



CONTROLLED COPY NUMBER 107

PRE-SERVICE EXAMINATION

FINAL REPORT

OF

REACTOR PRESSURE VESSEL

NATIONAL BOARD NUMBER 3686

SUSQUEHANNA STEAM ELECTRIC STATION UNIT #1

PENNSYLVANIA POWER AND LIGHT COMPANY

CONTRACT NUMBER 8856-M-166

Prepared

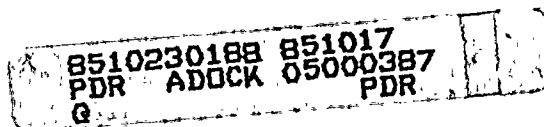
Edward P. Recyk

Reviewed

Wade F. Miller

Approved

Frederick T. Forsythe





SUSQUEHANNA UNIT #1

FINAL REPORT

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SECTION I.

INTRODUCTION

This report contains the results of the pre-service examination of the Susquehanna Steam Electric Station Unit Number 1 Reactor Pressure Vessel; National Board No. 3686.

The examinations were performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition including the Winter 1975 Addendum. The Code Categories examined were BA, BD, BE, BF, BG-1, BH, BI-1, BN-1, BN-2, BO, and BP.

Remote automatic ultrasonic examinations were performed on all accessible portions of the reactor vessel and nozzle welds as detailed in Sections II and III of this report.

Manual volumetric (ultrasonic), surface (penetrant and magnetic particle), and visual examinations were performed on the remaining portions of the reactor vessel, nozzle welds, including safe ends, and other components as detailed in Sections II and III.

Manual ultrasonic and penetrant examinations were performed on the six Feedwater nozzle inner radii. A penetrant examination was performed on the CRD Return Nozzle inner radius. These examinations were performed in accordance with the requirements of NUREG-0619.

All examination data and calibration sheets, data plots, personnel certifications, equipment, and material certifications; procedures, and drawings are on file at the Susquehanna Steam Electric Station Unit #1.



SECTION II.

SCOPE

1. Manual Examinations

Pre-service examinations were performed on the following welds and components, listed according to code category. These items will be manually examined during future In-Service Inspections. A detailed summary of each item examined, the examination method, and the results are listed in Section III.

1.1 Category B-A - Pressure-Retaining Welds in Reactor Vessel

1.1.1 Circumferential Welds

AA ^{BOTTOM}	AG
AD (Top)	AH
AE	AJ
AF	

1.1.2 Longitudinal Welds

BA ✓	DA	DK
BB ✓	DB	DM
BC ✓	DC	DN
BK	DD	DP
BM	DE	DR
BN	DF	DG
BP	DJ	DH

1.2 Category B-D - Full Penetration Welds of Nozzles in Vessels

1.2.1 Nozzle to Vessel Welds

N6A	N8A
N6B	N8B
N7	N9A



1.2.2 Nozzle Inner Radius

N1A	N3A	N6A
N1B	N3B	N6B
N2A	N3C	N7A
N2B	N3D	N8A
N2C	* N4A	N8B
N2D	* N4B	** N9A
N2E	* N4C	
N2F	* N4D	
N2G	* N4E	
N2H	* N4F	
N2J	N5A	
N2K	N5B	

* Six Feedwater Nozzle inner radii examined in accordance with the requirements of NUREG-0619.

** Surface examination (P.T.) also performed on the CRD Return Nozzle inner radius in accordance with the requirements of NUREG-0619.

1.3 Category B-E - Pressure-Retaining Partial Penetration Welds in Vessels

- N10 - Core Differential Pressure and Liquid Control Nozzle
- N11 A & B - Instrument Nozzles
- N12 A & B - Instrument Nozzles
- N13 - Flange Seal Leak Detector Nozzle on Vessel Flange
- N15 - R.P.V. Bottom Head Drain Nozzle
- N16 A & B - Instrumentation Nozzles
- 185 - Control Rod Drive Penetrations
- 55 - In-Core Penetrations



1.4 Category B-F - Pressure-Retaining Dissimilar Metal Welds

- N1 A & B - Recirculation Outlet
- N2 A thru K - Recirculation Inlet
- N3 A thru D - Main Steam Outlet
- N4 A thru F - Feedwater Inlet
- N5 A & B - Core Spray Inlet
- N6 A & B - Head Instrument
- N7 - Head Vent
- N8 A & B - Jet Pump Instrumentation
- N9 - CRD Return Cap

1.5 Category B-G-1 - Pressure-Retaining Bolting, 2 Inches and larger in Diameter

Studs S/N 1 thru 76R
Nuts S/N 1 thru 76
Washers S/N 1 thru 76
Flange Ligaments
Threaded Holes in Vessel Flange

1.6 Category B-H - Welded Vessel Support Skirt

Weld CG

1.7 Category B-I-1 - Interior Clad Surfaces of Reactor Vessels

Six (6) cladding patches on R.P.V. Wall

1.8 Category B-N-1 - Interior of Reactor Vessels

Areas Above and Below the Reactor Core
Jet Pump Instrumentation and Support Welds
Jet Pump and Shroud Annulus
Top Guide Assembly
Fuel Cell Components
Core Support Plate
Incore and CRD Assembly
Shroud Weld



Core Spray Header, Sparger
Feedwater Sparger Assembly
Steam Dryer, Shroud, and Separator

1.9 Category B-N-2 - Integrally Welded Core Support Structures
and Internal Attachments to Reactor Vessels

Core Support Weld
Feedwater Brackets
Core Spray Brackets
Jet Pump Riser Support Pads
Guide Rod Brackets
Steam Dryer Support Brackets
Dryer Support Hold Down Brackets
Surveillance Specimen Brackets
Incore Housing and Stub Tube to R.P.V. Welds

1.10 Category B-O.- Pressure-Retaining Welds in Control
Rod Drive Housings

Excluded from examination based upon plant make-up
capacity, and included in category B-P

1.11 Category B-P - Components Exempted from Examination by
IWB-1220

2. Remote Automatic Ultrasonic Examinations

Pre-service examinations were performed on the following reactor
vessel welds. These welds will be automatically examined during
future In-Service Inspections. A detailed summary of each item
examined, the examination method, and the results are listed
in Section III.

2.1 Category B-A - Pressure-Retaining Welds in Vessels

2.1.1 Circumferential Welds

AA (Top)
AB
AC
AD (Bottom)



2.1.2 Longitudinal Welds

BA	BE
BB	BF
BC	BG
BD	BH
	BJ

2.2 Category B-D - Full Penetration Welds of Nozzles in Vessels

N1 A & B
N1 A thru K
N3 A thru D
N4 A thru F
N5 A & B

160-897-091

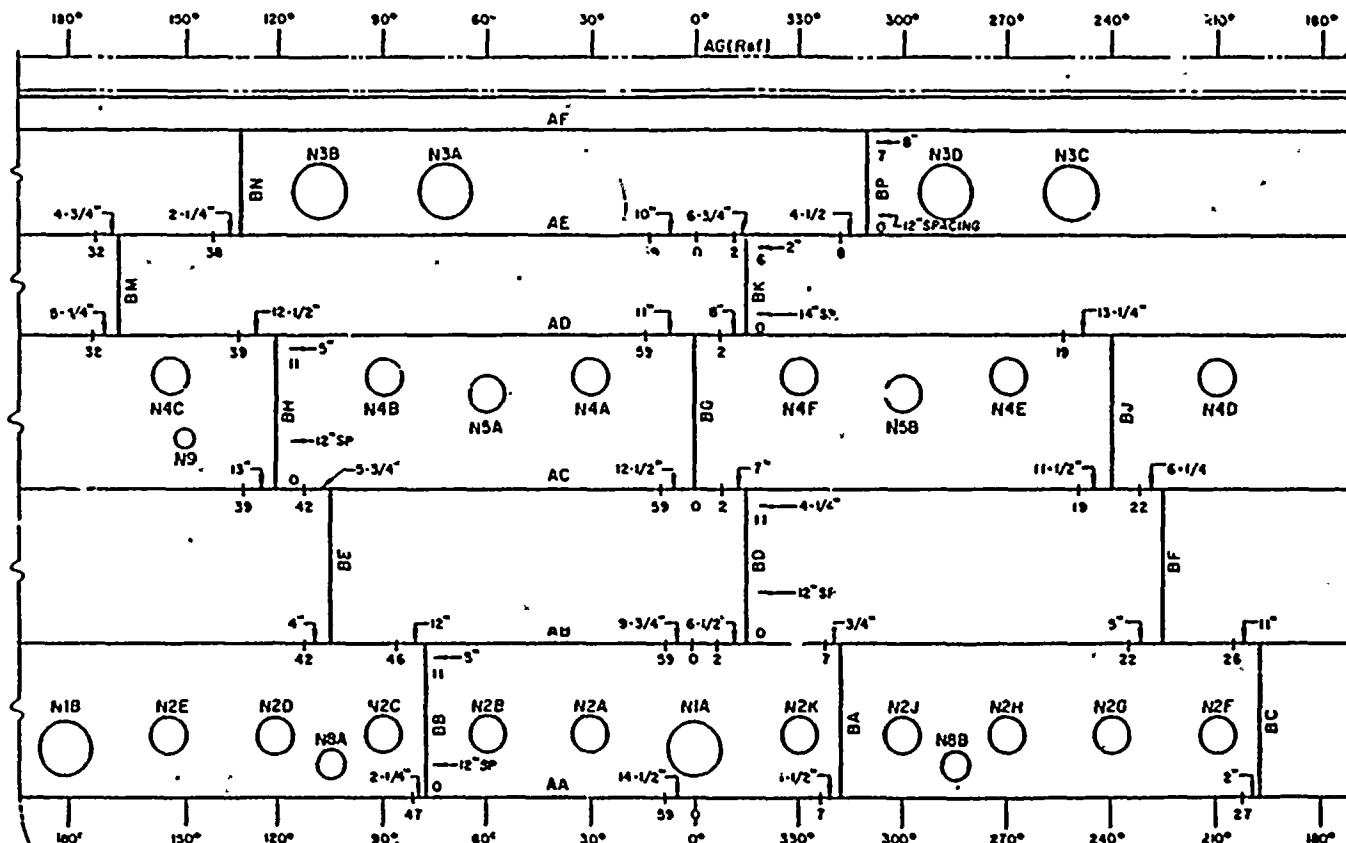
GENERAL ELECTRIC

160-768-0100

CONT ON SHEET 2

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING			
AFFLIED PRACTICES	SURFACES	SPACING	WELDING
✓	NA	NA	NA

TITLE
WELD IDENTIFICATION (RPV)
FIRST MADE FOR SUSQUEHANNA



SEE SHEET 3

EL. 745\" (Ref)

STD. No. 5 (SIDE 1) 12-19-77

VENDOR'S DRAWING REVIEW

- ☒ Approved-Mfg. may proceed.
- ☒ Approved-Sound. Unit org.-Mfg. may proceed.
- ☐ Approved except as noted-Make changes and submit Unit org.-Mfg. may proceed as approved.
- ☐ Not Approved-Correct and resubmit.
- ☐ Approved not required-Mfg. may proceed.

Approval of this drawing does not relieve supplier from full compliance with contract or purchase order.

REVIEWED C L M A J O B N D

BY *Orlan* DATE 12-20-77

WELCH

STD. No. 1 or STD. No. 5 (SIDE 2)

CERTIFIED CORRECT FOR	
SUSQUEHANNA	
STEAM ELECTRIC STATION	
UNIT 1	
PP&L Co.	
CONTRACT 8856-M-166	
BY <i>W. J. J. J.</i>	DATE 5/1/77

REVISIONS	PRINTS TO
1 See Sheet No. 8 Plan 11-3-76.	
2 Added: Radiographic Marks & Nbs. Added: Sheet No. 8 Changed: View from Inside Vessel to Outside. Revised 5-4-77	

OUTSIDE VIEW

EL. 0\" (Ref)

NOTE.

- SEE SHEET 2 FOR AZIMUTH & ELEVATION TABLES
- SEE 15E-QAI-323 FOR WELD LOCATION DETAILS

8856-M-166-23(1)-5

R W MALE APRIL 11, 1977

M. C. M. 4/14/77

105E-N50

PHILA

BY

DATE

160-768-0100

LOCATION

CONT ON SHEET 2

BY NO 1

DISTRIBUTION		LOCATION	
NO.	DATE	NO.	DATE
1	12-19-77	1	12-19-77
2	12-20-77	2	12-20-77
3	12-20-77	3	12-20-77
4	12-20-77	4	12-20-77
5	12-20-77	5	12-20-77
6	12-20-77	6	12-20-77
7	12-20-77	7	12-20-77
8	12-20-77	8	12-20-77
9	12-20-77	9	12-20-77
10	12-20-77	10	12-20-77
11	12-20-77	11	12-20-77
12	12-20-77	12	12-20-77
13	12-20-77	13	12-20-77
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18	12-20-77	18	12-20-77
19	12-20-77	19	12-20-77
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31	12-20-77	31	12-20-77
32	12-20-77	32	12-20-77
33	12-20-77	33	12-20-77
34	12-20-77	34	12-20-77
35	12-20-77	35	12-20-77
36	12-20-77	36	12-20-77
37	12-20-77	37	12-20-77
38	12-20-77	38	12-20-77
39	12-20-77	39	12-20-77
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42	12-20-77	42	12-20-77
43	12-20-77	43	12-20-77
44	12-20-77	44	12-20-77
45	12-20-77	45	12-20-77
46	12-20-77	46	12-20-77
47	12-20-77	47	12-20-77
48	12-20-77	48	12-20-77
49	12-20-77	49	12-20-77
50	12-20-77	50	12-20-77

BECHTEL
SAN FRANCISCO

RECORD

160-76B-0100

Page 3 of 2

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:-

APPLIED PRACTICES

SURFACES

104100015 no MICRAVE 104100015

150

	Total
--	--------------

WELD IDENTIFICATION (RPV)

FIRST MADE FOR SUSQUEHANNA

NOZZLE LOCATION

NOZZLE	AZIMUTH	ELEVATION	DESCRIPTION
M1A	0°	13°-55"	Recirc. Outlet
M1B	180°	13°-55"	Recirc. Outlet
M2A	30°	15°-1"	Recirc. Inlet
M2B	60°	15°-1"	"
M2C	90°	15°-1"	"
M2D	120°	15°-1"	"
M2E	150°	15°-1"	"
M2F	210°	15°-1"	"
M2G	240°	15°-1"	"
M2H	270°	15°-1"	"
M2J	300°	15°-1"	"
M2K	330°	15°-1"	"
M3A	72°	54°-10 1/2"	Main Steam
M3B	108°	54°-10 1/2"	"
M3C	252°	54°-10 1/2"	"
M3D	288°	54°-10 1/2"	"
M4A	30°	41°-6 1/2"	Feedwater
M4B	90°	41°-6 1/2"	"
M4C	150°	41°-6 1/2"	"
M4D	210°	41°-6 1/2"	"
M4E	270°	41°-6 1/2"	"
M4F	330°	41°-6 1/2"	"
M5A	60°	40°-4 1/2"	Core Spray
M5B	300°	40°-4 1/2"	"
M8A	105°	12°-8"	"
M8B	285°	12°-8"	"
M9A	146°	37°-4 1/2"	CRD Return

VENDOR'S DRAWING REVIEW

- 1 ☒ Approved—Selling may proceed.
2 ☒ Approved—Except final drug—Selling may proceed.
3 ☐ Approved—Selling as noted—Make changes and submit final drug—Selling may proceed as approved.
4 ☐ Not Approved—Correct and resubmit.
5 ☒ Approved but required—Selling may proceed.
- Approved: All the foregoing does not release supplier from full compliance with contract or purchase order.
- LVH—(C) C L L M * A JOB NO. 8556
F
- BY *D. J. H.* DATE 12-21-77
ASST. MGR.

VERTICAL REF. LOCATION

IC	A7:mill	SHELL COURSE
BA	317°	1
BB	77°	1
BC	197°	1
SD	255°	2
FE	105°	2
PF	252°	2
PG	0°	3
F--	120°	3
E,	240°	3
E,	345°	4
F--	165°	4
EH	130°	5
EF	310°	5

CIRCUMFERENTIAL WELD LOCATION

NO	ELEVATION
AA	10'-6"
AB	21'-11"
AC	33'-4"
AD	44'-9"
AE	51'-11"
AF	59'-7 19/32"

DISTRIBUTION

	NO	DATE
VENDOR	2	
CLIENT	06/12	
FIELD	7A	
GE.		
CIVIL		
ELECT.		
PLY. DES.		
MECH.	1	15
CON. SVS.		
ARCH		
PURCH		
EXPLO		
INSPECT		
SCHED.		
START-UP		
RECORD	1/5	

BECHTEL
SAN FRANCISCO

DISCUSSION

ACALV-301

CERTIFIED CORRECT FOR

**SUSQUEHANNA
STEAM ELECTRIC STATION
UNIT 1
PP&L Co.
CONTRACT 8856-M-166**

DATE: 11/16/16

REVISIONS

PRINTS TO

R W NAGLE NY 10 1976

R W HAGLE NOV 10 1976

105E-NSO

PHILA.

160-768-0100

[illegible]

0010-897-091

GENERAL ELECTRIC

160-76B-0100

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:-

APPLIED PRACTICES

SURFACES

TOLERANCES ON DIMENSIONS

FRACTIONS

DECIMALS

ANGLES

CONT ON SHEET

IN NO

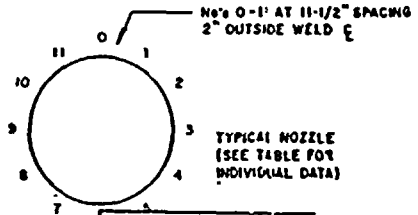
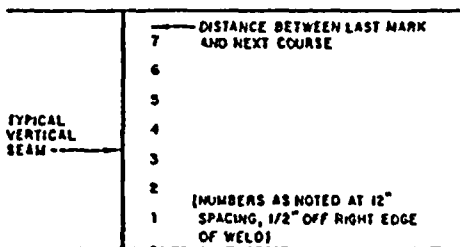
TITLE

WELD IDENTIFICATION (RPV)

FIRST MADE FOR SUSQUEHANNA

NOTES

- 1) Radiographic Marks 3/4" stamps and centerpunch as noted in typical outside views.
- 2) 0 Radiographic Mark is at 0° azimuth and numbers increase in counter clockwise direction at spacing noted.
- 3) Nozzles - 0 Radiographic Mark is at top and numbers proceed in clockwise direction except as noted in notes 4 and 5.
- 4) All nozzles in 83 shell course are marked with 0 on bottom and numbers proceed in clockwise direction.
- 5) Top head nozzles are stamped with mark 0 @ 0° azimuth and numbers proceed in clockwise direction.



DISTRIBUTION	
VENDOR	AD NOTE
CLIENT	
FIELD	
GE	
CIVIL	
ELECT	
P.T. DES.	
MECH.	
CON. SVS.	
ARCH	
PURCH.	
EXPEO.	
INSPECT	
SCHED.	
STARTUP	
RECORD	
BECHTEL	
SAN FRANCISCO	

NOZZLE	INTEGERS	SPACING	LOCATION OFF C	NO. OF NOZZLES
N1	0-19	10"	3"	2
N2	0-11	11"	2 1/2"	10
N3	0-15	11"	3 1/2"	4
N4	2-11	11 1/2"	2"	6
N5	0-11	11 1/2"	2"	2
N6	0-7	9"	2"	2
N7	0-3	12"	2"	1
N8	0-7	10 1/2"	2"	2
N9	0-7	10 1/2"	2 1/2"	1

NOTE 4
NOTE 4
NOTE 5
NOTE 5
NOTE 4

VENDOR'S DRAWING REVIEW

1 ☒ Approved - May proceed.

2 ☐ Approved - Submit final drawing - May proceed

3 ☐ Approved - Submit final drawing - May proceed

4 ☐ Approved - Submit final drawing - May proceed

5 ☐ Approved - Submit final drawing - May proceed

Approval of this drawing does not relieve supplier from full compliance with contract or purchase order.

REVIEWED BY: *[Signature]* DATE: *12-20-77*

BY: *[Signature]* DATE: *12-20-77*

RECHTEL

REVISIONS	PRINTS TO
1 See Sheet No. B <i>RW Nagle 1/2/77</i>	
2 See Sheet No. 1 <i>RW Nagle 1/11/77</i>	
3 Change E of 13-1 <i>11oz 13-1 1/11/77</i>	

CERTIFIED CORRECT FOR

SUSQUEHANNA
STEAM ELECTRIC STATION
UNIT 1
PP&L Co.
CONTRACT 8856-M-166

DATE: *5/1/77*

8856-M166-23(S)-3

R.W. NAGLE MAR. 25, 1977

PHILA.

160-76B-0100

160-76B-0100

49.4

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:—

150 Y23

DATE	TIME	LOCATION	REMARKS
1948			

WELD IDENTIFICATION (RPV)

FIRST MADE FOR SUSQUEHANNA

TOP & BOTTOM HEAD
MERIDIAN WELD LOCATION

WELD	AZIMUTH	
DA	33° 15'	Bottom Head
DB	33° 15'	" "
DC	273° 15'	" "
DD	213° 15'	" "
DE	153° 15'	" "
DF	93° 15'	" "
DG	35-1/32	Right of E
DH	36-1/32	Left of E
DJ	75°	Top Head
DK	135°	" "
DL	195°	" "
DM	255°	" "
DN	315°	" "
DR	15°	" "

TOP HEAD NOZZLE"

NOZZLE	AZIMUTH	DESCRIPTION
H6A	0°	Head Spray
H6B	180°	Spare
H7	1	Vent

CIRCUMFERENTIAL WELDS

NO	LOCATION
CG	Skirt-to-Knuckle
AJ	Bottom Head
AH	Top Head
AG	Top Head
	Head Flange

DISTRIBUTION

	NO	DATE
VENDOR	2	
CLIENT	0016	
FIELD	411	
GE		
CIVIL		
ELECT.		
PLT. DES.		
MECH.	1	
CON SVS.		
ARCH.		
PUPCM.		
EXPED		
INSPECT		
SCHED.		
START/UP		
RECORD	1A	

BECHTEL
SAN FRANCISCO

VENDOR'S DRAWING REVIEW

- 1 ☒ Approved-Info may proceed.
2 ☐ Approved-Suppld fund org.-Info may proceed.
3 ☐ Approved except as noted-Info changes and suppld fund org.-Info may proceed as approved.
4 ☐ Not Approved- Correct and resubmit.
5 ☐ Approval not required-Info may proceed.

Approval of this drawing does not release supplier from full compliance with contract or purchase order 16CVR19-1001.

REVIEWED BY	E	C	M	A			JOB N.
							8956

BY A. Ham DATE 12-20-7
AUCHEL

CERTIFIED CORRECT FOR

SUSQUEHANNA
STEAM ELECTRIC STATION
UNIT 1
PP&L Co.
CONTRACT 8856-M-166

BY: W. H. H. H. DATE: 5/1/57

REVISIONS

1	Corrected Meridian Wald Location Table (AZIMUTHS) Run 12-8-76
2	Added Sheet 5 Run 3/29/77
3	CHANGED N7A to N7 MCM 9/5/

PRINTS TO

8956-M166-23(4)-4

R.W. NAGLE NOV 11 1976

BASE-MSO
PHILA.

