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DUKE POWER

March 24, 1994

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

Subject: Catawba Nuclear Station, Unit 1
Docket No. 50-413
Relief Request 94-01
1EOC7 Inservice Inspection Report

Please find attached, Catawba's Request for Relief 94-01. The basis for this request is explained in Section III.

Any questions concerning this request should be directed to L. J. Rudy at (803) 831-3084.

Very truly yours,

Mark E. Patrick, for

D. L. Rehn

KEN/1EOC7ISI.RLF

Attachment

cc: S. D. Ebnetter, Regional Administrator

R. J. Freudenberger, SRI

R. E. Martin, ONRR

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PDR ADOCK 05000413
Q PDR

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A047

U. S. Nuclear Regulatory Commission
March 24, 1994
Page 2

bxc: K. E. Nicholson
J. O. Barbour
ELL -EC050
NCMPA-1
NCEMC
PMPA
SREC

Master File: CN-801.01
Group File: CN-801.01

DUKE POWER COMPANY
Request for Relief From
Inservice Inspection Requirement

Station: Catawba

Unit: 1

Requesting Department: Nuclear Generation Department

Reference Code: ASME Boiler and Pressure Vessel Code, Section XI 1980 Edition
through Winter 1981 Addenda

I. Component for which exemption is requested:

a. Name and Identification Number:

Reactor Vessel

<u>Weld Numbers</u>	<u>Item Numbers</u>
1RPV-W03	B01.011.001
1RPV-W06	B01.011.004
1RPV-W01	B01.021.001
1RPV-W02-01	B01.022.001
1RPV-W02-03	B01.022.003
1RPV-W02-04	B01.022.004
1RPV-W02-05	B01.022.005
1RPV-W02-06	B01.022.006
1RPV-W11	B03.090.001
1RPV-W11	B03.090.001A
1RPV-W12	B03.090.002
1RPV-W12	B03.090.002A
1RPV-W13	B03.090.003
1RPV-W13	B03.090.003A
1RPV-W14	B03.090.004
1RPV-W14	B03.090.004A
1RPV-W15	B03.090.005
1RPV-W15	B03.090.005A
1RPV-W16	B03.090.006
1RPV-W16	B03.090.006A
1RPV-W17	B03.090.007
1RPV-W17	B03.090.007A
1RPV-W18	B03.090.008
1RPV-W18	B03.090.008A
1RPV-W11	B03.100.001
1RPV-W12	B03.100.002

Reactor Vessel

<u>Weld Numbers</u>	<u>Item Numbers</u>
1RPV-W13	B03.100.003
1RPV-W14	B03.100.004
1RPV-W15	B03.100.005
1RPV-W16	B03.100.006
1RPV-W17	B03.100.007
1RPV-W18	B03.100.008

Pressurizer

<u>Weld Numbers</u>	<u>Item Numbers</u>
1PZR-W4A	B03.110.004
1PZR-W4B	B03.110.005
1PZR-W4C	B03.110.006
1PZR-W4A	B03.120.004
1PZR-W4B	B03.120.005
1PZR-W4C	B03.120.006
1PZR-W4ASE	B05.040.004
1PZR-W4BSE	B05.040.005
1PZR-W4CSE	B05.040.006

Steam Generator

<u>Weld Numbers</u>	<u>Item Numbers</u>
1SGC-INLET	B03.140.005
1SGC-OUTLET	B03.140.006
1SGC-INLET-SE	B05.070.005
1SGC-OUTLET-SE	B05.070.006

Reactor Coolant System (NC)

<u>Weld Numbers</u>	<u>Item Numbers</u>
1NC25-02	B05.130.014
1NC25-03	B05.130.015
1NC22-WN8	B09.031.003

b. Function:

Reactor Vessel - Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant.

Pressurizer - Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system.

Steam Generator - Acts as a heat exchanger in the reactor coolant system.

Reactor Coolant System - Transports heat energy from reactor core to steam generator.

c. ASME Section XI Code Class: Class 1

d. Construction Code and Class (If Applicable):

ASME Section III, 1974 Edition through Summer 1974 Addenda, Class 1

e. Valve Category (If Applicable): NA

II. Reference Code Requirement that has been determined to be impractical:

Examination Category B-A, Pressure Retaining Welds in Reactor Vessel, Table IWB-2500-1, Figure Nos. IWB-2500-1 and IWB-2500-3; "Note 2: Includes essentially 100% of the weld length".

Examination Category B-D, Full Penetration Welds of Nozzles in Vessels - Inspection Program B, Table IWB-2500-1, Figure No. IWB-2500-7; 100% examination coverage.

Examination Category B-F, Pressure Retaining Dissimilar Metal Welds, Table IWB-2500-1, Figure No. IWB-2500-8; 100% examination coverage.

Examination Category B-J, Pressure Retaining Welds in Piping, Table IWB-2500-1, Figure No. IWB-2500-11; "Note 3: Includes essentially 100% of the weld length".

III. Basis for Requesting Relief:

During the ultrasonic examination of the welds shown in Attachment 1, the minimum 90% coverage requirement of ASME Section XI, 1980 Edition through Winter 1981 Addenda, clarified by Code Case N-460, could not be obtained due to part geometry and actual physical barriers. A combination of multiple angles and UT techniques was used to obtain maximum coverage possible. The attached examination reports document the actual amount of examination coverage obtained.

Although the coverage requirements of ASME Section XI could not be met, the amount of coverage obtained for these examinations provides an acceptable level of quality and integrity. Based on these evaluations, the limited coverage will in no way endanger the health and safety of the general public.

No additional examinations are required.

IV. Alternate Examination:

The use of radiography as an alternate volumetric examination method is not practical due to component thicknesses and geometric configurations. Other restrictions making radiography impractical are the use of double wall techniques and physical barriers prohibiting access for placement of source, film, number bands, etc.

We will continue to use the most current ultrasonic techniques available for future examinations of the Item Numbers shown in Attachment 1.

V. 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.

Evaluated By:	<u>J. C. Cherry</u>	Date:	<u>3/10/94</u>
NDE Level III Review:	<u>James J. McAllen</u>	Date:	<u>3/10/94</u>
Compliance Review:	<u>James O. O'Neil</u>	Date:	<u>3/10/94</u>
Reviewed By:	<u>J. Barkow</u>	Date:	<u>3/10/94</u>

Item No.	Exam Category /Figure No.	System Or Component	Function	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B01.011.001	B-A IWB-2500-1	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head to Shell Weld	Limited scan due to geometric configuration. Actual coverage obtained =43.60%	None
B01.011.004	B-A IWB-2500-1	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Shell to Nozzle Belt Weld	Limited scan due to geometric configuration. Actual coverage obtained =48.20%	None
B01.021.001	B-A IWB-2500-3	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head Weld	Limited scan due to geometric configuration. Actual coverage obtained =53.40%	None
B01.022.001	B-A IWB-2500-3	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head Meridional Weld 302 Deg.	Limited scan due to geometric configuration. Actual coverage obtained =68.20%	None
B01.022.003	B-A IWB-2500-3	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head Meridional Weld 182 Deg.	Limited scan due to geometric configuration. Actual coverage obtained =77.10%	None
B01.022.004	B-A IWB-2500-3	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head Meridional Weld 122 Deg.	Limited scan due to geometric configuration. Actual coverage obtained =77.10%	None
B01.022.005	B-A IWB-2500-3	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head Meridional Weld 62 Deg.	Limited scan due to geometric configuration. Actual coverage obtained =50.00%	None
B01.022.006	B-A IWB-2500-3	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Lower Head Meridional Weld 2 Deg.	Limited scan due to geometric configuration. Actual coverage obtained =77.10%	None
B03.090.001	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 67 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
303.090.001A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 67 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None

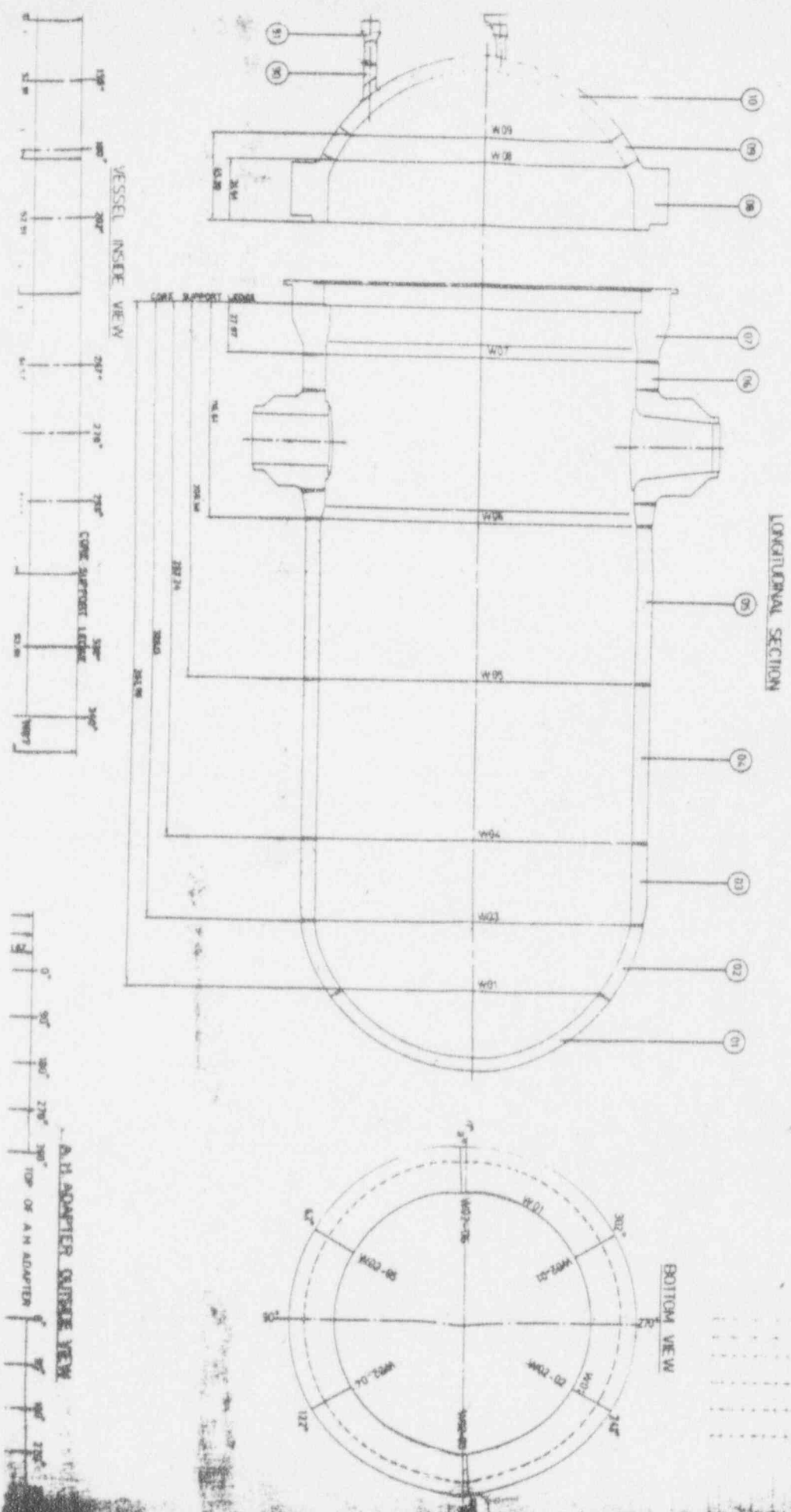
Item No.	Exam Category /Figure No.	System Or Component	Function	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B03.090.002	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 113 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
103.090.002A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 113 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
B03.090.003	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 247 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
103.090.003A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 247 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
B03.090.004	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 293 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
103.090.004A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 293 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =69.20%	None
B03.090.005	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 22 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
103.090.005A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 22 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
B03.090.006	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 158 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None

Item No.	Exam Category /Figure No.	System Or Component	Function	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B03.090.006A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 158 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
B03.090.007	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 202 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
B03.090.007A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 202 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
B03.090.008	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 338 Deg. UT from Vessel ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
B03.090.008A	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 338 Deg. UT from Nozzle ID	Limited scan due to geometric configuration. Actual coverage obtained =43.70%	None
B03.100.001	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 67 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =64.60%	None
B03.100.002	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 113 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =64.60%	None
B03.100.003	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 247 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =64.60%	None

Item No.	Exam Category /Figure No.	System Or Component	Function	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B03.100.004	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Inlet Nozzle to Shell 293 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =64.60%	None
B03.100.005	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 22 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =87.70%	None
B03.100.006	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 158 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =87.70%	None
B03.100.007	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 202 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =87.70%	None
B03.100.008	B-D IWB-2500-7	Reactor Vessel	Houses the fuel assemblies, control rods, and vessel internals, also directs the flow of reactor coolant	Outlet Nozzle to Shell 338 Deg. Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =87.70%	None
B03.110.004	B-D IWB-2500-7	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head	Limited scan due to geometric configuration. Actual coverage obtained =88.20%	None
B03.110.005	B-D IWB-2500-7	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head	Limited scan due to geometric configuration. Actual coverage obtained =88.20%	None
B03.110.006	B-D IWB-2500-7	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head	Limited scan due to geometric configuration. Actual coverage obtained =88.20%	None

Item No.	Exam Category /Figure No.	System Or Component	Function	Area To Be Examined	Reason For Request	Licensee Proposed Alternate Examination
B03.120.004	B-D IWB-2500-7	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =66.10%	None
B03.120.005	B-D IWB-2500-7	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =66.10%	None
B03.120.006	B-D IWB-2500-7	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =66.10%	None
B03.140.005	B-D IWB-2500-7	Steam Generator	Acts as a heat exchanger in the reactor coolant system	Inlet Nozzle Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =55.25%	None
B03.140.006	B-D IWB-2500-7	Steam Generator	Acts as a heat exchanger in the reactor coolant system	Outlet Nozzle Inside Radius Section	Limited scan due to geometric configuration. Actual coverage obtained =55.25%	None
B05.040.004	B-F IWB-2500-8	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head Safe End	Limited scan due to geometric configuration. Actual coverage obtained =75.00%	None
B05.040.005	B-F IWB-2500-8	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head Safe End	Limited scan due to geometric configuration. Actual coverage obtained =75.00%	None
B05.040.006	B-F IWB-2500-8	Pressurizer	Maintains reactor coolant system pressure within set limits and provides a surge volume for the reactor coolant system	Safety Nozzle to Upper Head Safe End	Limited scan due to geometric configuration. Actual coverage obtained =75.00%	None
B05.070.005	B-F IWB-2500-8	Steam Generator	Acts as a heat exchanger in the reactor coolant system	Inlet Nozzle Safe End	Limited scan due to geometric configuration. Actual coverage obtained =75.00%	None
B05.070.006	B-F IWB-2500-8	Steam Generator	Acts as a heat exchanger in the reactor coolant system	Outlet Nozzle Safe End	Limited scan due to geometric configuration. Actual coverage obtained =75.00%	None
B05.130.014	B-F IWB-2500-8	Reactor Coolant System (NC)	Transports heat energy from reactor core to steam generator	Pipe to Safe End	Limited scan due to geometric configuration. Actual coverage obtained =75.00%	None

Item No.	Exam Category / Figure No.	System Or Component	Function	Area To Be Examined	Reason For Request	Licensed Proposed Alternate Examination
B05.13C.015	B-F IWB-2500-8	Reactor Coolant System (NC)	Transports heat energy from reactor core to steam generator	Pipe to Safe End	Limited scan due to geometric configuration. Actual coverage obtained = 75.00%	None
B09.031.003	B-J IWB-2500-11	Reactor Coolant System (NC)	Transports heat energy from reactor core to steam generator	Branch Connection to Main Loop	Limited scan due to geometric configuration. Actual coverage obtained = 49.81%	None



Ser.No. 94-01
 ATTACHMENT 2
 REACTOR VESSEL
 OUTLINE
 RV Lower Head
 PG 1 OF 28

W-03

Total Exam Area = 53.32 in² (Near Surface + Weld + T/2)
Near Surface Area = 8.37 in² (Cross-Section)
Weld Area = 6.37 in² (Cross-Section)
T/2 Area = 38.58 in² (Cross-Section)

BETWEEN LUGS

CIRC 70° Gets 6.24 in² of Near Surface Area (74.6 %)
0° Gets 9.07 in² of Total Exam Area (17.0 %)
45° & 60° Get 31.79 in² of T/2 Area, .44 in² of Weld Area
Total Coverage = $\frac{31.79 + 0.44 + 0.44}{38.58 + 6.37 + 6.37} = 63.7 \%$

AXIAL 70° Gets 8.24 in² of Near Surface Area; however due to the Full-Node Exam, 100 % Coverage of the Near Surface Area is obtained by the 45° & 60°.
45° Gets 100 % of Weld and T/2 Area
60° Gets 100 % of Weld and T/2 Area

BELOW LUGS

AXIAL Due to the Full-Node Exam, 7.58 in² of the Near Surface Area is obtained by the 60° (90.6 %).
45° Gets 3.79 in² of T/2 Area (0 % Weld Area)
Total Coverage = $\frac{3.79 + 0.00 + 0.00}{38.58 + 6.37 + 6.37} = 7.4 \%$
60° Gets 9.11 in² of T/2 Area and 1.23 in² of Weld Area
Total Coverage = $\frac{9.11 + 1.23 + 0.00}{38.58 + 6.37 + 6.37} = 20.1 \%$

SER. No. 94-01
ATTACHMENT 2
B01.011.001
IRPV-W03
PG 2 OF 68

There are six (6) Segments Between Lugs, each 31.60° covered by the center of the head (0° and 60° Circ). The outside transducers each cover an additional 2.06° which results in 35.72° covered by 70°, 60° & 45° Axial and 70° & 45° Circ. There are also six (6) Segments Below Lugs, each covering the remaining 24.28° for Axial Scans.

$$0^\circ \text{ \& \ } 60^\circ \text{ Circ Coverage} = \frac{189.60 \times \% \text{ Between}}{100 \times 360}$$

$$70^\circ \text{ \& \ } 45^\circ \text{ Circ Coverage} = \frac{214.32 \times \% \text{ Between}}{100 \times 360}$$

$$\text{Axial Coverage} = \frac{214.32 \times \% \text{ Between} + 145.68 \times \% \text{ Below}}{100 \times 360}$$

W-03

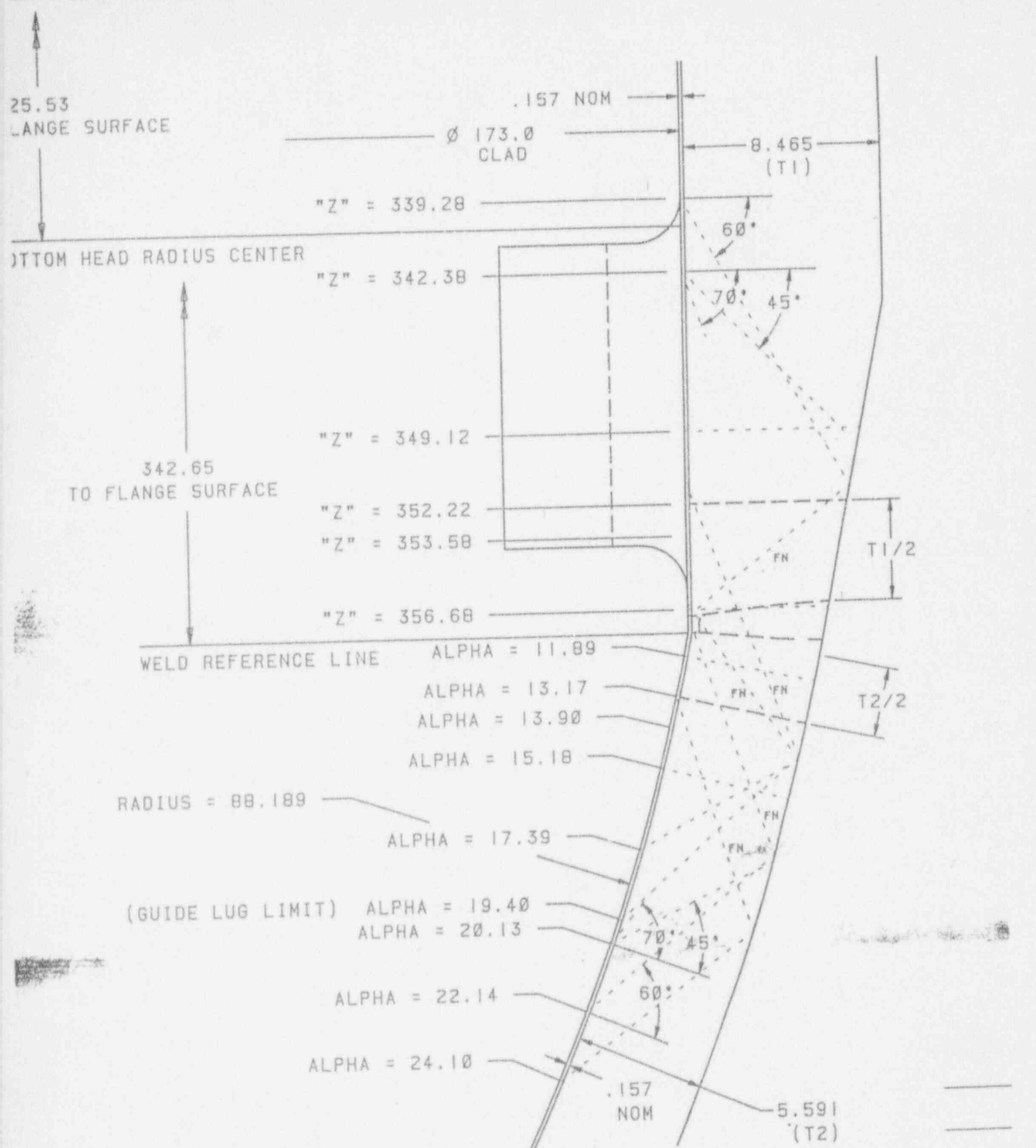
<u>AXIAL</u>			<u>CIRC</u>			
<u>NS</u>	<u>60</u>	<u>45</u>	<u>70</u>	<u>60</u>	<u>45</u>	<u>0</u>
96.2	67.7	62.5	44.4	33.5	37.9	9.0

