%

Item No: C05.011.251

Prepared By: GARY MOSS Gary Moss Level: II Date: 10/20/00

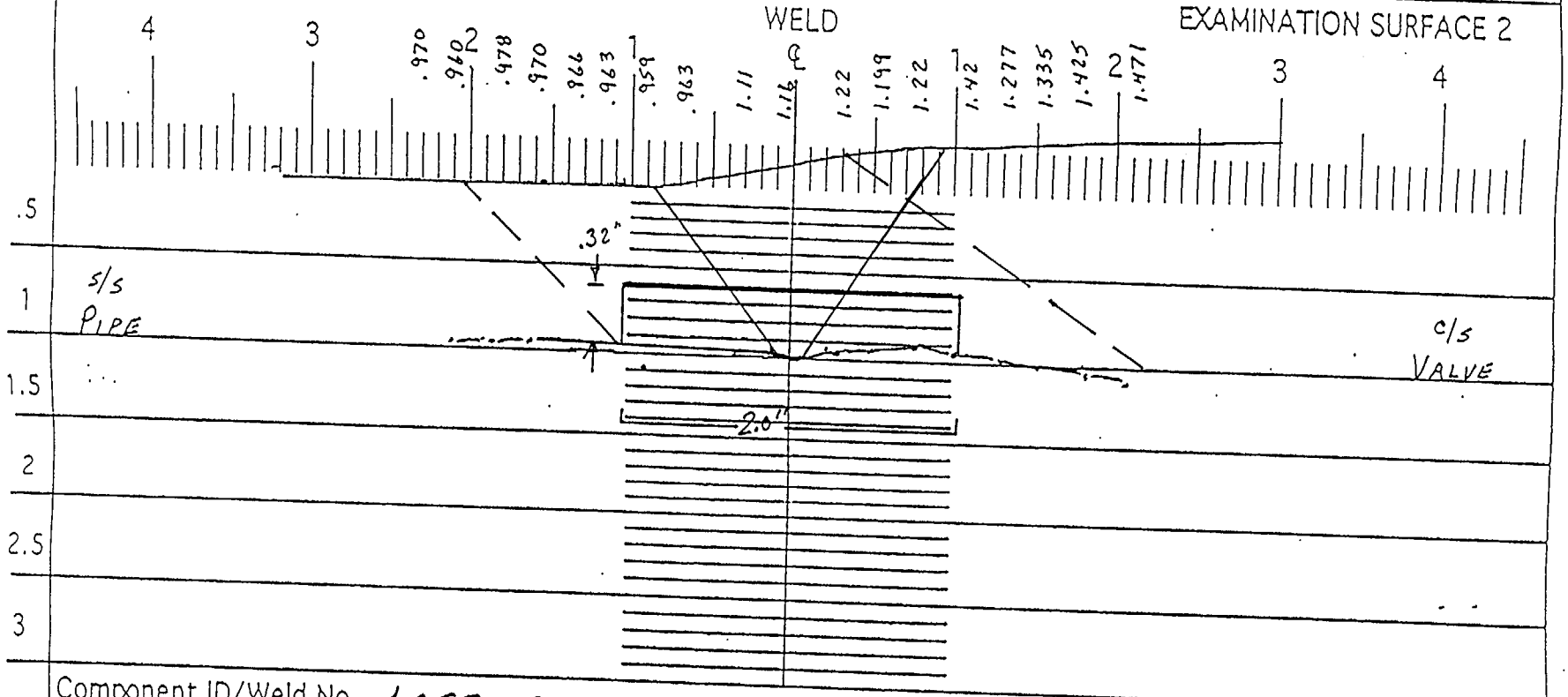
Reviewed By: Larry McAlder Level: III Date: 10-20-00

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

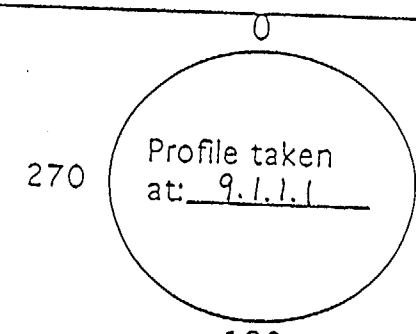
NDE-UT-5

Revision 1



Component ID/Weld No. 1CF34-3

: Remarks: 100% SCAN IN AXIAL DIRECTION FROM S1 TOWARD S2. NO SCAN FROM S-2 TOWARD S-1.