160-768-0100

160-76B-0100

UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING				REV
APPLIED PRACTICES	SURFACES	DESIGNS AND DETAILS	DETAILS	BY
	✓	1 NA	1 NA	
		2 NA	2 NA	
		3 NA	3 NA	

DATE	TITLE	INITIALS	REMARKS
11/1/54	1000		
11/2/54	1000		
11/3/54	1000		
11/4/54	1000		
11/5/54	1000		
11/6/54	1000		
11/7/54	1000		
11/8/54	1000		
11/9/54	1000		
11/10/54	1000		
11/11/54	1000		
11/12/54	1000		
11/13/54	1000		
11/14/54	1000		
11/15/54	1000		
11/16/54	1000		
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12/24/54	1000		
12/25/54	1000		
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12/29/54	1000		
12/30/54	1000		
12/31/54	1000		

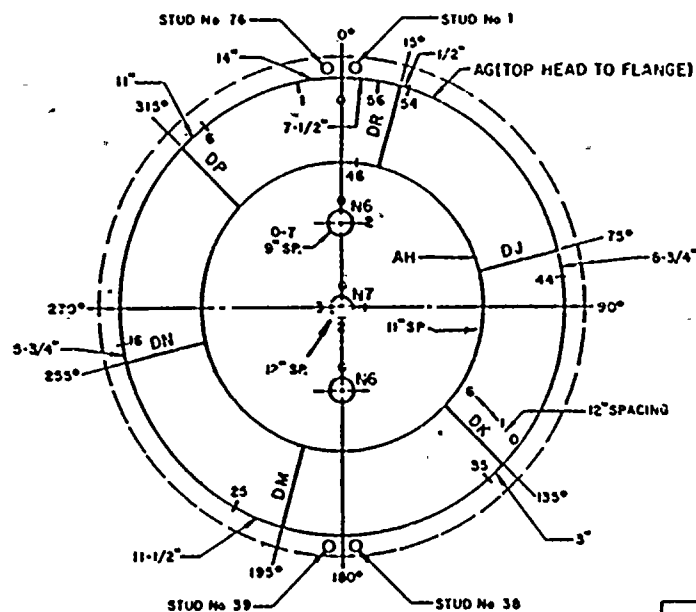
WELD IDENTIFICATION (RPV)

FIRST MADE FOR SUSQUEHANNA

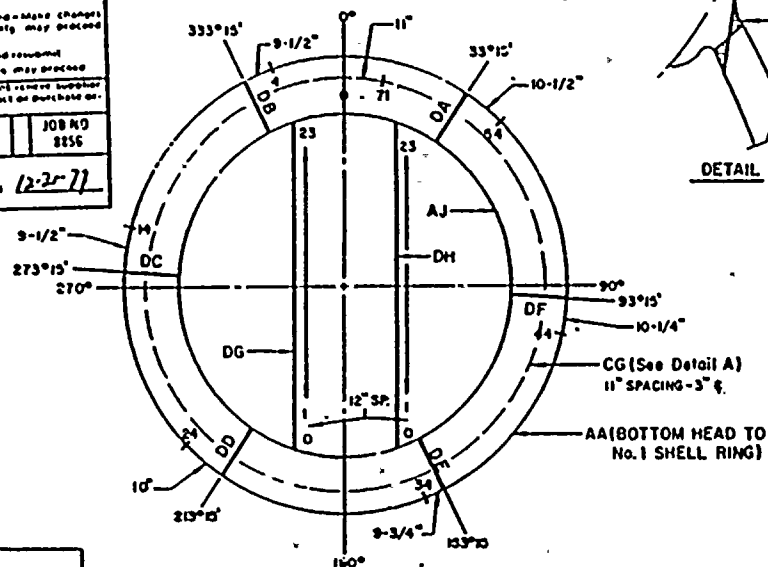
12-19-77

VENDOR'S DRAWING REVIEW

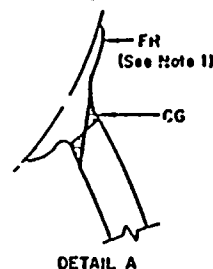
- 1 ☒ Approved - may proceed
- 2 ☐ Approved - Subject Matter - may proceed
- 3 ☐ Approved except as noted - may proceed
- 4 ☐ Not Approved - (reasons) - may proceed

[illegible]

PLAN VIEW
(OUTSIDE - TOP HEAD ASSEMBLY)



PLAN VIEW
(INSIDE - BOTTOM HEAD ASSEMBLY)



CERTIFIED CORRECT FOR

SUSQUEHANNA
STEAM ELECTRIC STATION
UNIT 1

PPBL Co.

CONTRACT 8856-M-166

BY: W. J. K. H. DATE: 5/1/77

NOTE 1.

**Weld Build-up FR to be Examined
Concurrent with Weld CG.**

DISTRIBUTION		LOCATION	
NO.	DATE	NO.	DATE
VENOR	7	VENOR	7
CLIENT	01/16	CLIENT	01/16
FIELD	24	FIELD	24
G.S.		G.S.	
CIVIL		CIVIL	
ELECT.		ELECT.	
PLT. DES.		PLT. DES.	
MECH.	1	MECH.	1
CON. SYS.		CON. SYS.	
ARCH.		ARCH.	
PURCH.		PURCH.	
EXPED.		EXPED.	
IMPACT		IMPACT	
SCHED.		SCHED.	
STARTUP		STARTUP	
RECORD	1	RECORD	1

REVISIONS		PRINTS TO	
1	Added: CG Weld & Detoil A. FR Weld & Note 1. <i>Rwn 12-3-76</i>		
2	Added: Radiographic Mark Locations of Uls. <i>Rwn 3-29-77</i>		

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MADE BY: R.W. NAGLE	NOV. 11, 1976	OFFICIALS	IAS
RECEIVED: 11/11/76			PHIL

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24 25

LOCATION

160-76B-0100

LOCATION	CONF ON BULLET 4	pg 3
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SECTION III.

SUMMARY OF CONDITIONS NOTED AND EXAMINATION RESULTS

Manual Examinations

During the examination of the Reactor Pressure Vessel welds, ninety-four (94) code recordable spot indications were detected and determined by the Level III to be within the acceptance standards of Section XI of the ASME Boiler and Pressure Vessel Code, 1994 Edition, including Winter 1995 Addendum. The data sheets and plots of these indications are included in Section V of this report.

In addition two (2) visual indications were detected in threaded stud holes in the vessel flange. These two (2) indications were dispositioned by the vessel designer/manufacture to be an acceptable condition. A report on the stud hold discrepancies appears in Section IV.

During the course of the manual examinations, geometric reflectors were detected from the closure head nozzles N6A and N6B, and vessel support weld CG. Summary reports for the above conditions are located in Section IV of this report.

Summary reports describing limited scans due to vessel configuration, penetrations, and thermocouple pads are located in Section IV.

An acoustic comparison between SA-508 and SA-533 was performed to satisfy the requirements of Paragraph I-3121, Appendix I of ASME Section XI. This report is located in Section IV.



INSTRUCTIONS FOR THE USE OF THE DETAILED
SUMMARY INCLUDED IN THIS REPORT

The detailed summary section of this report enables the user of the report to review the entire pre-service examination with a minimum of effort.

The following terms are used in the summary to identify the weld, the examinations performed, and the results of the examinations:

- | | |
|---------------------|---|
| CATEGORY | - The designation of the code category is per Table IWB-2500 of ASME XI W'75 Addenda. |
| WELD TYPE | - The weld types are listed in the section of Table IWB-2500 that pertains to the code category being examined. |
| WELD IDENTIFICATION | - The weld seam identification is taken from the RPV weld identification drawing included in the drawing section of the report. |
| ITEM NUMBER | - The designation of code item numbers is per Table IWB-2600 of ASME XI W'75 Addenda. |
| PROCEDURE NUMBER | - This column lists the procedure used to perform the examination. |
| EXAMINATION | - This column lists the examination(s) performed on each listed weld. |



REMARKS

- This column lists the results of each examination performed. The results appear directly opposite the examination.

0°BM	NRI
0°WM	NRI
45°	2 Spot Indications See Data Sheet _____
60°	NRI

As shown, the abbreviation NRI is used to document an examination where no recordable indications were detected. The 45° examination shows a result of 2 spot indications. Where indications were detected, a statement to see data sheet(s) _____ follows the number of indications detected. This statement tells the user which data sheet(s) detail the subject indication(s).

Where a condition exists that generally affects the examination, such as a limited scan or an interference requiring additional examination, a general statement is added to describe the condition. This statement is not intended to apply to any single examination. They are placed wherever space permits.

0°BM	NRI	Restricted scan, Reference Report # _____
0°WM	NRI	
45°	2 spot indications, see data sheet _____	
60°	NRI	

In the illustration above, there was a restricted scan affecting the examination. It is not intended to apply to the 0°BM examination. The statement tells the user which report(s) detail the referenced condition.



All data sheets referenced in the remarks column are included in Section V. Sheets documenting code recordable indications have been included with calibration data and data plots.



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM.	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL	AA	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL	AD	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL	AE (TOP)	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
					NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL	AE (BOTTOM)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
CIRCUMFERENTIAL	AF (BOTTOM)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
					SEE NOTE (1)
VESSEL TO FLANGE	AF (TOP)	B 1.1	ISE-QAI-326	0°BM	NRI

NRI = No Recordable Indications
Note(1) Restricted Examination
Reference Report #6 Section IV



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
					REMARKS
LONGITUDINAL	BA	B 1.1	ISE-QAI-325	0°BM	(1) Spot Indication. See Data Sheet 2047 in Section V.
				0°WM	(6) Spot Indications. See Data Sheet 2050 in Section V.
				45°	NRI
				60°	NRI
LONGITUDINAL	BB	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
LONGITUDINAL	BC	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	(2) Spot Indications. See Data Sheet 2052 in Section V.
				45°	NRI
				60°	NRI



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
LONGITUDINAL	BK	B 1.1	ISE-QAI-325	0° BM 0° WM 45° 60°	NRI NRI NRI NRI	
LONGITUDINAL	BM	B 1.1	ISE-QAI-325	0° BM 0° WM 45° 60°	NRI NRI NRI NRI	
LONGITUDINAL	BN	B 1.1	ISE-QAI-325	0° BM 0° WM 45° 60°	NRI NRI NRI NRI	SEE NOTE (1) AND REPORT #1 IN SECTION IV.



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM.	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
LONGITUDINAL	BP	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	AH (TOP)	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	AH (BOTTOM)	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL AND MERIODIONAL WELDS IN VESSEL HEADS	AJ (TOP)	B 1.1	ISE-QAI-325	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	AJ (BOTTOM)	B 1.1	ISE-QAI-325	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DA (AA-SKIRT)	B 1.1	ISE-QAI-325	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
						SEE NOTE (1) AND REPORT #1 IN SECTION IV



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
					NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL AND MERIODIONAL WELDS IN VESSEL HEADS	DC (AA-SKIRT)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1) AND REPORT #1 IN SECTION IV.					
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DC (SKIRT-AJ)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1) AND REPORT #1 IN SECTION IV.					
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DD (AA-SKIRT)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1) AND REPORT #1 IN SECTION IV					



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL AND MERIODIONAL WELDS IN VESSEL HEADS .	DA (SKIRT-AJ)	B 1.1	ISE-QAI-325	0°BM	NRI	SEE NOTE (1) AND REPORT #1 IN SECTION IV.
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DB (AA-SKIRT)	B 1.1	ISE-QAI-325	0°BM	NRI	SEE NOTE.(1) AND REPORT #1 IN SECTION IV.
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DB (SKIRT-AJ)	B 1.1	ISE-QAI-325	0°BM	NRI	SEE NOTE (1) AND REPORT #1 IN SECTION IV
				0°WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM.	REMARKS
CIRCUMFERENTIAL AND MERIODIONAL WELDS IN VESSEL HEADS	DD (SKIRT-AJ)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1) AND REPORT #1 IN SECTION IV.					
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DE (AA-SKIRT)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1) AND REPORT #1 IN SECTION IV.					
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DE (SKIRT-AJ)	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1) AND REPORT #1 IN SECTION IV					



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL AND MERIODIONAL WELDS IN VESSEL HEADS	DF (AA-SKIRT)	B 1.1	ISE-QAI-325	0°BM	NRI	SEE NOTE (1) AND REPORT #1 IN SECTION IV.
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DF (SKIRT-AJ	B 1.1	ISE-QAI-325	0°BM	NRI	SEE NOTE (1) AND REPORT #1 IN SECTION IV.
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DJ	B 1.1	ISE-QAI-325	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	
					NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DK	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DM	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DN	B 1.1	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DP	B 1.1	ISE-QAI-325	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
CIRCUMFERENTIAL AND MERIDIONAL WELDS IN VESSEL HEADS	DR	B 1.1	ISE-QAI-325	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
HEAD TO FLANGE WELD	AG	B 1.1	ISE-QAI-325	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI

NRI = No Recordable Indications
Note(1) Restricted Examination
Reference Report #6 Section IV



CATEGORY BA
MANUAL ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
BOTTOM HEAD DOLLAR PLATE WELDS	DG	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
				SEE NOTE (1) AND REPORT #1 IN SECTION IV.	
BOTTOM HEAD DOLLAR PLATE WELDS	DH	B 1.1	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
				SEE NOTE (1) AND REPORT #1 IN SECTION IV.	



CATEGORY BA
REMOTE ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
CIRCUMFERENTIAL	AA	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1)					
CIRCUMFERENTIAL	AB	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
CIRCUMFERENTIAL	AC	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	(1) SPOT INDICATION SEE DATA SHEET AC, SHEET 4 of 4 IN SECTION V
				60°	NRI



CATEGORY BA
REMOTE ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
CIRCUMFERENTIAL	AD	B 1.1	ISE-QAI-329	0° BM 0° WM 45° 60°	NRI NRI (1) SPOT INDICATION SEE DATA SHEET AD, SHEET 3 of 4 IN SECTION V NRI SEE NOTE (1)
LONGITUDINAL	BA	B 1.1	ISE-QAI-329	0° BM 0° WM 45° 60°	(5) SPOT INDICATIONS SEE DATA SHEET BA, SHEET 13 of 16 IN SECTION V (21) SPOT INDICATIONS SEE DATA SHEET BA, SHEET 13 of 16 IN SECTION V NRI NRI SEE NOTE (1)
LONGITUDINAL	BB	B 1.1	ISE-QAI-329	0° BM 0° WM 45° 60°	NRI NRI NRI NRI SEE NOTE (1)



CATEGORY BA
REMOTE ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM.	REMARKS
					NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
LONGITUDINAL	BC	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	(16) Spot Indications. See Data Sheet BC, Sheet 5 of 8 in Section V.
				45°	NRI
				60°	NRI
SEE NOTE (1)					
LONGITUDINAL	BD	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	(1) Spot Indication. See Data Sheet BD, Sheet 2 of 2 in Section V.
				60°	NRI
LONGITUDINAL	BE	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI



CATEGORY BA
REMOTE ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
LONGITUDINAL	BF	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
				SEE NOTE (1)	
LONGITUDINAL	BG	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	(11) Spot Indications. See Data Sheet BG, Sheet 3 of 3 in Section V.
				45°	NRI
				60°	NRI
				SEE NOTE (1)	
LONGITUDINAL	BH	B 1.1	ISE-QAI-329	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
				SEE NOTE (1)	



CATEGORY BA
REMOTE ULTRASONIC EXAMINATION
PRESSURE RETAINING WELDS IN REACTOR VESSEL

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
LONGITUDINAL	BJ	B 1.1	ISE-QAI-329	0°BM	(1) Spot Indication. See Data Sheet BJ, Sheet 3 of 3 in Section V.
				0°WM	NRI
				45°	NRI
				60°	(1) Spot Indication. See Data Sheet BJ Sheet 2 of 3 in Section V. SEE NOTE (1)



INSTALLATION & SERVICE
ENGINEERING DIVISION

CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM.	REMARKS	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
PRIMARY NOZZLE TO VESSEL WELDS	N6A	B 1.4	ISE-QAI-325	0° BM	NRI	REFERENCE REPORT NO. 2 IN SECTION IV.
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
PRIMARY NOZZLE TO VESSEL WELDS	N6B	B 1.4	ISE-QAI-325	0° BM	NRI	REFERENCE REPORT NO. 2 IN SECTION IV.
				0° WM	NRI	
				45°	NRI	
				60°	NRI	
PRIMARY NOZZLE TO VESSEL WELDS	N7	B 1.4	ISE-QAI-325	0° BM	NRI	
				0° WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
					REMARKS
PRIMARY NOZZLE TO VESSEL WELDS	N8A	B 1.4	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
PRIMARY NOZZLE TO VESSEL WELDS	N8B	B 1.4	ISE-QAI-325	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
PRIMARY NOZZLE TO VESSEL WELDS	N9	B 1.4	ISE-QAI-325	0°BM	5 Spot Indications. See Data Sheet 4094 in Section V.
				0°WM	2 Spot Indications. See Data Sheet 4093 in Section V.
				45°	NRI
				60°	1 Spot Indication. See Data Sheet 1106 in Section V.



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
NOZZLE INNER RADIUSED SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI= No Recordable Indications
NOZZLE INNER RADIUSED SECTION	N1A	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUSED SECTION	N1B	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUSED SECTION	N2A	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUSED SECTION	N2B	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUSED SECTION	N2C	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUSED SECTION	N2D	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
NOZZLE INNER RADIUS SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI= No Recordable Indications
NOZZLE INNER RADIUS SECTION	N2E	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N2F	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N2G	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N2H	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N2J	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
NOZZLE INNER RADIUS SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI= No Recordable Indications
NOZZLE INNER RADIUS SECTION	N2K	B 1.4	ISE-QAI-324	INNER RADIUS	NRI
NOZZLE INNER RADIUS SECTION	N3A	B 1.4	ISE-QAI-324	INNER RADIUS	NRI
NOZZLE INNER RADIUS SECTION	N3B	B 1.4	ISE-QAI-324	INNER RADIUS	NRI
NOZZLE INNER RADIUS SECTION	N3C	B 1.4	ISE-QAI-324	INNER RADIUS	NRI
NOZZLE INNER RADIUS SECTION	N3D	B 1.4	ISE-QAI-324	INNER RADIUS	NRI
NOZZLE INNER RADIUS SECTION	N5A	B 1.4	ISE-QAI-324	INNER RADIUS	NRI



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
NOZZLE INNER RADIUS SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI= No Recordable Indications
NOZZLE INNER RADIUS SECTION	N5B	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N6A	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N6B	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N7	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N8A	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	
NOZZLE INNER RADIUS SECTION	N8B	B 1.4	ISE-QAI-324	INNER RADIUS	NRI	



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
NOZZLE INNER RADIUS SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI= No Recordable Indications
NOZZLE INNER RADIUS SECTION	N9	B 1.4	ISE-QAI-324	INNER RADIUS	NRI
	N9	B 1.4	ISE-QAI-331	P.T.	NRI <u>NOTE:</u> Liquid penetrant examination performed on the nozzle inner radius in accordance with the requirements of NUREG-0619.



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
FEEDWATER NOZZLE INNER RADIUSED SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI= No Recordable Indications
PRIMARY NOZZLE TO VESSEL WELDS	N4A	B1.4	ISE-QAI-334	ZONE 1	NRI	- Restricted Scan, Reference Report #6 in Section IV
	N4A	B1.4	ISE-QAI-332	ZONE 2	NRI	<u>Note:</u> Liquid penetrant examination performed on the accessible portions of the six (6) feedwater nozzle inner radii with the spargers installed, to satisfy the requirements of NUREG-0619. No recordable indications were detected. Procedure ISE-QAI-331 was used.
	N4A	B1.4	ISE-QAI-333	ZONE 3	NRI	
PRIMARY NOZZLE TO VESSEL WELDS	N4B	B1.4	ISE-QAI-334	ZONE 1	NRI	
	N4B	B1.4	ISE-QAI-332	ZONE 2	NRI	
	N4B	B1.4	ISE-QAI-333	ZONE 3	NRI	- Restricted Scan 90° to 120° due to thermocouple pads



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
FEEDWATER NOZZLE INNER RADIUSED SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI= No Recordable Indications
PRIMARY NOZZLE TO VESSEL WELDS	N4C	B1.4	ISE-QAI-334	ZONE 1	NRI
	N4C	B1.4	ISE-QAI-332	ZONE 2	NRI
	N4C	B1.4	ISE-QAI-333	ZONE 3	NRI
PRIMARY NOZZLE TO VESSEL WELDS	N4D	B1.4	ISE-QAI-334	ZONE 1	NRI - Restricted scan. Reference Report #6 in Section IV.
	N4D	B1.4	ISE-QAI-332	ZONE 2	NRI
	N4D	B1.4	ISE-QAI-333	ZONE 3	NRI - Restricted Scan 90° to 120° due to thermocouple pads



CATEGORY BD
MANUAL ULTRASONIC EXAMINATION
FEEDWATER NOZZLE INNER RADIUSED SECTION

NOZZLE TYPE	NOZZLE ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI= No Recordable Indications
PRIMARY NOZZLE TO VESSEL WELDS	N4E	B1.4	ISE-QAI-334	ZONE 1	NRI	
	N4E	B1.4	ISE-QAI-332	ZONE 2	NRI	
	N4E	B1.4	ISE-QAI-333	ZONE 3	NRI	
PRIMARY NOZZLE TO VESSEL WELDS	N4F	B1.4	ISE-QAI-334	ZONE 1	NRI	
	N4F	B1.4	ISE-QAI-332	ZONE 2	NRI	
	N4F	B1.4	ISE-QAI-333	ZONE 3	NRI	



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM.	NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
					REMARKS
NOZZLE TO VESSEL	N1A	B 1.4	ISE-QAI-330	0° BM	(1) Spot - See Data Sheet N1A, Sheet 2 of 3 in Section V
				0° WM	(1) Spot - See Data Sheet N1A, Sheet 2 of 3 in Section V
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N1B	B 1.4	ISE-QAI-330	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N2A	B 1.4	ISE-QAI-330	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV
NOZZLE TO VESSEL	N2B	B 1.4	ISE-QAI-330	0°BM 0°WM 45° 60°	NRI NRI NRI NRI
NOZZLE TO VESSEL	N2C	B 1.4	ISE-QAI-330	0°BM 0°WM 45° 60°	NRI NRI NRI NRI SEE NOTE (1)
NOZZLE TO VESSEL	N2D	B 1.4	ISE-QAI-330	0°BM 0°WM 45° 60°	NRI NRI NRI NRI SEE NOTE (1)



INSTALLATION & SERVICE
ENGINEERING DIVISION

CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
NOZZLE TO VESSEL	N2E	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N2F	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N2G	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI

NRI = No Recordable Indications
Note(1) Restricted Examination
Reference Report #6 Section IV



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
NOZZLE TO VESSEL	N2H	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1)					
NOZZLE TO VESSEL	N2J	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
SEE NOTE (1)					
NOZZLE TO VESSEL	N2K	B 1.4	ISE-QAI-330	0°BM	(1) Spot Indication. See Data Sheet N2K, Sheet 2 of 3 in Section V.
				0°WM	NRI
				45°	NRI
				60°	NRI



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
NOZZLE TO VESSEL	N3A	B 1.4	ISE-QAI-330	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N3B	B 1.4	ISE-QAI-330	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N3C	B 1.4	ISE-QAI-330	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
NOZZLE TO VESSEL	N3D	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N4A	B 1.4	ISE-QAI-330	0°BM	(1) Spot Indication. See Data Sheet N4A, Sheet 2 of 3 in Section V. SEE NOTE (1)
				0°WM	
				45°	
				60°	
NOZZLE TO VESSEL	N4B	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	
					NRI = No Recordable Indications Note(1) Restricted Examination Reference Report #6 Section IV	
NOZZLE TO VESSEL	N4C	B 1.4	ISE-QAI-330	0°BM	(3) Spot Indications.	See Data Sheet N4C, Sheet 2 of 3 in Section V
				0°WM	(2) Spot Indications.	See Data Sheet N4C, Sheet 2 of 3 in Section V
				45°	NRI	
				60°	NRI	
NOZZLE TO VESSEL	N4D	B 1.4	ISE-QAI-330	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	SEE NOTE (1)
NOZZLE TO VESSEL	N4E	B 1.4	ISE-QAI-330	0°BM	(2) Spot Indications.	See Data Sheet N4E, Sheet 2 of 3 in Section V
				0°WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BD
REMOTE ULTRASONIC EXAMINATION
FULL PENETRATION WELDS OF NOZZLES IN REACTOR VESSELS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS
NOZZLE TO VESSEL	N4F	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	(1) Spot Indication. See Data Sheet N4F, Sheet 3 of 3 in Section V
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N5A	B 1.4	ISE-QAI-330	0°BM	NRI
				0°WM	NRI
				45°	NRI
				60°	NRI
NOZZLE TO VESSEL	N5B	B 1.4	ISE-QAI-330	0°BM	(5) Spot Indications. See Data Sheet N5B, Sheet 3 of 4 in Section V
				0°WM	(2) Spot Indications. See Data Sheet N5B, Sheet 3 of 4 in Section V
				45°	NRI
				60°	NRI



CATEGORY BE
PRESSURE RETAINING PARTIAL PENETRATION WELDS IN VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
<u>LEAKAGE ON PARTIAL PENETRATION WELD JUNCTIONS:</u> o 185 STUB TUBE TO R.P.V. JUNCTIONS	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o 55 INCORE HOUSING TO R.P.V. JUNCTIONS	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o N10 CORE DIFFERENTIAL PRESSURE AND LIQUID CONTROL NOZZLE	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE



CATEGORY BE
PRESSURE RETAINING PARTIAL PENETRATION WELDS IN VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
o N11A INSTRUMENTATION NOZZLE JUNCTIONS	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o N11B INSTRUMENTATION NOZZLE JUNCTIONS	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o N12A INSTRUMENTATION NOZZLE JUNCTIONS	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o N12B INSTRUMENTATION NOZZLE JUNCTIONS	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o N15 DRAIN NOZZLE	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE



CATEGORY BE
PRESSURE RETAINING PARTIAL PENETRATION WELDS IN VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
o N16A INSTRUMENTATION NOZZLE	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE
o N16B INSTRUMENTATION NOZZLE	B1.5	160A7807 SUPPLEMENT J	VT	NO LEAKAGE





**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
RECIRCULATION OUTLET	NIA	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	NIA	SAFE END SIDE	B1.6	ISE-QAI-322	35°/45°	NRI
	NIA	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
RECIRCULATION OUTLET	NIB	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	NIB	SAFE END SIDE	B1.6	ISE-QAI-322	35°/45°	NRI
	NIB	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI



CATEGORY BF
NOZZLE TO SAFE END WELDS

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
RECIRCULATION INLET	N2A	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2A	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2A	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI
RECIRCULATION INLET	N2B	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2B	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2B	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI



INSTALLATION & SERVICE
ENGINEERING OPERATIONS

CATEGORY BF
NOZZLE TO SAFE END WELDS

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM.	REMARKS NRI=No Recordable Indications
RECIRCULATION INLET	N2C	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2C	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2C	NOZZLE TO SAFE END	B1.6	18XA7400	P.T.	NRI
RECIRCULATION INLET	N2D	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2D	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2D	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
RECIRCULATION INLET	N2E	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2E	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2E	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI
RECIRCULATION INLET	N2F	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2F	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2F	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI



CATEGORY BF
NOZZLE TO SAFE END WELDS

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI=No Recordable Indications
MAINSTEAM OUTLET	N3A	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI	Note: Mainsteam Safe-Ends examined from both sides with two calibrations
	N3A	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI	
	N3B	NOZZLE TO SAFE END	B1.6	ISE-QAI-332	45°	NRI	
	N3B	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI	
	N3C	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI	
	N3C	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI	



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
MAINSTEAM OUTLET	N3D	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI
	N3D	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
FEEDWATER INLET	N4A	NOZZLE TO SAFE END	B1.6	ISE-QAI-332	45°	NRI <u>NOTE:</u> Feedwater Safe Ends examined from both sides with two calibrations.
	N4A	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
	N4B	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI
	N4B	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI



CATEGORY BF
NOZZLE TO SAFE END WELDS

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
FEEDWATER INLET	N4C	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI
	N4C	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
	N4D	NOZZLE TO SAFE END	B1.6	ISE-QAI-332	45°	NRI
	N4D	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
	N4E	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI
	N4E	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
FEEDWATER INLET	N4F	NOZZLE TO SAFE END	B1.6	ISE-QAI-322	45°	NRI
	N4F	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
CORE SPRAY	N5A	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N5A	SAFE END TO NOZZLE	B1.6	ISE-QAI-322	33°/45°	NRI
	N5A	SAFE END TO EXTENSION	B1.6	ISE-QAI-322	45°	NRI
	N5A	EXTENSION TO SAFE END	B1.6	ISE-QAI-322	45°	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM, NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
RECIRCULATION INLET	N2G	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2G	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2G	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI
RECIRCULATION INLET	N2H	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2H	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2H	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE.	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
RECIRCULATION INLET	N2J	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2J	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2J	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI
RECIRCULATION INLET	N2K	NOZZLE, SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2K	SAFE END SIDE	B1.6	ISE-QAI-322	45°	NRI
	N2K	NOZZLE TO SAFE END	B1.6	18XA8402	P.T.	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
CORE SPRAY	N5A	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
	N5A	SAFE END TO EXTENSION	B1.6	ISE-QAI-331	P.T.	NRI
CORE SPRAY	N5B	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N5B	SAFE END TO NOZZLE	B1.6	ISE-QAI-322	33°/45°	NRI
	N5B	SAFE END TO EXTENSION	B1.6	ISE-QAI-322	45°	NRI
	N5B	EXTENSION TO SAFE END	B1.6	ISE-QAI-322	45°	NRI



CATEGORY BF
NOZZLE TO SAFE END WELDS

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
CORE SPRAY	N5B	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI
	N5B	SAFE END TO EXTENSION	B1.6	ISE-QAI-331	P.T.	NRI
HEAD INSTRUMENT	N6A	NOZZLE SIDE	B1.6	ISE-QAI-322	33°/45°	NRI
	N6A	FLANGE SIDE	B1.6	ISE-QAI-322	33°	NRI
	N6A	NOZZLE TO FLANGE	B1.6	ISE-QAI-331	P.T.	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
HEAD VENT	N7	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N7	FLANGE SIDE	B1.6	ISE-QAI-322	33°	NRI
	N7	NOZZLE TO FLANGE	B1.6	ISE-QAI-331	P.T.	NRI
JET PUMP INSTRUMENTATION	N8A	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N8A	SAFE END SIDE	B1.6	ISE-QAI-322	33°/45°	NRI
	N8A	NOZZLE TO SAFE END	B1.6	ISE-QAI-331	P.T.	NRI



**CATEGORY BF
NOZZLE TO SAFE END WELDS**

NOZZLE	WELD I.D.	PERFORMED FROM	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
JET PUMP INSTRUMENTATION	N8B	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N8B	SAFE END SIDE	B1.6	ISE-QAI-322	33°/45°	NRI
	N8B	SAFE END TO NOZZLE	B1.6	ISE-QAI-331	P.T.	NRI
CRD RETURN CAP	N9A	NOZZLE SIDE	B1.6	ISE-QAI-322	45°	NRI
	N9A	CAP SIDE	B1.6	ISE-QAI-322	45°	NRI
	N9A	NOZZLE TO CAP	B1.6	18XA7400	P.T.	NRI <u>NOTE:</u> Penetrant examination performed after hydrostatic test



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
NUT	1	B1.7	ISE-QAI-328	MT	NRI
NUT	2	B1.7	ISE-QAI-328	MT	NRI
NUT	3	B1.7	ISE-QAI-328	MT	NRI
NUT	4	B1.7	ISE-QAI-328	MT	NRI
NUT	5	B1.7	ISE-QAI-328	MT	NRI
NUT	6	B1.7	ISE-QAI-328	MT	NRI
NUT	7	B1.7	ISE-QAI-328	MT	NRI
NUT	8	B1.7	ISE-QAI-328	MT	NRI
NUT	9	B1.7	ISE-QAI-328	MT	NRI
NUT	10	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM.	REMARKS NRI=No Recordable Indications
NUT	11	B1.7	ISE-QAI-328	MT	NRI
NUT	12	B1.7	ISE-QAI-328	MT	NRI
NUT	13	B1.7	ISE-QAI-328	MT	NRI
NUT	14	B1.7	ISE-QAI-328	MT	NRI
NUT	15	B1.7	ISE-QAI-328	MT	NRI
NUT	16	B1.7	ISE-QAI-328	MT	NRI
NUT	17	B1.7	ISE-QAI-328	MT	NRI
NUT	18	B1.7	ISE-QAI-328	MT	NRI
NUT	19	B1.7	ISE-QAI-328	MT	NRI
NUT	20	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
NUT	21	B1.7	ISE-QAI-328	MT	NRI
NUT	22	B1.7	ISE-QAI-328	MT	NRI
NUT	23	B1.7	ISE-QAI-328	MT	NRI
NUT	24	B1.7	ISE-QAI-328	MT	NRI
NUT	25	B1.7	ISE-QAI-328	MT	NRI
NUT	26	B1.7	ISE-QAI-328	MT	NRI
NUT	27	B1.7	ISE-QAI-328	MT	NRI
NUT	28	B1.7	ISE-QAI-328	MT	NRI
NUT	29	B1.7	ISE-QAI-328	MT	NRI
NUT	30	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
NUT	31	B1.7	ISE-QAI-328	MT	NRI
NUT	32	B1.7	ISE-QAI-328	MT	NRI
NUT	33	B1.7	ISE-QAI-328	MT	NRI
NUT	34	B1.7	ISE-QAI-328	MT	NRI
NUT	35	B1.7	ISE-QAI-328	MT	NRI
NUT	36	B1.7	ISE-QAI-328	MT	NRI
NUT	37	B1.7	ISE-QAI-328	MT	NRI
NUT	38	B1.7	ISE-QAI-328	MT	NRI
NUT	39	B1.7	ISE-QAI-328	MT	NRI
NUT	40	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
NUT	41	B1.7	ISE-QAI-328	MT	NRI
NUT	42	B1.7	ISE-QAI-328	MT	NRI
NUT	43	B1.7	ISE-QAI-328	MT	NRI
NUT	44	B1.7	ISE-QAI-328	MT	NRI
NUT	45	B1.7	ISE-QAI-328	MT	NRI
NUT	46	B1.7	ISE-QAI-328	MT	NRI
NUT	47	B1.7	ISE-QAI-328	MT	NRI
NUT	48	B1.7	ISE-QAI-328	MT	NRI
NUT	49	B1.7	ISE-QAI-328	MT	NRI
NUT	50	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NQ. 711.1	EXAM	REMARKS NRI=No Recordable Indications
NUT	51	B1.7	ISE-QAI-328	MT	NRI
NUT	52	B1.7	ISE-QAI-328	MT	NRI
NUT	53	B1.7	ISE-QAI-328	MT	NRI
NUT	54	B1.7	ISE-QAI-328	MT	NRI
NUT	55	B1.7	ISE-QAI-328	MT	NRI
NUT	56	B1.7	ISE-QAI-328	MT	NRI
NUT	57	B1.7	ISE-QAI-328	MT	NRI
NUT	58	B1.7	ISE-QAI-328	MT	NRI
NUT	59	B1.7	ISE-QAI-328	MT	NRI
NUT	60	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
NUT	61	B1.7	ISE-QAI-328	MT	NRI
NUT	62	B1.7	ISE-QAI-328	MT	NRI
NUT	63	B1.7	ISE-QAI-328	MT	NRI
NUT	64	B1.7	ISE-QAI-328	MT	NRI
NUT	65	B1.7	ISE-QAI-328	MT	NRI
NUT	66	B1.7	ISE-QAI-328	MT	NRI
NUT	67	B1.7	ISE-QAI-328	MT	NRI
NUT	68	B1.7	ISE-QAI-328	MT	NRI
NUT	69	B1.7	ISE-QAI-328	MT	NRI
NUT	70	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
NUTS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
NUT	71	B1.7	ISE-QAI-328	MT	NRI
NUT	72	B1.7	ISE-QAI-328	MT	NRI
NUT	73	B1.7	ISE-QAI-328	MT	NRI
NUT	74	B1.7	ISE-QAI-328	MT	NRI
NUT	75	B1.7	ISE-QAI-328	MT	NRI
NUT	76	B1.7	ISE-QAI-328	MT	NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	1	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	2	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	3	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	4	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	5	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	6	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	7	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	8	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	9	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	10	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	11	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	12	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	13	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	14	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	14	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	15	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	16	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	17	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	18	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	19	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	20	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM.	REMARKS NRI=No Recordable Indications
STUD	21	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	22	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	23	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	24	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	25	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	26	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	27	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	28	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	29	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	30	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	31	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	32	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	33	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	34	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	36	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	37	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	38	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	39	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	40	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	41	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	42	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	43	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	44	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	45	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	46	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	47	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	48	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	49	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM.	REMARKS NRI=No Recordable Indications
STUD	50	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	51	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	52	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	53	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	54	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	55	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	56	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	57	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	58	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	59	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	60	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	61	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	62	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	63	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NRI=No Recordable Indications
STUD	64	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	65	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	66	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	67	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	68	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	69	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	70	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI



**CATEGORY BG-1
PRESSURE RETAINING BOLTS AND STUDS**

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM.	REMARKS NRI=No Recordable Indications
STUD	71	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	72	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	73	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	74	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	75	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI NRI
STUD	76				Used as a calibration standard not inspected with closure studs.
STUD	76R	B1.8	ISE-QAI-327 ISE-QAI-328	UT MT	NRI Inspected as S-4 - All data for 76R is filed with NRI the Piece No. Designation S-4.



CATEGORY BG-1
LIGAMENTS BETWEEN THREADED STUD HOLES

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM.	REMARKS NRI=No Recordable Indications
FLANGE LIGAMENTS	UNIT #1	B1.9	ISE-QAI-326	UT	NRI



CATEGORY BG-1
THREADS IN BASE MATERIAL

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
THREADED STUD HOLES IN VESSEL FLANGE	#1 - #76 (less #16 and #76)	B1.9	ISE-QAI-317	VT	NAD
THREADED STUD HOLES IN VESSEL FLANGE	#16	B1.9	ISE-QAI-317	VT	Change in Thread Size. See Control Number 750 and Report Number 7 in Section IV.
THREADED STUD HOLES IN VESSEL FLANGE	#76	B1.9	ISE-QAI-317	VT	Missing Thread. See Control Number 750 and Report Number 7 in Section IV.



CATEGORY BG-1
CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	1	B1.10	ISE-QAI-317	VT	NAD
WASHER	2	B1.10	ISE-QAI-317	VT	NAD
WASHER	3	B1.10	ISE-QAI-317	VT	NAD
WASHER	4	B1.10	ISE-QAI-317	VT	NAD
WASHER	5	B1.10	ISE-QAI-317	VT	NAD
WASHER	6	B1.10	ISE-QAI-317	VT	NAD
WASHER	7	B1.10	ISE-QAI-317	VT	NAD
WASHER	8	B1.10	ISE-QAI-317	VT	NAD
WASHER	9	B1.10	ISE-QAI-317	VT	NAD
WASHER	10	B1.10	ISE-QAI-317	VT	NAD



CATEGORY BG-1
• CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	11	B1.10	ISE-QAI-317	VT	NAD
WASHER	12	B1.10	ISE-QAI-317	VT	NAD
WASHER	13	B1.10	ISE-QAI-317	VT	NAD
WASHER	14	B1.10	ISE-QAI-317	VT	NAD
WASHER	15	B1.10	ISE-QAI-317	VT	NAD
WASHER	16	B1.10	ISE-QAI-317	VT	NAD
WASHER	17	B1.10	ISE-QAI-317	VT	NAD
WASHER	18	B1.10	ISE-QAI-317	VT	NAD
WASHER	19	B1.10	ISE-QAI-317	VT	NAD
WASHER	20	B1.10	ISE-QAI-317	VT	NAD



**CATEGORY BG-1
CLOSURE WASHERS**

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	21	B1.10	ISE-QAI-317	VT	NAD
WASHER	22	B1.10	ISE-QAI-317	VT	NAD
WASHER	23	B1.10	ISE-QAI-317	VT	NAD
WASHER	24	B1.10	ISE-QAI-317	VT	NAD
WASHER	25	B1.10	ISE-QAI-317	VT	NAD
WASHER	26	B1.10	ISE-QAI-317	VT	NAD
WASHER	27	B1.10	ISE-QAI-317	VT	NAD
WASHER	28	B1.10	ISE-QAI-317	VT	NAD
WASHER	29	B1.10	ISE-QAI-317	VT	NAD
WASHER	30	B1.10	ISE-QAI-317	VT	NAD



· CATEGORY BG-1
CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	31	B1.10	ISE-QAI-317	VT	NAD
WASHER	32	B1.10	ISE-QAI-317	VT	NAD
WASHER	33	B1.10	ISE-QAI-317	VT	NAD
WASHER	34	B1.10	ISE-QAI-317	VT	NAD
WASHER	35	B1.10	ISE-QAI-317	VT	NAD
WASHER	36	B1.10	ISE-QAI-317	VT	NAD
WASHER	37	B1.10	ISE-QAI-317	VT	NAD
WASHER	38	B1.10	ISE-QAI-317	VT	NAD
WASHER	39	B1.10	ISE-QAI-317	VT	NAD
WASHER	40	B1.10	ISE-QAI-317	VT	NAD



CATEGORY BG-1
CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	41	B1.10	ISE-QAI-317	VT	NAD
WASHER	42	B1.10	ISE-QAI-317	VT	NAD
WASHER	43	B1.10	ISE-QAI-317	VT	NAD
WASHER	44	B1.10	ISE-QAI-317	VT	NAD
WASHER	45	B1.10	ISE-QAI-317	VT	NAD
WASHER	46	B1.10	ISE-QAI-317	VT	NAD
WASHER	47	B1.10	ISE-QAI-317	VT	NAD
WASHER	48	B1.10	ISE-QAI-317	VT	NAD
WASHER	49	B1.10	ISE-QAI-317	VT	NAD
WASHER	50	B1.10	ISE-QAI-317	VT	NAD



CATEGORY BG-1
CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	51	B1.10	ISE-QAI-317	VT	NAD
WASHER	52	B1.10	ISE-QAI-317	VT	NAD
WASHER	53	B1.10	ISE-QAI-317	VT	NAD
WASHER	54	B1.10	ISE-QAI-317	VT	NAD
WASHER	55	B1.10	ISE-QAI-317	VT	NAD
WASHER	56	B1.10	ISE-QAI-317	VT	NAD
WASHER	57	B1.10	ISE-QAI-317	VT	NAD
WASHER	58	B1.10	ISE-QAI-317	VT	NAD
WASHER	59	B1.10	ISE-QAI-317	VT	NAD
WASHER	60	B1.10	ISE-QAI-317	VT	NAD



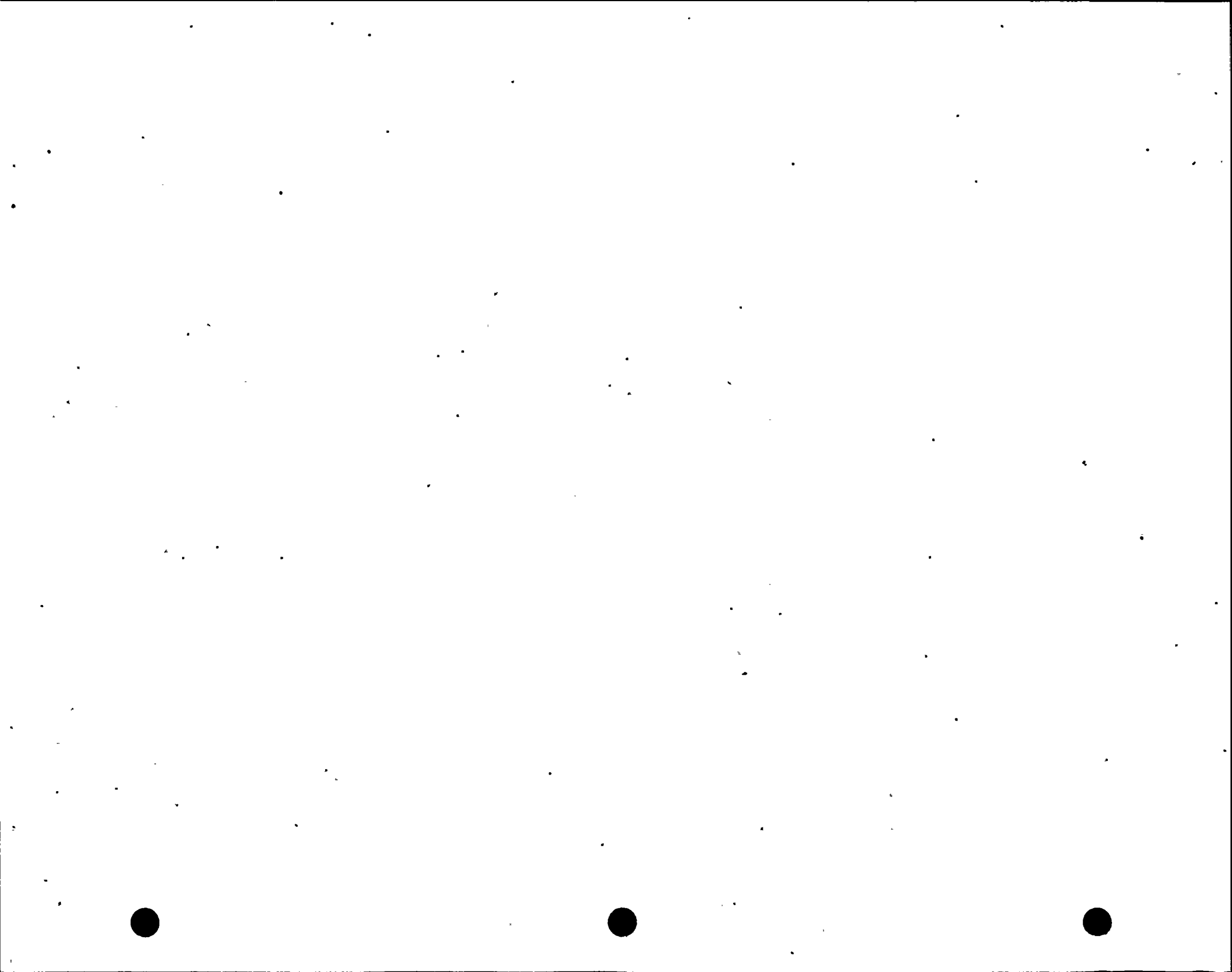
CATEGORY BG-1
CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	61	B1.10	ISE-QAI-317	VT	NAD
WASHER	62	B1.10	ISE-QAI-317	VT	NAD
WASHER	63	B1.10	ISE-QAI-317	VT	NAD
WASHER	64	B1.10	ISE-QAI-317	VT	NAD
WASHER	65	B1.10	ISE-QAI-317	VT	NAD
WASHER	66	B1.10	ISE-QAI-317	VT	NAD
WASHER	67	B1.10	ISE-QAI-317	VT	NAD
WASHER	68	B1.10	ISE-QAI-317	VT	NAD
WASHER	69	B1.10	ISE-QAI-317	VT	NAD
WASHER	70	B1.10	ISE-QAI-317	VT	NAD



CATEGORY BG-1
CLOSURE WASHERS

PART	I.D.	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS NAD=No Apparent Defects
WASHER	71	B1.10	ISE-QAI-317	VT	NAD
WASHER	72	B1.10	ISE-QAI-317	VT	NAD
WASHER	73	B1.10	ISE-QAI-317	VT	NAD
WASHER	74	B1.10	ISE-QAI-317	VT	NAD
WASHER	75	B1.10	ISE-QAI-317	VT	NAD
WASHER	76	B1.10	ISE-QAI-317	VT	NAD





CATEGORY BH
MANUAL ULTRASONIC EXAMINATION
VESSEL SUPPORTS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS NRI=No Recordable Indications
WELDED VESSEL SUPPORT SKIRT	CG (DA-DB)	B1.12	ISE-QAI-321	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
	CG (DB-DC)	B1.12	ISE-QAI-321	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI
	CG (DC-DD)	B1.12	ISE-QAI-321	0° BM	NRI
				0° WM	NRI
				45°	NRI
				60°	NRI



CATEGORY BH
MANUAL ULTRASONIC EXAMINATION
VESSEL SUPPORTS

WELD TYPE	WELD ID	ITEM NO.	PROCEDURE	EXAM	REMARKS	NRI=No Recordable Indications
WELDED VESSEL SUPPORT SKIRT	CG (DD-DE)	B1.12	ISE-QAI-321	0°BM	NRI	DUE TO VESSEL CONFIGURATION, WELD CG WAS EXAMINED FROM ONE (1) SIDE ONLY IN ACCORDANCE WITH THE PROVISIONS OF PARAGRAPH 1-5121 OF ASME SECTION XI.
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
	CG (DE-DF)	B1.12	ISE-QAI-321	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	
	CG (DF-DA)	B1.12	ISE-QAI-321	0°BM	NRI	
				0°WM	NRI	
				45°	NRI	
				60°	NRI	



CATEGORY BI-1
INTERIOR CLAD SURFACES OF REACTOR VESSELS

ITEM	I.D.	ITEM NO.	AZIMUTH	ELEVATION	PROCEDURE	EXAM	REMARKS
CLAD PATCHES	1	BI.14	90°	724"	160A7807 SUPP. H	VT	SATISFACTORY
	2	BI.14	270°	724"	160A7807 SUPP. H	VT	SATISFACTORY
	3	BI.14	60°	537"	160A7807 SUPP. H	VT	SATISFACTORY
	4	BI.14	150°	522"	160A7807 SUPP. H	VT	SATISFACTORY
	5	BI.14	240°	537"	160A7807 SUPP. H	VT	SATISFACTORY
	6	BI.14	330°	522"	160A7807 SUPP. H	VT	SATISFACTORY



CATEGORY BN-1
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
STEAM DRYER, SHROUD AND SEPARATOR	B1.15	160A7807 SUPPLEMENT A	VT	SATISFACTORY Note: A visual examination will be repeated during the final installation of the Steam Dryer, Shroud and Separator. The results will be documented and included into this report as a supplement.
JET PUMP INSTRUMENT ASSEMBLY & SUPPORT WELDS	B1.15	160A7807 SUPPLEMENT B	VT	SATISFACTORY
JET PUMP & SHROUD ANNULUS	B1.15	160A7807 SUPPLEMENT C	VT	SATISFACTORY



CATEGORY BN-1
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
CORE SUPPORT PLATE	B1.15	160A7807 SUPPLEMENT D	VT	SATISFACTORY
INCORE AND CRD ASSEMBLY	B1.15	160A7807 SUPPLEMENT F	VT	SATISFACTORY
CORE SPRAY HEADER AND SPARGER ASSEMBLY	B1.15	160A7807 SUPPLEMENT I	VT	SATISFACTORY



CATEGORY BN-1
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
FEEDWATER SPARGER ASSEMBLY	B1.15	160A7807 SUPPLEMENT I	VT	SATISFACTORY
FUEL CELL COMPONENTS	B1.15	160A7807 SUPPLEMENT K	VT	SATISFACTORY
TOP GUIDE ASSEMBLY	B1.15	160A7807 SUPPLEMENT L	VT	SATISFACTORY



CATEGORY BN-1
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
SHROUD WELD	B1.15	160A7807 SUPPLEMENT G	VT	SATISFACTORY



CATEGORY BN-2
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
CORE SPRAY BRACKETS	B1.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY
JET PUMP RISER PADS	B1.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY
GUIDE ROD BRACKETS	B1.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY



CATEGORY BN-2
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
STEAM DRYER SUPPORT AND HOLD DOWN BRACKETS	B1.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY
SURVEILLANCE SPECIMEN BRACKET	B1.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY
CORE SUPPORT WELD	B1.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY



CATEGORY BN-2
INTERIOR OF REACTOR VESSELS

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
INCORE HOUSING AND STUB TUBE TO R.P.V. WELDS	BI.16	160A7807 SUPPLEMENT E	VT	SATISFACTORY
FEEDWATER BRACKETS	BI.16	160A7807 SUPPLEMENT H	VT	SATISFACTORY





CATEGORY BO

PRESSURE RETAINING WELDS IN CONTROL ROD HOUSINGS

The welds in CRD housings were exempted from volumetric examination based upon plant make-up capacity. They were examined for leakage during system hrdro and included in Category BP.