Aggregate Coverage =

$$\begin{aligned}
 & [96.2 \times 8.37 + (67.7 + 62.5) \times (38.58 + 6.37 + 6.37) \\
 & + 44.4 \times 8.37 + (33.5 + 37.9) \times (38.58 + 6.37 + 6.37) \\
 & + 9.0 \times 53.32] / \\
 & [8.37 \times 2 + (38.58 + 6.37 + 6.37) \times 4 + 53.32] =
 \end{aligned}$$

Aggregate Coverage = 43.6 %

See No. 94-01
 ATTACHMENT 2
 B01.011.001
 IRPV-W03



Ser.No. 94-01
 ATTACHMENT 2
 B01.011.001
 IRPV-W03
 MIN CLEARANCE =
 PG 4 OF 68

MIN CLEARANCE = 2.00"

2.06"

W-03

W-06

Total Exam Area = 93.65 in² (Near Surface + Weld + T/2)
Near Surface Area = 10.47 in² (Cross-Section)
Weld Area = 11.38 in² (Cross-Section)
T/2 Area = 71.80 in² (Cross-Section)

CIRC 70° Gets 3.82 in² of Near Surface Area (36.5 %)
0° Gets 6.08 in² of Total Exam Area (6.5 %)
45° & 60° Get 28.50 in² of T/2 Area (0 % Weld)
Total Coverage = $\frac{28.50 + 0.00 + 0.00}{71.80 + 11.38 + 11.38} = 30.1 \%$

AXIAL 70° Gets 5.40 in² of Near Surface Area (51.6 %)
45° Gets 63.34 in² of T/2 Area
45°-UP Gets 11.10 in² of Weld Area
45°-DOWN Gets 4.74 in² of Weld Area
Total Coverage = $\frac{63.34 + 11.10 + 4.74}{71.80 + 11.38 + 11.38} = 83.7 \%$

60° Gets 67.39 in² of T/2 Area
60°-UP Gets 9.87 in² of Weld Area
60°-DOWN Gets 9.34 in² of Weld Area
Total Coverage = $\frac{67.39 + 9.87 + 9.34}{71.80 + 11.38 + 11.38} = 91.6 \%$

SER. No. 94-01
ATTACHMENT 2
BOI.011.004
IRPV-W06
PG 5 OF 68

W-06

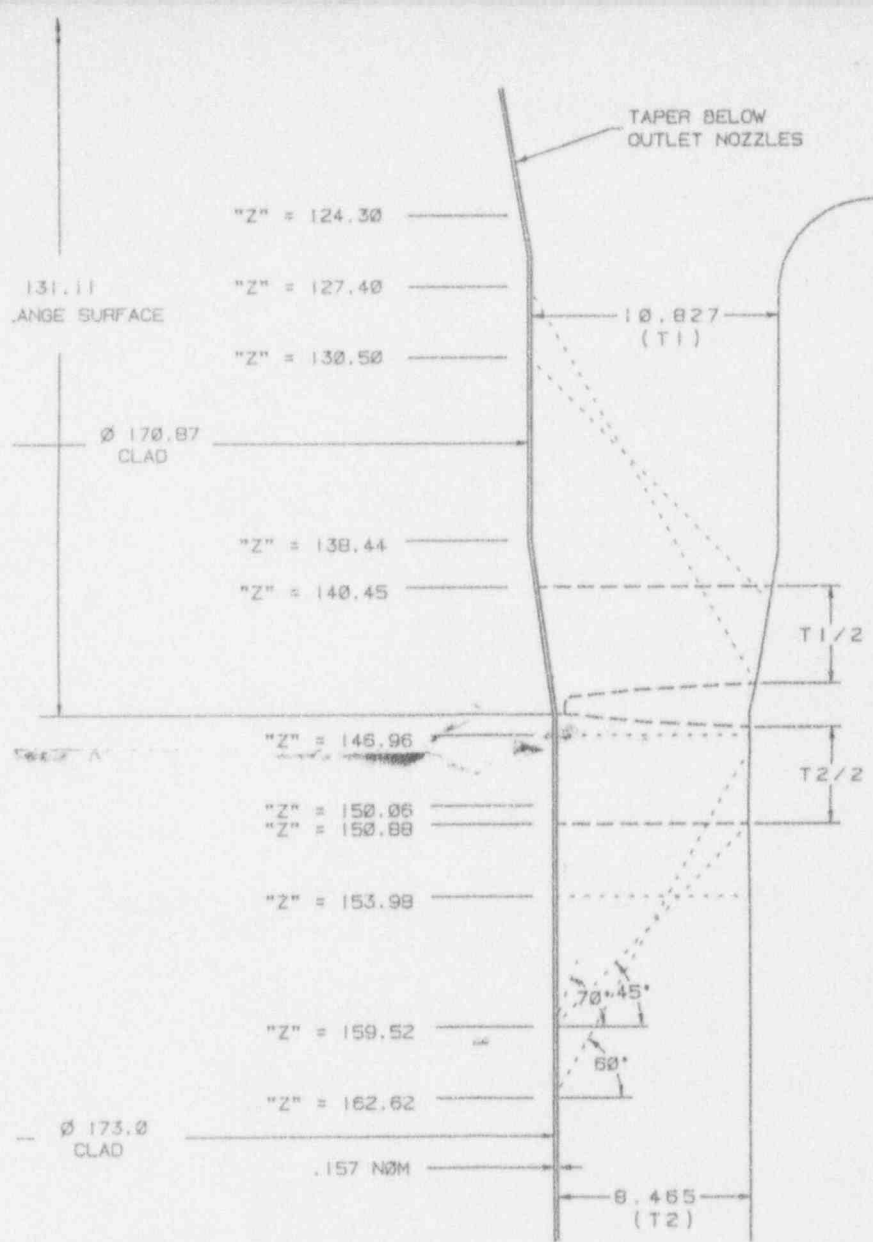
AXIAL			CIRC			
<u>70</u>	<u>60</u>	<u>45</u>	<u>70</u>	<u>60</u>	<u>45</u>	<u>0</u>
51.6	91.6	83.7	36.5	30.1	30.1	6.5

Aggregate Coverage =

$$\begin{aligned} & [51.6 \times 10.47 + (91.6 + 83.7) \times (71.80 + 11.38 + 11.38) \\ & + 36.5 \times 10.47 + (30.1 + 30.1) \times (71.80 + 11.38 + 11.38) \\ & + 6.5 \times 93.65] / \\ & [10.47 \times 2 + (71.80 + 11.38 + 11.38) \times 4 + 94.65] = \end{aligned}$$

Aggregate Coverage = 48.2 %

SER. No. 94-01
ATTACHMENT 2
BOL 011.004
IRPV-W06
PG 6 OF 68



GENERAL NOTES:

1. ALL "Z" DIMENSIONS REFERENCE THE DISTANCE BETWEEN THE MATING SURFACE AND THE ROOM THE CENTER OF

SER. No. 94-01
 ATTACHMENT 2
 B01.011.004
 1RPV-W06
 PG 7 OF 68

W-01

Total Exam Area = 41.68 in² (Near Surface + Weld + T/2)
Near Surface Area = 7.27 in² (Cross-Section)
Weld Area = 5.11 in² (Cross-Section)
T/2 Area = 29.30 in² (Cross-Section)

CIRC 70° Gets 4.46 in² of Near Surface Area (61.3 %)
0° Gets 7.73 in² of Total Exam Area (18.5 %)

45° & 60° Get 16.02 in² of T/2 Area (100 % Weld)
Total Coverage = $\frac{16.02 + 5.11 + 5.11}{29.30 + 5.11 + 5.11} = 66.4 \%$

AXIAL 70° Gets 6.20 in² of Near Surface Area; however due to the Full Node Exam, 100 % of the Near Surface Area is obtained with the 45° & 60°.

45° Gets 100 % of Weld and T/2 Area

60° Gets 100 % of T/2 Area

60°-UP Gets 100 % of Weld Area

60°-DOWN Gets 4.77 in² of Weld Area
Total Coverage = $\frac{29.30 + 5.11 + 4.77}{29.30 + 5.11 + 5.11} = 99.1 \%$

SER. No. 94-01
ATTACHMENT 2
B01.021.001
IRPV-W01
PG 8 OF 68

W-01 is Obstructed due to Instrument Nozzles. Six (6) Angular Portions of the Weld are Scanned.

Segments are: 16.42°, 13.44°, 59.84°, 76.46°, 49.46° & 43.44°

The outside transducers each cover an additional 2.01° which increases coverage by 4.02° for the 60° & 45° Axial and 70° & 45° Circ.

$$0^\circ \text{ \& \ } 60^\circ \text{ Circ Coverage} = \frac{259.06 \times \% \text{ Between}}{100 \times 360}$$

$$70^\circ \text{ \& \ } 45^\circ \text{ Circ Coverage} = \frac{279.16 \times \% \text{ Between}}{100 \times 360}$$

$$70^\circ \text{ Axial Coverage} = \frac{259.06 \times \% \text{ Between}}{100 \times 360}$$

$$60^\circ \text{ \& \ } 45^\circ \text{ Axial Coverage} = \frac{279.16 \times \% \text{ Between}}{100 \times 360}$$

W-01

<u>AXIAL</u>			<u>CIRC</u>			
<u>NS</u>	<u>60</u>	<u>45</u>	<u>70</u>	<u>60</u>	<u>45</u>	<u>0</u>
72.0	76.8	77.6	47.5	47.8	51.5	13.3

Aggregate Coverage =

$$[72.0 \times 7.27 + (76.8 + 77.6) \times (29.30 + 5.11 + 5.11) + 46.5 \times 7.27 + (47.8 + 51.5) \times (29.30 + 5.11 + 5.11) + 13.3 \times 41.68] /$$

$$[7.27 \times 2 + (29.30 + 5.11 + 5.11) \times 4 + 41.68] =$$

Aggregate Coverage = 53.4 %

SER. No. 94-01
ATTACHMENT 2
B01.021.001
IRPV-W01
PG 9 OF 68

W-02

Total Exam Area = 221.51 in² (Near Surface + Weld + T/2)
(Alpha Cross-Section)

Near Surface Area = 38.21 in² (Alpha Cross-Section)

Weld & T/2 Area = 183.30 in² (Alpha Cross-Section)

The Weld Area occupies 1.30° and T/2 Area occupies 4.48°
in the Circumferential or Theta Direction.

Coverage for the Weld & T/2 Areas is based on:
(4.48 + 1.30 + 1.30) / 5.78 or 122.5 % Area.

CIRC 70° Gets 28.58 in² of Near Surface Area (74.8 %)
45° & 60° Get 136.38 in² of Weld & T/2 Area (74.4 %)

AXIAL 70° Gets 30.32 in² of Near Surface Area; however due to the
Full Node Exam, 100 % of the Near Surface Area is
obtained with the 45° & 60°.

0° Gets 137.45 in² of Total Exam Area (62.1 %)

45° Gets 170.84 in² of T/2 Area

45°-UP Gets 151.89 in² of Weld Area

45°-DOWN Gets 170.84 in² of Weld Area

Total Coverage = $\frac{170.84 \times 4.48 + 151.89 \times 1.30 + 170.84 \times 1.30}{183.30 \times 4.48 + 183.30 \times 1.30 + 183.30 \times 1.30}$
= 91.3 %

60° Gets 175.32 in² of T/2 Area

60°-UP Gets 147.48 in² of Weld Area

60°-DOWN Gets 175.32 in² of Weld Area

Total Coverage = $\frac{175.32 \times 4.48 + 147.48 \times 1.30 + 175.32 \times 1.30}{183.30 \times 4.48 + 183.30 \times 1.30 + 183.30 \times 1.30}$
= 92.9 %

See No. 94-01

ATTACHMENT 2

B01.022.001 IRPV-W02-01
B01.022.003 IRPV-W02-03
B01.022.004 IRPV-W02-04
B01.022.005 IRPV-W02-05
B01.022.006 IRPV-W02-06
Pg 11 OF 68

W02-03, W2-04 & W2-06 are Unobstructed and

Get the Following Coverages:

W-02

<u>CIRC</u>			<u>AXIAL</u>			
<u>70</u>	<u>60</u>	<u>45</u>	<u>NS</u>	<u>60</u>	<u>45</u>	<u>0</u>
74.8	74.4	74.4	100	91.3	92.9	62.1

Aggregate Coverage =

$$\begin{aligned} & [100 \times 38.21 + (91.3 + 92.9) \times (183.30 \times 122.5 \%) \\ & + 74.8 \times 38.21 + (74.4 + 74.4) \times (183.30 \times 122.5 \%) \\ & + 62.1 \times 221.51] / \\ & [38.21 \times 2 + (183.30 \times 122.5 \%) \times 4 + 221.51] = \end{aligned}$$

Aggregate Coverage = 77.1 %

SER. No. 94-01

ATTACHMENT 2

B01.022.001 IRPV-W02-01
B01.022.003 IRPV-W02-03
B01.022.004 IRPV-W02-04
B01.022.005 IRPV-W02-05
B01.022.006 IRPV-W02-06

PG 12 OF 68

W02-01 is Obstructed due to Instrument Nozzles.

CIRC 70° Gets 22.40 in² of Near Surface Area (58.6 %)
45° & 60° Get 106.02 in² of Weld & T/2 Area (57.8 %)

AXIAL 70° Gets 25.89 in² of Near Surface Area; however due to the Full Node Exam, 100 % of the Near Surface Area is obtained with the 45° & 60°.

0° Gets 92.65 in² of Total Exam Area (41.8 %)

45° Gets 169.70 in² of T/2 Area

45°-UP Gets 147.82 in² of Weld Area

45°-DOWN Gets 152.94 in² of Weld Area

$$\begin{aligned} \text{Total Coverage} &= \frac{169.70 \times 4.48 + 147.82 \times 1.30 + 152.94 \times 1.30}{183.30 \times 4.48 + 183.30 \times 1.30 + 183.30 \times 1.30} \\ &= 88.7 \% \end{aligned}$$

60° Gets 175.48 in² of T/2 Area

60°-UP Gets 156.66 in² of Weld Area

60°-DOWN Gets 147.08 in² of Weld Area

$$\begin{aligned} \text{Total Coverage} &= \frac{175.48 \times 4.48 + 156.66 \times 1.30 + 147.08 \times 1.30}{183.30 \times 4.48 + 183.30 \times 1.30 + 183.30 \times 1.30} \\ &= 91.0 \% \end{aligned}$$

SER. No. 94-01

Attachment 2

B01.022.001 IRPV-W02-01
B01.022.002 IRPV-W02-03
B01.022.004 IRPV-W02-04
B01.022.005 IRPV-W02-05
B01.022.006 IRPV-W02-06

PG 13 OF 68

W02-01

<u>CIRC</u>			<u>AXIAL</u>			
<u>70</u>	<u>60</u>	<u>45</u>	<u>NS</u>	<u>60</u>	<u>45</u>	<u>0</u>
58.6	57.8	57.8	100	91.0	88.7	41.8

Aggregate Coverage =

$$\begin{aligned} & [100 \times 38.21 + (91.0 + 88.7) \times (183.30 \times 122.5 \%) \\ & + 58.6 \times 38.21 + (57.8 + 57.8) \times (183.30 \times 122.5 \%) \\ & + 41.8 \times 221.51] / \end{aligned}$$

$$[38.21 \times 2 + (183.30 \times 122.5 \%) \times 4 + 221.51] =$$

Aggregate Coverage = 68.2 %

Ser. No. 94-01

Attachment 2

B01.022.001 IRPV-W02-01
B01.022.003 IRPV-W02-03
B01.022.004 IRPV-W02-04
B01.022.005 IRPV-W02-05
B01.022.006 IRPV-W02-06

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W02-05

CIRC 70° Gets 5.52 in² of Near Surface Area (75.9 %)

45° Gets 22.45 in² of T/2 Area

45°-DOWN Gets 100 % of Weld Area

$$\text{Total Coverage} = \frac{22.45 + 0.00 + 5.12}{29.29 + 5.12 + 5.12} = 69.7 \%$$

60° Gets 20.09 in² of T/2 Area

60°-DOWN Gets 4.20 in² of Weld Area

$$\text{Total Coverage} = \frac{20.09 + 0.00 + 4.20}{29.29 + 5.12 + 5.12} = 61.4 \%$$

AXIAL 70° Gets 3.78 in² of Near Surface Area (52.0 %)

0° Gets 3.77 in² of Total Exam Area (9.0 %)

45° & 60° Get 14.57 in² of T/2 Area

45° & 60° Get 3.30 in² of T/2 Area

$$\text{Total Coverage} = \frac{14.57 + 3.30 + 3.30}{29.29 + 5.12 + 5.12} = 53.6 \%$$

SER. No. 94-01
ATTACHMENT 2
B01.022.001 IRPV-W02-01
B01.022.003 IRPV-W02-03
B01.022.004 IRPV-W02-04
B01.022.005 IRPV-W02-05
B01.022.006 IRPV-W02-06
PG 15 OF 68

W02-05

<u>CIRC</u>			<u>AXIAL</u>			
<u>70</u>	<u>60</u>	<u>45</u>	<u>70</u>	<u>60</u>	<u>45</u>	<u>0</u>
75.9	61.4	69.7	52.0	53.6	53.6	9.0

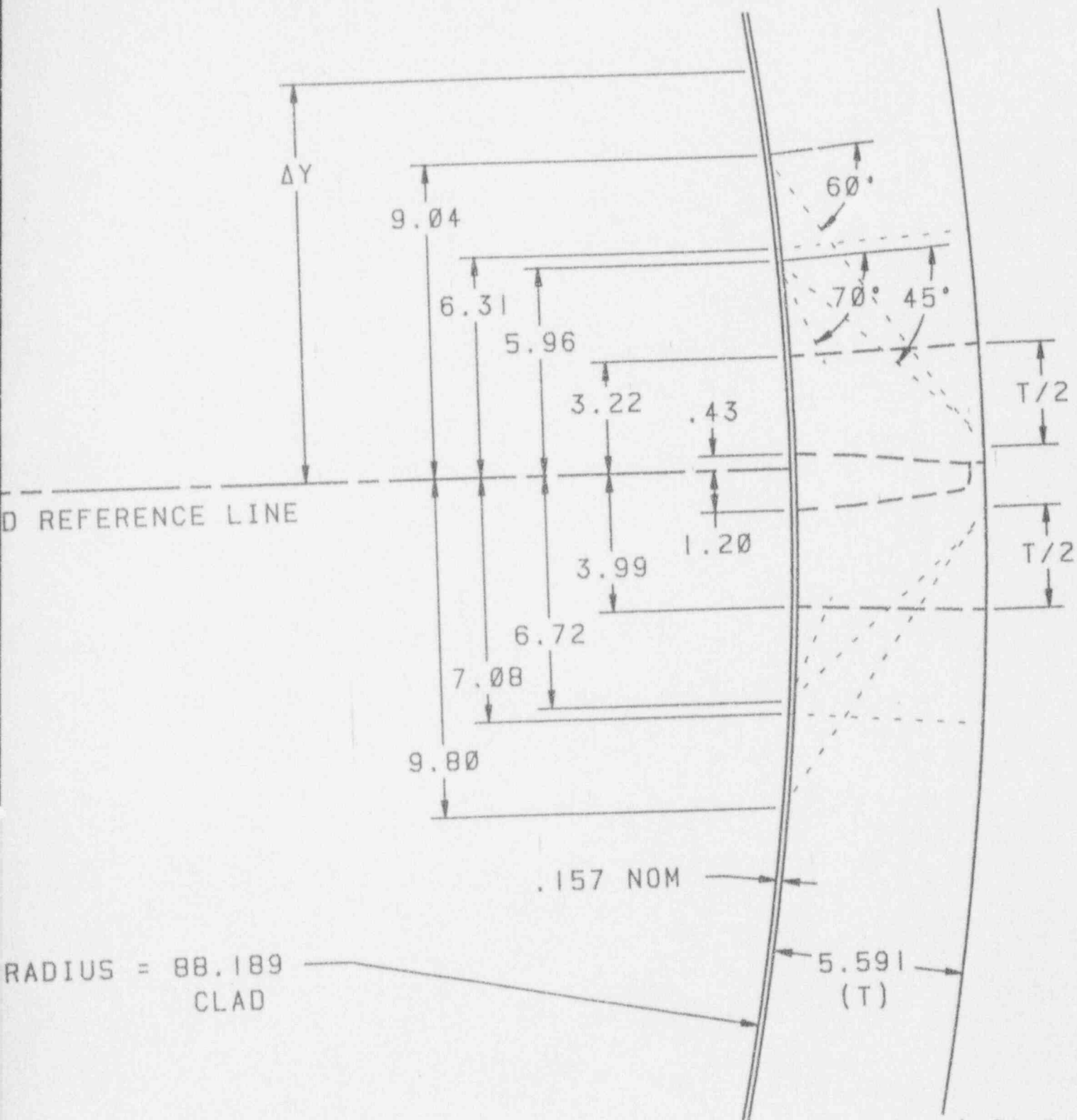
Aggregate Coverage =

$$\begin{aligned} & [52.0 \times 7.27 + (53.6 + 53.6) \times (29.29 + 5.12 + 5.12) \\ & + 75.9 \times 7.27 + (61.4 + 69.7) \times (29.29 + 5.12 + 5.12) \\ & + 9.0 \times 41.68] / \\ & [7.27 \times 2 + (29.29 + 5.12 + 5.12) \times 4 + 41.68] = \end{aligned}$$

Aggregate Coverage = 50.0 %

$$\begin{aligned} \text{Total Coverage} &= \frac{50.0 \% \times \text{Unobstructed} + 50.0 \% \times \text{Obstructed}}{100 \%} \\ &= 72.7 \% \end{aligned}$$

Ser. No. 94-01
ATTACHMENT 2
B01.022.001 IRPV-W02-01
B01.022.003 IRPV-W02-03
B01.022.004 IRPV-W02-04
B01.022.005 IRPV-W02-05
B01.022.006 IRPV-W02-06
PG 16 OF 68