Item No: C05.011.251

Examiner: Gary Moss	Level: II	Date: 10-19-00
Reviewed By: Gary Mauldin	Level: III	Date: 10-20-00
Authorized Inspector: Robert McNeil		Date: 10-29-00

DUKE POWER COMPANY

ULTRASONIC INDICATION RESOLUTION SHEET

Form NDE-UT-8

Revision 1

Acceptance Standard:

IND. #1 WAS DETERMINED TO A GEOMETRIC REFLECTOR DUE TO ID WELD ROOT GEOMETRY. THE SIGNAL WOULD NOT HOLD UP TO SKEWING. THIS WAS CONFIRMED WITH THE RESPONSE OF A 70° SHEAR WAVE TRANSDUCER (LESS THAN 50% OF THE L-WAVE SIGNAL). ALSO BY THE USE OF A WSY-70 TRANSDUCER AND THE REVIEW OF THE RADIOGRAPHIC FILM.

Item No: C05.011.251

Acceptable Indications: #1

Rejectable Indications:

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

Examiner:	Level:	Date:		Sheet 7 of 7
Gary J. Moss Gary J. Moss	II	10/19/00	[redacted]	
Reviewer:	Level:	Date:	Authorized Inspector:	Date:
Larry Maulden	III	10-20-00	Robert McGee	10/29-00

DUKE POWER COMPANY
ULTRASONIC EXAMINATION DATA SHEET FOR LAMINAR REFLECTORS

Exam Start: 0830			NDE-UT-3A
Exam Finish: 0841			Revision 2
Station: Catawba	Unit: 1	Component/Weld ID: 1BSWINJF-SH-HD	Date: 9/15/00
Nominal Material Thickness (in): 0		Weld Length (in.): 14.1	Surface Temperature: 87° Deg F
Measured Material Thickness (in): 0.398		Lo: 8.1.4	Pyrometer S/N: MCNDE 27017
Surface Condition: AS GROUND		Calibration Sheet No: 0001001	Cal Due: 12/13/00
Examiner: David Zimmerman	Level: II		Configuration: Shell to Head
Examiner:	Level:		S1 Flow S2
Procedure: NDE-640	Rev: 1 FC: *		HEAD to SHELL

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
NRI	0°													

Remarks: *FC 95-18 & 95-19 *** I.D. TAPER IN SHELL B.M. RANGES 0.398 TO 0.708. TAPER ALSO SHOWN ON ISO.