**CATEGORY BP
EXEMPTED COMPONENTS**

SYSTEM	ITEM NO.	PROCEDURE NO.	EXAM	REMARKS
185 CRD HOUSING WELDS	B1.19	160A7807 SUPPLEMENT J	VT	NO LEAKAGE



SUSQUEHANNA UNIT #1

SECTION IV

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SUMMARY REPORT: . Effect of Vessel Configuration on RPV Ultrasonic Examinations

REFERENCE: Pennsylvania Power and Light Company Susquehanna
 Steam Electric Station
 Contract No. 8856-M-166
 RPV Pre-service Ultrasonic Examination

This report is presented at the request of PP&L to discuss the effect of the RPV configuration relative to the ASME Section XI required ultrasonic examinations for the Unit #1 vessel. It should be noted that the data presented is also valid for the Unit #2 vessel.

The referenced configuration caused limited examinations in code categories BA and BH. The vessel interferences were of three types and will be discussed as to their effect on specific welds. A list of welds to which the restrictions apply is presented in the summary of restrictions.

The types of restrictions discussed in this are:

1. Thermocouple pads, 1" diameter welded attachment
2. Vessel curvature - as shown
3. CRD penetrations - 6" diameter - bored through

The equipment used to perform the examinations is documented elsewhere in the preservice report. A representative set is listed here to illustrate the discussion.

Branson Sonoray Detector Model 303
Aerotech Transducers - Gamma Series 2.25 MHz
1" round and .5" x 1" rectangular
Aerotech wedges .5" x 1" lucite
Co-axial cable 12' RG 58 U

THERMOCOUPLE RESTRICTIONS

Welded thermocouple pads are located at various points on the vessel exterior surface. When design considerations require placement of these pads in or near the Section XI required examination volume, they preclude ultrasonic examination of a portion of that volume. These pads restrict ultrasonic examination in the 0°, 45°, and 60° beam

angles used at Susquehanna. The unexamined volume associated with these thermocouple pads varies with the beam angle used for the examination and the placement of the pad. The following drawings are used to graphically present these restrictions and to estimate their effect.

- Figure 1a Thermocouple restriction on weld AF 0°
- Figure 1b Thermocouple restriction on weld BN 0°
- Figure 1c Thermocouple restriction on weld CG/FR 0°
- Figure 1d Thermocouple restriction on weld AF 45°, 60°
- Figure 1e Thermocouple restriction on weld CG/FR 45°, 60°

Each beam angle will be addressed in the following discussion. To simplify calculations and keep the estimates of unexamined volume conservative, the sound beam will be depicted as a single ray, measured either from the center of the transducer or from the center of a lucite wedge measured along the exit point.

For the 0° beam angle, it should be noted that beam spread will reduce the estimated volumes of unexamined metal even further.

For the 45° and 60° angles, both lateral angulation of the search unit and beam spread (lateral and vertical) reduce the estimated volume of unexamined metal. When a thermocouple pad causes a shadow effect on the code required volume that cannot be totally eliminated by angulation, no credit will be taken for angulation. Where angulation can totally eliminate the shadow effect, no restriction to the required examination exists. In this case, the thermocouple pad is actually no more than an obstruction to free search unit movement and will be noted to have a 0.0% effect.

RESTRICTIONS TO THE 0° EXAMINATION DUE TO THERMOCOUPLE PADS

As shown in the figures, the unexamined volume near a thermocouple pad appears as a cylinder. The volume of the cylinder is determined by:

1. Plate thickness
2. Thermocouple pad diameter including the attachment we.
3. Transducer diameter including the case

Figure 1a shows a thermocouple pad centered at 5.25" from the weld centerline. This placement occurs on weld AF in 6 locations. As shown in the drawing, only 20% of the total unexamined volume

extends into the required volume. The remainder affects only the base metal examination. The volume of the cylinder is 35.6 in^3 per pad. The unexamined portion of the required volume is 7.1 in^3 per pad. The section XI (weld + $1/2T$) volume of weld AF is $54,414 \text{ in}^3$. The unexamined portion of the required weld metal examination volume = .08%. The required volume for the base metal examination is $107,421 \text{ in}^3$. The unexamined base metal examination volume = .16%. The volume of base metal examination is only for 1 side of the weld because the full examination was performed from one side only.

Figure 1b shows a thermocouple pad centered $7.75''$ from the weld centerline. This placement occurs on weld BN. On weld BN, there is also a pad centered at $11.75''$. Since the effect of both pads is identical, only one is shown on the drawing. Both pads in this case (weld BN) affect only the base metal scan. The volume of unexamined metal from the thermocouple pads on weld BN is 71.2 in^3 . The required base metal examination volume for weld BN is $18,949 \text{ in}^3$. The unexamined portion of the required base metal volume for weld BN = .4%.

A thermocouple restriction exists to the 00 base metal exam for weld DC. Since the effect is similar to weld BN, no illustration is given. The unexamined volume for weld DC is 64 in^3 . The required volume is $16,108 \text{ in}^3$. The unexamined volume is .4% of the requirement.

Figure 1c shows a thermocouple pad centered at $1''$ from the centerline of weld CG. Because of this placement, the pad affects both weld CG and weld FR. This placement occurs in 6 locations around weld CG. The volume of unexamined metal for weld CG is 6 in^3 . The required examination volume for weld CG is $10,335 \text{ in}^3$. The unexamined volume is .06% of the requirement. The volume of unexamined metal for weld FR is 130 in^3 . The examination volume for weld FR is $18,921 \text{ in}^3$. The unexamined volume is .6% of the total volume.

RESTRICTIONS TO ANGLE BEAM EXAMINATIONS DUE TO THERMOCOUPLE PADS

Figure 1d shows the restriction to angle beam examination on weld AF. The unexamined volume = 3.7 in^3 . The required volume for weld AF is $54,414 \text{ in}^3$. The unexamined portion is .04% of the requirement.

There is a thermocouple restriction listed for weld BN. Due the pad's placement $7.75''$ from the weld, there is no restriction to angle beam examination of weld BN. The effect is 0.0%.

There is a thermocouple restriction listed for weld DC. Due to pad placement, there is no restriction to the angle beam examination of weld DC. The effect is 0.0%.

Figure 1c shows the restriction to angle beam examination of welds CG and FR. The volume of unexamined metal for weld CG is 12 in^3 . The required examination volume for weld CG is $10,335 \text{ in}^3$. The unexamined volume is .1% of the required volume. The volume of unexamined metal for weld FR is 75 in^3 . The examination volume for weld FR is $18,921 \text{ in}^3$. The unexamined volume is .4% of the total volume.

CURVATURE RESTRICTION AT SKIRT KNUCKLE WELDS CG/FR.

In the performance of the pre-service examinations on Susquehanna units 1 and 2, the welds CG and FR were examined together. For clarity in the evaluation of examination restrictions the following should be noted:

1. Weld CG is the ASME Section XI category BH weld
2. Weld FR is an ASME Section III NF. Integral attachment to the pressure boundary and as such is not within the examination scope of Section XI.
3. To evaluate the restrictions properly, the examination volumes will be calculated separately.

Weld CG was fully examined in accordance with the rules of ASME Section XI. No restriction due to curvature was noted on weld CG. Weld FR had restrictions to the ultrasonic examinations in the 0° , 45° , 60° beam angles.

The 0° examination of weld FR was restricted in a volume as shown in Figure 2d. This volume is 6837 in^3 . The unexamined volume is 36.1% of the total $18,921 \text{ in}^3$ for this weld.

45°

The 45° examination of weld FR was restricted in a volume as shown in figure 2e. This volume is 8427 in^3 . The unexamined volume is 44.5% of the total $18,921 \text{ in}^3$ for this weld.

60°

The 60° examination of weld FR was restricted in a volume as shown in Figure 2f. This volume is 8137 in³. The unexamined volume is 43.0% of the total 18,921 in³ for this weld.

On welds DA, DB, DC, DD, DE, and DF, a 9.9" long area of each weld is shadowed by the FR weld buildup. This shadow affects the ultrasonic examination of each weld in the 0° base metal, 0° weld metal, 45°, and 60° beam angles.

To simplify calculation of the affected volumes, yet remain conservative, the sound beam was treated as a single ray. Beam spread, if used, will reduce rather than increase the affected volumes.

Credit was taken for lateral angulation of the search unit where used since it resulted in a significant increase to the examined volume.

There is an overlap of examination volumes for FR and DA through DF welds. Credit was taken for the overlapping volumes where applicable.

0°

The 0° base metal examination of a volume 9.9" long x 32.5 wide x 6.5" thick is shadowed on each weld (DA through DF). This volume is 2091 in³. There is an overlapping volume of 167 in³ from the FR examination, leaving an unexamined volume of 1924 in³ per weld. The unexamined volume is equal to 11.9% of the required 16,108 in³ per weld.

The 0° weld metal examination Figure 2a of a volume 9.9" long x 9.2" wide x 6.5" thick is shadowed on each weld (DA through DF). This volume is 592 in³. There is an overlapping volume of 47 in³ from the FR examination leaving an unexamined volume of 545 in³ per weld. The unexamined volume is equal to 11.9% of the required 4560 in³ per weld.

45°

The 45° examination of the volume shown in Figure 2b is shadowed. This volume is 278 in³. There is an overlapping volume of 121

in³ from the FR examination leaving an unexamined volume of 156 in³ per weld. The unexamined volume is 3.4% of the required 4560 in³ per weld.

60°

The 60° examination of a volume as shown in Figure 2c is shadowed. This volume is 159 in³. There is an overlapping volume of 85 in³ from the FR examination leaving an unexamined volume of 74 in³ per weld. The unexamined volume is 1.6% of the required 4560 in³ per weld.

Figure 2d shows a composite of the examinations of the shadowed portion of welds DA through DF. The total volume missed by all examination angles is 53 in³. This is equal to 1.2% of the total examination volume per weld.

In an effort to increase the coverage of the unexamined volume and the partially examined volumes, the following analysis was used:

1. No increase to the 0° examination volume was possible due to the curvature at the FR to bottom head junction. This curvature caused loss of transducer contact. On Unit #1, smaller transducers were tried but were unable to generate sufficient output as noted in G.E. Lockyer's summary report on loss of contact.
2. All beam angles in the range of shear waves, 35° to 68°, were considered. Angles below 45° were eliminated since the examination coverage would be reduced. The beam angles from 60° to 68° were analyzed. These angles would allow only a very small increase in the size of the partially examined volume and no increase in the size of the completely examined volume. No angles above 68° were considered because of the surface wave generation phenomena described by Krautkramer and Schlenger mann.
3. All pertinent vessel manufacturer's drawings were presented to K. B. Aerotech, who acted as a consultant. Utilizing the drawings, Aerotech suggested angles in the 40° - 45° and 55° - 60° range as being appropriate for the examination. It was noted

during the discussion that very little gain in examined volume was possible, within Section XI parameters, by an angle change.

4. The possibility of examination from the vessel I.D. was eliminated because of double refraction and scattering of the sound beam due to the cladding.

RESTRICTION TO EXAMINATION DUE TO CRD PENETRATIONS

There are 15 CRD penetrations bored through the centerline of welds DG and DH. By angulation of the search units, the required volume for each weld was examined within the parameters of Section XI.

The limited scan noted on the data sheets was to point out that due to these penetrations, the transverse scan of the welds was limited to one direction near the holes.

Wade F. Miller
ASNT LEVEL III

REPORT #1

5.25"

CENTER OF 1" TRANSDUCER A.

THERMOCOUPLE
PAD

2.5"

CENTER OF 1" TRANSDUCER B.

EDGE OF EXAM VOLUME

UNEXAMINED VOLUME

4.5m

4.7

4.7



2 OF 2
K
N
EX OF
DUCER

REPORT #1

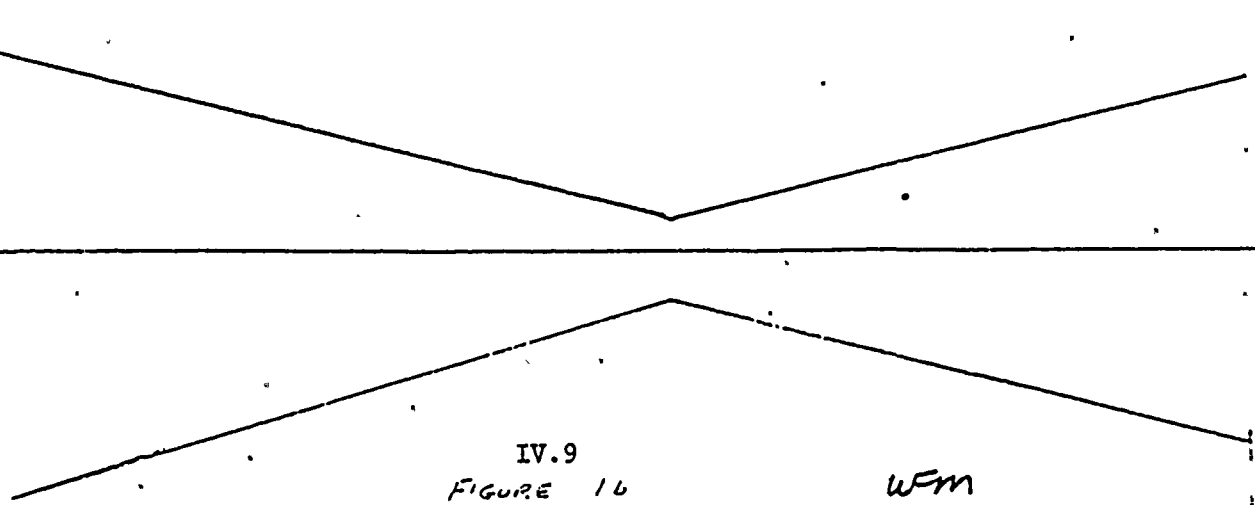
UNEXAMINED VOLUME

2.5"

EDGE OF EXAM. VOLUME

5.1"