Ser. No. 94-01
 Attachment 2
 B01.022.001 IRPV-W02-01
 B01.022.003 IRPV-W02-03
 B01.022.004 IRPV-W02-04
 B01.022.005 IRPV-W02-05
 B01.022.006 IRPV-W02-06
 PG 17 OF 68

W-IN

NOZZLE-TO-SHELL WELD & INSIDE RADIUS

Total Area = 209.57 in ²	(Near Surface + Weld + T/2)
Near Surface Area = 13.87 in ²	(Vertical Cross-Section)
Weld Area = 24.95 in ²	(Vertical Cross-Section)
T/2 Area = 170.75 in ²	(Vertical Cross-Section)
Inside Radius Area = 9.21 in ²	(Vertical Cross-Section)
Total Area = 164.09 in ²	(Near Surface + Weld + T/2)
Near Surface Area = 13.62 in ²	(Horizontal Cross-Section)
Weld Area = 13.42 in ²	(Horizontal Cross-Section)
T/2 Area = 137.05 in ²	(Horizontal Cross-Section)
Inside Radius Area = 5.56 in ²	(Horizontal Cross-Section)

INSIDE RADIUS

CIRC	70°	Gets 4.11 in ² Coverage Vertical Section
	70°	Gets 3.10 in ² Coverage Horizontal Section
		Covered Area = $(\frac{4.11}{9.21} + \frac{3.10}{5.56}) \times .50 = 50.2 \%$
AXIAL	70°	Gets 6.24 in ² Coverage Vertical Section
	70°	Gets 5.01 in ² Coverage Horizontal Section
		Covered Area = $(\frac{6.24}{9.21} + \frac{5.01}{5.56}) \times .50 = 78.9 \%$

70° INSIDE RADIUS COVERAGE

<u>AXIAL</u>	<u>CIRC</u>
78.9	50.2
Aggregate Coverage = 64.6 %	

SER. No. 94-01
ATTACHMENT 2
B03.090.001 IRPV-W11
B03.090.001A IRPV-W11
B03.090.002 IRPV-W12
B03.090.002A IRPV-W12
B03.090.003 IRPV-W13
B03.090.003A IRPV-W13
B03.090.004 IRPV-W14
B03.090.004A IRPV-W14
B03.100.001 IRPV-W11
B03.100.002 IRPV-W12
B03.100.003 IRPV-W13
B03.100.004 IRPV-W14
PG 18 OF 68

NOZZLE-TO-SHELL WELD

CIRC 70° Gets 13.70 in² Coverage Vertical Section
70° Gets 10.72 in² Coverage Horizontal Section
Covered Area = $(\frac{13.70}{13.87} + \frac{10.72}{13.62}) \times .5 = 88.7 \%$

CIRC 0° Gets 144.35 in² Coverage Vertical Section
0° Gets 98.40 in² Coverage Horizontal Section
Covered Area = $(\frac{146.35}{209.57} + \frac{98.40}{164.09}) \times .5 = 64.4 \%$

CIRC 45° & 60° Get 100 % Weld Coverage Vertical Section
45° & 60° Get 167.93 in² T/2 Coverage Upper Vertical Section
45° Gets 145.24 in² T/2 Coverage Lower Vertical Section
60° Gets 167.93 in² T/2 Coverage Lower Vertical Section

45° & 60° Get 11.74 in² Weld Coverage Horizontal Section
45° & 60° Get 75.95 in² T/2 Coverage Horizontal Section
Adjacent to Neighboring Inlet Nozzle
45° Gets 75.93 in² T/2 Coverage Horizontal Section
Adjacent to Neighboring Outlet Nozzle
60° Gets 75.95 in² T/2 Coverage Horizontal Section
Adjacent to Neighboring Outlet Nozzle

SER. No. 94-01
ATTACHMENT 2
B03.090.001 IRPV-W11
B03.090.001A IRPV-W11
B03.090.002 IRPV-W12
B03.090.002A IRPV-W12
B03.090.003 IRPV-W13
B03.090.003A IRPV-W13
B03.090.004 IRPV-W14
B03.090.004A IRPV-W14
B03.100.001 IRPV-W11
B03.100.002 IRPV-W12
B03.100.003 IRPV-W13
B03.100.004 IRPV-W14
PG 19 OF 68

$$\begin{aligned}
45^\circ \text{ Covered Area} &= \left[\left(\frac{167.93 + 24.95 + 24.95}{170.75 + 24.95 + 24.95} \right) \right. \\
&+ \left(\frac{145.24 + 24.95 + 24.95}{170.75 + 24.95 + 24.95} \right) \\
&+ \left(\frac{75.95 + 11.74 + 11.74}{137.05 + 13.42 + 13.42} \right) \\
&+ \left. \left(\frac{75.93 + 11.74 + 11.74}{137.05 + 13.42 + 13.42} \right) \right] \times .25 \\
&= 77.1 \%
\end{aligned}$$

$$\begin{aligned}
60^\circ \text{ Covered Area} &= \left[\left(\frac{167.93 + 24.95 + 24.95}{170.75 + 24.95 + 24.95} \right) \right. \\
&+ \left(\frac{167.93 + 24.95 + 24.95}{170.75 + 24.95 + 24.95} \right) \\
&+ \left(\frac{75.95 + 11.74 + 11.74}{137.05 + 13.42 + 13.42} \right) \\
&+ \left. \left(\frac{75.95 + 11.74 + 11.74}{137.05 + 13.42 + 13.42} \right) \right] \times .25 \\
&= 79.7 \%
\end{aligned}$$

AXIAL 45° Gets 11.61 in² Coverage Vertical Section Near Surface
 45° Gets 2.78 in² Coverage Horizontal Section Near Surface
 Covered Area = $\left(\frac{11.61}{13.87} + \frac{2.78}{13.62} \right) \times .50 = 52.1 \%$

AXIAL 0° Gets 128.63 in² Coverage Vertical Section
 0° Gets 31.15 in² Coverage Horizontal Section
 Covered Area = $\left(\frac{128.63}{195.70} + \frac{31.15}{150.47} \right) \times .50 = 43.2 \%$

AXIAL 45° Gets 158.01 in² Coverage Vertical Section
 45° Gets 117.92 in² Coverage Horizontal Section
 Covered Area = $\left(\frac{158.01}{195.70} + \frac{117.92}{150.47} \right) \times .50 = 79.6 \%$

SER. No. 94-01
 ATTACHMENT 2 PG 20 of 68

B03.090.001	IRPV-W11	B03.090.003	IRPV-W13	B03.100.001	IRPV-W11
B03.090.001A		B03.090.003A		B03.100.002	IRPV-W12
B03.090.002	IRPV-W12	B03.090.004	IRPV-W14	B03.100.003	IRPV-W13
B03.090.002A		B03.090.004A		B03.100.004	IRPV-W14

W-IN

NOZZLE-TO-SHELL WELD

AXIAL			CIRC			
NS	0	45	70	60	45	0
52.1	43.2	79.6	88.7	79.7	77.1	64.4

Aggregate Coverage =

$$\begin{aligned} & [52.1 \times (13.87 + 13.62) + (43.2 + 79.6) \times (195.70 + 150.47) \\ & + 88.7 \times (13.87 + 13.62) + (79.7 + 77.1) \\ & \times (170.75 + 24.95 + 24.95 + 137.05 + 13.42 + 13.42) \\ & + 64.4 \times (209.57 + 164.09)] / \\ & [(13.87 + 13.62) \times 2 + (195.70 + 150.47) \times 2 \\ & + (170.75 + 24.95 + 24.95 + 137.05 + 13.42 + 13.42) \times 2 \\ & + (209.57 + 164.09)] \end{aligned}$$

Aggregate Coverage = 69.2 %

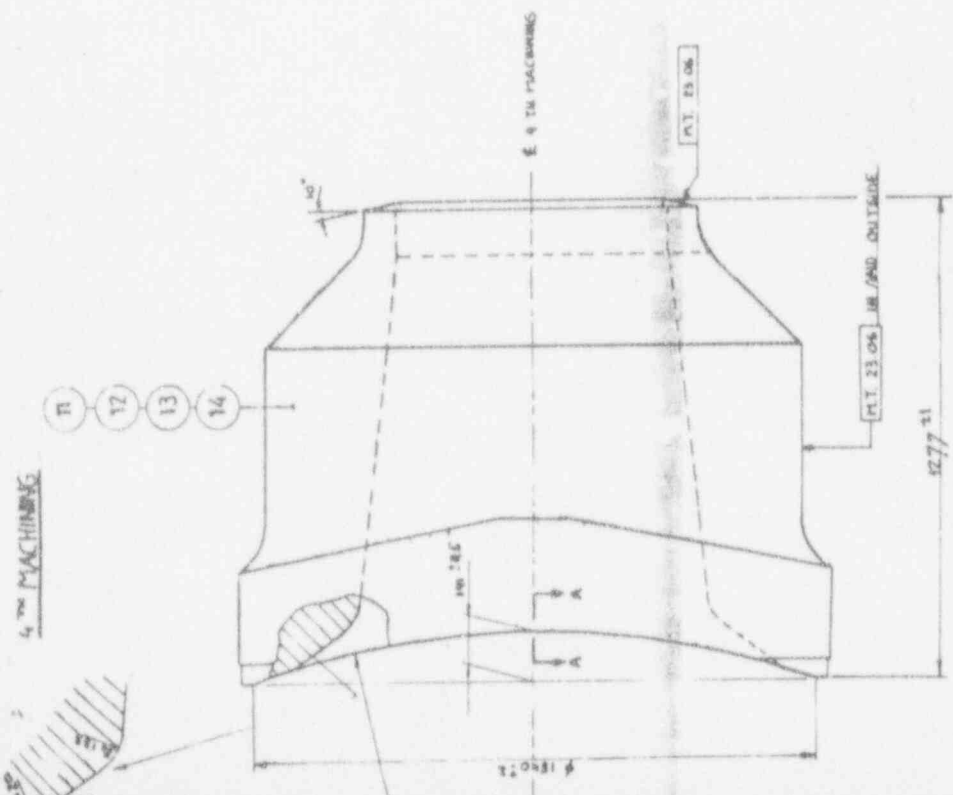
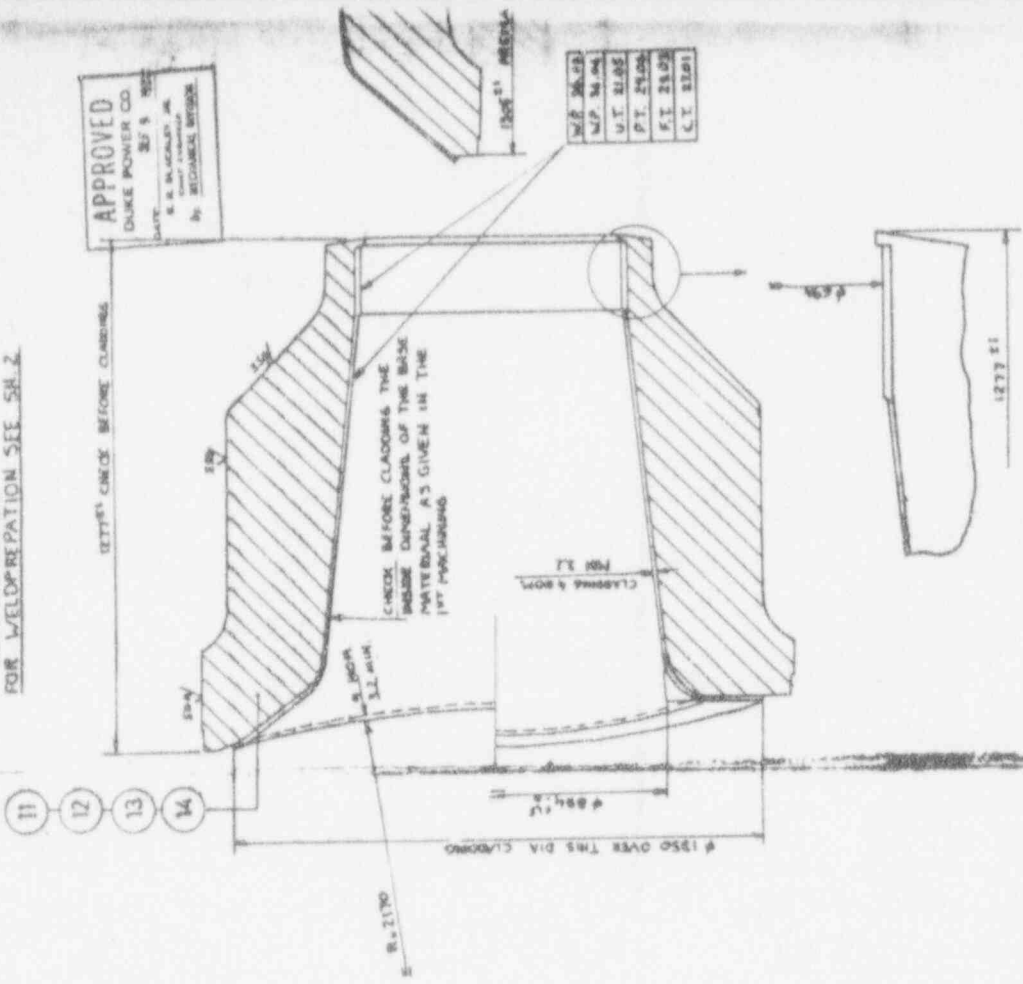
SER. No. 94-01
ATTACHMENT 2
B03.090.001 IRPV-W11
B03.090.001A
B03.090.002 IRPV-W12
B03.090.002A
B03.090.003 IRPV-W13
B03.090.003A
B03.090.004 IRPV-W14
B03.090.004A
B03.100.001 IRPV-W11
B03.100.002 IRPV-W12
B03.100.003 IRPV-W13
B03.100.004 IRPV-W14

SECTION B-B

5TH CLADDING
FOR WELD PREPATION SEE SR. 2

APPROVED
DUKE POWER CO.
DATE: 12/15/68 BY: S. J. [unclear]
BY: [unclear]

MR. [unclear]
MP. [unclear]
UT. [unclear]
PT. [unclear]
KT. [unclear]
CT. [unclear]

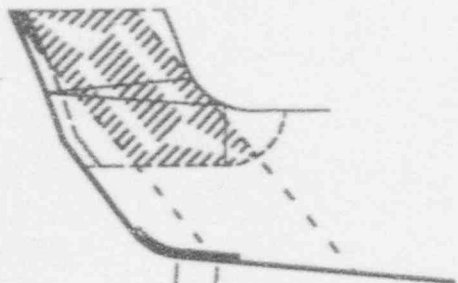


- SEC. No. 94-01
ATTACHMENT 2
- B03.090.001 IRPV-W11
 - B03.090.001A IRPV-W11
 - B03.090.002 IRPV-W12
 - B03.090.002A IRPV-W12
 - B03.090.003 IRPV-W13
 - B03.090.003A IRPV-W13
 - B03.090.004 IRPV-W14
 - B03.090.004A IRPV-W14
 - B03.100.001 IRPV-W11
 - B03.100.002 IRPV-W12
 - B03.100.003 IRPV-W13
 - B03.100.004 IRPV-W14

AXIAL COVERAGE

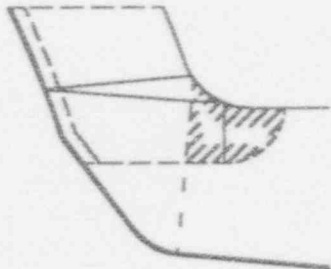


CIRC COVERAGE

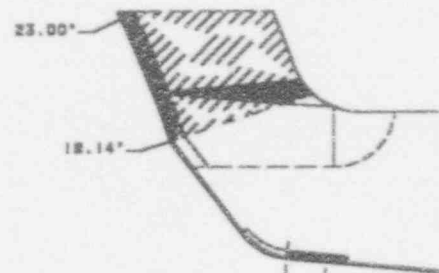


"R" = 18.84
"X" = 4.10

45 & 70 DEGREE
AXIAL COVERAGE

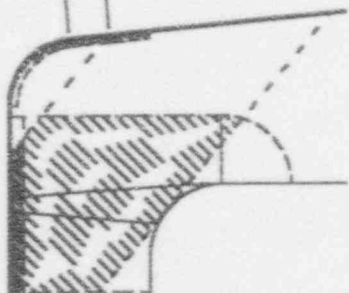


0 DEGREE
AXIAL COVERAGE

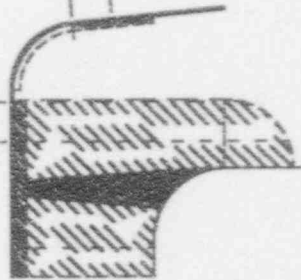
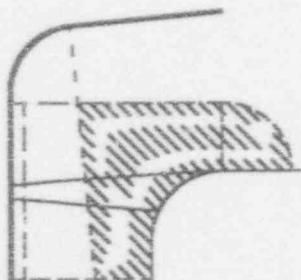


"R" = 18.84
"X" = 4.10

CIRC COVERAGE
(ALL ANGLES)



HORIZ TAPER LIMIT
(73.88) "I" = 127.00



SER. No. 94-01
 ATTACHMENT 2
 B03.090.001 | RPV-W11
 B03.090.001A | RPV-W11
 B03.090.002 | RPV-W12
 B03.090.002A | RPV-W12
 B03.090.003 | RPV-W13
 B03.090.003A | RPV-W13
 B03.090.004 | RPV-W14
 B03.090.004A | RPV-W14
 B03.100.001 | RPV-W11
 B03.100.002 | RPV-W12
 B03.100.003 | RPV-W13
 B03.100.004 | RPV-W14

W-OUT

NOZZLE-TO-SHELL WELD & INSIDE RADIUS

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

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

INSIDE RADIUS

CIRC 70° Gets 7.82 in² Coverage Vertical Section
70° Gets 7.07 in² Coverage Horizontal Section
Covered Area = $(\frac{7.82}{8.76} + \frac{7.07}{8.90}) \times .50 = 84.4 \%$

AXIAL 70° Gets 8.40 in² Coverage Vertical Section
70° Gets 7.66 in² Coverage Horizontal Section
Covered Area = $(\frac{8.40}{8.76} + \frac{7.66}{8.90}) \times .50 = 91.0 \%$

70° INSIDE RADIUS COVERAGE

<u>AXIAL</u>	<u>CIRC</u>
91.0	84.4

Aggregate Coverage = 87.7 %

SER. No. 94-01
ATTACHMENT 2
B03.090.005 IRPV-W15
B03.090.005A IRPV-W15
B03.090.006 IRPV-W16
B03.090.006A IRPV-W16
B03.090.007 IRPV-W17
B03.090.007A IRPV-W17
B03.090.008 IRPV-W18
B03.090.008A IRPV-W18
B03.100.005 IRPV-W15
B03.100.005A IRPV-W15
B03.100.007 IRPV-W17
B03.100.008 IRPV-W18

AXIAL 45° Gets 12.77 in² Coverage Vertical Section of Near Surface
 45° Gets 9.96 in² Coverage Horizontal Section of Near Surface

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

0° Gets 180.77 in² Coverage Vertical Section

0° Gets 124.50 in² Coverage Horizontal Section

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

45° Gets 154.56 in² Coverage Vertical Section

45° Gets 155.82 in² Coverage Horizontal Section

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

W- OUT

NOZZLE-TO-SHELL WELD

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

Aggregate Coverage =

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

Aggregate Coverage = 43.7 %

See No. 94-01
 ATTACHMENT 2 PG 25 OF 68

- | | | | | | |
|--------------|----------|--------------|----------|-------------|----------|
| B03.090.005 | IRPV-W15 | B03.090.007 | IRPV-W17 | B03.100.005 | IRPV-W15 |
| B03.090.005A | | B03.090.007A | | B03.100.006 | IRPV-W16 |
| B03.090.006 | IRPV-W16 | B03.090.008 | IRPV-W18 | B03.100.007 | IRPV-W17 |
| B03.090.006A | | B03.090.008A | | B03.100.008 | IRPV-W18 |

NOZZLE-TO-SHELL WELD

CIRC 70° Gets 6.17 in² Coverage Vertical Section

70° Gets 6.36 in² Coverage Horizontal Section

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

0° Gets 33.28 in² Coverage Vertical Section

0° Gets 16.47 in² Coverage Horizontal Section

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

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

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

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

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

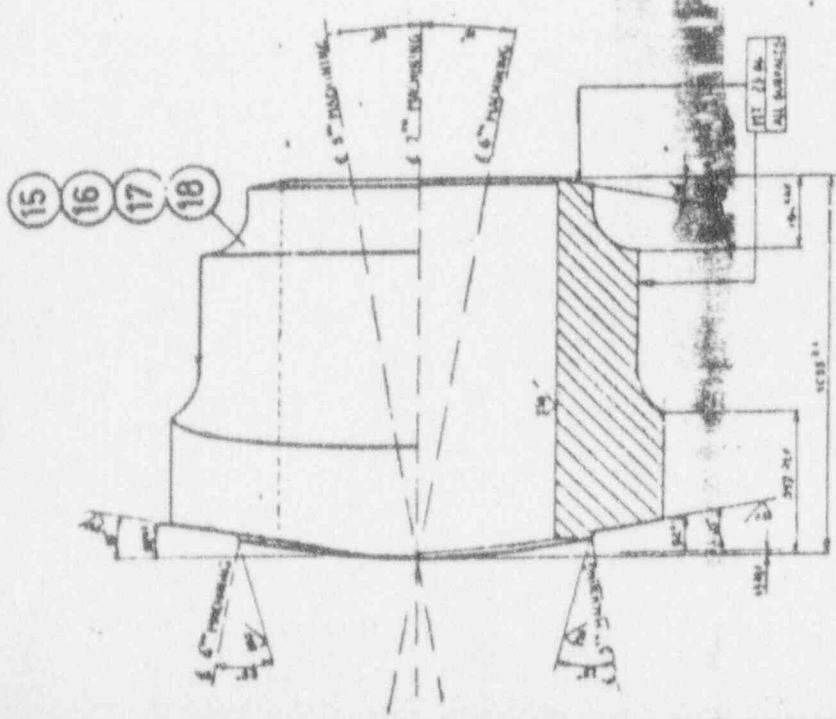
$$\begin{aligned} 45^\circ \ \& \ 60^\circ \ \text{Covered Area} &= \left[\left(\frac{56.95 + 3.75 + 3.75}{182.44 + 18.84 + 18.84} \right) \right. \\ &+ \left. \left(\frac{44.92 + 0.00 + 0.00}{175.93 + 13.08 + 13.08} \right) \right] \times .50 \\ &= 25.8 \% \end{aligned}$$