Limitations: see NDE-UT-4 ☐ None: ☒

Sheet 1 of 6

Reviewed By: Larry Maulden Level: III Date: 10-19-00

Authorized Inspector: Robert McKee Date: 11-13-00

Item No: C01.020.018

REQUEST FOR RELIEF #01-001 ATTACHMENT 10

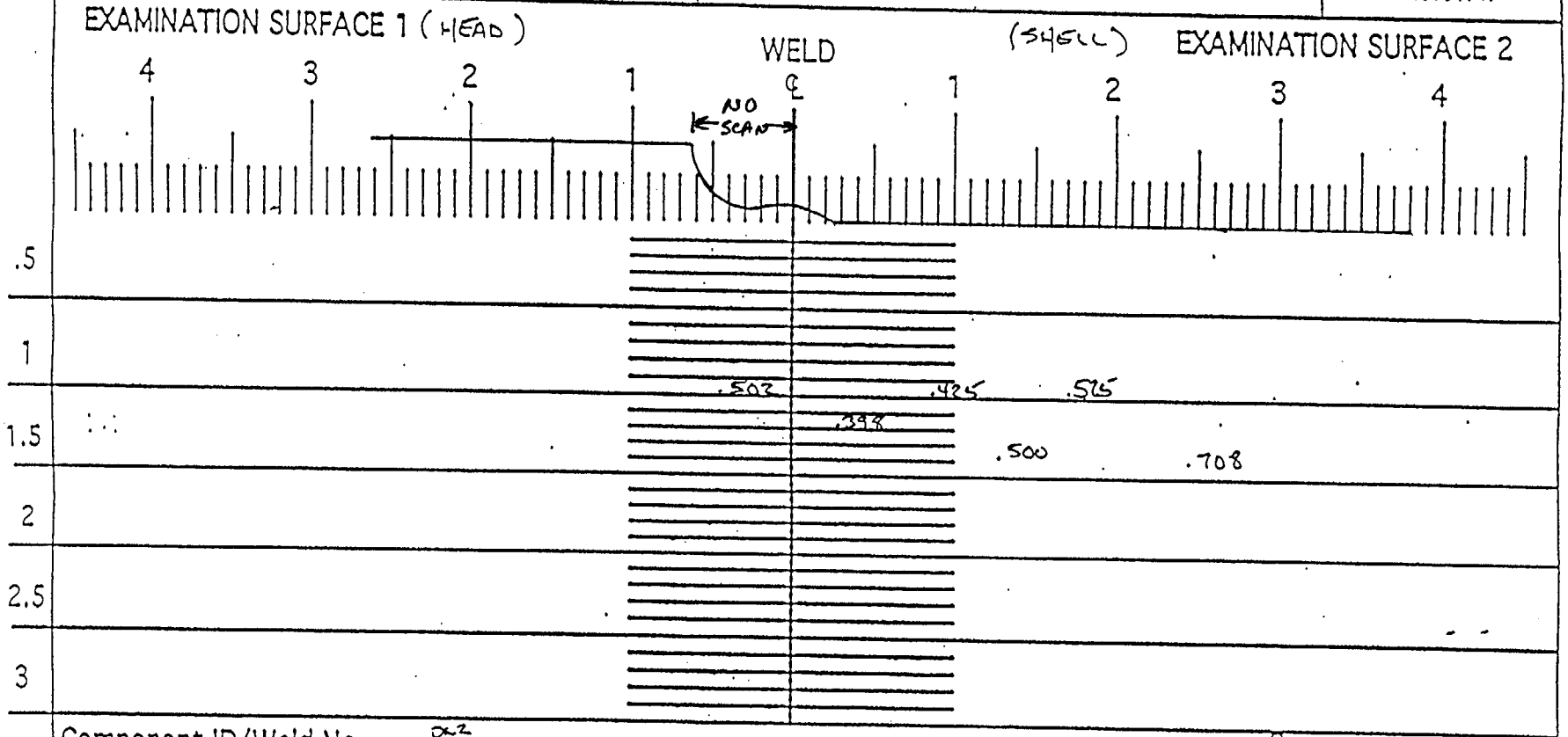
AIH 1-24-01

DUKE POWER COMPANY

UT PROFILE/PLOT SHEET

NDE-UT-5

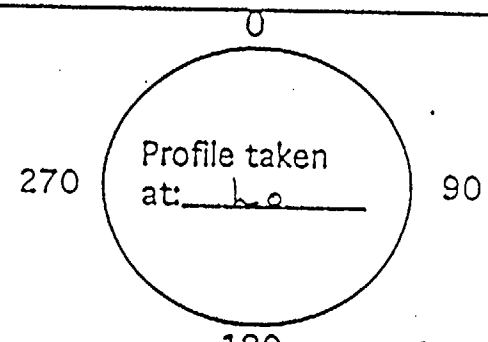
Revision 1



Component ID/Weld No. 1A SW(IN) IF-SH-HD

: Remarks: 3

NO SCAN FROM HEAD SIDE OF WELD



Item No: C01.020.018

Examiner: [signature]	Level: II	Date: 9/15/00
Reviewed By: [signature]	Level: III	Date: 10.19.00
Authorized Inspector [signature]		Date: 11.13.00