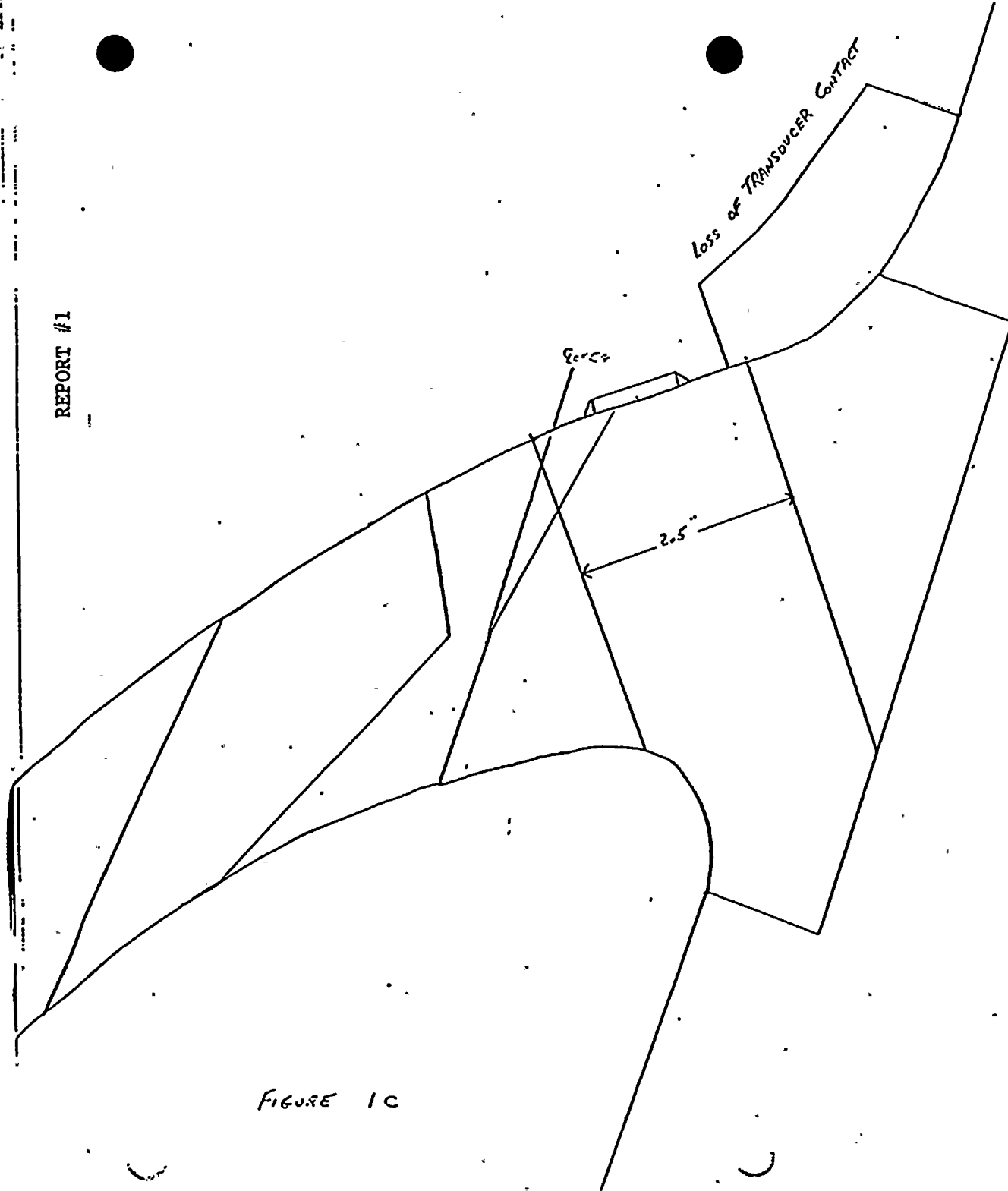
FIGURE



IV.9
FIGURE 16

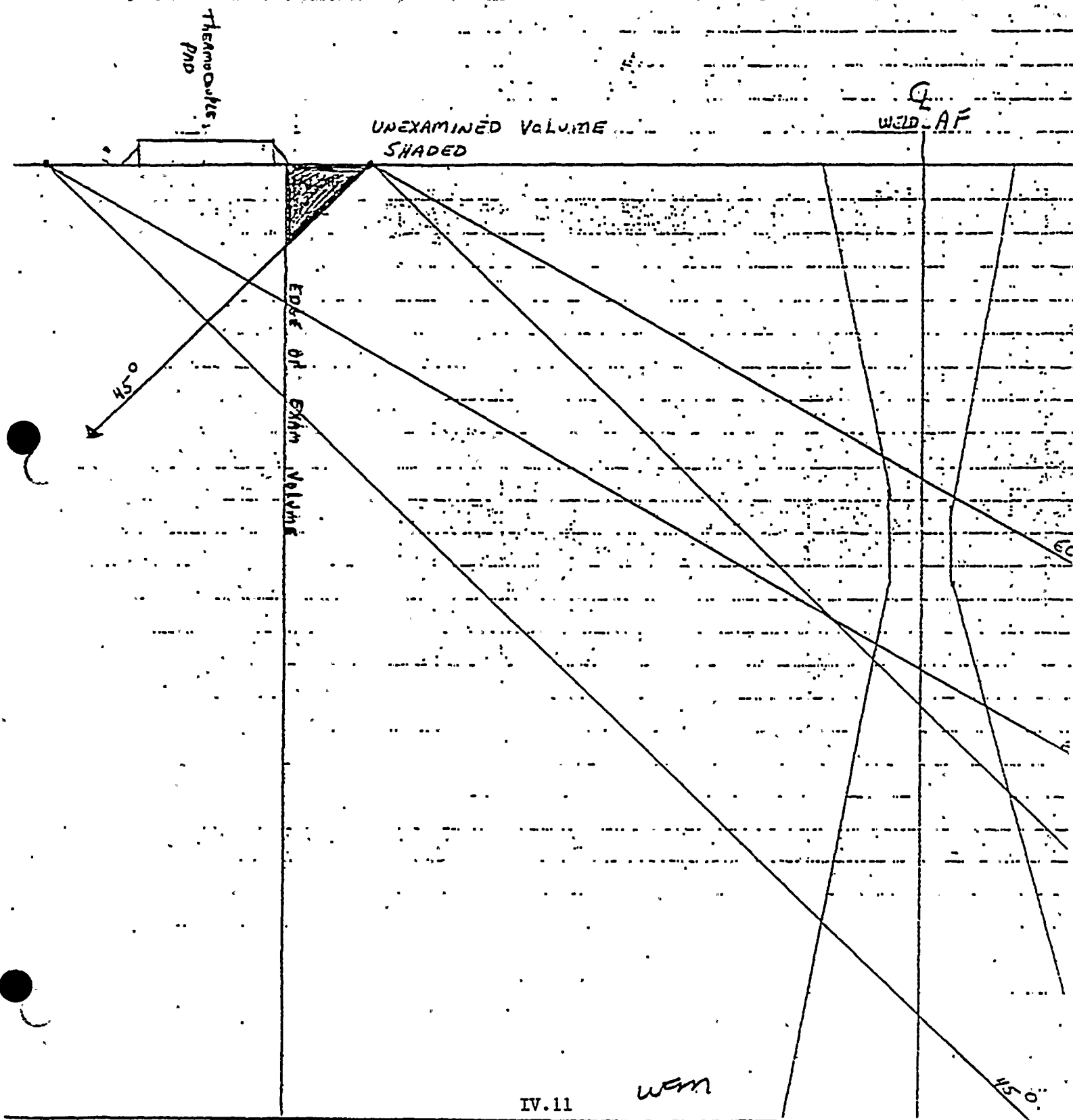
WFM

REPORT #1



Loss of Transducer Contact

FIGURE 1C



IV.11

WFM

FIGURE 12

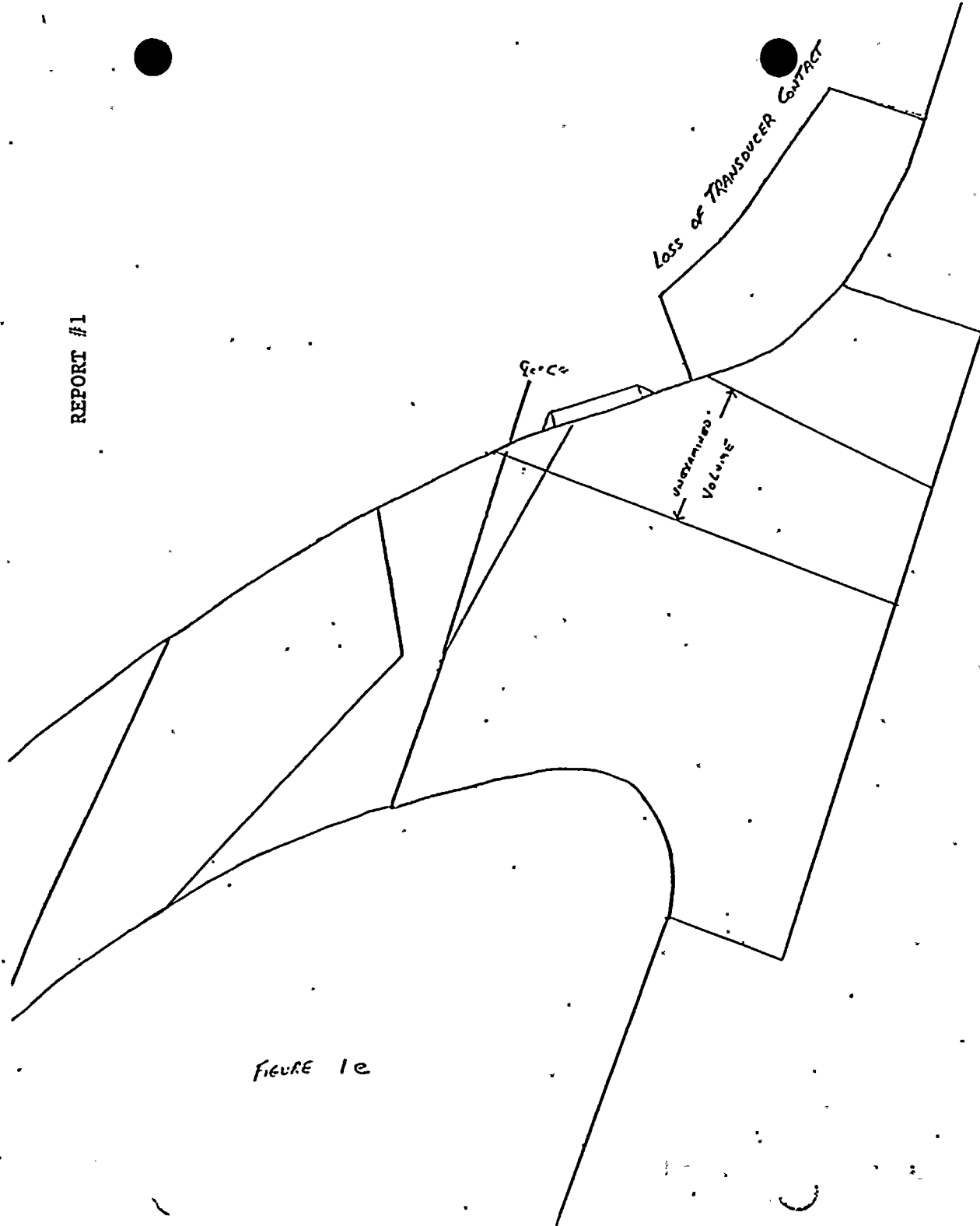
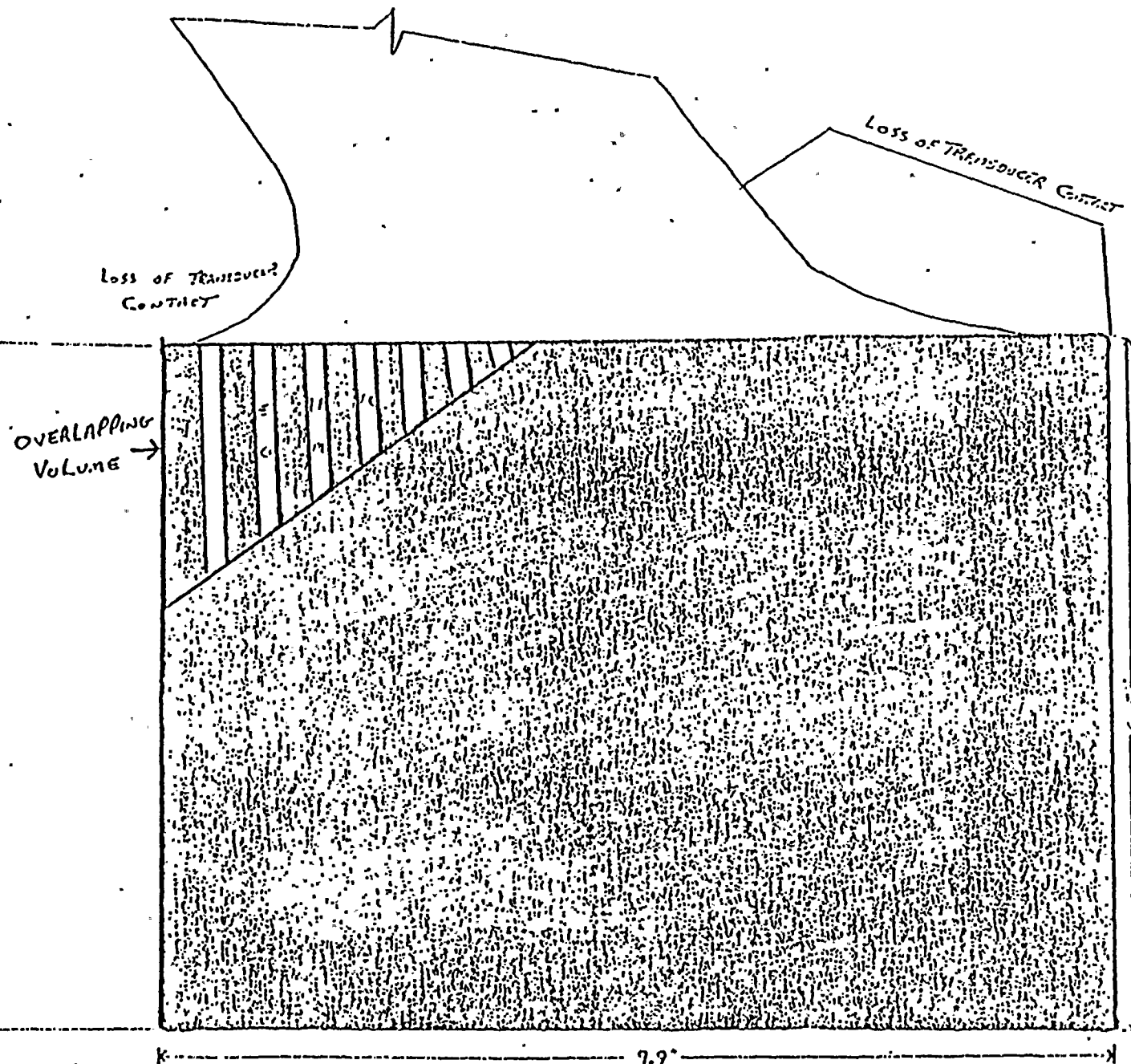


FIGURE 1e



WFM

IV.13

UNEXAMINED VOLUME
IS SHADED.
OVERLAPPING VOLUME
AS SHOWN.

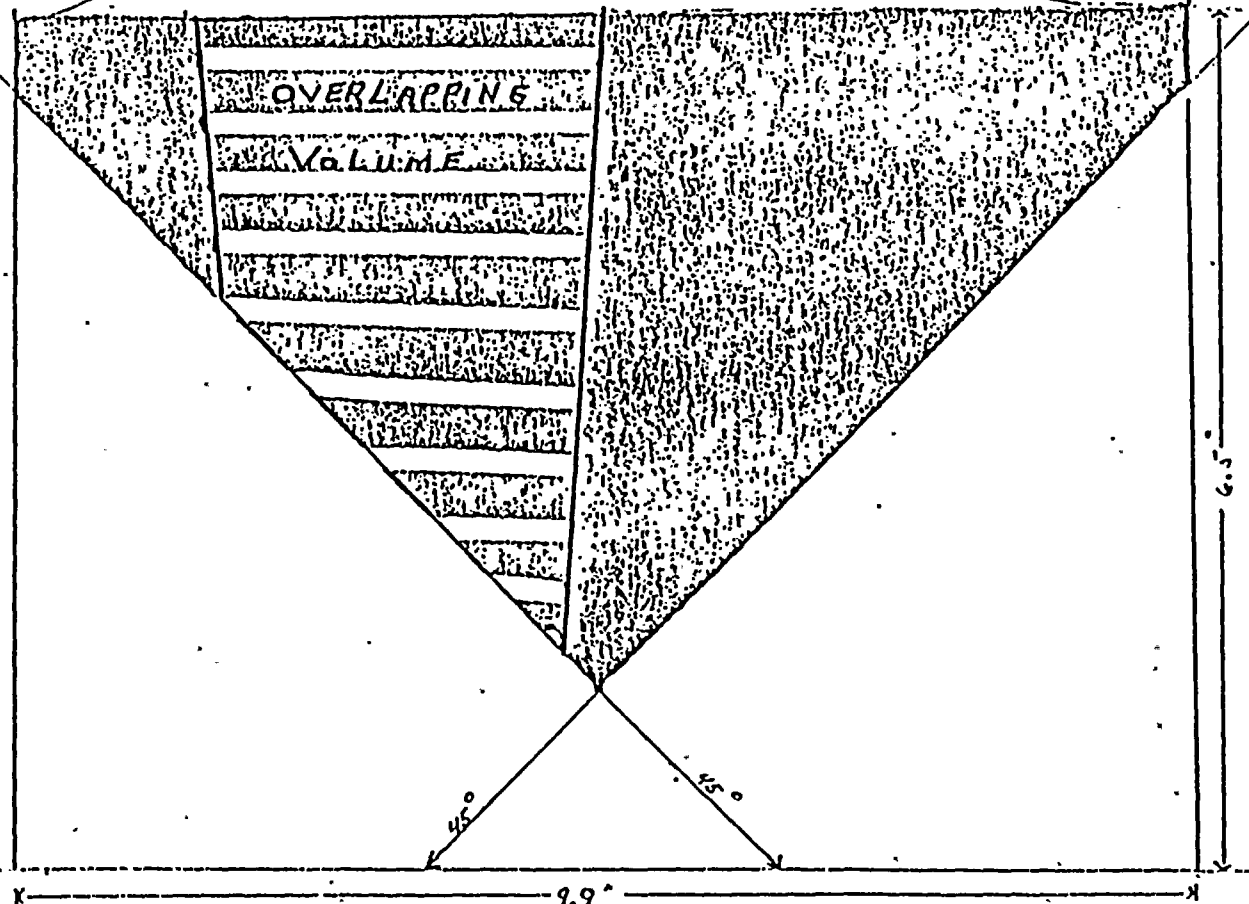
FIGURE 2 a

REPORT #1

Loss of Transverse
Contact

Loss of Transverse Contact

WFM



45°
UNEXAMINED VOLUME
IS SHADED.
OVERLAPPING VOLUME
AS SHOWN.

IV.14

FIGURE 2b.

REPORT #1

60°

UNEQUINED VOLUME
IS SHADED

OVERLAPPING VOLUME
AS SHOWN.

Loss of Transducer
Contact

Loss of Transducer
Contact

WFM

IV.15

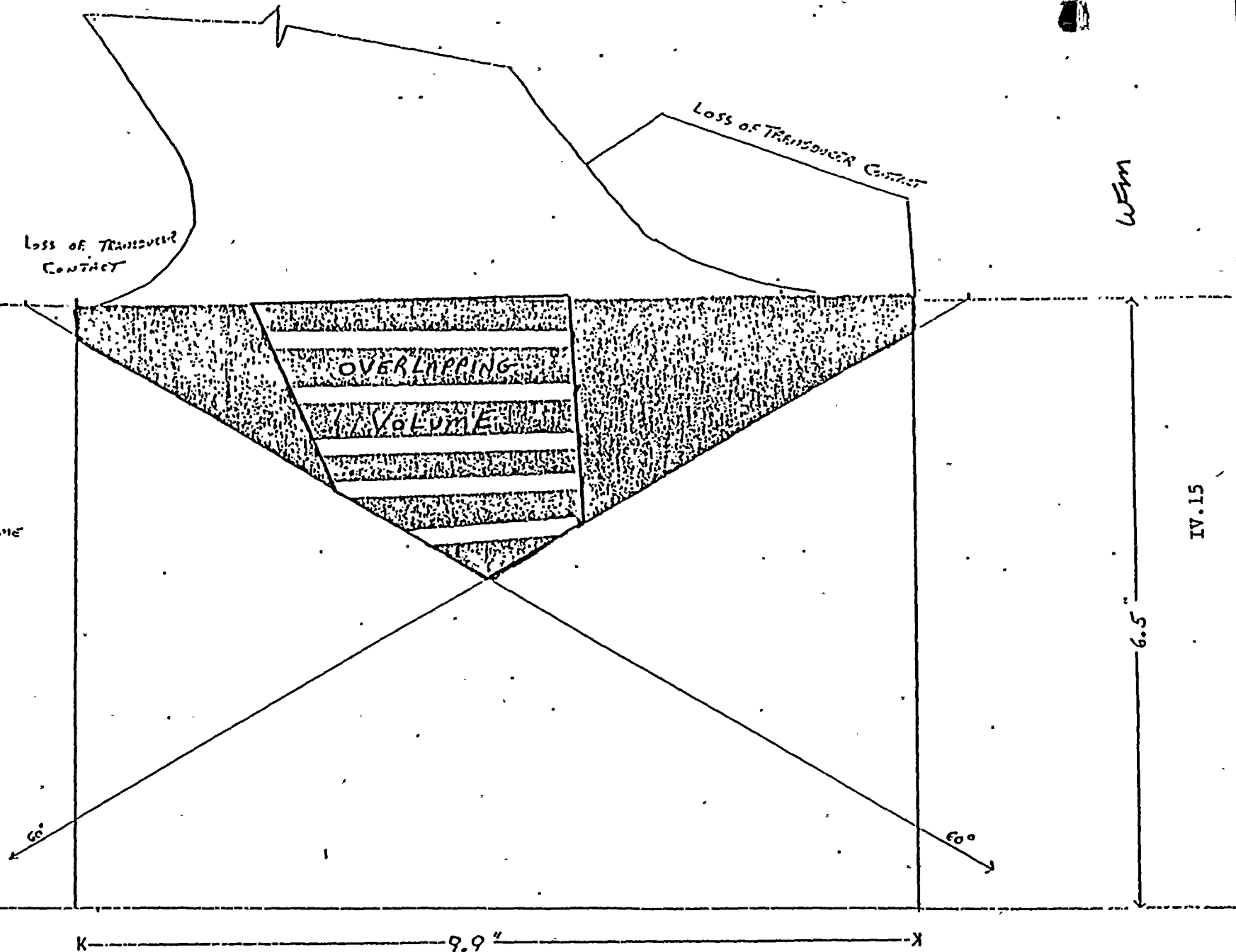
6.5"

K

9.9"

X

FIGURE 2.c



FR

Wm

IV. 16

45° & 60°

 $45^\circ \pm 60^\circ$

NO
EXAMINATION

60° only

45° & 60°

60°
only

5159

9.9 〃

FIGURE 2d.

SUMMARY REPORT: RPV Unit #1, Tophead Nozzle Welds N6A and N6B - Resolution of Spurious UT Indications

REFERENCE: Pennsylvania Power and Light Company
Susquehanna Steam Electric Station
Contract No. 8856-M-166
RPV Pre-Service UT Examination

I. INTRODUCTION

In order to document the ideas, discussion and action taken throughout the analysis of the "spurious" indications detected in the subject nozzles, this report is presented in full detail at the request of Pennsylvania Power and Light Company.

II. DISCUSSION

On December 10, 1976, a routine UT examination on the subject nozzles using a 60° angle beam was conducted by S. Metta, UT Level II, and R. Hooper, UT Level I, using a Sonic MKI (Serial No. 732203) and accessory equipment as specified and controlled by UT procedure No. ISE-QA1-325, Rev. 2. Indications were detected of varying magnitude (25% DAC to as high as 5 dB above 100% DAC), ranging in apparent depth from approximately 1.5 inches to 3.0 inches (maximum magnitudes at 2.0 inches to 2.5 inches). Depths varied depending on transducer position on the surface of the head, which ranged from 4.5 to 8.0 inches from the center-line of the weld.

Figure 1 shows a plan view of the outside top head assembly, as well as an enlarged view of the surface scan pattern (typical of both nozzles) where the indications were detected. Figure 2 is a section through a nozzle along the 0°/180° reference line, and shows a typical transducer position for a 100 + % DAC indication at an apparent depth of 2.5 inches. This indication could be finger dampened on the inside surface of the head which was nominally 3.5 inches in depth or thickness.

Note: It is important to mention that procedure ISE-QA1-325, Rev. 2, required calibration of the UT inspection system in "depth", rather than "metal path".

The obvious question is . . . how does one finger dampen an indication at an apparent depth of 2.5 inches on a surface which is equivalent to 3.5 inches in depth from the scanning surface. This question lead to the initial analysis involving mode conversion, which later proved to be incorrect.

A. Initial Analysis

It is well-known, and recognized in the code, that mode conversion using 60° angle beam is often a problem, particularly with reflectors oriented perpendicular to an opposite reflecting surface which is parallel to the scanning surface. In order to illustrate this point, consider the case of oblique incidence of a shear wave at a free surface; i.e., a surface bounded by air. The direction of the reflected shear and longitudinal waves is given in terms of the incident wave by Snell's law:

$$\frac{\sin \phi}{V_S} = \frac{\sin \theta}{V_L}$$

where ϕ = incident S-wave angle

θ = reflected L-wave angle

V_S = S-wave velocity in the medium

V_L = L-wave velocity in the medium

As illustrated in Figure 3, the angle of the reflected S-wave equals the incident S-wave up to the critical angle which is shown to be around 30° in the graph of Figure 3. The significance of this illustration is that at an incident S-wave angle approaching 30° most of the energy is converted and reflected as an L-wave; the equations defining the relative amplitudes of the respective waves are complex and do not serve our purpose. Beyond the "critical"

angle the L-wave disappears and all the energy reflected is in the form of an S-wave again.

This phenomenon has practical implications as it relates to the 2% milled notch in an ASME Section XI calibration block. In order to amplify this point, consider the enlarged sketch of such a notch, and the incident S-wave at 60° shown in Figure 4. As depicted, after reflection from the opposite surface of the block, the energy is incident at the face of the notch at 30° , which is the angle for conversion of the S-wave to predominantly L-wave energy. We have indicated a single ray in our illustration. The reflection of a beam of sound containing a discrete range of angles near 30° produces an indication from the notch of relatively small magnitude; most of the energy being converted into an L-wave and lost to the system.

Referring again to Figure 2, the initial analysis was that an S-wave traveling to the bottom surface of the head would arrive at a time corresponding to one-half the 3.5 inch depth or about 1.7 inches. Reflection from a reflector oriented favorably (near 90°) to the surface could produce mode conversion as described above. The L-wave traveling back to the surface would require a time equivalent to about 0.8 inches, since the L-wave travels at approximately twice the velocity of the S-wave. The total time equivalent would then be 2.5 inches; 1.7 inches down as an S-wave and 0.8 inches back as an L-wave.

At this point, original final acceptance radiographs of these welds were obtained for review. These radiographs were of excellent quality, and showed no indications of reflectors in the areas in

question. Further, attempts to verify the above occurrence were unsuccessful, both graphically and analytically. Hindsight into the situation indicated that the initial analysis was, after all, rather weak.

In order to resolve the problem, other equipment was used to investigate the phenomenon. The use of a Branson 303 on one occasion, and a Branson 301 on another failed to produce the indications, which could still be reproduced with the original Sonic equipment. It was obvious at this point that the phenomenon was equipment related. Collaboration with R. Holt, NED Level III, led to the following analysis regarding equipment pulse repetition rate.

B. Pulse Repetition Rate Analysis

Before beginning this analysis, it should be stated that the intent here is to be descriptive rather than rigorous. At the same time, the evidence presented will substantiate the final conclusion as to the cause of the spurious indications.

It is well-known, but little observed as a practical problem, that pulse repetition rates for certain sweep ranges can be critical in some UT applications. In UT pulse-echo equipment, sweep length or range control and pulse repetition are integrated so as to automatically provide uniform sweep trace brilliance with changes in range or sweep length. Moreover, some equipment provides for ranges of pulse repetition by way of a separate rep rate selector switch. Each rep rate range, in turn, is integrated with sweep length to provide variable pulse repetition with changes in sweep length.

With this in mind, the original Sonic equipment was calibrated using a different sweep range setting; i.e., a zero to 10 inch range instead of a zero to 5 inch range. The indications previously reported disappeared. The original calibration was repeated, and the indications returned. While the indications were visible on the screen the repetition rate selector switch was changed from the 3000 range to the 1000 range; again the indications disappeared. With the equipment set up in this manner, the sweep was delayed to the left to reveal an indication from a geometric reflector at a metal path of approximately 27 inches.

The "spurious" indications originally recorded at a depth of 1.5 to 3.0 inches were, in fact, caused by geometric reflection within the nozzle at a distance far beyond the range of interest. The magnitude and depth varied with changes in transducer position but all were confirmed to have resulted from part geometry rather than flaws. The high rep rate at the 3000 range created what are referred to as a "wrap around" indications whose apparent depths were within the calibrated range of interest. The following discussion summarizes the essential aspects of a presentation made by the writer to personnel from PP&L, their Authorized Inspectors, and G.E. I&SE.

Illustrated in Figure 5 is a square wave superimposed and in sync with a saw tooth voltage. The saw tooth causes the CRT sweep from left-to-right; a low and a high rep rate are compared. The square wave provides sweep brilliance from left-to-right and darkness on the return. Immediately below these voltage representations is the CRT presentation of the back surface reflection from the block shown at the left. This "picture" is repeated at a frequency

corresponding to the pulse repetition. At a rep rate of 1000 per second, for example, the "picture" repeats 1000 times per second, providing persistency of vision on the CRT. During the "dark" time between pulses, the sound reverberates back and forth in the block (illustrated by the dotted multiple order indications of the back surface), finally dying out before the next repetition as shown for the low rep rate illustration. However, as shown in the lower portion of the figure, if the rep rate is too high the multiples of the back surface may not have completely died out before the next pulse is repeated. This results in superimposing the next "picture" over a distant multiple order of the back surface as illustrated.

Figure 6 shows the reflection from the nozzle geometry which led to the problem. A calibration in metal path was made as illustrated in order to verify the overall distance to the reflector; total metal path to the reflector was determined to be 27.2 inches. The sound path to the reflector could be verified by damping the indication at reflection points on both the inside and the outside of the nozzle. Careful graphical analysis confirmed these results. Comparison of the effect of low and high rep rates is shown at the bottom of Figure 6 for this situation.

III. CONCLUSION

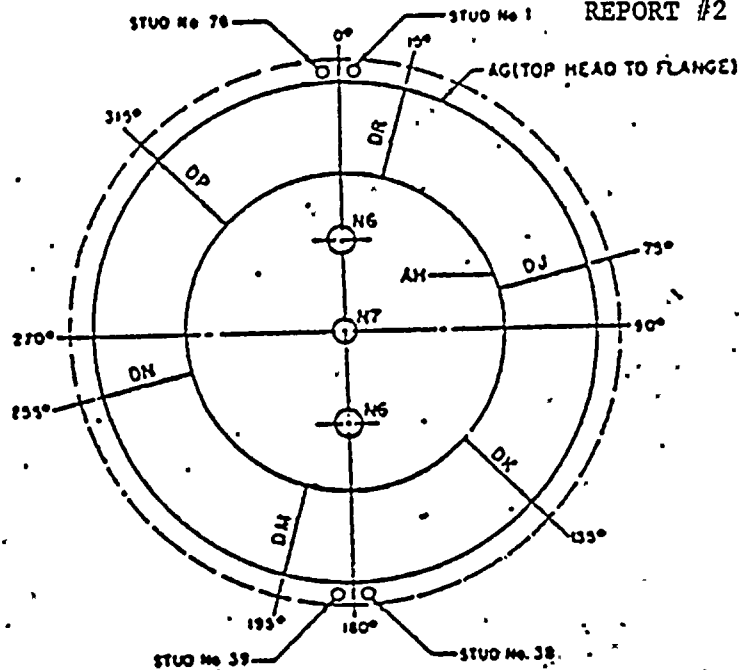
Having proved the origin of the "spurious" indication to the satisfaction of the customer and their Authorized Inspectors, it was decided to perform a complete 60° angle beam reinspection of the N6 nozzles at an instrument rep rate of 1000. This inspection, which revealed no recordable indications, is a part of the permanent record.