Sec. No. 94-01

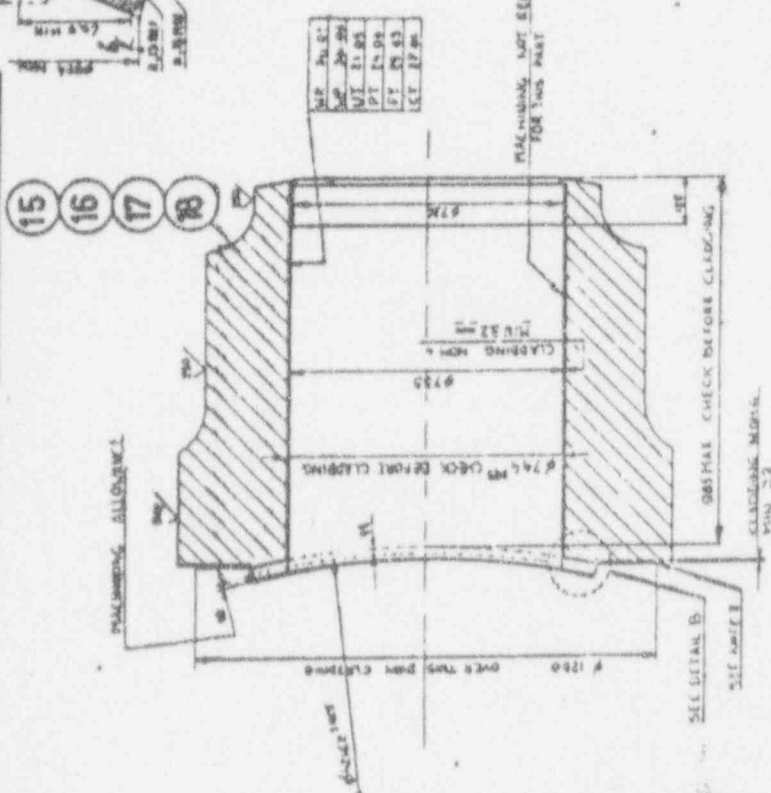
ATTACHMENT 2

B03.090.005	IRPV-W15
B03.090.005A	IRPV-W16
B03.090.006	IRPV-W17
B03.090.006A	IRPV-W18
B03.090.007	IRPV-W15
B03.090.007A	IRPV-W16
B03.090.008	IRPV-W17
B03.090.008A	IRPV-W18
B03.100.005	IRPV-W15
B03.100.006	IRPV-W16
B03.100.007	IRPV-W17
B03.100.008	IRPV-W18

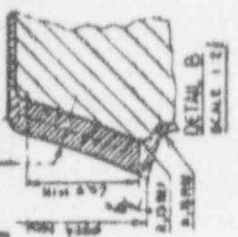
5" AND 7" MACHINING
SCALE 1:1



8" CLADDING
SCALE 1:1



8" MACHINING ALLOWANCE
SCALE 1:1



RECEIVED
JUN 7 1974
DUKE POWER COMPANY
DESIGN ENGINEER

NUCLEAR SAFETY RELIABILITY

REFERENCE DRAWINGS:

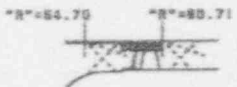
- OUTLET NOZZLE (FORMING) DWG. 30238-1002
- FOR WELD PREPARATION SEE DWG. 30238-1051-1052
- FOR WELDING AND MACHINING, AFTER WELDING, THE ARTICLES
- NO ITEM 04, SEE DWG. 30238-1053
- FOR WELD DROPOUT SURFACE AND SEE DWG. 30238-1054
- FOR MACHINING, SEE DWG. 30238-1058

SER. No. 94-01

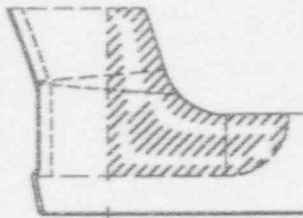
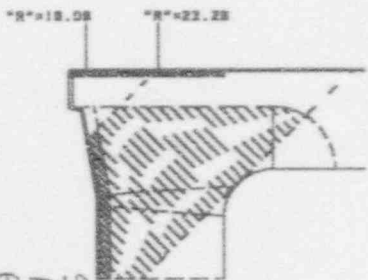
ATTACHMENT 2

- B03.090.005 IRPV-W15
- B03.090.005A IRPV-W15
- B03.090.006 IRPV-W16
- B03.090.006A IRPV-W16
- B03.090.007 IRPV-W17
- B03.090.007A IRPV-W17
- B03.090.008 IRPV-W18
- B03.090.008A IRPV-W18
- B03.100.005 IRPV-W15
- B03.100.006 IRPV-W16
- B03.100.007 IRPV-W17
- B03.100.008 IRPV-W18

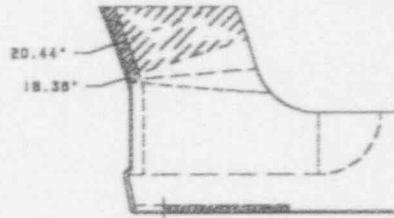
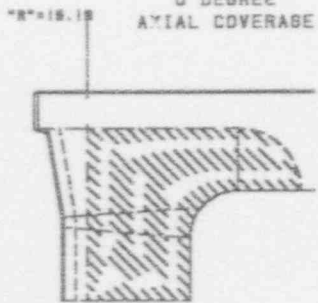
CIRC COVERAGE
AXIAL COVERAGE
(ALL ANGLES)



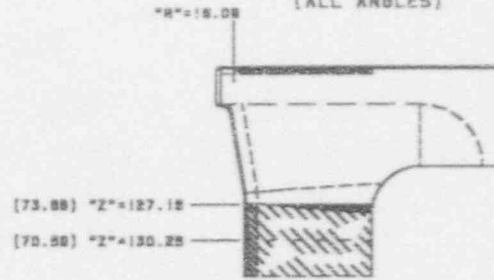
47 & 70 DEGREE
AXIAL COVERAGE



0 DEGREE
AXIAL COVERAGE



CIRC COVERAGE
(ALL ANGLES)

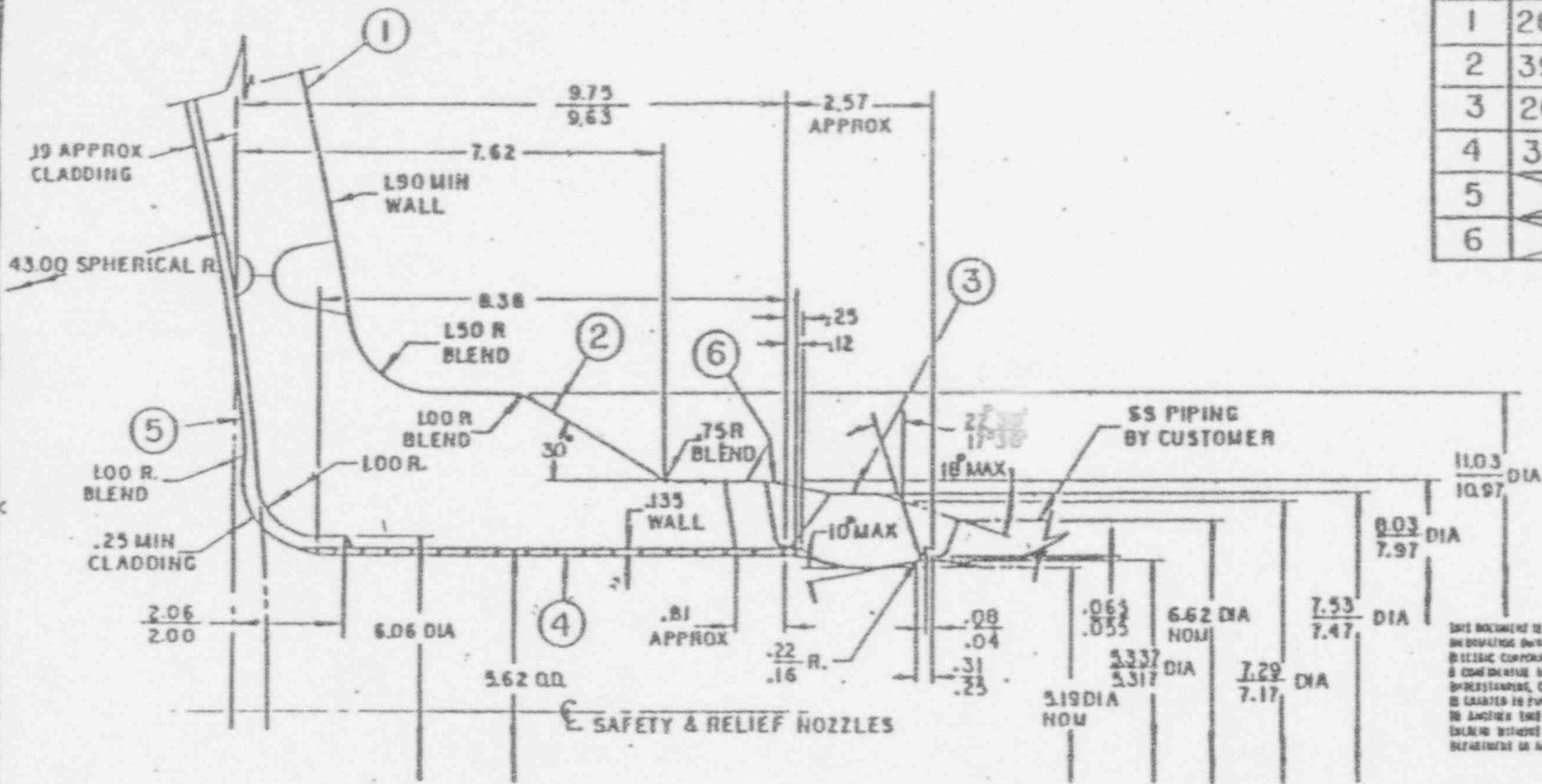


Ser. No. 94-01
 Attachment 2
 803.090.005 1RPV-W15
 803.090.005A 1RPV-W15
 803.090.006 1RPV-W16
 803.090.006A 1RPV-W16
 803.090.007 1RPV-W17
 803.090.007A 1RPV-W17
 803.090.008 1RPV-W18
 803.090.008A 1RPV-W18
 803.100.005 1RPV-W15
 803.100.006 1RPV-W16
 803.100.007 1RPV-W17
 803.100.008 1RPV-W18

NOTES:

1: WELD PREP PER PWR50 DWG 271C900

MATERIAL		
ITEM	W ^{PD5} /DWG N ^o	ASME N ^o
1	2656A90	SA-533 GR A CLASS 2
2	393A708	SA-508 CLASS 2 or 3
3	2656A96	SA-182 GRADI F-316L
4	398A009	SA-213 GRAD TP 304
5		SS CLADDIN
6		INCOHEL WEL



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WESTINGHOUSE PROPRIETARY CLASS 2

1	CHANG	1/20/88
2		

LAST NUMBER USED	
ITEM	006
PARTS LIST	

Westinghouse Electric Corporation
 TAMPA DIVISION TAMPA FLA.
 APPARATUS PRESSURIZER (84 SERIES)
 TITLE SAFETY & RELIEF NOZ DET (FAB HD)

DTM J.E. Simon	DATE 1/20/88	CHKD [Signature]	DATE 1/20/88	EDSK
CIRD [Signature]	DATE 1/20/88	APP [Signature]	DATE 1/20/88	379443B
WELD [Signature]	DATE 1/20/88	DRG [Signature]	DATE 1/20/88	

672C799001
 Ser. No. 94-01
 Attachment 2
 PG 29 OF 68

Figure 2-1. Safety and Relief Nozzle Detailed Drawing

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1 PER. WAA
By Jane W. Ely Date 11-24-93 Item # B03.110.004
Checked By Larry Mauldin Date 11-29-93 Page 7 of 9

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

Total Cross Sectional Area 12 x (Number of Scans) 9 = 108 (% Factor)

Vessels:

Area Loss : Zone #1 2.06
Zone #2 2.83
Zone #3 7.77

Total Zone Loss 12.66 / (% Factor) 108 x 100 = 11.72 % of Loss

Lump Sum Loss From Other Limitations + _____ %

Total Loss 11.72 %

100% - (Total Loss) 11.72 = 88.2 % of Coverage

(Additional * % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

Explain: _____ Total % Loss

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

Qualifies for Request for Relief Yes No

Disposition: * LOSSES ARE ONLY FROM ONE DIRECTION ONLY.

By: _____ Date: _____

Handwritten initials and date:
11/29/93

ATTACHMENT 1 of
PG. 7 of 9

ITEM # BOS. 110.004

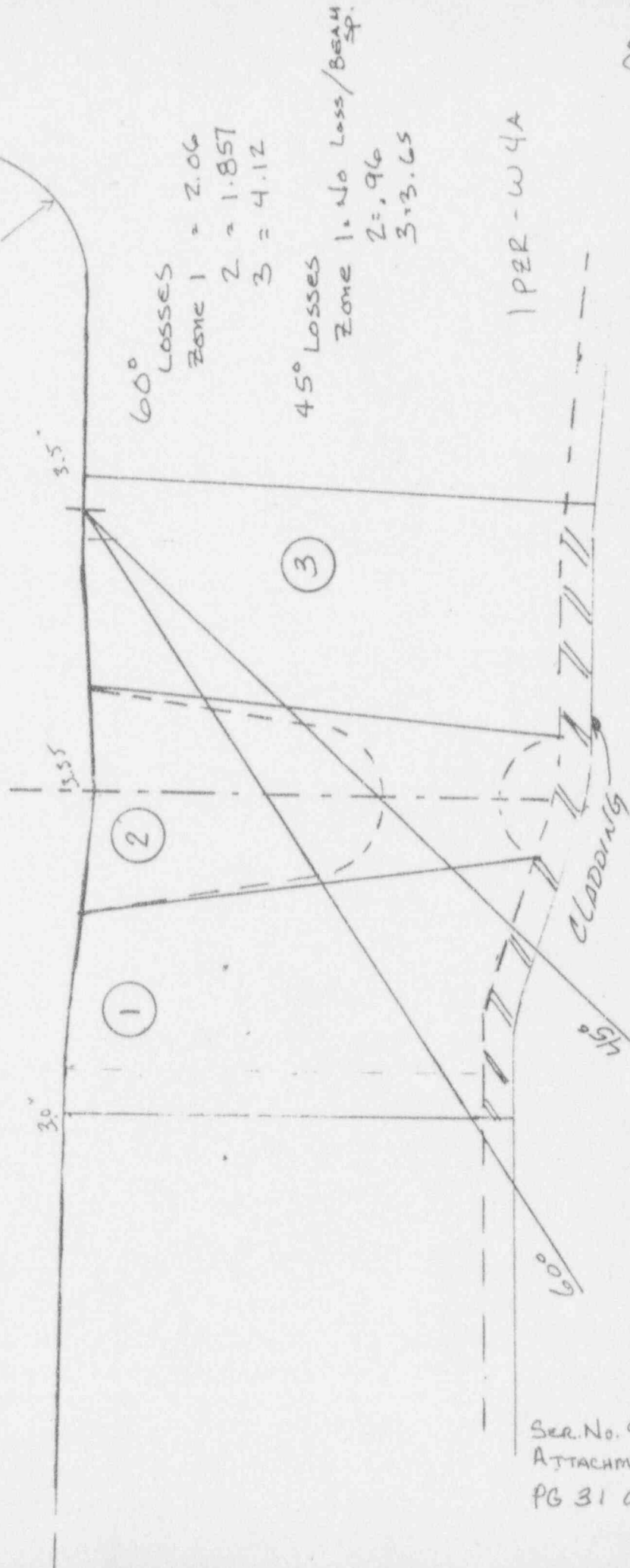
total Sq. = 12.00"

Zone 1 = 4.48

Zone 2 = 2.95

Zone 3 = 4.57

total =



NOTE THAT ALL ZONES DID RECEIVE COMPLETE CIRC COVERAGE, ± 0 DEG COVERAGE AND 45 ± 60 AX (BEAM 2 SURFACE 1) COMPLETE COVERAGE

1/1/94

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1PER-W4B
By Jane W. Steyer Date 11-24-93 Item # B03.110.005
Checked By Kenny Mauldin Date 11-24-93 Page 6 Of 8

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

Total Cross Sectional Area 12 x (Number of Scans) 9 = 108 (% Factor)

Vessels:

Area Loss : Zone #1 2.06
Zone #2 2.83
Zone #3 7.77

Total Zone Loss 12.66 / (% Factor) 108 x 100 = 11.72 % of Loss

Lump Sum Loss From Other Limitations + _____ %

Total Loss 11.72 %

100% - (Total Loss) 11.72 = 88.2 % of Coverage

(Additional * % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

Explain: _____ Total % Loss

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

Qualifies for Request for Relief Yes No

Disposition: * LOSSES ARE ONLY FROM ONE DIRECTION ONLY.

By: _____ Date: _____

[Handwritten initials]
1/6/94

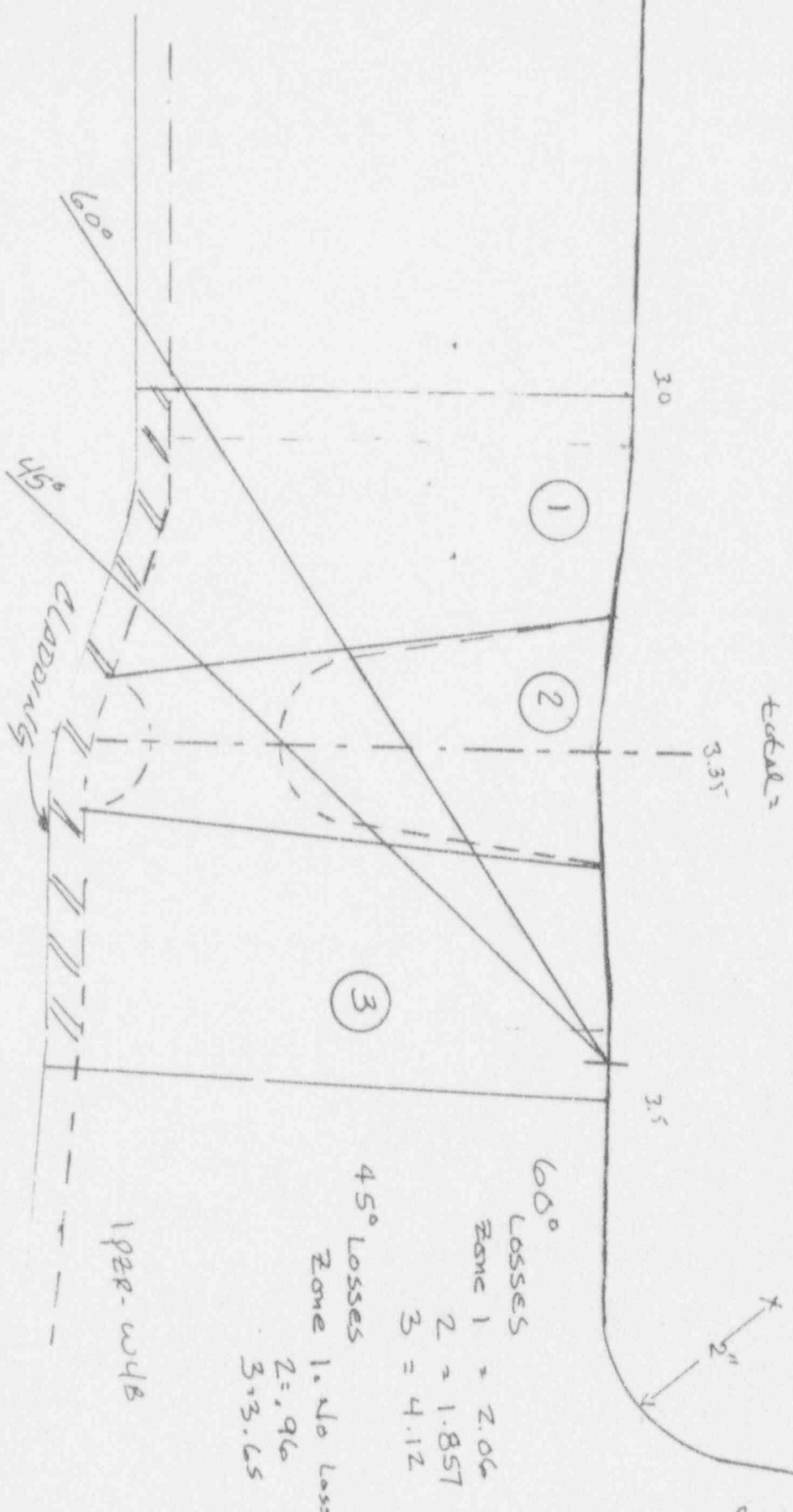
total Sq. ~ 12.00"

Zone 1 = 4.48
 Zone 2 = 2.95
 Zone 3 = 4.57
 total =

ITEM # R03.110.005

ATTACHMENT 1
 of pg. 6 of 8

SER. No. 94-01
 ATTACHMENT 2
 PG 33 OF 68



60° Losses
 Zone 1 = 2.06
 2 = 1.857
 3 = 4.12

45° Losses
 Zone 1.46 Loss/Beam Sp.
 2 = .96
 3 = 3.65

1928-048

NOTE THAT ALL

ZONES

DID RECEIVE

COMPLETE CIRC COVERS, & 0 DEG

COVERS

AND 45 & 60 AX (BEAM 2)

COMPLETE

COVERS

Handwritten signature and date: 10/19/11

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1 PER-W/C
By James W. Sizer Date 11-24-93 Item # B03.110.006
Checked By Larry Marklin Date 11-29-93 Page 6 Of 8

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

Total Cross Sectional Area 12 x (Number of Scans) 9 = 108 (% Factor)

Vessels:

Area Loss : Zone #1 2.06
Zone #2 2.83
Zone #3 7.77
Total Zone Loss: 12.66 / (% Factor) 108 x 100 = 11.72 % of Loss
Lump Sum Loss From Other Limitations + _____ %
Total Loss 11.72 %
100% - (Total Loss) 11.72 = 88.2 % of Coverage
(Additional * % of Partial Coverage)
Qualifies for Request for Relief Yes No

Piping:

Axial Scan _____ (Loss) _____ / _____ (% Factor) x 100 = _____ % of Loss
Circumferential Scan Over Root Area Yes No _____ % of Loss
Axial Loss _____ + Circ. Loss _____ = _____ / 2 = _____ % Loss
Additional Losses (Due to hangers, restraints, etc.) + _____ % Loss
Explain: _____ Total % Loss

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

Disposition: * LOSSES ARE ONLY FROM ONE DIRECTION ONLY.