Sheet 2 of 6

DUKE POWER COMPANY

ULTRASONIC EXAMINATION DATA SHEET FOR PLANAR REFLECTORS

Exam Start: 0842 | Form NDE-UT-2A

Exam Finish: 0908 | Revision 4

Station: Catawba | Unit: 1 | Component/Weld ID: 1BSWINJF-SH-HD | Date: 9/15/00

Weld Length (in.): 14.1 | Surface Condition: AS GROUND | Lo: 8.1.4

Surface Temperature: 87° ° F

Examiner: David Zimmerman Level: II

Examiner: Level:

Pyrometer S/N: MCNDE 27017

Cal Due: 12/13/00

Procedure: Rev: 2 | FC: 99-02

Calibration Sheet No: 0001002, 0001003, 0001004

Scans:

45 ☒ 47.0 dB 70 ☐ ____ dB

45T ☒ 55.5 dB 70T ☐ ____ dB

60 ☐ ____ dB

60T ☐ ____ dB

Other: 45 RL@62.5 dB

Configuration: Shell to Head

HEAD Flow SHELL

S1 to S2

Scan Surface: OD

Applies to NDE-680 only

Skew Angle:

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

Remarks:

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

Sheet 3 of 6

Reviewed By: Larry Maulden Level: III Date: 10-19-00

Authorized Inspector: Robert Mabe Date: 11-13-00

Item No: C01.020.018

DUKE POWER COMPANY
ISI LIMITATION REPORT

FORM NDE-UT-4
Revision 1

Component/Weld ID: 1BSWINJF-SH-HD Item No: C01.020.018 Remarks:

☒ NO SCAN SURFACE: ☒ 1 ☐ 2 BEAM DIRECTION: ☐ 1 ☒ 2 ☐ cw ☐ ccw
☐ LIMITED SCAN
FROM L N/A to L N/A INCHES FROM WO .3" to BEYOND
ANGLE: ☐ 0 ☒ 45 ☐ 60 ☐ Other _____ FROM 0 DEG to 360 DEG

HEAD CONFIGURATION (S1) ALLOWS 0% SCAN IN AXIAL DIRECTION TOWARDS S2.

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

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

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

Prepared By: David G. [illegible] Level: II Date: 9/15/00 Sketch(s) attached ☒ yes ☐ no Sheet 4 of 6

Reviewed By: Larry Moulder Date: 10.19.00 Authorized Inspector: Robert McGill Date: 11/3-00

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	Volume Calculation
0.134" X 1.0" = 0.134 SQ. IN.	0.134 IN. X 14.1 IN. = 1.89 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	0	14.1	0	1.89	0.00
2	45	1	.050	14.1	0.705	1.89	37.30
3	45	CW	.134	14.1	1.89	1.89	100.00
4	45	CCW	.134	14.1	1.89	1.89	100.00
	SHEAR	WAVE	AGGREGATE	COVERAGE	4.485	7.56	59.33
RL	WAVE	COVERAGE					0.00
2	45RL	1	.084	14.1	1.184	1.89	62.65