George Lockyer 4/1/77
G. E. Lockyer, Level III
Manager, NDT Product Service
Building 6 - Room 227

IV.22



REPORT #2



PLAN VIEW
(OUTSIDE - TOP HEAD ASSEMBLY)

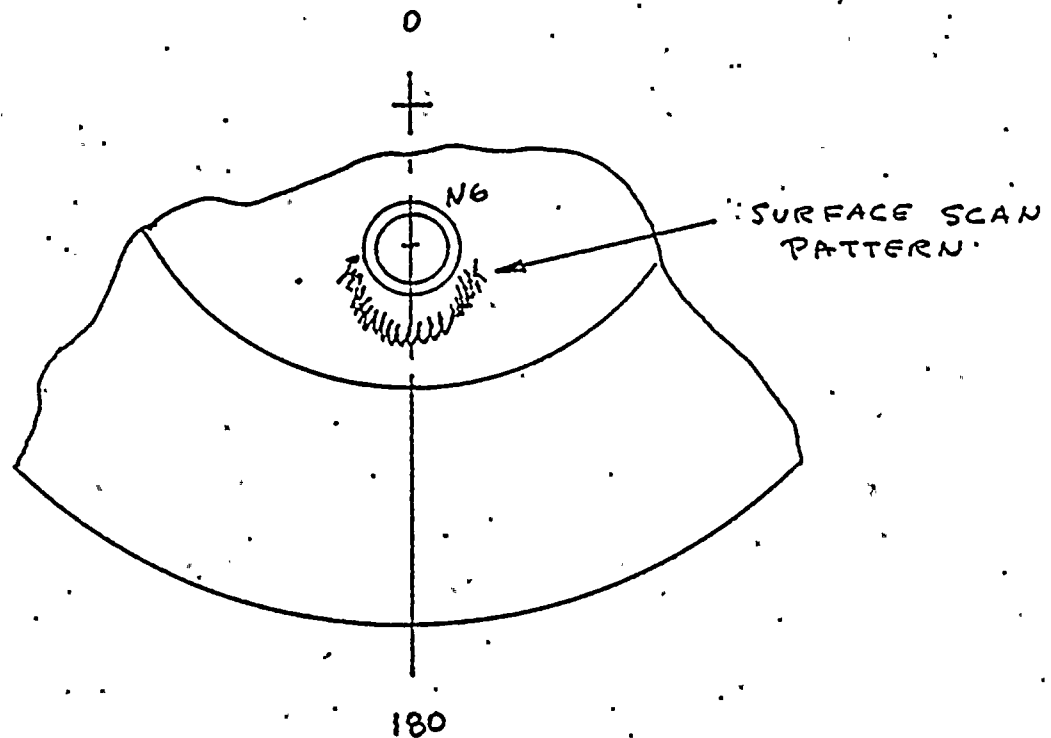
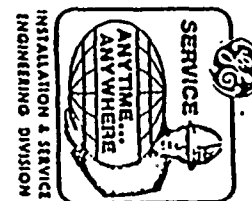


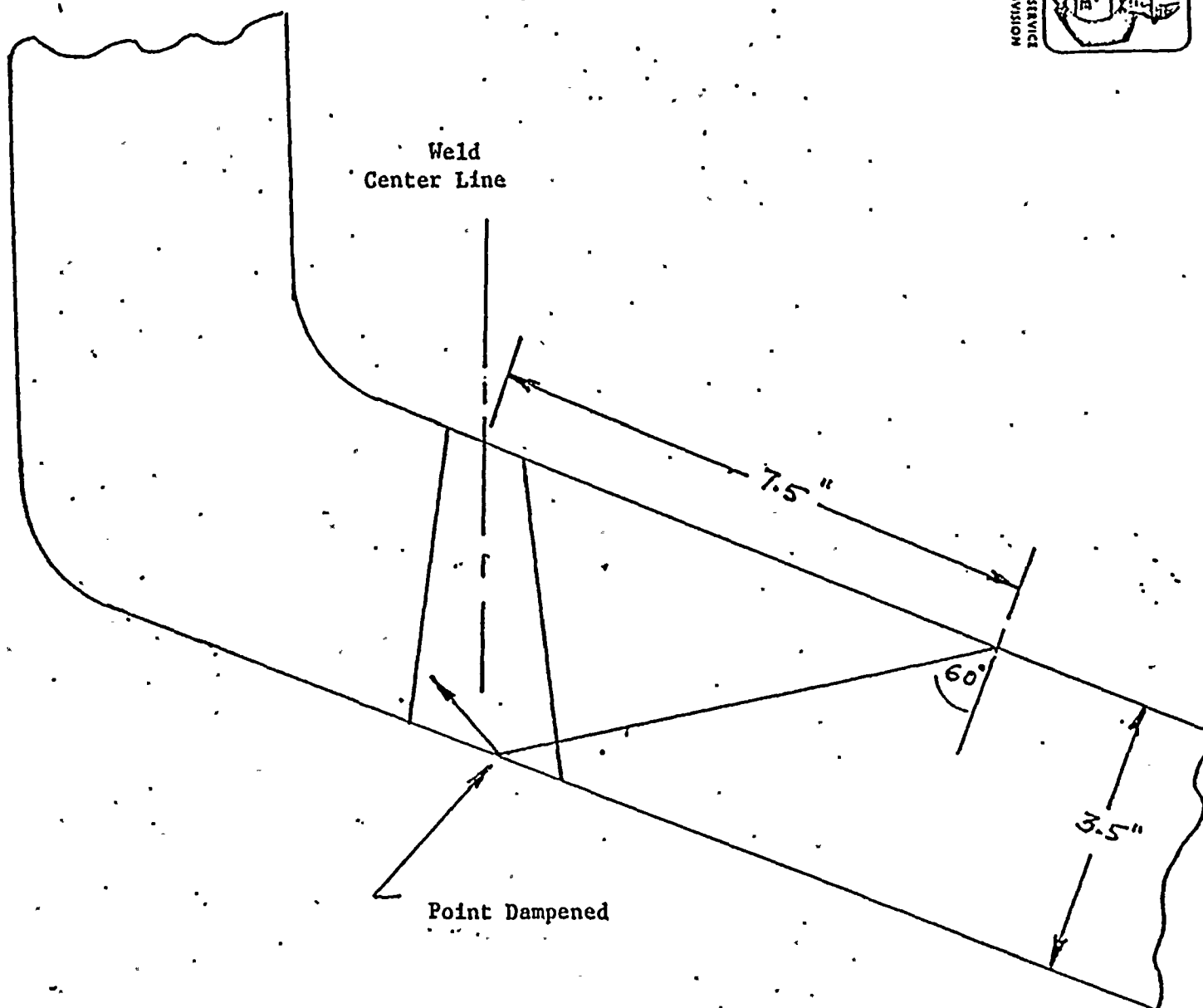
Figure 1. Plan view of top head and transducer scan pattern on typical N6 nozzle.

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N6

IV.24



REPORT #2

Figure 2. Section through N6 nozzle at 0°/180°, showing typical indication at apparent 2.5" depth.

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Interface

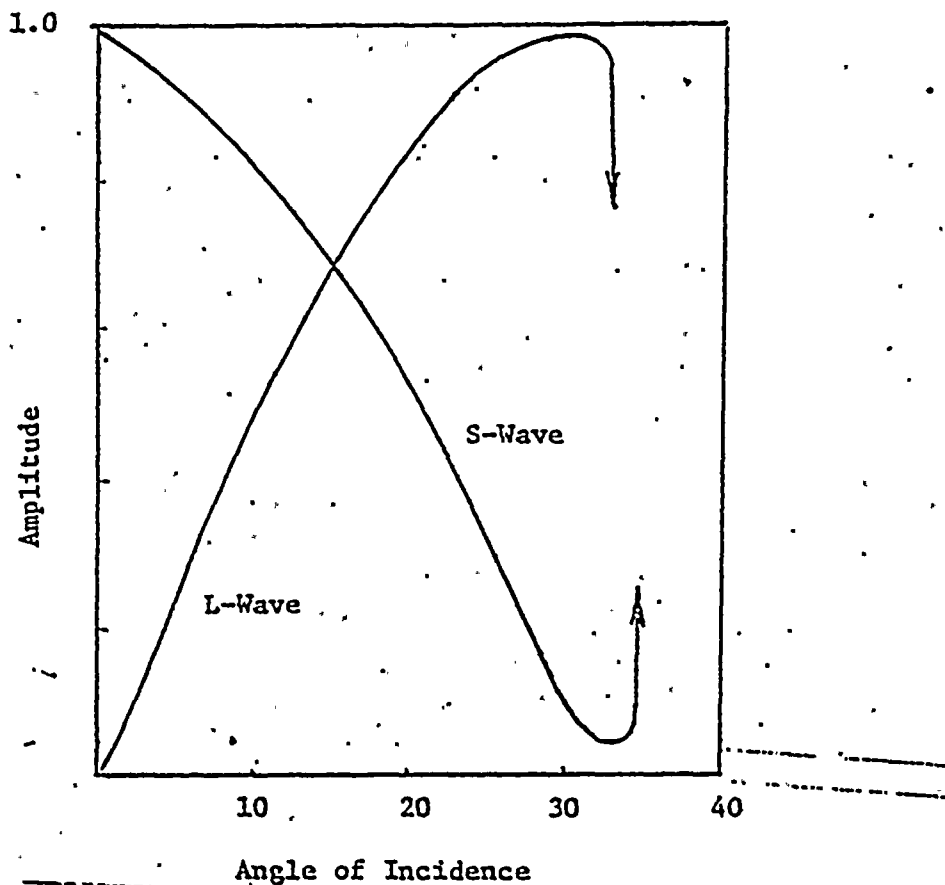
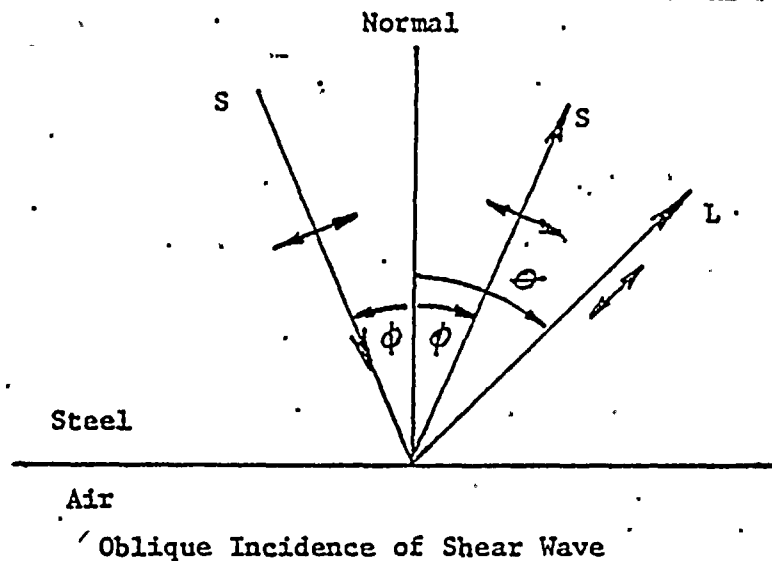


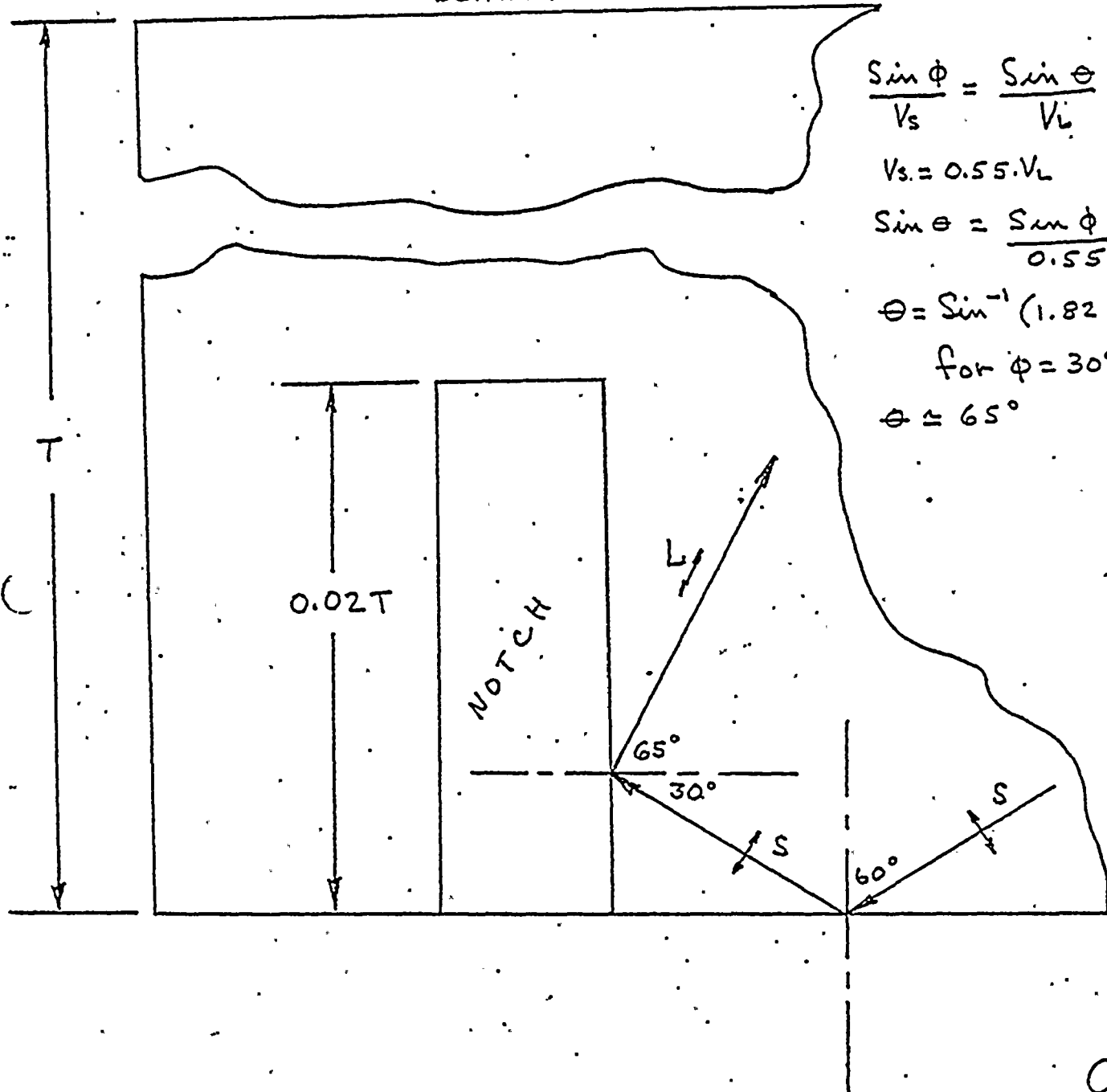
Figure 3. Amplitudes of reflected components generated at a free surface by an incident shear wave in steel.

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REPORT #2

SCANNING SURFACE



$$\frac{\sin \phi}{V_s} = \frac{\sin \theta}{V_L}$$

$$V_s = 0.55 V_L$$

$$\sin \theta = \frac{\sin \phi}{0.55}$$

$$\theta = \sin^{-1}(1.82 \sin \phi)$$

$$\text{for } \phi = 30^\circ$$

$$\theta \approx 65^\circ$$

qel
4/1/77

Figure 4. Enlarge view of 2X notch in ASME Section XI calibration block.

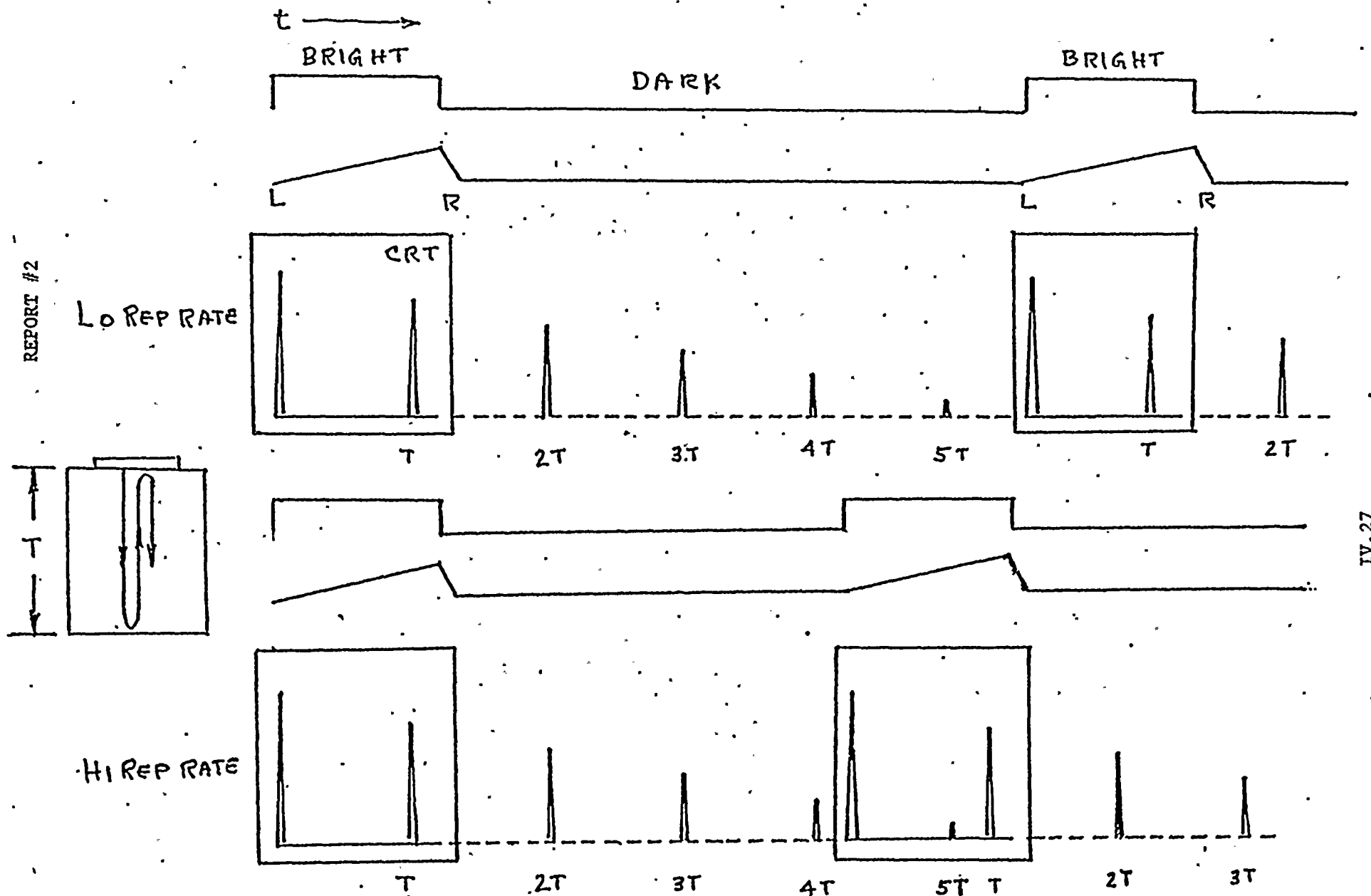
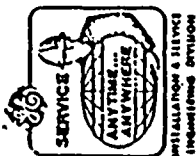


Figure 5. Square and saw tooth voltages, and CRT presentation of block reflections for a low and a high pulse repetition rate.

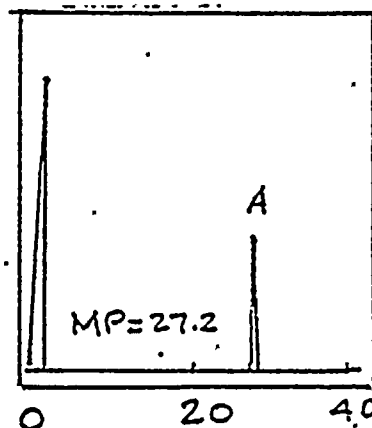
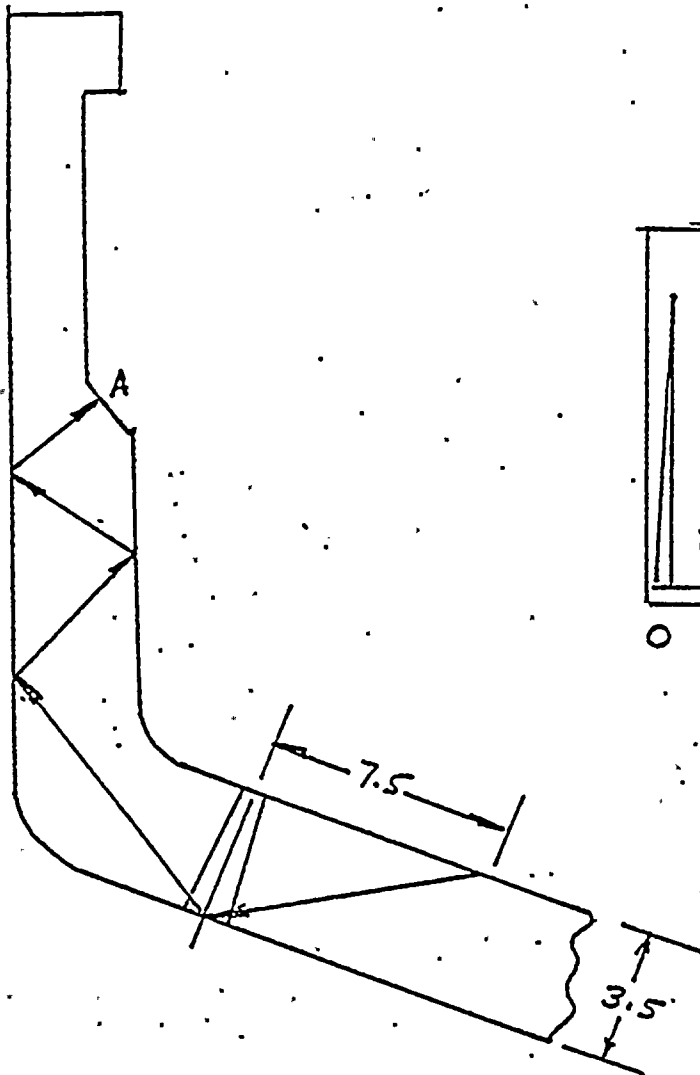


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4/1/77

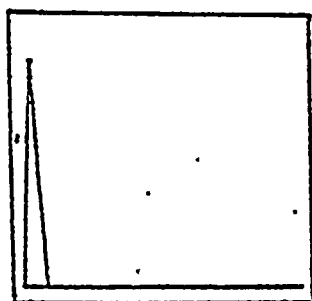


REPORT #2

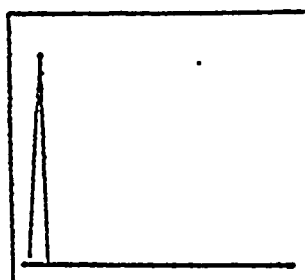
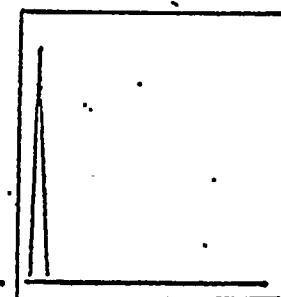
Open
4/1/77



SONIC
REP RATE 1000
40" SCREEN RANGE



SONIC REP RATE 1000
BRANSON 301
BRANSON 303



SONIC REP RATE 3000

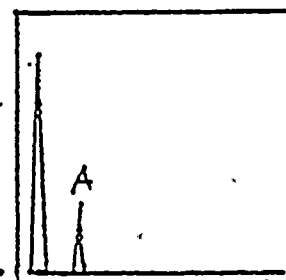


Figure 6. Illustration of geometric reflector in N6 nozzle, and comparison of low and high pulse repetition rate.

SUBJECT: Summary Report - Geometric UT
Reflections in N3, N4, N5 Nozzles
Using 60° Angle Beam, and in CG "Knuckle" Weld Using 45° Angle Beam

REFERENCE: Pennsylvania Power and Light Co.
Susquehanna Steam Electric Station
Contract Number 8856-M-166
RPV Pre-Service Examination

In ultrasonic weld testing, indications from component configuration can be analyzed by pure geometric reflection concepts. While mode conversion at oblique incidence exists to a significant extent in these UT applications, the associated changes which take place in velocity and direction generally eliminate mode conversion as a consideration where reflections from component geometry are concerned. Therefore, the analysis of the geometric reflections in the subject welds follows the basic incidence/reflection laws of optics.