By: _____ Date: _____

ATTACHMENT 1 of
Pg. 6 of 8

total Sq. = 12.00"

Zone 1 = 4.48

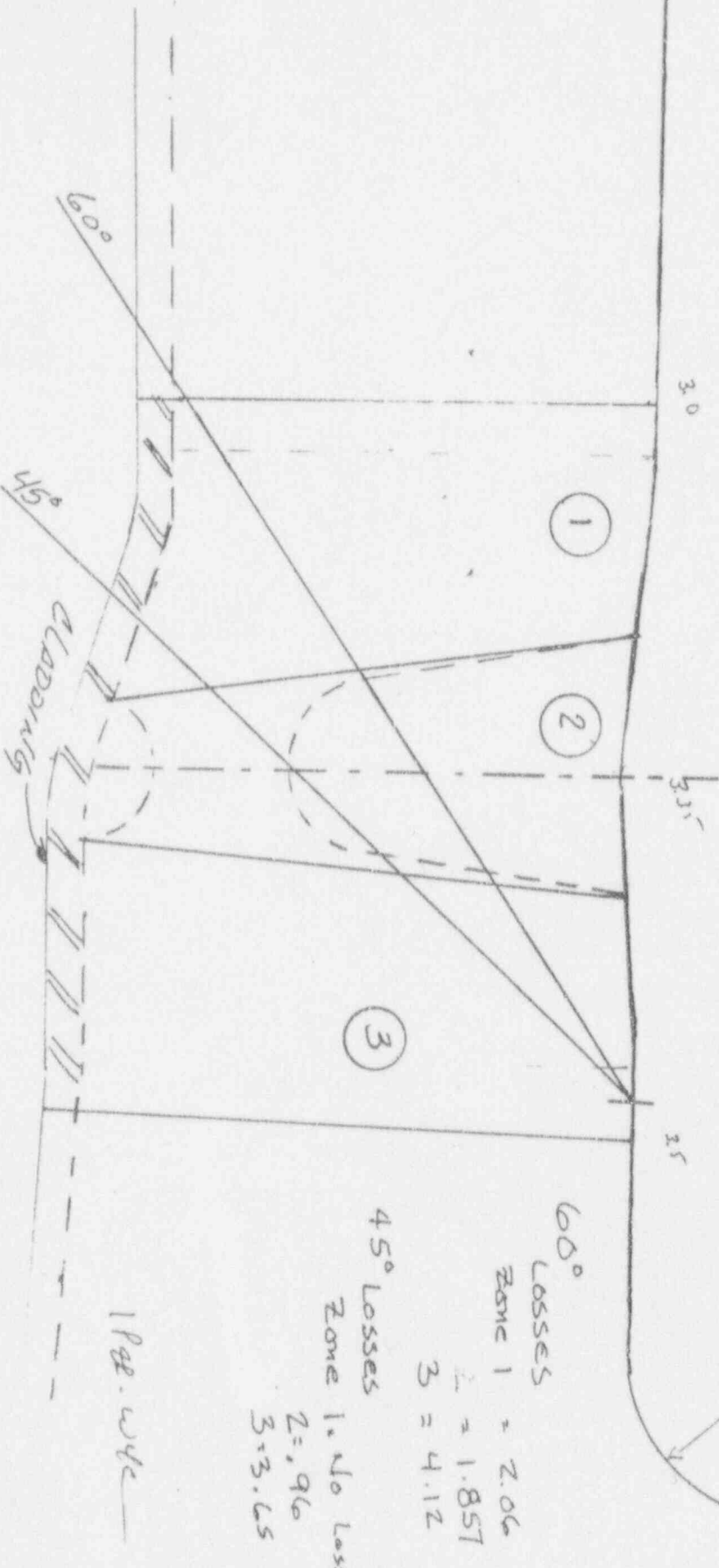
Zone 2 = 2.95

Zone 3 = 4.57

total =

ITEM # B03.110.006

See No. 94-01
ATTACHMENT 2
PG 35 OF 68



60° Losses

Zone 1 = 2.06

2 = 1.857

3 = 4.12

45° Losses

Zone 1 = 1.40 Loss/Beam sp.

2 = .96

3 = 3.65

1/2\"/>

NOTE THAT ALL ZONES DID RECEIVE COMPLETE CIRC COVERAGE, ± 0 DEG

AND ± 5 ± 60 AX (BEAM 2) COMPLETE COVERAGE
SUPERVA 1) COMPLETE COVERAGE
40

[Signature]

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1 PER-W44
By Jam W. Seto Date 11-24-93 Item # B03.120.004
Checked By Randy Mauldin Date 11-29-93 Page 3 Of 5

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

Total Cross Sectional Area 1.83 x (Number of Scans) 2 = 3.66 (% Factor)

Vessels:

Area Loss : Zone #1 n/a
Zone #2 n/a
Zone #3 n/a

Total Zone Loss 1.242 / (% Factor) 3.66 x 100 = 33.9 % of Loss

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

100% - (Total Loss) 33.9 = 66.1 % of Coverage

(Additional n/a % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

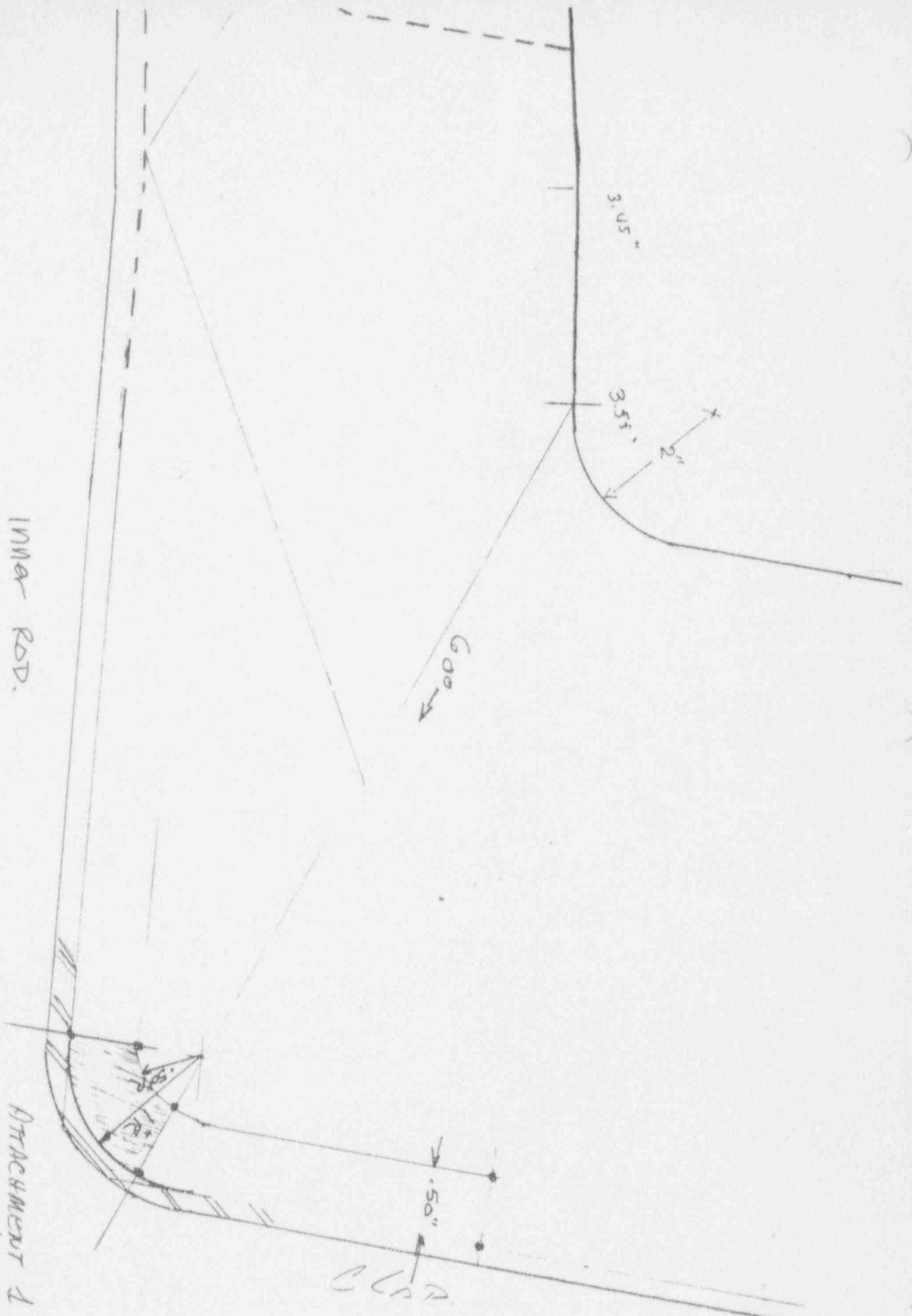
Explain: _____ Total % Loss

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

Qualifies for Request for Relief Yes No

Disposition: _____

By: _____ Date: _____



INNER RAD.

total AREA = 1.83 sq. in.
 total LOSS = 1.242

ATTACHMENT 4
 of PG. 3 of 3

ITEM # 803.120.004

11/6/94

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1PER-W4B
By James W Seton Date 11-24-93 Item # B03.120.005
Checked By Randy Mauldin Date 11-29-93 Page 3 Of 3

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

Total Cross Sectional Area 1.83 x (Number of Scans) 2 = 3.66 (% Factor)

Vessels:

Area Loss : Zone #1 n/A
Zone #2 n/A
Zone #3 n/A

Total Zone Loss 1.242 / (% Factor) 3.66 x 100 = 33.9 % of Loss

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

100% - (Total Loss) 33.9 = 66.1 % of Coverage

(Additional 0/0 % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

Explain: _____ Total % Loss

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

Qualifies for Request for Relief Yes No

Disposition: _____

By: _____ Date: _____

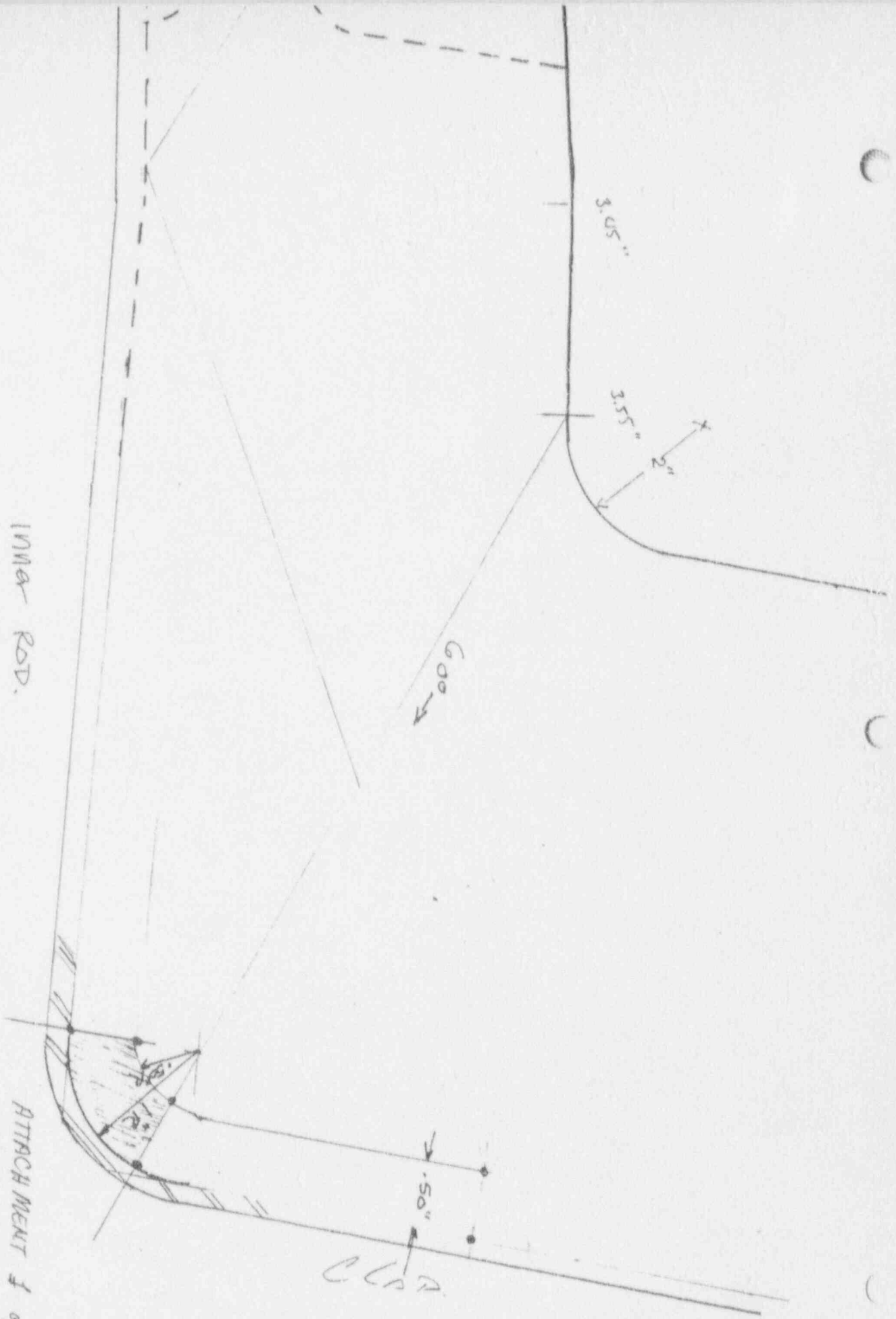
OC
11/29/94

INNER ROD.
 total AREA = 1.83 sq in.
 total LOSS = 1.242

ATTACHMENT 1 of 3 of 3

ITEM # B03.120.005

1/16/94



Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1PER-W4C
By Jans W. Seto Date 11-24-97 Item # B03.120.006
Checked By Ramy Mawda Date 11-29-93 Page 5 Of 3

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

Total Cross Sectional Area 1.83 x (Number of Scans) 2 = 3.66 (% Factor)

Vessels:

Area Loss : Zone #1 n/A
Zone #2 n/A
Zone #3 n/A

Total Zone Loss 1.242 / (% Factor) 3.66 x 100 = 33.9 % of Loss

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

100% - (Total Loss) 33.9 = 66.1 % of Coverage

(Additional n/A % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

Explain: _____ Total % Loss

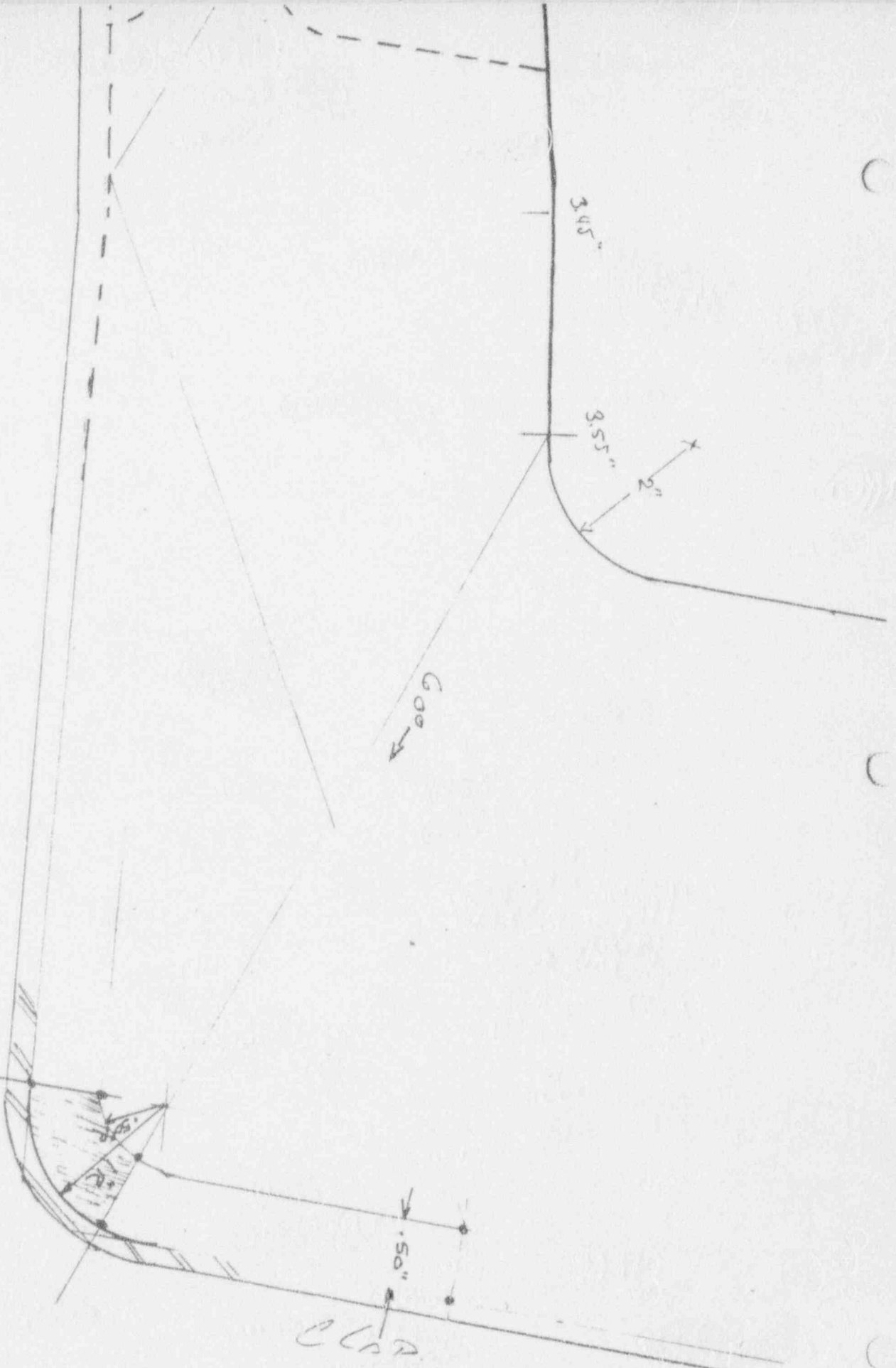
100% - (Total Loss) _____ = _____ % of Coverage

Qualifies for Request for Relief Yes No

Disposition: _____

By: _____ Date: _____

[Handwritten signature]



INNER ROAD.