62.6 X 25% (1 SCAN) = 15.7 % OF TOTAL WELD

Item No: C01.020.018

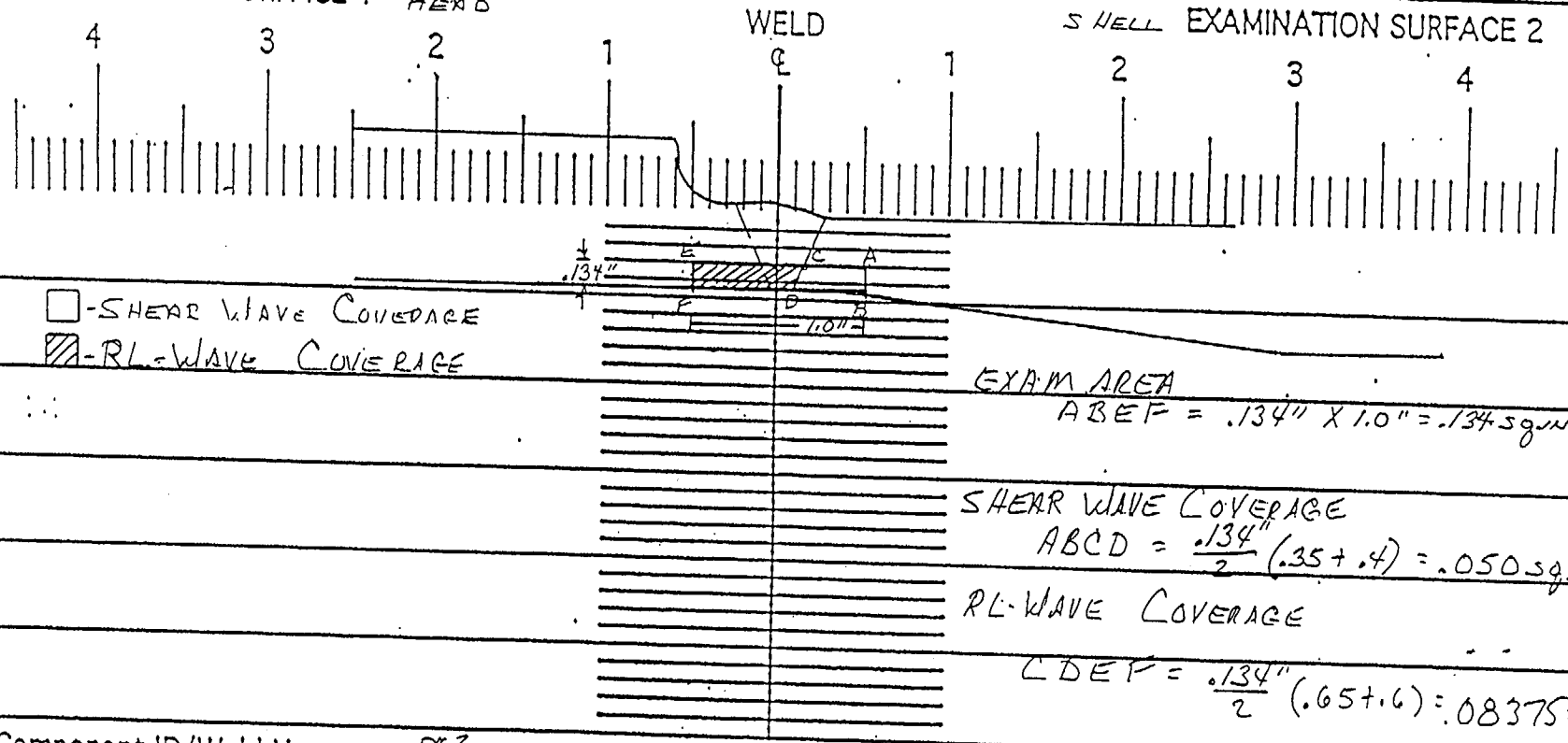
Prepared By: David K. Z... Level: II Date: 10/10/00

Reviewed By: Larry Moulder Level: III Date: 10-19-00

DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5
Revision 1

EXAMINATION SURFACE 1 HEAD



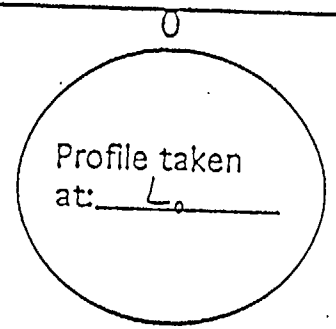
☐ - SHEAR WAVE COVERAGE
▨ - RL-WAVE COVERAGE

EXAM AREA
ABEF = .134" X 1.0" = .134 sq.in

SHEAR WAVE COVERAGE
ABCD = $\frac{.134"}{2}$ (.35 + .4) = .050 sq.in

RL-WAVE COVERAGE
CDEF = $\frac{.134"}{2}$ (.65 + .6) = .08375 = .084 sq.in.

Component ID/Weld No. 1A.SWINJF-SH-HD (DCZ)
: Remarks: B



Item No: C01.020.018

Examiner: David L. Z		
Reviewed By: Larry O'Maulden	Level: II	Date: 10/10/00
Authorized Inspector: Robert McGill	Level: III	Date: 10-19-00
		Date: 11-13-00

Sheet 6 of 9