To illustrate the concepts involved consider Figure 1, wherein a typical nozzle geometry and related weld location, as well as transducer position and sound beam are illustrated. As shown, normal (perpendicular) geometric reflection from the inner radius of the nozzle occurs for only those rays which pass through the geometric center of the nozzle radius. Of course, the greatest geometric reflection illustrated is associated with that transducer position (A) which directs the most intense portion of the beam (central ray) through the geometric center of the radius, at which point it returns directly back along the central ray to the transducer. However, it is particularly significant to note that in this position the beam is no longer interrogating the material volume of interest for this scan direction. Within the scanning zone of interest, it is the less intense rays toward the edge of the beam which produce the geometric incidence/reflection causing the indications from the nozzle radius as shown for transducer positions B and C.

In order to verify the subject weld geometry reflections by graphical means, it was necessary to calibrate the UT system in "metal path" rather than in "depth" as required by the applicable procedure. Calibration in metal path provides a graphical double check on the validity of transducer position, beam angle and sound distance traveled in relation to component geometry. Accordingly, Figures 2, 3 and 4 show typical graphical presentations which verify the geometric reflections reported for the N3, N4 and N5 nozzles respectively.

The geometric reflection from the inside curvature of the CG weld using 45° angle beam is shown in Figure 5. As illustrated, the maximum indication from this inside surface occurs at that point where the transducer is in a position to provide pure geometric reflection from some portion of the beam.

The information above is presented to serve as a "base-line" against which geometric reflections detected in these welds during subsequent UT inspections can be compared. Obviously, variations in magnitude of indication, as well as metal path distances, will occur with varying transducer position and beam angle and should be considered in future comparisons.

George Lockyer 4/1/77
G.E. Lockyer, Level III
Manager, NDT Product Service
Building 6 - Room 227

GEL:KEF

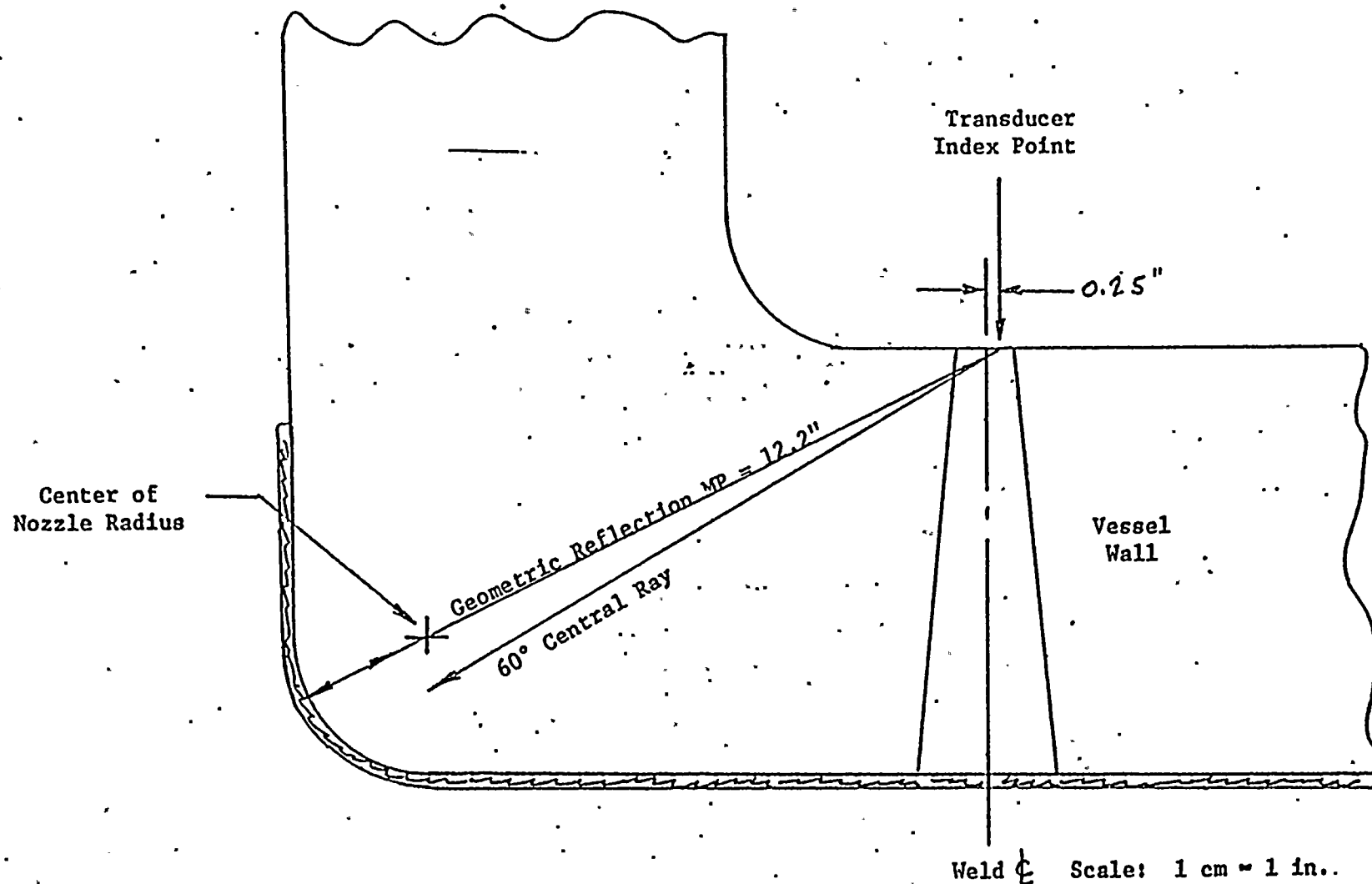
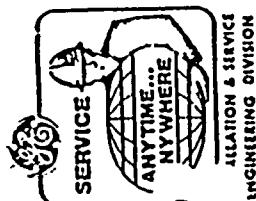


Figure 4. Typical geometric reflection from radius of N5 nozzle; MP = 12.2" determined by UT measurement agrees well with graphical determination.



Apr 3/1/77

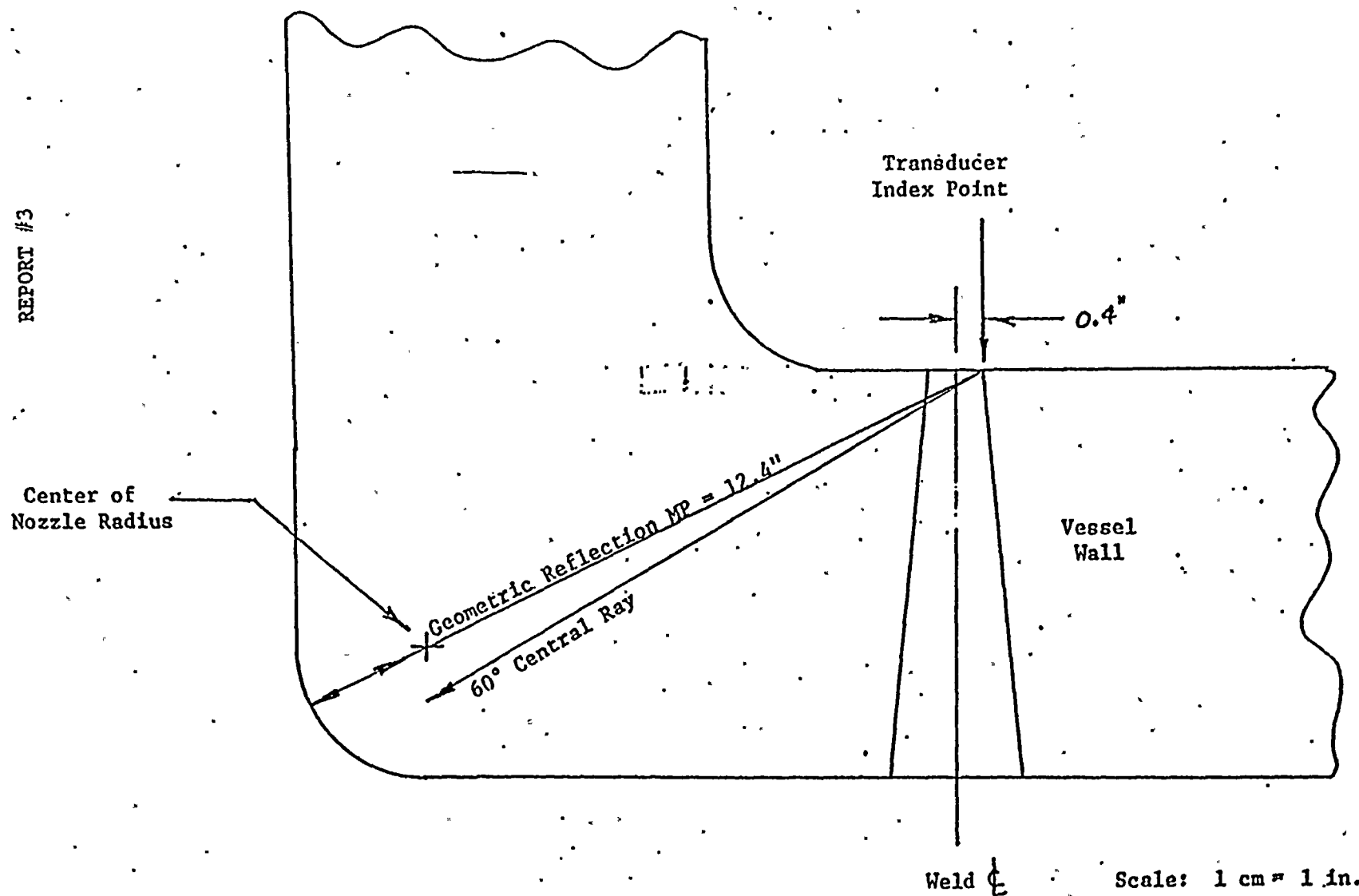
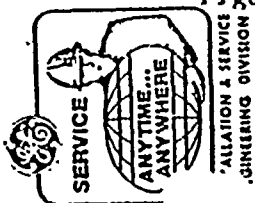


Figure 3. Typical geometric reflection from radius of N4 nozzle; MP = 12.4" determined by UT measurement agrees well with graphical determination.



C. J. L.

CENTER OF
NOZZLE RADIUS

TRANSDUCER
POSITIONS

A

B

C

60° MPA
60° CENTRAL RAY

MP_a

MP_c

60° RAY

60° RAY

VESSEL
WALL

C
B
A

WELD

IV.33

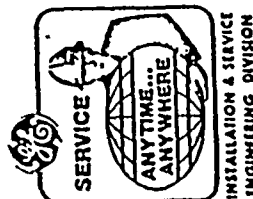


Figure 1. Geometric reflections and related sound metal paths for various transducer positions in a typical nozzle.

OK
4/1/77

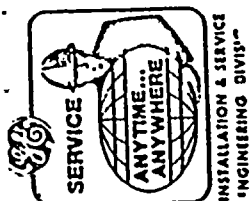
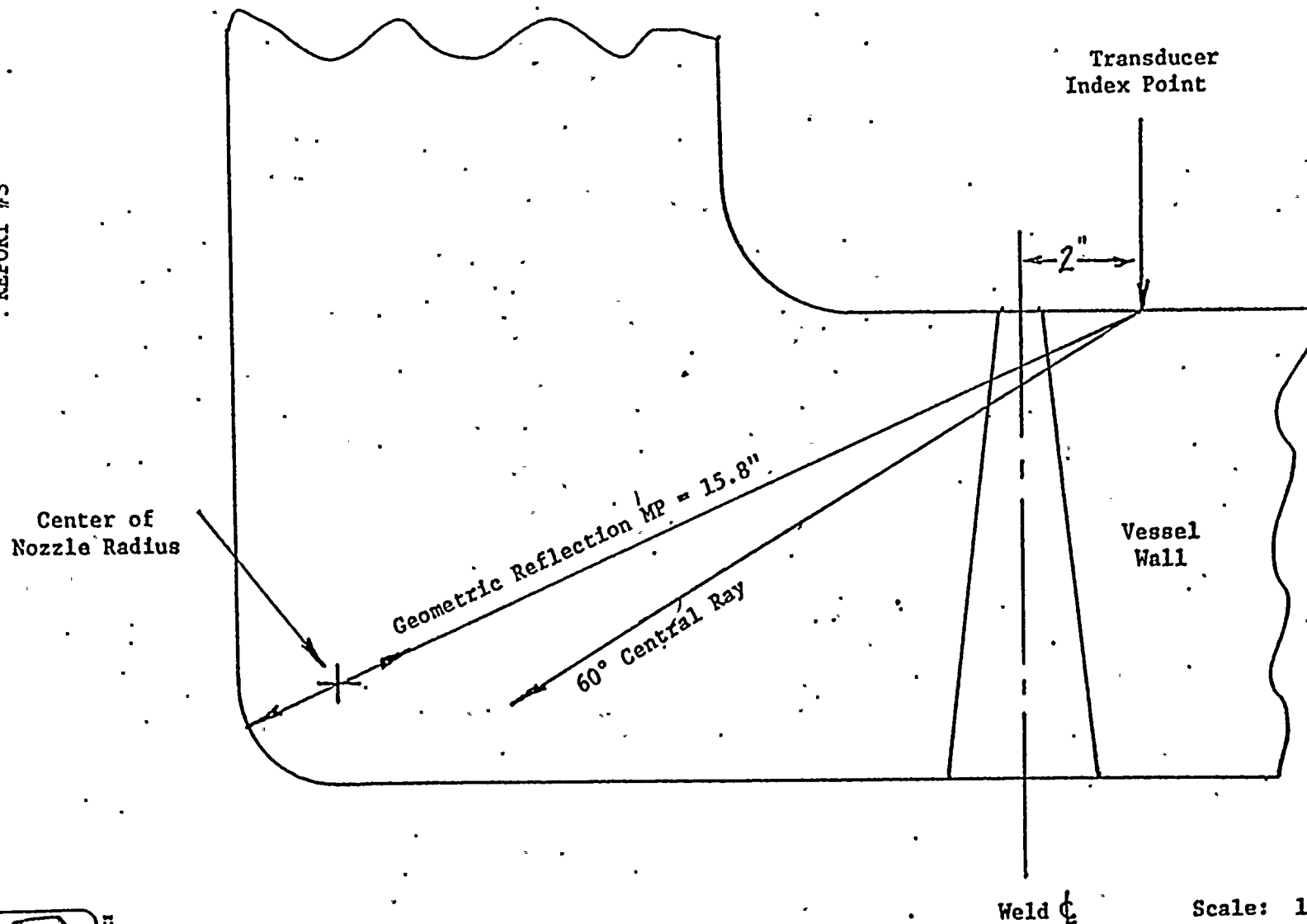


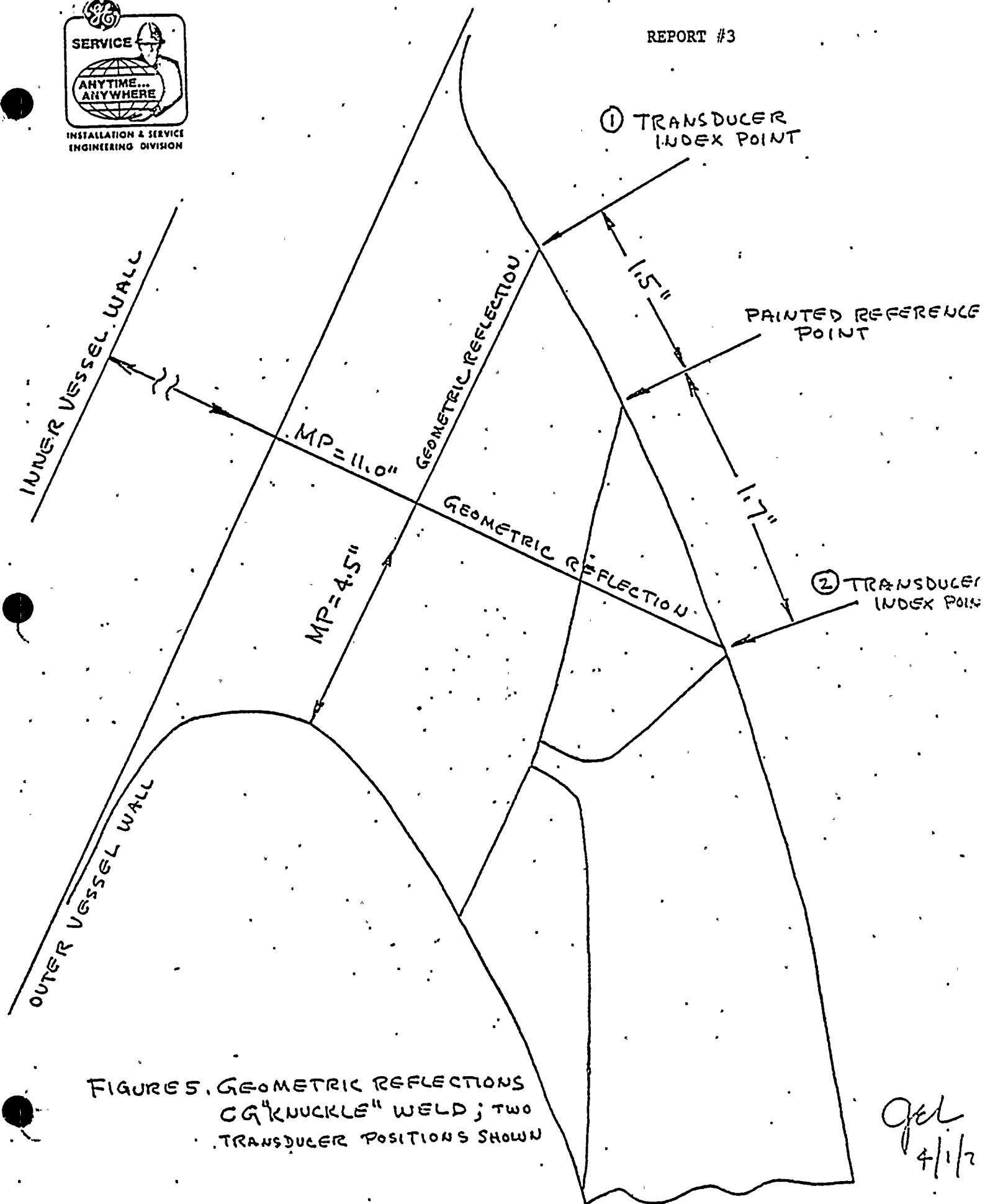
Figure 2. Typical geometric reflection from radius of N3 nozzle; MP = 15.8" determined by UT measurement agrees well with graphical determination.

Scale: 1 cm = 1 in.

REL
4/1/77

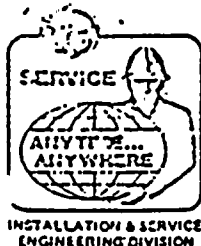


REPORT #3



FIGURES 5. GEOMETRIC REFLECTIONS
CG "KNUCKLE" WELD; TWO
TRANSDUCER POSITIONS SHOWN

gel
4/1/72



January 14, 1977

SUBJECT: Acoustic Velocity and Attenuation Determinations:
Reactor Pressure Vessel Calibration Standards #1, #2 and
#3 (SA533) and Upper Vessel and Mating Top Head Flanges
(SA508)

REFERENCE: ASME Boiler and Pressure Vessel Code, Section IX, 1974
Edition, Summer 1975, Paragraph I-3121 (Block Selection)

DRAWINGS: GE-160-76C-0087 Rev. 1 Reactor Pressure Vessel Std. #1
GE-160-76C-0088 Rev. 0 Reactor Pressure Vessel Std. #2.
GE-160-76C-0089 Rev. 0 Reactor Pressure Vessel Std. #3
CBIN-27 Rev. 3 Shell Flange Details

Paragraph I-3121 (referenced above) requires that "... (3) when it is not possible to fabricate the block from material taken from the component, it may be fabricated from a material of a specification included in the applicable examination volumes of the component. The acoustic velocity and attenuation of such a block shall be demonstrated to fall within the range of straight beam longitudinal wave velocity and attenuation found in the unclad component." Accordingly, UT Examination Team #4 (S. Metta and R. Hooper) performed velocity and attenuation evaluations on the subject materials.

VELOCITY COMPARISON

(January 11, 1977)

CALIBRATION: Calibrated the Sonic MK1 with 220 thickness Adapter to the 28.00" and 17.00" dimensions on Cal. Std. #1 and #3 respectively.

NOTE: The 220 Adapter has a range of 20.00", in order to get the 28.00" range - the Velocity Adjustment was halved and the readings taken off the Digital Read Out were $\frac{1}{2}$ of the "real" readings.



EXAMINATION:

MEASURED ON BLOCK	DIGITAL READING		MEASURE BY SONIC MK1
27.95"	13.98	X 2 =	27.96"
16.95"	8.48	X 2 =	16.96"
MEASURE ON VESSEL FLANGE	DIGITAL READING		MEASURE BY SONIC MK1
26.00	13.00	X 2 =	26.00"
26.00	13.01	X 2 =	26.02"
26.00	13.02	X 2 =	26.04"
26.00	13.00	X 2 =	26.00"

NOTE: Readings taken on bottom side of flange: (No instrument settings were changed.) See Figure 1.

The technique and results described above for velocity comparison are sufficient to show that the subject materials (SA533 and SA508) are "...within the range..." of velocity required by the Code.

ATTENUATION COMPARISON

(January 13, 1977)

CALIBRATION: The transducer was positioned on RPV Standard #2 at approximately 1 3/4" from the edge as shown in Figure 2. The signal amplitude from the back surface was then set at 80% FSH. This was the primary reference level.

EXAMINATION: The transducer was placed at 4 locations between the stud holes on the Top Head Flange at approximately 1 3/4" from the edge of the OD surface (See Figure 3). The back surface signal was then adjusted to determine the db difference necessary to obtain the 80% FSH primary reference level (See Table 1).

TABLE 1

<u>Position</u>	<u>db Difference</u>
1	-1
2	-1
3	-1
4	-1

NOTE: Minus db readings correspond to a higher amplitude on the Top Flange which is on the " safe " side.

This technique, although not sufficient for a quantitative determination of acoustic attenuation, shows that these materials are "...within the range..." of attenuation required by the Code.

A handwritten signature in cursive script, appearing to read "G.E. Lockyer".