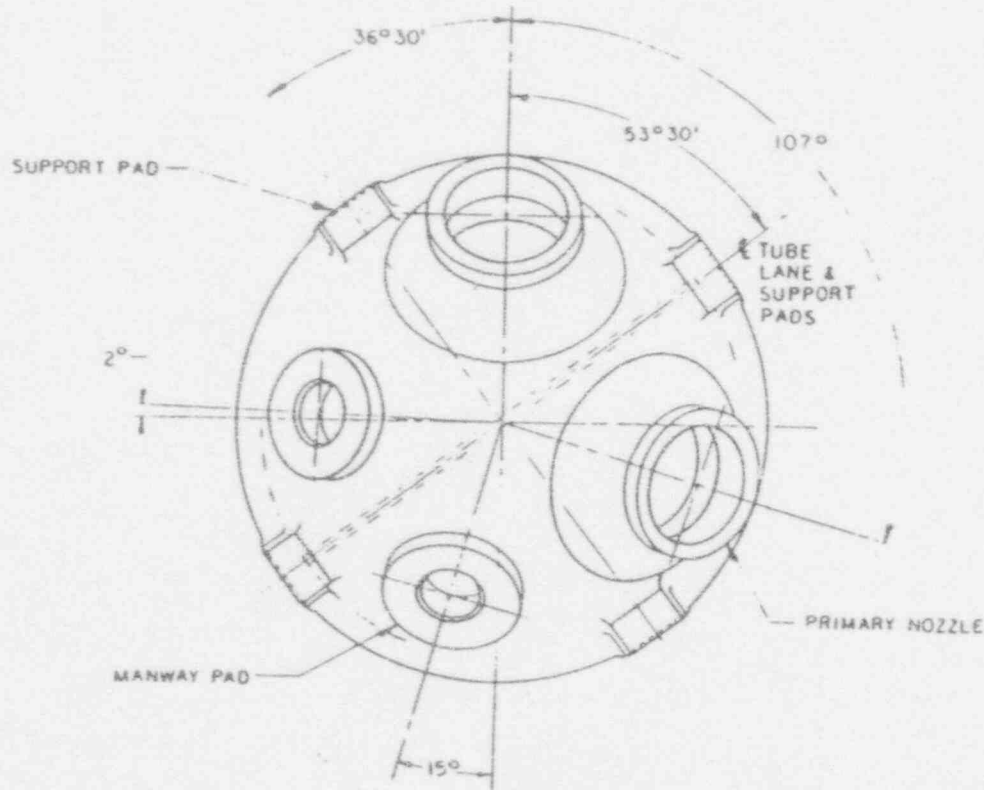
total AREA = 1.83 Sq. in.
 total LOSS = 1.242

ATTACHMENT 1
 of PG. 3 of 3

B03.120.006


CLAD

[Handwritten signature]
 1/16/94



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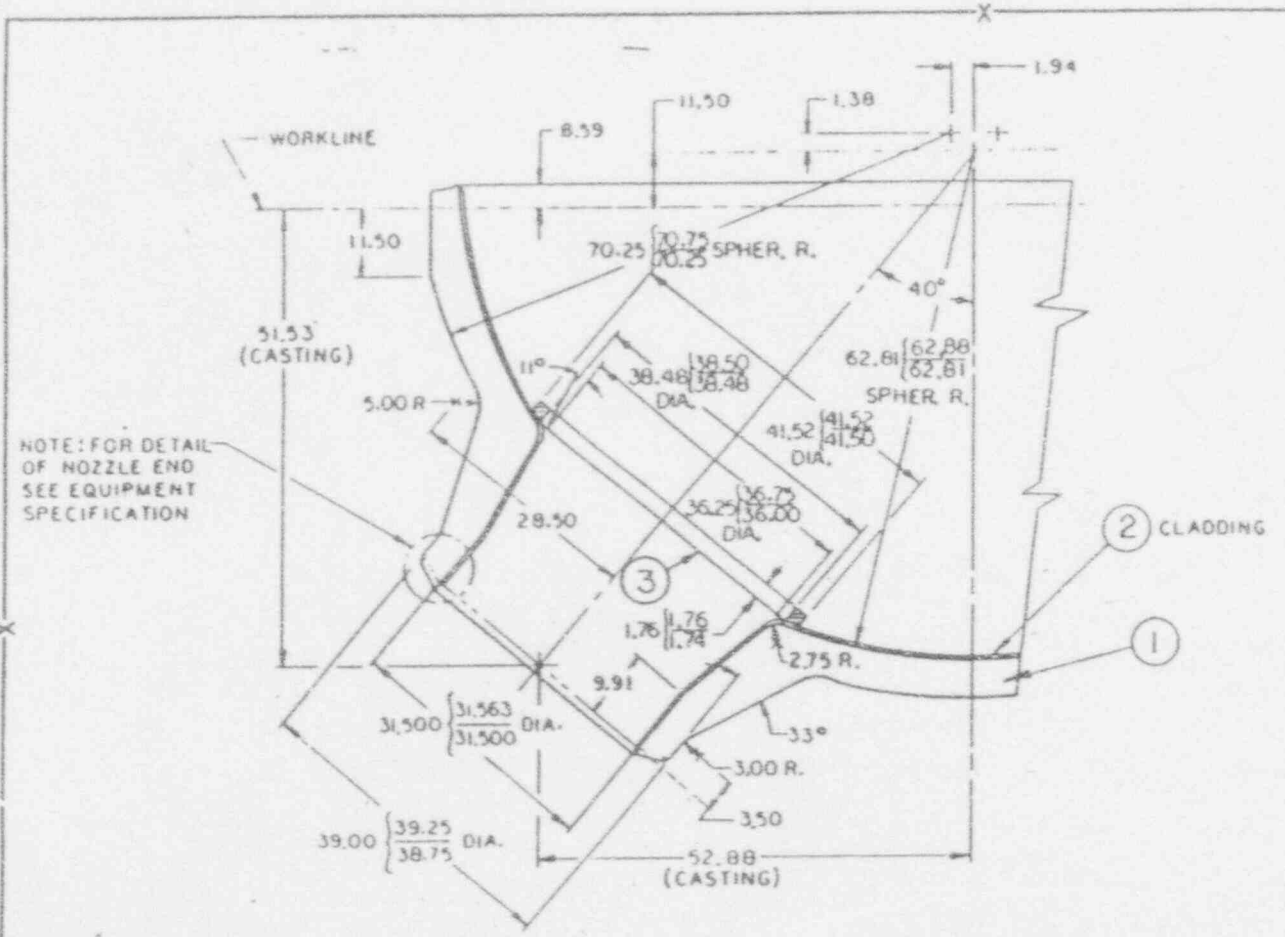
3-3
Sheet No. 94-01
Attachment Z
Pg 42 of 68

1	CHANGE	ITEM	LAST NUMBER USED	PARTS LIST	Westinghouse Electric Corporation		
					TAMPA DIVISION TAMPA FLA.		
					APPARATUS MODEL "D" STEAM GENERATOR		EDSK-351098B
					TITLE CHAMBER HEAD ORIENTATION		
DWTM Jim Sallinger		8/2/28		MECH ENG			
CHKD		8/4/28		MFG APP			
DESIGN APP		8/7/28		QUAL CONT			
MILL & WELD APP				DRAWING NOT TO SCALE		SHEET NO OF SHEETS	

B72C799001

MATERIAL		
ITEM	W ^{POS} DWG N ^o	ASME N ^o
1	398A006	SA-216 GRADE WCC STAINLESS STEEL
2		
3	2655A11	SA-479 TYPE 316 BAR

SEE
EDSK-379349B



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3-6
See No. 94-01
Attachment Z
Pg 43 of 68

SO D.S.	ITEM	CHANGE	LAST NUMBER USED	PARTS LIST	
				ITEM	
1					
3	ENG CHG # 2323 ADDED C/Change: B/2B/7N see drawing for end view J.C.M. 11/20/68				
2					

Westinghouse Electric Corporation
TAMPA DIVISION TAMPA FLA.
APPARATUS MODEL "D" STEAM GENERATOR
TITLE PRIMARY NOZZLE DETAIL - CAST HEAD

DRWN J. M. SANCHEZ	1/2/68	WEC	
CHKD J. M. SANCHEZ	1/2/68	WEC	
DESIGN APP. J. M. SANCHEZ	1/2/68	APP	
MATL & WELD APP.		DIAL	
		CONT	

EDSK-351101B

DRAWING NOT TO SCALE

SHEET NO. | OF | SHEETS

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # SG-1C INLET Nozzle
By Larry Mauldin Date 11-5-93 Item # B03.140.005
Checked By Richard B Childers Date 11-11-93 Page 3 of 3

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

Total Cross Sectional Area 5.81 x (Number of Scans) 2 = 11.62 (% Factor)

Vessels:

Area Loss : Zone #1 _____
Zone #2 N/A
Zone #3 _____

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

Lump Sum Loss From Other Limitations + 44.75 %

Total Loss 44.75 %

100% - (Total Loss) 44.75 = 55.25 % of Coverage

(Additional 0 % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

Explain: _____

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

Disposition: _____

By: _____ Date: _____

Handwritten signature/initials

STEAM GENERATOR INLET NOZZLE

$$\begin{aligned}
 2.75'' R^2 \times \pi &= 23.758 + 4 = 5.9395 = 5.94 \\
 2.25'' R^2 \times \pi &= 15.9 + 4 = 3.975 = 3.98 \\
 \hline
 &7.96 \text{ sq in} \\
 &1.5 \\
 &\hline
 &2.55
 \end{aligned}$$

5.81 sq in Total Exam Area

$$\begin{aligned}
 \text{AREA OF LOSS} &= .5'' \times 5.2'' = 2.6 \text{ sq in} \\
 &2.6 \div 5.81 = 44.75\%
 \end{aligned}$$

Amount of Coverage = 55.25%
SCANNED ON GENERATOR SIDE ONLY

AREA NOT SCANNED
SCALE 1/2" = 1"



SER. No. 94-01
ATTACHMENT Z
PG 45 OF 68

By: Larry Mueller

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # SG 1C OUTLET Nozzle
By Tom Mauldin Date 11-5-93 Item # 803.140.006
Checked By Richard B Childers Date 11-11-93 Page 3 of 8

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

Total Cross Sectional Area 5.81 x (Number of Scans) 2 = 11.62 (% Factor)

Vessels:

Area Loss : Zone #1 _____
Zone #2 N/A
Zone #3 _____

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

Lump Sum Loss From Other Limitations + 44.75 %

Total Loss 44.75 %

100% - (Total Loss) 44.75 = 55.25 % of Coverage

(Additional 0 % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

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

Circumferential Scan Over Root Area Yes No _____ % of Loss

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

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

Explain: _____

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

Disposition: _____

By: _____ Date: _____

[Signature]
11/6/93

STEAM GENERATOR
 OUTLET NOZZLE

$$\begin{aligned}
 2.75'' R^2 \times \pi &= 23.758 + 4 = 5.9375 = 5.94 \\
 2.25'' R^2 \times \pi &= 15.9 + 4 = 3.975 = 3.98 \\
 \hline
 &1.96 \text{ sq in} \\
 &1.5 \\
 &\hline
 &2.55
 \end{aligned}$$

5.81 sq in TOTAL EXAM AREA

$$\begin{aligned}
 \text{AREA OF LOSS} &= .5'' \times 5.2'' = 2.6 \text{ sq in} \\
 &2.6 \div 5.81 = 44.75\%
 \end{aligned}$$

AMOUNT OF COVERAGE = 55.25%

SCANNED ON GENERATOR SIDE ONLY

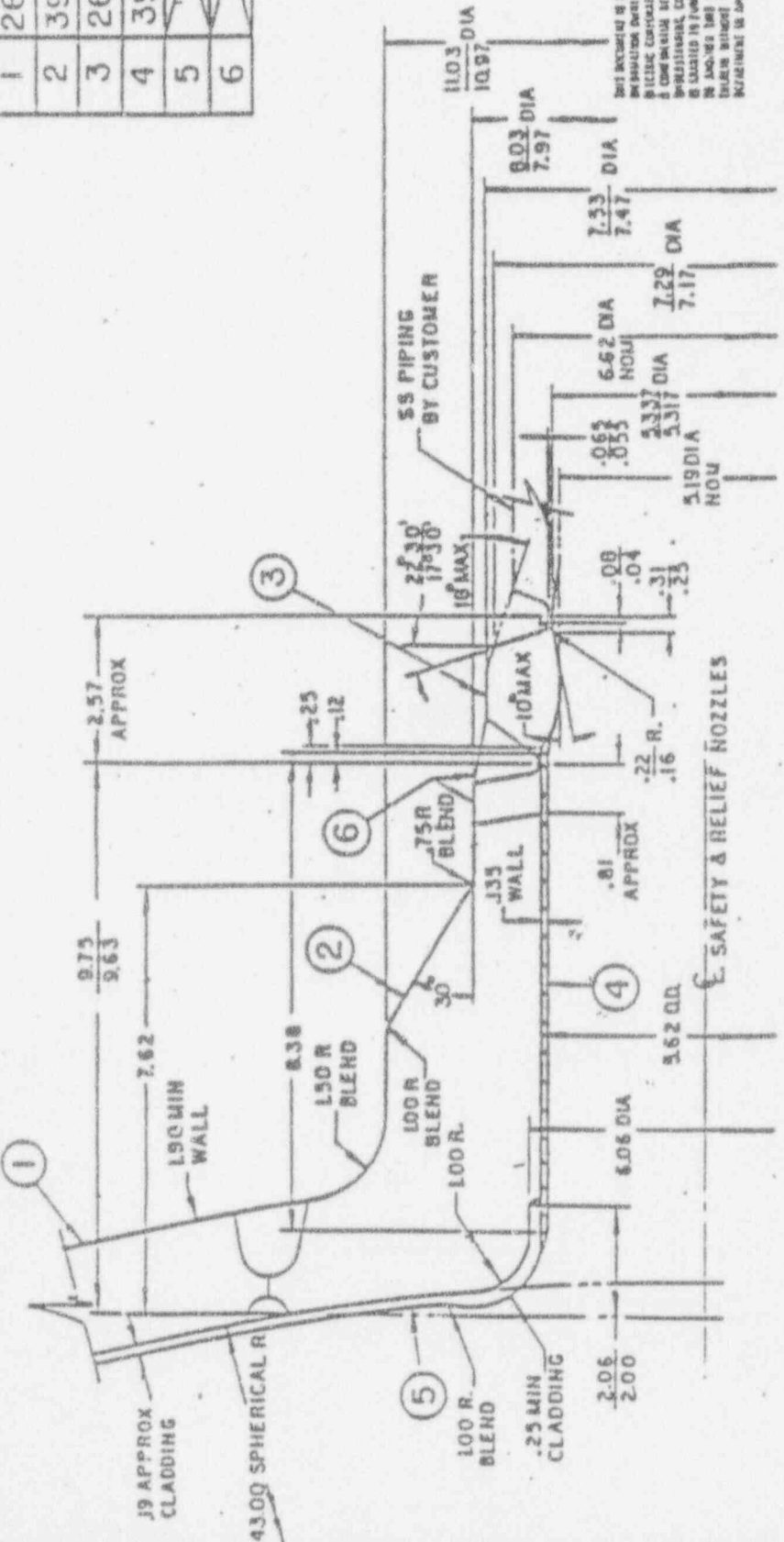
AREA NOT SCANNED
 SCALE 1/2" = 1"



By Larry Mueller

NOTED:

WELD PREP PER PWRSD DWG 271C500



NOT RECORDED IN THE PROJECT OR, AND CONTAINS INFORMATION PROPRIETARY TO WESTINGHOUSE. THE INFORMATION IS NOT TO BE DISCLOSED TO ANY OTHER PARTY WITHOUT THE WRITTEN PERMISSION OF THE COMPANY. THE INFORMATION IS NOT TO BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN PERMISSION OF THE COMPANY.

WESTINGHOUSE PROPRIETARY CLASS 2

ITEM	(W) PDS / DWG No	MATERIAL	ASME NO
1	2656A90		SA-333 GRA CLASS 2
2	393A708		SA-500 CLASS 2 OF 1
3	2656A96		SA-102 GRAD F-316L
4	398A009		SA-213 GRAD TP 304
5			SS CLADDING
6			INCOHEL WEL

NO	DATE	DESCRIPTION	BY	CHKD
1		CHANGE		
2				

Westinghouse Electric Corporation			
TAMPA DIVISION TAMPA FLA.			
APPARATUS PRESSURIZER (84 SERIES)			
TITLE SAFETY & RELIEF NOZ DET (FAB ID)			
DESIGN	J.E. SIMON	DATE	1/13/77
CHECKED		DATE	
APPROVED		DATE	
WELD APPR		DATE	
DRAWING NOT TO SCALE		E DSK	
379443B		SHEET NO 1 OF 1 SHEETS	

Figure 2-1. Safety and Relief Nozzle Detailed Drawing

SER.No. 94-01
Attachment 2
PG 48 OF 68

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1PER-W4ASE
 By DEHUSER Date 11-24-93 Item # BOS. 040. 004
 Checked By Randy Mauldin Date 12-1-93 Page 4 Of 5

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

Total Cross Sectional Area .6565 x (Number of Scans) 2 = 1.313 (% Factor)

Vessels:

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

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

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

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

(Additional _____ % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

Axial Scan 45° L & 60° L & 38° (Loss) .6565 / 1.313 (% Factor) x 100 = 50 % of Loss

Circumferential Scan Over Root Area Yes No 0 % of Loss

Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss

Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss

Explain: No SCAN from Surface 2 25 Total % Loss

DUE TO NOZZLE CONFIGURATION

100% - (Total Loss) 25 = 75 % of Coverage

Qualifies for Request for Relief Yes No

Disposition: _____

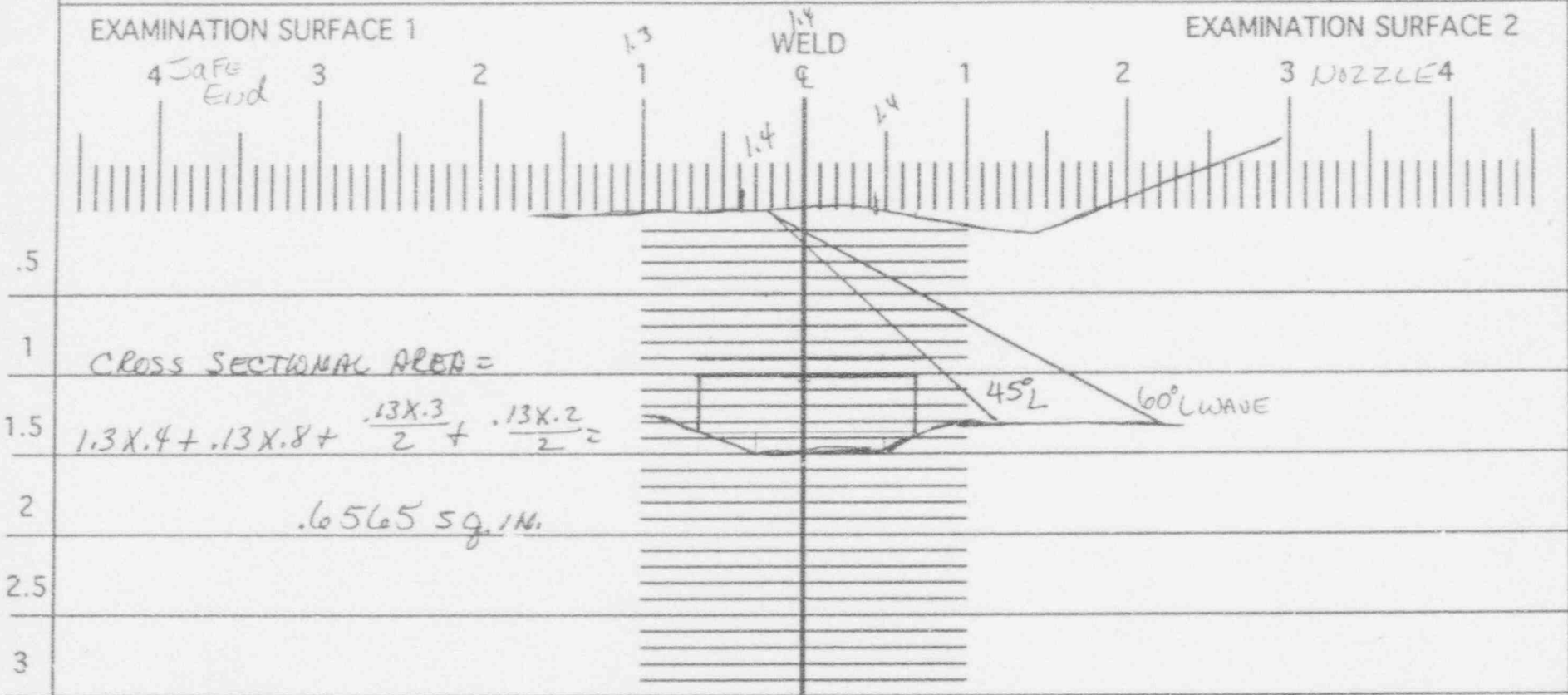
By: _____ Date: _____

[Handwritten Signature]
 1/6/94

DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

NDE-UT-5

Revision 1



Component ID/Weld No. 1PZR-W4ASE

Remarks: Profile Taken From Previous Data



Item No: B05.040.004

Examiner: L.E. Hoyer

Level: II

Date: 11-24-93

Reviewed By: Kevin Mauder

Level: II

Date: 12-1-93

Authorized Inspector: Robert M. ...

Date: DEC 9 1993

180 Sheet 5 of 5

SER. No. 94-01
Attachment 2
Pg 50 of 68

[Signature]
1/6/94

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1 PER-64 BSE
 By DEHansen Date 11-24-93 Item # 305.040.005
 Checked By Larry Mauldin Date 12-1-93 Page 4 of 5

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

Total Cross Sectional Area .6225 x (Number of Scans) 2 = 1.245 (% Factor)

Vessels:

Area Loss : Zone #1 _____
 Zone #2 _____
 Zone #3 _____
 Total Zone Loss _____ / (% Factor) _____ x 100 = _____ % of Loss
 Lump Sum Loss From Other Limitations + _____ %
 Total Loss _____ %
 100% - (Total Loss) _____ = _____ % of Coverage
 (Additional _____ % of Partial Coverage)
 Qualifies for Request for Relief Yes No

Piping:

Axial Scan 45°, 60° & 38° (Loss) .6225 / 1.245 (% Factor) x 100 = 50 % of Loss
 Circumferential Scan Over Root Area Yes No 0 % of Loss
 Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss
 Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss
 Explain: No SCAN from Suetsee 2 25 Total % Loss
DUE TO NOZZLE CONFIGURATION

100% - (Total Loss) 25 = 75 % of Coverage
 Qualifies for Request for Relief Yes No

Disposition: _____

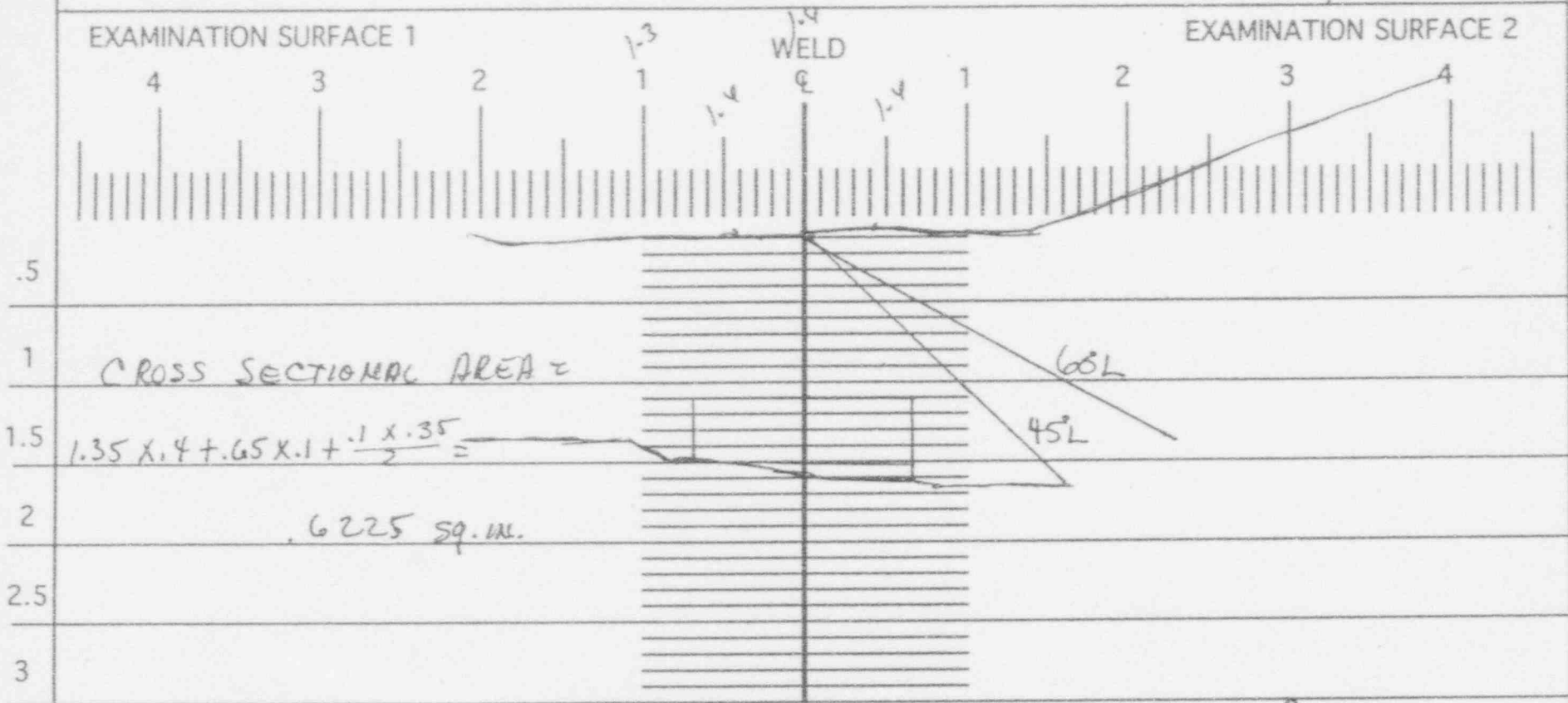
By: _____ Date: _____

[Handwritten Signature]
 1/6/94

DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

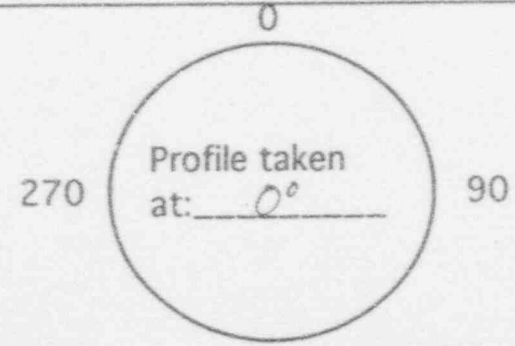
NDE-UT-5

Revision 1



Component ID/Weld No. 1PZR W4R5E

Remarks: Profile Taken From Previous DATA



Item No: B05 040.005

Examiner: DE Houser Level: II Date: 11.24.93

Reviewed By: Randy Mauldin Level: II Date: 12-1-93

Authorized Inspector: Robert McMill Date: DEC 9 1993

180 Sheet 5 of 5

Ser. No. 94-01
Attachment 2
pg 52 of 68

[Signature]
1/6/94

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # 1 PER-W4CSE
 By W.E. Hancock Date 11-24-93 Item # BOS. 040. 006
 Checked By Randy Mauldin Date 12-1-93 Page 4 of 5

DETERMINING THE CUMULATIVE TOTAL OF WELD VOLUME INSPECTED

(in percent)

Total Cross Sectional Area .675 x (Number of Scans) 2 = 1.35 (% Factor)

Vessels:

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

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

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

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

(Additional _____ % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

Axial Scan 45° & 60° & 38.5 (Loss) .675 / 1.35 (% Factor) x 100 = 50 % of Loss

Circumferential Scan Over Root Area Yes No 0 % of Loss

Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss

Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss

Explain: No Scan from Surface 25 Total % Loss

DUE TO NOZZLE CONFIGURATION

100% - (Total Loss) 25 = 75 % of Coverage

Qualifies for Request for Relief Yes No

Disposition: _____

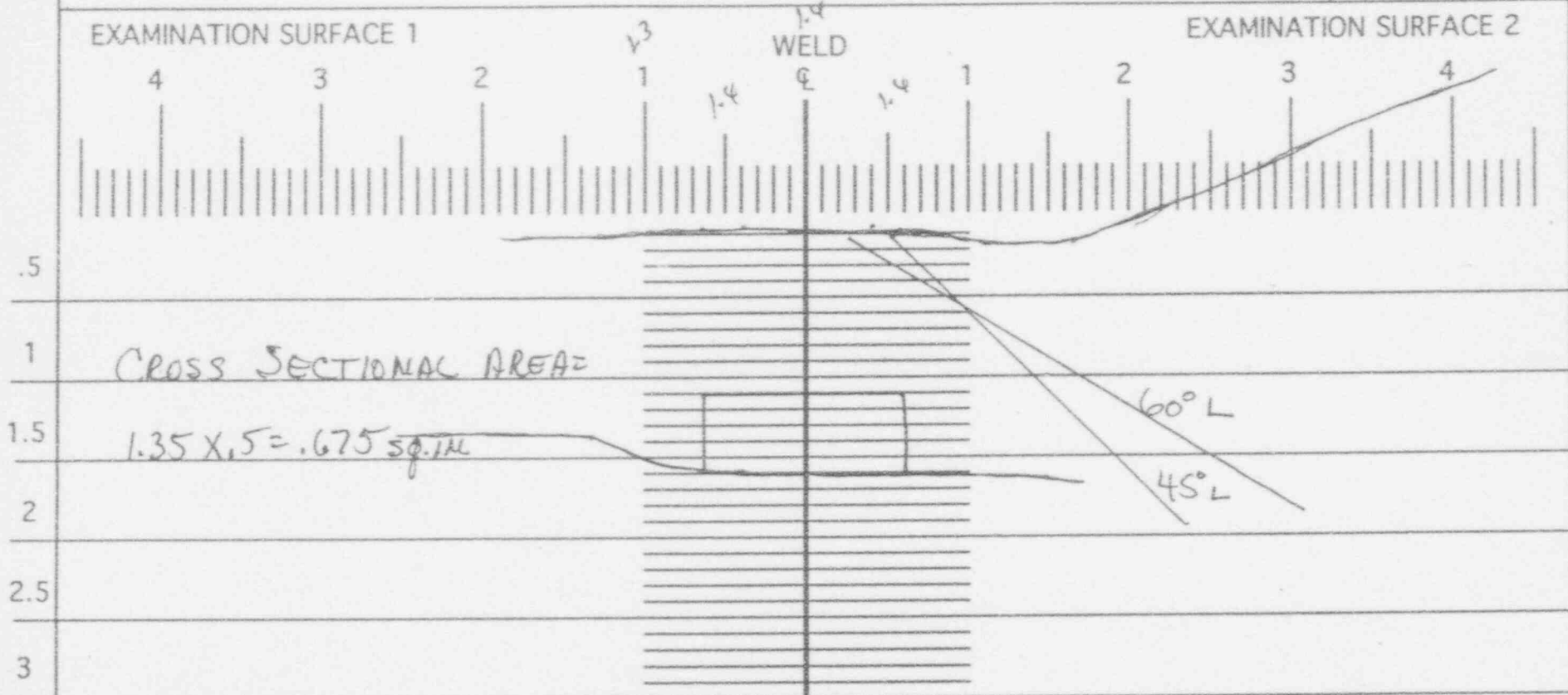
By: _____ Date: _____

[Handwritten Signature]
 11/6/93

DUKE POWER COMPANY
UT PROFILE/PLOT SHEET

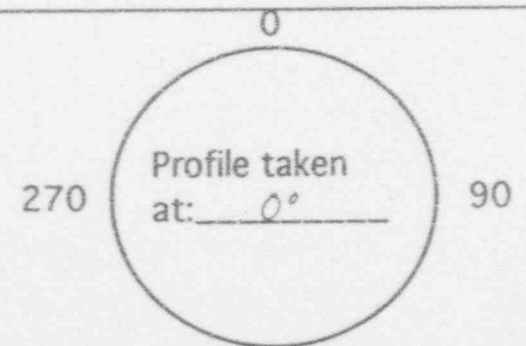
NDE-UT-5

Revision 1



Component ID/Weld No. 1PZR-W4CSE

Remarks: PROFILE TAKEN FROM PREVIOUS DATA



Item No: B05.040.006

Examiner: DEHouser

Level: II

Date: 11-24-93

Reviewed By: Larry Mauldin

Level: II

Date: 12-1-93

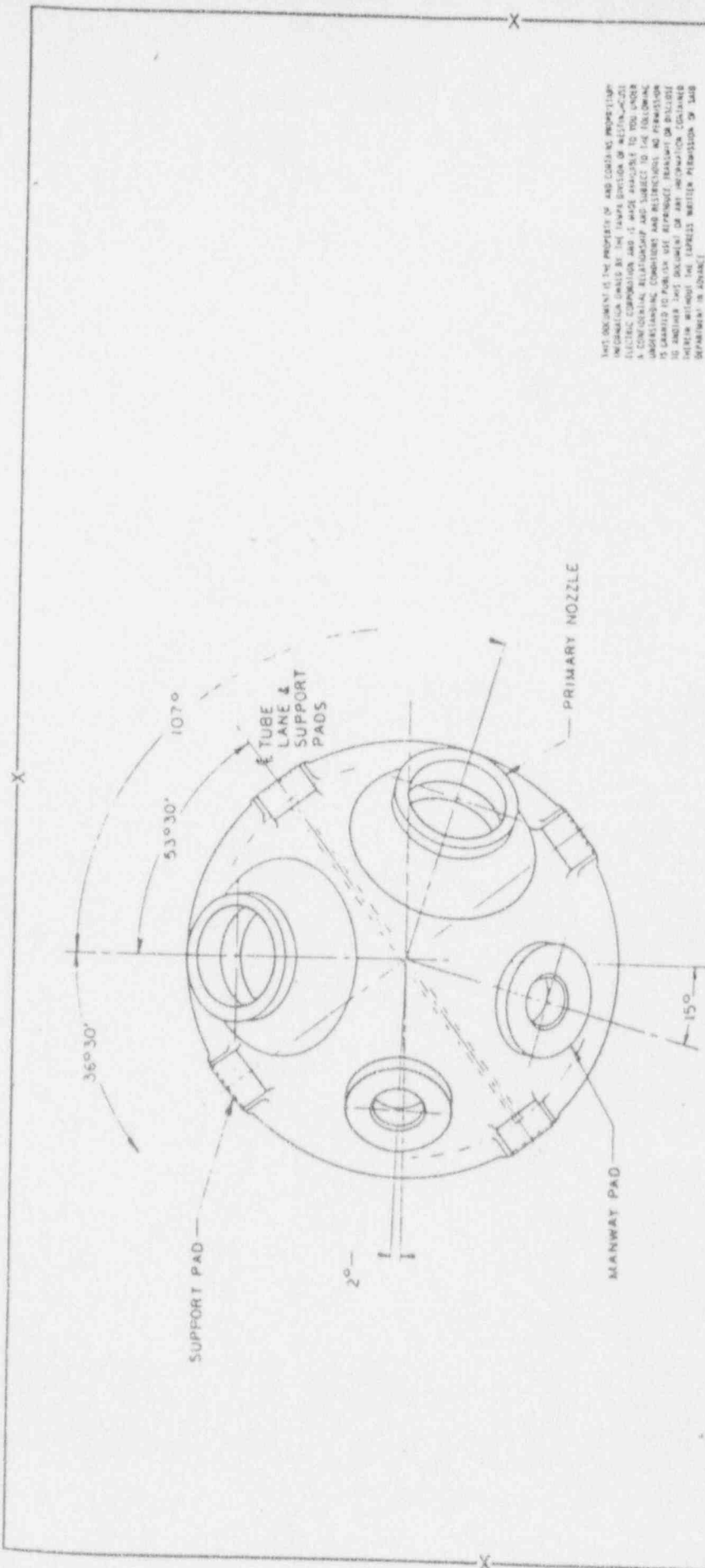
Authorized Inspector: Robert Alford

Date: DEC 9 1993

180 Sheet 5 of 5

SER. No. 94-01
ATTACHMENT 2
PG 54 OF 68

[Signature]
1/6/94



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Westinghouse Electric Corporation
 TAMPA DIVISION TAMPA FLA.
 APPARATUS MODEL "D" STEAM GENERATOR
 TITLE CHAMBER HEAD ORIENTATION

DATE	10/1/54	BY	J. J. ...
CHKD	10/1/54	APP	J. J. ...
APPROV	10/1/54	LOCAL	J. J. ...
MATERIAL		WELD APP.	

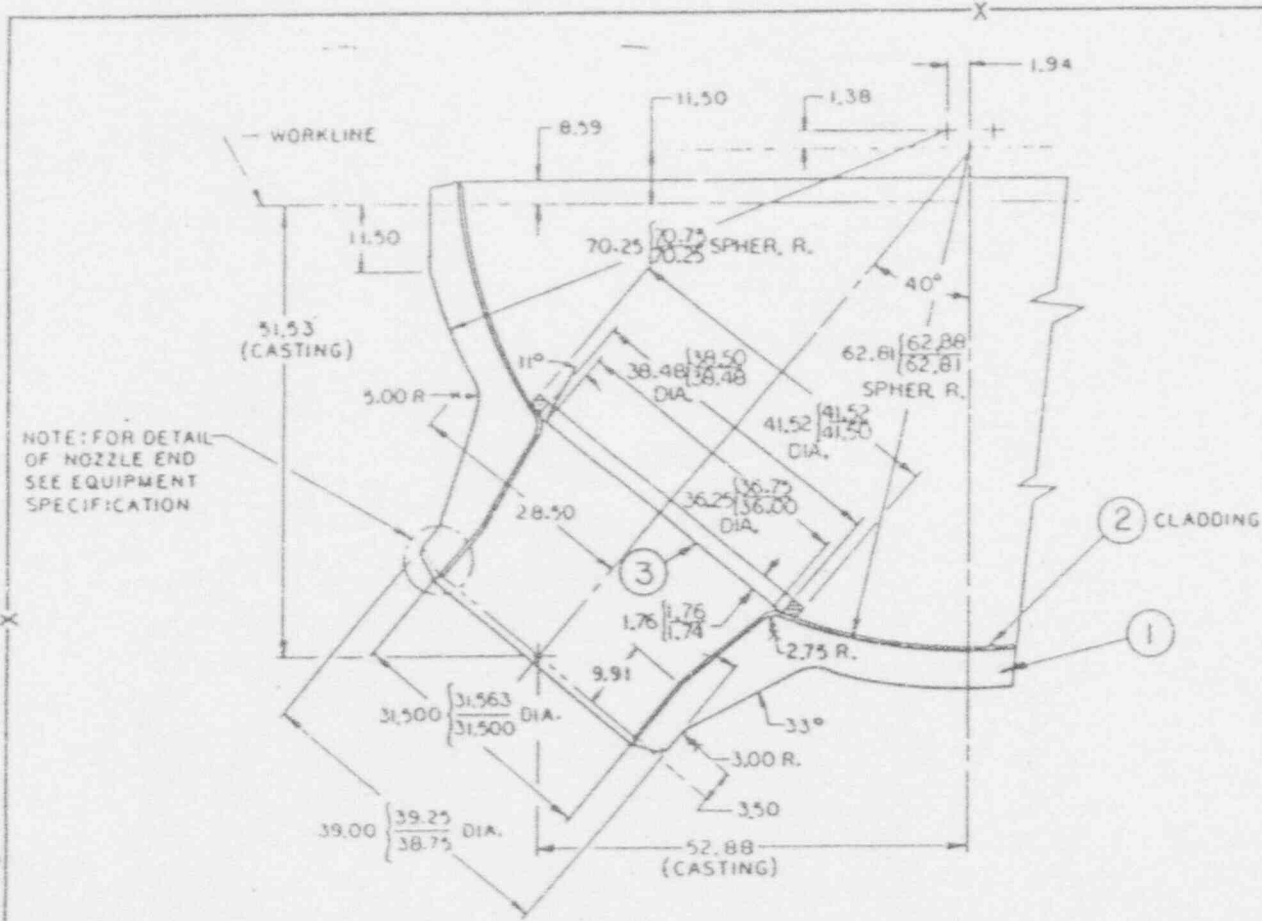
EDSK-351098B

SHEET NO 1 OF 1 SHEETS

15	ISSUE
14	DATE
13	SCALE
12	ITEM PARTS LIST
11	LAST NUMBER USED

S.O.	1
CHANGE	

8720799011



SEE
EDSK-379349B

MATERIAL		
ITEM	W POS / DWG NO	ASME NO
1	398A006	SA-216 GRADE WCC
2		STAINLESS STEEL
3	2655A11	SA-479 TYPE 316 BAR

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Serial No. 44-01
ATTACHMENT 2
Pg 56 OF 68

ITEM	CHANGE
1	
2	ENG. CHG # 2723
3	ADDED L.P. Chang, B/BB/M R. S. ... J. ...

LAST NUMBER USED	PARTS LIST
ITEM	

Westinghouse Electric Corporation
TAMPA DIVISION TAMPA FLA.
APPARATUS MODEL "D" STEAM GENERATOR
TITLE PRIMARY NOZZLE DETAIL - CAST HEAD

DRWN J. ...	1/2	MECH ENG	
CHKD J. ...	1/2	MFG APP	
DESIGN APP ...	1/2	DUAL CONT	
MATL & WELD APP ...	1/2		

EDSK-351101B
DRAWING NOT TO SCALE
SHEET NO 1 OF 1 SHEETS

Limited Exam Data Sheet

Station CATAWBA Unit L I.D. # ISGC-INLET-SE
By Richard B. Childers Date 11-5-93 Item # BOS.070.005
Checked By Larry Mauldin Date 11-11-93 Page 3 Of 3

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

Total Cross Sectional Area N/A x (Number of Scans) _____ = _____ (% Factor)

Vessels:

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

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

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

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

(Additional _____ % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

Axial Scan 4.5°L (Loss) _____ / _____ (% Factor) x 100 = 50 % of Loss

Circumferential Scan Over Root Area Yes No 0 % of Loss

Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss

Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss

Explain: INCONEL BUTTERING

(100% - Total Loss) = 75 % of Actual Coverage

Disposition: _____

By: _____ Date: _____

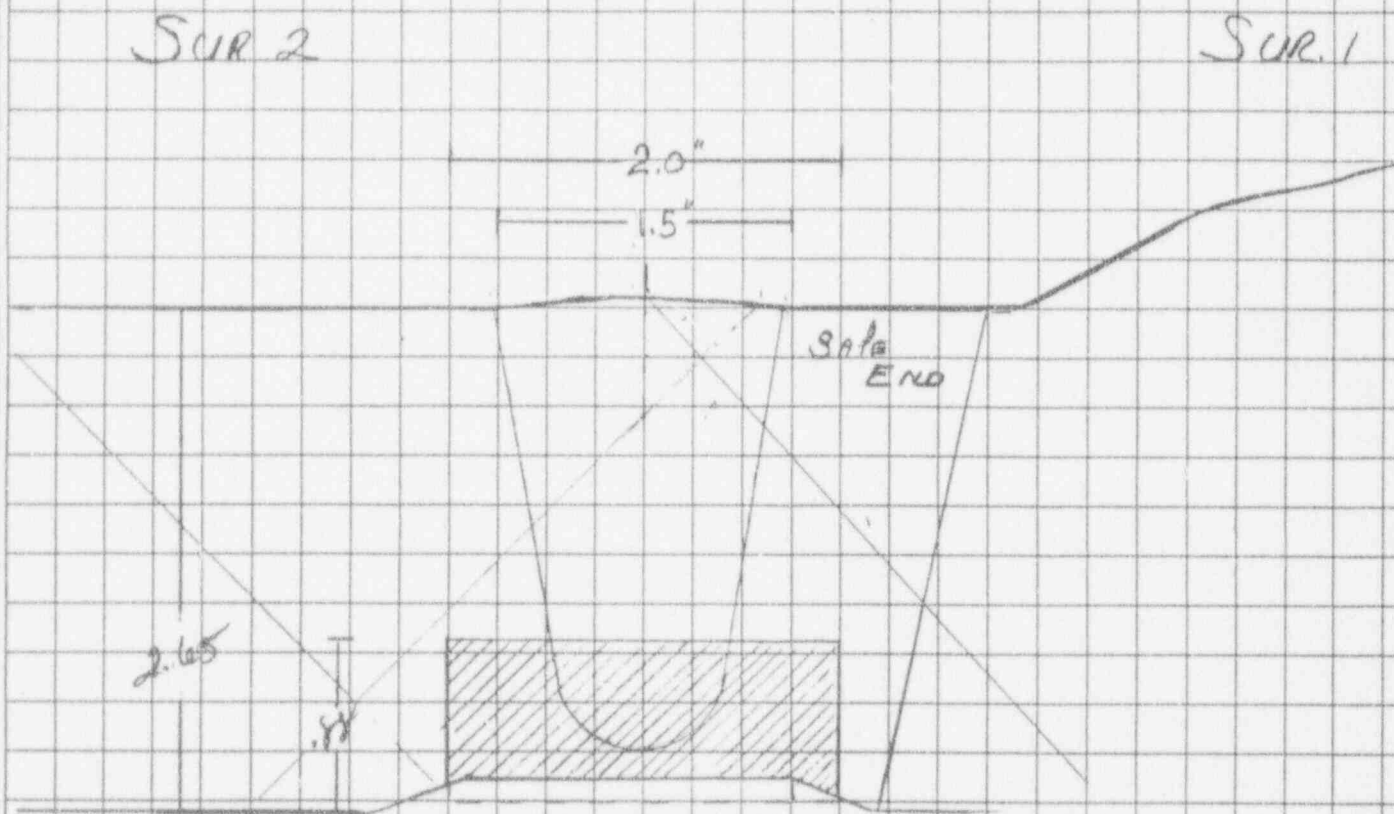
Handwritten initials/signature

Station CATAWBA Unit 1 Rev. _____ File No. ISGC-INLET-SE Sheet _____ Of _____

Subject B05.070.005

By Richard B Childers Date 11-5-93

Prob No. _____, Checked By Rory Mauler Date 11-11-93



CROSS SECTIONAL AREA = N/A

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

AXIAL DIRECTION LOSS - 50%

CIRC. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

$50\% \div 2 = 25\%$

$100 - 25\% = 75\%$ COVERAGE

Ser. No. 94-01

ATTACHMENT 2
PG 58 OF 68

Limited Exam Data Sheet

Station CATribal Unit 1 I.D. # ISGC-OUTLET-SE
 By Winfred C. Lopez Date 11-5-93 Item # B05.070.006
 Checked By Larry Mauldin Date 11-11-93 Page 3 Of 3

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

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

Vessels:

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

Total Zone Loss _____ / (% Factor) _____ x 100 = _____ % of Loss
 Lump Sum Loss From Other Limitations + _____ %
 Total Loss _____ %

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

Piping:

Axial Scan 45° (Loss) _____ / _____ (% Factor) x 100 = 50 % of Loss
 Circumferential Scan Over Root Area Yes No 0 % of Loss
 Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss
 Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss
 Explain: Inconel Buffering 25

(100% - Total Loss) = 25 % of Actual Coverage

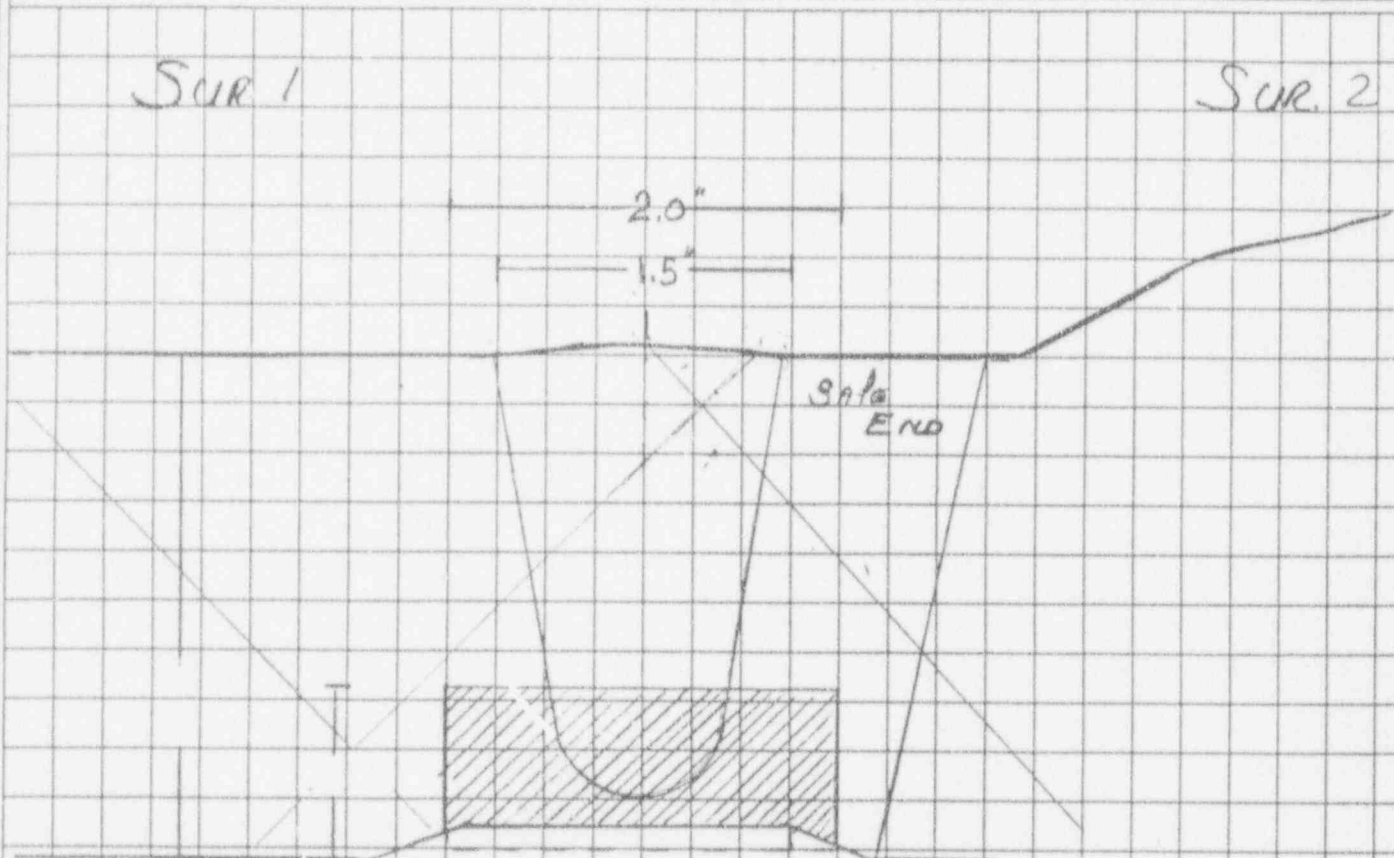
Disposition:

By: _____ Date: _____

[Signature]
 11/6/94

Station CATAWBA Unit 1 Rev. _____ File No. 156C-DUTLETSE Sheet _____ Of _____

Subject _____ By W. J. [unclear] Date 11-5-97
 Prob No. B05.070.006 Checked By Larry Maudlin Date 11-11-95



CROSS SECTIONAL AREA = N/A

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

AXIAL DIRECTION LOSS - 50%

CIRC. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

$$50\% \div 2 = 25\%$$

$$100 - 25\% = 75\% \text{ COVERAGE}$$

[Handwritten signature]

Limited Exam Data Sheet

Station CATAWBA Unit L I.D. # INC25-02
By Richard B. Childers Date 11-5-93 Item # B05.130.014
Checked By Larry Maulder Date 11-11-93 Page 3 Of 3

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

Total Cross Sectional Area 1.76 x (Number of Scans) 2 = 3.52 (% Factor)

Vessels:

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

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

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

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

(Additional _____ % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

Axial Scan 45°L (Loss) 1.76 / 3.52 (% Factor) x 100 = 50 % of Loss

Circumferential Scan Over Root Area Yes No 0 % of Loss

Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss

Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss

Explain: NO SCAN DUE TO NOZZLE CONFIGURATION

(100% - Total Loss) = 75 % of Actual Coverage

Disposition: _____

By: _____ Date: _____

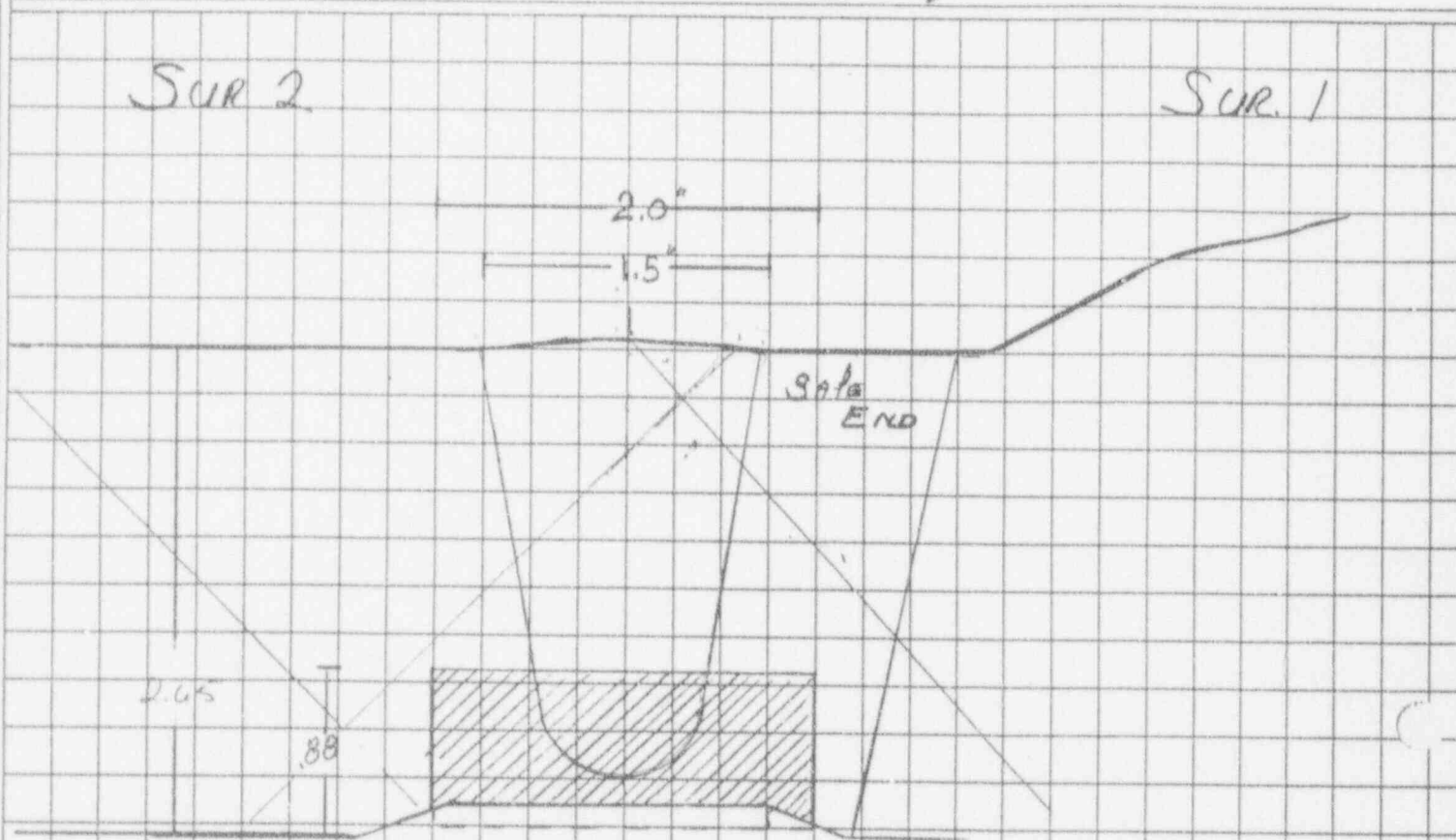
[Handwritten signature]
11/16/93

Station CATAWBA Unit 1 Rev. _____ File No. INC 25-02 Sheet _____ Of _____

Subject B05.130.014

By Richard B Childers Date 11-5-93

Prob No. _____ Checked By Larry Moulton Date 11-11-93



CROSS SECTIONAL AREA = $2 \times .88 = 1.76 \times 2 \text{ SCANS} = 3.52$

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

AXIAL DIRECTION LOSS - 50%

CIRC. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

$50\% \div 2 = 25\%$
(DIRECTIONS)

100 - 25% = 75% COVERAGE

SER. No. 9401

ATTACHMENT 2

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[Handwritten signature]
11/11/93

Limited Exam Data Sheet

Station CATAWBA Unit L I.D. # INC 25-03
By Wesley R. Lenger Date 11-5-93 Item # B05.130.015
Checked By Larry Thawler Date 11-11-95 Page 3 Of 3

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

Total Cross Sectional Area 1.76 x (Number of Scans) 2 = 3.52 (% Factor)

Vessels:

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

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

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

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

(Additional _____ % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

Axial Scan 45°L (Loss) 1.76 / 3.52 (% Factor) x 100 = 50 % of Loss

Circumferential Scan Over Root Area Yes No 0 % of Loss

Axial Loss 50 + Circ. Loss 0 = 50 / 2 = 25 % Loss

Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss

Explain: NO SCAN DUE TO NOZZLE CONFIGURATION (25%)

(100% - Total Loss) = 25 % of Actual Coverage

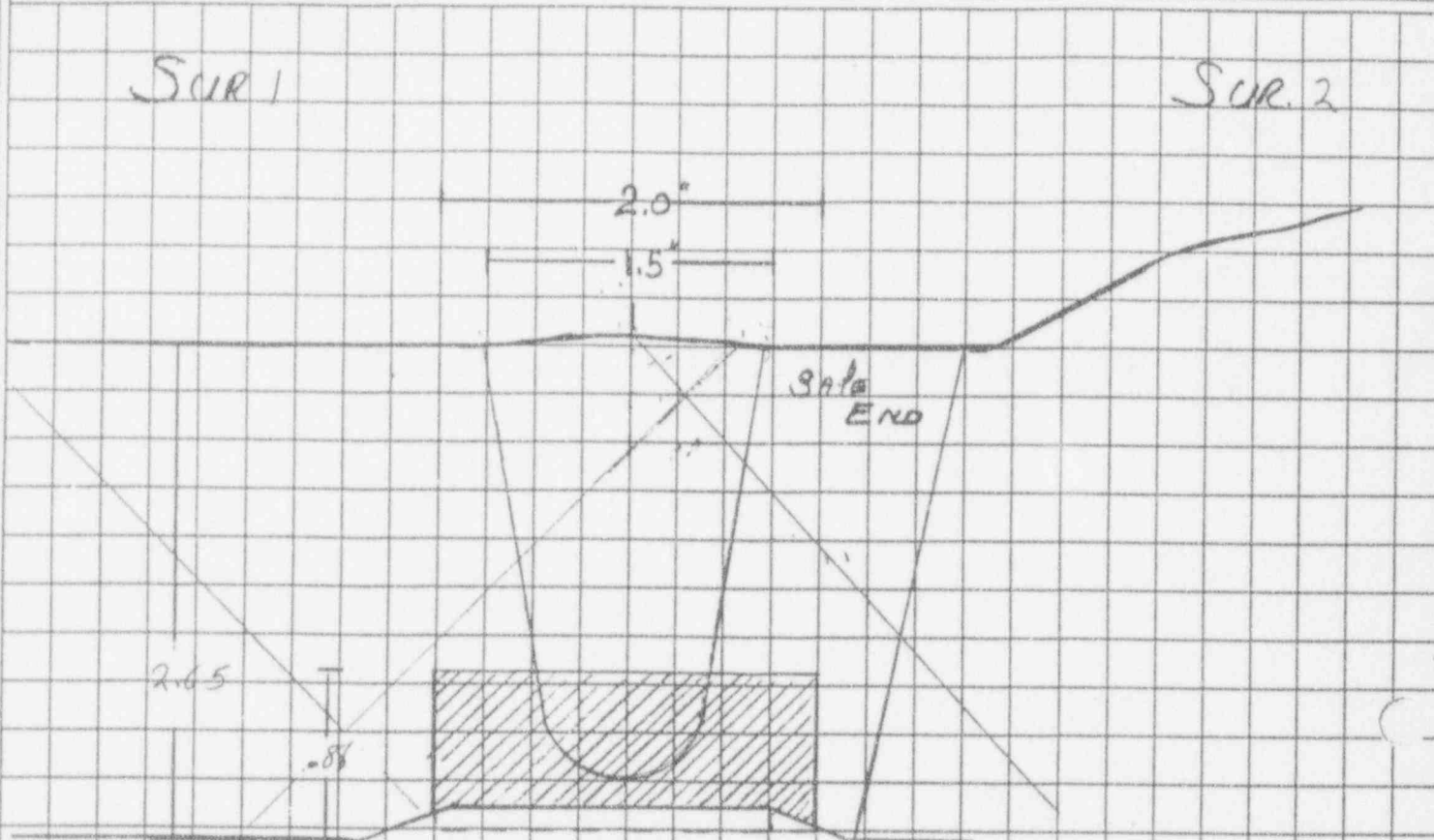
Disposition: _____

By: _____ Date: _____

Station CATAWBA Unit 1 Rev. _____ File No. INC-25-03 Sheet _____ Of _____
 Subject _____

By W. J. C. Lepp Date 11-5-93

Prob No. BOS.130.015 Checked By Larry Mauldin Date 11-11-95



CROSS SECTIONAL AREA = $2 \times .88 = 1.76 \times 2 \text{ SCANS} = 3.52$

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

AXIAL DIRECTION LOSS - 50%

CIRC. DIRECTION LOSS - 0%

TOTAL LOSS - 50%

$50\% \div 2 = 25\%$ (Correction)

$100 - 25\% = 75\% \text{ COVERAGE}$

SER. No. 94-01

ATTACHMENT 2
 PG 64 OF 68

[Handwritten signature]

Limited Exam Data Sheet

Station CATAWBA Unit 1 I.D. # INC 22-WN8

By AJ Mos Date 11-11-93 Item # B09.031.003

Checked By Larry Mauldin Date 11-11-93 Page 3 Of 3

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

Total Cross Sectional Area N/A x (Number of Scans) _____ = _____ (% Factor)

Vessels:

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

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

Lump Sum Loss From Other Limitations + _____ %

Total Loss _____ %

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

(Additional _____ % of Partial Coverage)

Qualifies for Request for Relief Yes No

Piping:

Axial Scan 45°L (Loss) _____ / _____ (% Factor) x 100 = _____ % of Loss

Circumferential Scan Over Root Area Yes No _____ % of Loss

DRAWING 1 LOSS Axial Loss 25% + DRAWING 2 LOSS Circ. Loss 75.37% = 100.37 / 2 = 50.19 % Loss

Additional Losses (Due to hangers, restraints, etc.) + 0 % Loss

Explain: _____ 50.19 Total % Loss

100% - (Total Loss) 50.19 = 49.81 % of Coverage

Qualifies for Request for Relief Yes No

Disposition: _____

By: _____ Date: _____

[Handwritten signature]
1/6/94

Station CATAWBA Unit 1 Rev. _____ File No. INC 22-WN8 Sheet 1 Of 3
 Subject LIMITED EXAM DATA
12" 5/8 NOZZLE By Richard A Childers Date 11-11-93
 Prob No. BO9.031.003 Checked By Larry Traubler Date 11-11-93

DRAWING #1

CROSS SECTIONAL AREA: $.88" \times 2.4" = 2.112 \text{ sq.in.}$

$\times 2 \text{ SCANS}$
 $\hline 4.224 \text{ sq.in.}$

AREA of LOSS:

AXIAL: $2.112 \div 4.224 \times 100 = 50\%$

CIRC: No Loss

DRAWING #2

CROSS SECTIONAL AREA: $.88" \times 2.4" = 2.112 \text{ sq.in.}$

$\times 2 \text{ SCANS}$
 $\hline 4.224 \text{ sq.in.}$

AREA of LOSS:

AXIAL: $\frac{25 \times .25}{2} + 2.112 = 2.14375$

$2.14375 \div 4.224 \times 100 = 50.73982$

CIRC: 100%

50.74%

	AXIAL		CIRC		=	
DRAWING #1	50	+	0	$\div 2$	=	25
DRAWING #2	50.74	+	100	$\div 2$	=	75.37

100.37

$\therefore 100.37 \div 2 = 50.185 = 50.19 \text{ LOSS}$

WITH NO LIMITATIONS

$100 - 50.19 = 49.81\% \text{ COVERAGE}$

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

OTHER LIMITATIONS: No

49.81% COVERAGE

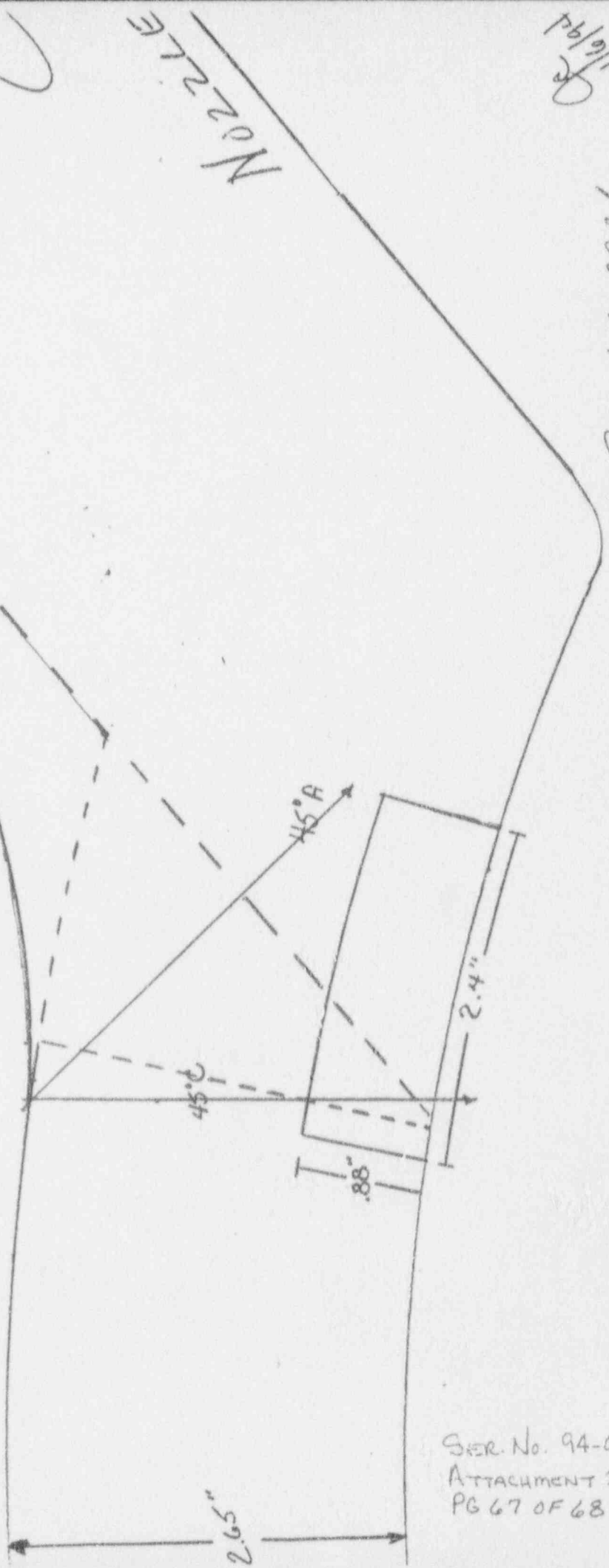
[Handwritten signature]

12" NOZZLE

DRAWING #1

WELD ID. - INC22-WN8

ITEM NO. - B09.031.003



1/6/91

By: Richard B. Childers
REVIEWED BY: Larry Moulder

12" $\frac{1}{8}$ NOZZLE
DRAWING #2
WELD ID. - INC22-WN8
ITEM NO. - B09.031.003