G.E. Lockyer
NDT Level 111

cc B.W. Wilkins



REPORT #4

CBIN-27 Rev. #3
Sect. A-A

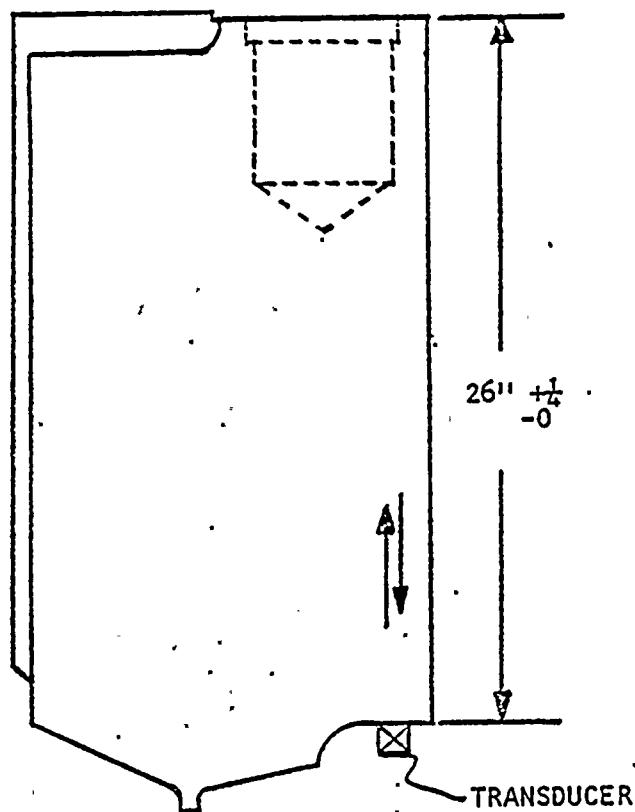
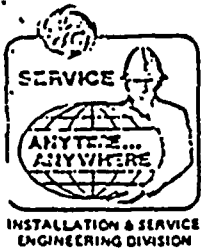
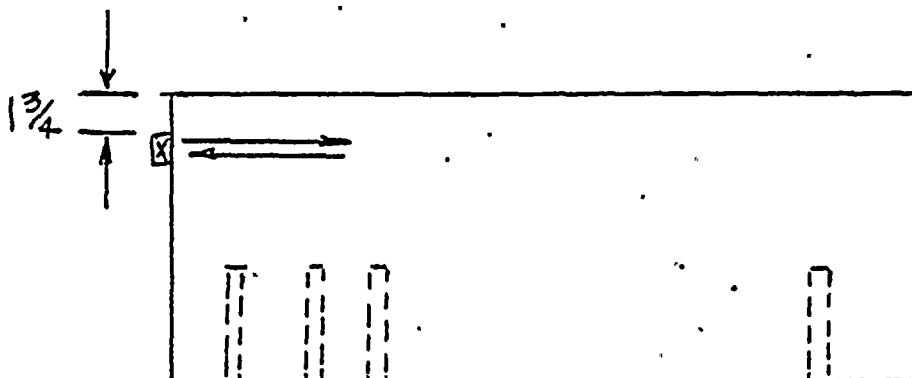


FIGURE 1: RPV FLANGE

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REPORT #4



TRANSDUCER
POSITION

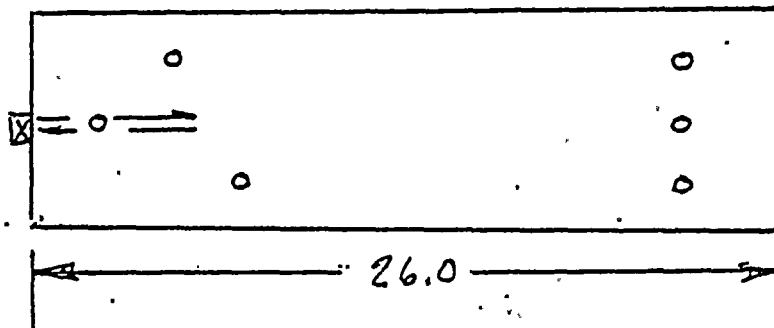
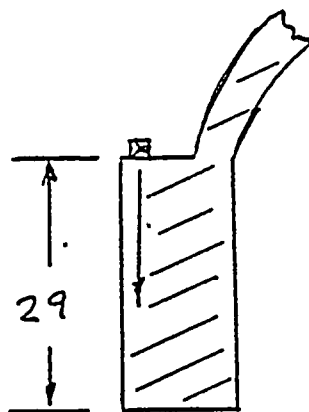
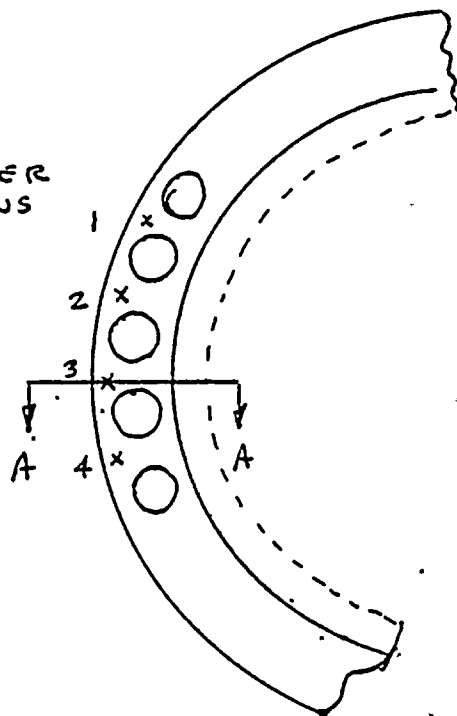


FIGURE 2 : CALIBRATION STANDARD #2

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TRANSDUCER
POSITIONS



A - A (TRANSDUCER POSITION 3)

FIGURE 3: RPV TOP HEAD FLANGE

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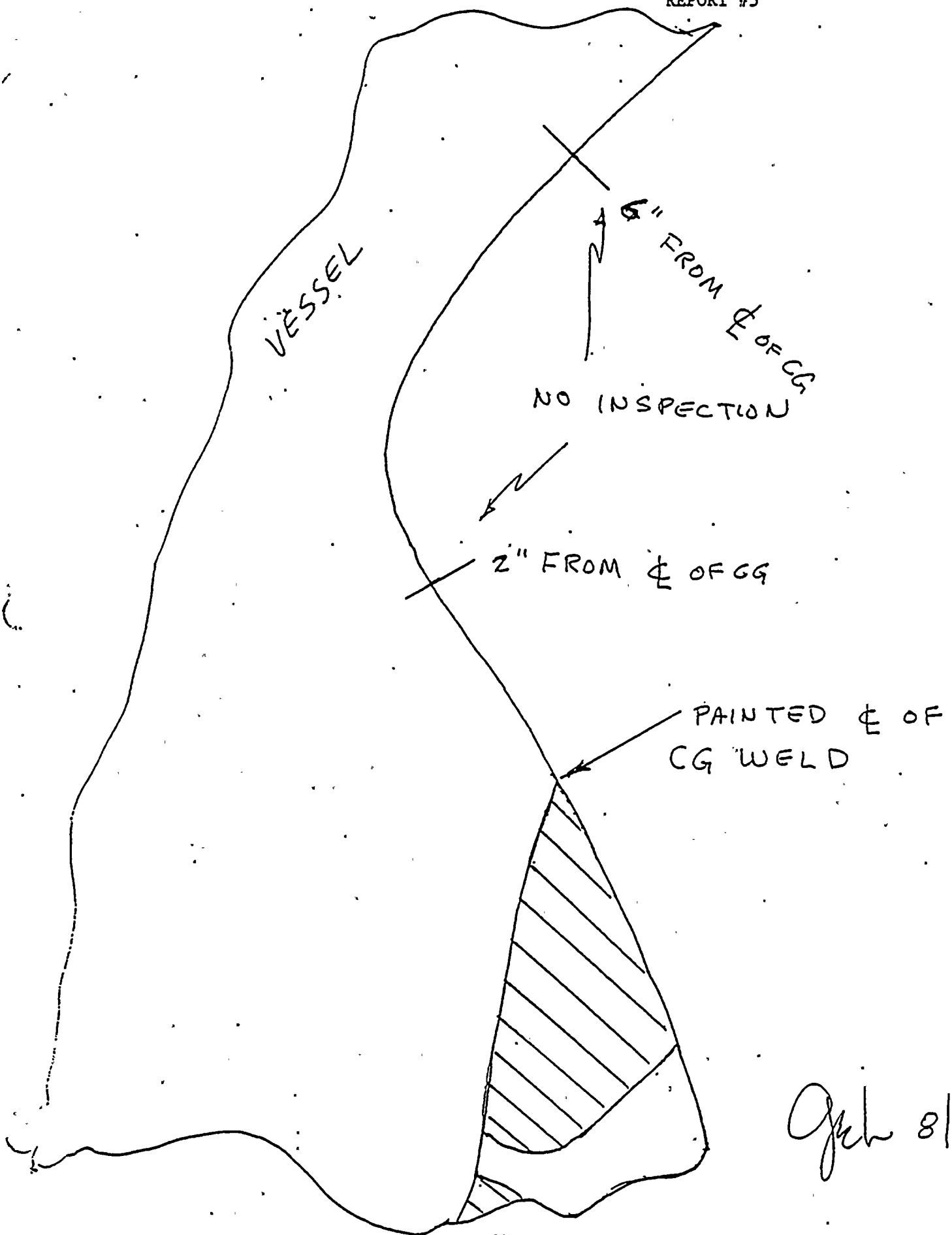
Subject: Summary Report of Loss of UT Transducer Contact
Due to Curvature of CG Weld

REFERENCE: Pennsylvania Power and Light Company
Susquehanna Steam Electric Station
Contract Number 8856-M-166
RPV Preservice Examination

The attached sketches illustrate the area of the base metal and adjacent weld in the vicinity of the CG weld which could not be inspected because of the loss of UT transducer contact at the curvatures as shown. The centerline of the CG weld as painted on the vessel surface, is really at the edge of the CG weld shown on the sketch. The area of no UT inspection extended from 2" to 6" from the painted centerline during inspection of weld CG. These curvatures also caused loss of contact affecting welds DA, DB, DC, DD, DE, and DF from AA to skirt and from skirt to AJ.

It should be noted that, although the use of smaller transducers would have improved contact area, smaller transducers were determined to be inadequate because of insufficient output.

George E. Lockyer, Level III
Manager ASFD-NDT



John 8/5/7

Bottom HEAD.

AREA OF CONTACT
LOSS ON WELOS
DA, DB, DC, DD,
DE, AND DF
FROM SKIRT TO AJ

REPORT #6

COMPOSITE OF THE MANUAL AND
REMOTE AUTOMATIC PRESERVICE EXAMINATIONS
FOR SUSQUEHANNA UNIT #1

Composite includes all exclusions to the baseline
examination and the basis/justification for the
exclusions.

General Electric Company
Maschellmac Office Complex.
1000 First Avenue
King of Prussia, PA 19406

CATEGORY BA
PRESSURE RETAINING WELDS IN REACTOR VESSEL
CIRCUMFERENTIAL SHELL WELDS
WELD SEAM AA

AA TOP SIDERemote Automatic Examination Coverage

There were five (5) interferences on weld seam AA top that caused missed areas during the remote automatic examination. These were:

Nozzle N1A	66" Missed
Nozzle N1B	66" Missed
Nozzle N8A	36" Missed
Nozzle N8B	36" Missed
Surface-Gouge	4" Missed*

TOTAL	208" Missed
-------	-------------

The circumference of weld seam AA is 837".

The interferences caused 24.85 percent of weld seam AA top to be missed during the remote automatic examination. *The 4" missed due to the surface gouge will be examined during the first ISI. The surface has been conditioned to allow examination. The missed area will at that time become 24.37 percent.

Manual Examination Coverage

The nozzle interferences listed for the automatic examination do not exist for the manual examination. The nozzles N1's and N8's are far enough from the weld centerline to allow a complete examination in accordance with Paragraph I-5121 of Section XI, Appendix I.

AA BOTTOM SIDERemote Automatic Examination - Not PerformedManual Examination Coverage

No interferences. One hundred percent coverage.

SUMMARY WELD SEAM AA

One hundred percent of weld seam AA was manually examined in accordance with Appendix I of ASME Section XI. In addition, 75.15 percent of the top side of weld seam AA was examined using remote automatic equipment. Manual data exists for the 12.42 percent of the weld seam missed by the remote scanner and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Examine the missed areas of AA top manually while examining AA bottom.

WELD SEAM ABRemote Automatic Examination Coverage

Weld seam AB was examined 100 percent by the remote automatic equipment.

WELD SEAM ACRemote Automatic Examination Coverage

Weld seam AC was examined 100 percent by the remote automatic equipment.

WELD SEAM ADAD TOP SIDERemote Automatic Examination

Not performed.

Manual Examination Coverage

No interferences - 100 percent coverage.

AD BOTTOM SIDERemote Automatic Examination Coverage

There were two (2) interferences on weld seam AD bottom that caused missed areas during the remote automatic examination. These were:

AD BOTTOM SIDE (Continued)

Nozzle N11A	47" Missed
Nozzle N11B	41" Missed
<hr/>	
TOTAL	88" Missed

The circumference of weld seam AD is 838". The interferences caused 10.5 percent of weld seam AD bottom to be missed during the remote automatic examination.

Manual Examination Coverage

No interferences - 100 percent coverage.

SUMMARY FOR WELD SEAM AD

One hundred percent of weld seam AD was manually examined in accordance with Appendix I of ASME Section XI. In addition, 89.5 percent of the bottom side of weld seam AD was examined using remote automatic equipment. Manual data exists for the 5.25 percent of the weld seam missed by the remote scanner and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Examine the missed areas of AD bottom manually while examining AD top.

WELD SEAM AEManual Examination Coverage

Weld seam AE was examined 100 percent by manual techniques.

WELD SEAM AF

Manual Examination Coverage

Weld seam AF was examined 100 percent from one side in accordance with Paragraph I-5121 of ASME Section XI, Appendix I. In addition, a 0° only examination of weld AF was performed from the top surface of the vessel flange.

EXCLUSIONS

No exclusions are required for the reactor pressure vessel circumferential welds AA, AB, AC, AD, AE and AF.

CATEGORY BA
PRESSURE RETAINING WELDS IN REACTOR VESSEL
LONGITUDINAL SHELL WELDS
WELD SEAM BA

BA LEFT SIDE (CW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BA left side that caused a missed area during the remote automatic examination. This was:

Nozzle N2K

43" Missed

The length of weld seam BA is 137".

The interference caused 31.38 percent of weld seam BA left side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

SUMMARY WELD SEAM BA

Eighty-four and three-tenth percent of weld seam BA was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 15.7 percent of the weld seam missed by the remote scanner and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Exclude the 15.7 percent of weld seam BA missed by the remote scanner. Justification: Radiation exposure and restricted access. The 84.3 percent examined provides adequate sampling to determine the condition of the weld seam.

WELD SEAM BBBB LEFT SIDE (CW)Remote Automatic Examination Coverage

There was one (1) interference on weld seam BB left side that caused a missed area during the remote automatic examination. This was:

Nozzle N2C

46" Missed

The length of weld seam BB is 137".

The interference caused 33.57 percent of weld seam BB left side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

BB RIGHT SIDE (CCW)Remote Automatic Examination Coverage

No interference. One hundred percent coverage.

SUMMARY WELD SEAM BB

Eighty-three and two-tenth percent of weld seam BB was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 16.8 percent of the weld seam missed by the remote scanner and when combined with the remote examination, data provides 100 percent coverage.

Recommendation for ISI

Exclude the 16.8 percent of weld seam BB missed by the remote examination. Same logic as weld seam BA.

WELD SEAM BCBC LEFT SIDE (CW)Remote Automatic Examination Coverage

There was one (1) interference on weld seam BC left side that caused a missed area during the remote automatic examination. This was:

Nozzle N2F

44" Missed

WELD SEAM BC (Continued)

The length of weld seam BC is 137".

The interference caused 32.12 percent of weld seam BC to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

BC RIGHT SIDE (CCW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BC right side that caused a missed area during the remote automatic examination. This was:

Nozzle N1B

69" Missed

The interference caused 50.36 percent of weld seam BC right side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

SUMMARY WELD SEAM BC

Fifty-eight and eight-tenth percent of weld seam BC was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 41.2 percent of the weld seam missed by the remote scanner and when combined with the remote examination, data provides 100 percent coverage.

Recommendation for ISI

Exclude the 41.2 percent of weld seam BC missed by the remote examination. Same logic as weld seam BA.

WELD SEAM BD

Remote Automatic Examination Coverage

Weld seam BD was examined 100 percent by the remote automatic equipment.

WELD SEAM BE

Remote Automatic Examination Coverage

Weld seam BE was examined 100 percent by the remote automatic equipment.

WELD SEAM BF

BF LEFT SIDE (CW)

Remote Automatic Examination Coverage

There was one (1) interference on weld on weld seam BF left side that caused a missed area during the remote automatic examination. This was:

Nozzle N16B 18" Missed

The length of weld seam BF is 137".

The interference caused 13.14 percent of weld seam BF left side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

BF RIGHT SIDE (CCW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BF right side that caused a missed area during the remote automatic examination. This was:

Nozzle N16B 44" Missed

The interference caused 32.12 percent of weld seam BF right side to be missed during the remote automatic examination.

Manual Examination Coverage

N16B interference. One hundred percent coverage*.

*NOTE: An area 15" long was examined in one direction only for parallel reflectors in accordance with the requirements of Paragraph I5121 of ASME Section XI, Appendix I.

SUMMARY WELD SEAM BF

Seventy-seven and four-tenth percent of weld seam BF was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 22.6 percent of the weld seam missed by the remote scanner and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Exclude the 22.6 percent of weld seam BF missed by the remote examination. Same logic as weld seam BA.

WELD SEAM BGBG LEFT SIDE (CW)Remote Automatic Examination Coverage

There was one (1) interference on weld seam BG left side that caused a missed area during the remote automatic examination. This was:

RPV Stabilizer Bracket 8" Missed

The length of weld seam BG is 137".

The interference caused 5.8 percent of weld seam BG left side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

BG RIGHT SIDE (CCW)Remote Automatic Examination Coverage

There was one (1) interference on weld seam BG right side that caused a missed area during the remote automatic examination. This was:

RPV Stabilizer Bracket 8" Missed

The interference caused 5.8 percent of weld seam BG right side to be missed during the remote automatic examination.

WELD SEAM BG (Continued)

Manual Examination Coverage

No interference. One hundred percent coverage.

SUMMARY WELD SEAM BG

Ninty-four and two-tenth percent of weld seam BG was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 5.8 percent of the weld seam missed by the remote scanner, and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Exclude the 5.8 percent of weld seam BG missed by the remote examination. Same logic as weld seam BA.

WELD SEAM BH

BH LEFT SIDE (CW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BH left side that caused a missed area during the remote automatic examination. This was:

RPV Stabilizer Bracket 10" Missed

The length of weld seam BH is 137".

The interference caused 7.3 percent of weld seam BH left side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

BH RIGHT SIDE (CCW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BH right side that caused a missed area during the remote automatic examination. This was:

WELD SEAM BH (Continued)

RPV Stabilizer Bracket 11" Missed

The interference caused 8.0 percent of weld seam BH right side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

SUMMARY WELD SEAM BH

Ninty-two and four-tenth percent of seam BH was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 7.6 percent of the weld seam missed by the remote scanner and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Exclude the 7.6 percent of weld seam BH missed by the remote examination. Same logic as weld seam BA.

WELD SEAM BJ

BJ LEFT SIDE (CW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BJ left side that caused a missed area during the remote automatic examination. This was:

RPV Stabilizer Bracket 9" Missed

The length of weld seam BJ is 137".

The interference caused 6.6 percent of weld seam BJ left side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

WELD SEAM BJ (Continued)

BJ RIGHT SIDE (CCW)

Remote Automatic Examination Coverage

There was one (1) interference on weld seam BJ right side that caused a missed area during the remote automatic examination. This was:

RPV Stabilizer Bracket 8" Missed

The interference caused 5.8 percent of weld seam BJ right side to be missed during the remote automatic examination.

Manual Examination Coverage

No interference. One hundred percent coverage.

SUMMARY WELD SEAM BJ

Ninty-three and eight-tenth percent of weld seam BJ was examined in accordance with Appendix I of ASME Section XI using remote automatic techniques. Manual data exists for the 6.2 percent of the weld seam missed by the remote scanner and when combined with the remote examination data provides 100 percent coverage.

Recommendation for ISI

Exclude the 6.2 percent of weld seam BJ missed by the remote examination. Same logic as weld seam BA.

WELD SEAM BK

Manual Examination Coverage

No interference. One hundred percent coverage.

WELD SEAM BM

Manual Examination Coverage

No interference. One hundred percent coverage.

WELD SEAM BN

Manual Examination Coverage

No interference. One hundred percent coverage.

WELD SEAM BP

Manual Examination Coverage

No interference. One hundred percent coverage.

CATEGORY BA
PRESSURE RETAINING WELDS IN REACTOR VESSEL
CIRCUMFERENTIAL AND MERIDIONAL WELDS
IN VESSEL HEADS

CLOSURE HEAD (TOP)

The following circumferential weld seams were examined manually with 100 percent coverage:

AG (Head to Flange)
AH (Dollar Plate to Side Plates)

The following meridional weld seams were examined manually with 100 percent coverage:

DJ (Side Plate to Side Plate)
DK (Side Plate to Side Plate)
DM (Side Plate to Side Plate)
DN (Side Plate to Side Plate)
DP (Side Plate to Side Plate)
DR (Side Plate to Side Plate)

SUMMARY FOR CLOSURE HEAD WELD SEAMS

All weld seams in the RPV closure head were examined in accordance with Appendix I of ASME Section XI using manual examination techniques. There were no interferences to the examination.

BOTTOM HEAD

The following circumferential weld seam was examined manually with 100 percent coverage:

AJ (Dollar Plate to Side Plates)

The following longitudinal weld seams were examined manually with 100 percent coverage:

DG (Dollar Plate Longitudinal Seam)
DH (Dollar Plate Longitudinal Seam)

BOTTOM HEAD (Continued)

The following meridional weld seams were examined manually with partial coverage due to interference:

DA (Side Plate to Side Plate)
DB (Side Plate to Side Plate)
DC (Side Plate to Side Plate)
DD (Side Plate to Side Plate)
DE (Side Plate to Side Plate)
DF (Side Plate to Side Plate)

The weld buildup for the vessel skirt attachment caused an interference to the manual examination of weld seams DA - DF. The interference caused unexamined volumes as follows:

0° Base Metal Exam	12% Missed
0° Weld Metal Exam	12% Missed
45° Exam	4% Missed
60° Exam	2% Missed

A composite of all examination angles shows that a volume equal to 2 percent of the required examination volume for welds DA - DF is completely unexamined. An exclusion of this 2 percent will be required.

CATEGORY BD

PRIMARY NOZZLE-TO-VESSEL WELDS AND
NOZZLE INSIDE RADIUS SECTIONS

The following nozzle-to-vessel welds were examined 100 percent using remote automatic examination techniques:

N1A and B - Recirculation Outlet Nozzles

N2 A, B, E, F, G and K - Recirculation Inlet Nozzles

N3 A, B, C and D - Main Steam Outlet Nozzles

N4 B, C, E and F - Feedwater Inlet Nozzles

N5 A and B - Core Spray Inlet Nozzles

The following nozzle-to-vessel welds were examined partially using remote automatic examination techniques:

Recirculation Inlet (N2) NozzlesN2C

- 288.8° - Completely examined
- 71.2° - Examined with a short scan due to interference from nozzle N8A

N2D

- 313.5° - Completely examined
- 46.5° - Examined with a short scan due to interference from nozzle N8A

N2H

- 314.9° - Completely examined
- 45.1° - Examined with a short scan due to interference from nozzle N8B

N2J

- 321.5° - Completely examined
- 38.5° - Examined with a short scan due to interference from nozzle N8B

SUMMARY OF N2 PARTIAL EXAMINATIONS

The interference from the N8 nozzles caused a short scan of the affected areas. A scan length of 16" from the weld centerline is needed to achieve a complete examination of the required examination volume. The N8 nozzle interference allowed only a 13.75" scan length. This caused a missed volume of 19 percent in the affected areas. (81 percent was examined)

Manual data exists for the 19 percent of the affected areas missed by the remote scanner and when combined with the remote examination data, provides 100 percent coverage.

Recommendation for ISI

Exclude the affected areas of the N2 nozzles since only a partial code examination can be performed. Agree to perform the partial examination without full credit.

Basis for Exclusion

Six (6) nozzles of the same configuration and location are being examined completely.

On the affected nozzles from 80.2 percent to 89.3 percent of the weld seam is being examined completely. In the remaining areas, 10.7 percent to 19.8 percent of the weld seam is being examined in 81 percent of the required volume.

The high radiation exposure associated with recirculation inlet nozzles makes manual examination of these areas to gain a small increase in examination coverage an ALARA violation.

FEEDWATER INLET (N4) NOZZLESN4A

300°	-	Completely examined
60°	-	Not examined due to interference from nozzle N11A

N4D

300°	-	Completely examined
60°	-	Not examined due to interference from nozzle N11B.

SUMMARY OF N4 PARTIAL EXAMINATIONS

The proximity of nozzles N11 A and B to the affected feedwater nozzles precludes a complete Section XI examination of weld seams N4A and N4D. The spacing of 4.5" between the nozzles allows only a best effort manual examination of the areas. Partial manual data exists for the affected areas but does not provide 100 percent coverage. The 60° segments of weld seams N4A and N4D should be excluded from the baseline examination.

Basis for Exclusion

The spacing of 4.5" between the N11 and N4 nozzles precludes a meaningful examination of the required examination volume.

The excluded area is 16.67 percent of the weld seam. 83.33 percent is completely examined.

Four (4) nozzles of the same configuration and location (N4 B, C, E, F) have been completely examined.

Due to configuration, manual examination yields no increase in examination coverage.

Recommendation for ISI

Exclude the 16.67 percent of the weld seam as unexaminable. Same logic as baseline exclusion.

Manual Nozzle Examinations

The following nozzle-to-vessel welds were examined 100 percent using manual examination techniques:

N6 A & B	Head Instrumentation Nozzles
N7	Head Vent Nozzle
N8 A & B	Jet Pump Instrumentation Nozzles
N9	CRD Hydraulic Return Nozzle

CATEGORY BE

PRESSURE RETAINING PARTIAL
PENETRATION WELDS IN VESSELS

The following partial penetration welds were examined for evidence of leakage during the system hydrostatic test on Susquehanna Unit #1.

N10	Core Δ P and Liquid Control Nozzle
N11 A & B	Instrumentation Nozzles Shell Course #3
N12 A & B	Instrumentation Nozzles Shell Course #4
N13	Flange Seal Leak Detector Nozzle on Vessel Flange
N15	RPV Bottom Head Drain Nozzle
N16 A & B	Instrumentation Nozzles Shell Course #2
Control Rod Drive Penetrations 185	
In-Core Penetrations 55	

CATEGORY BF

PRESSURE RETAINING DISSIMILAR METAL WELDS

NOZZLE TO SAFE END WELDS

Nozzle to safe end welds were examined in accordance with Table IWB 2600 of ASME Section XI.

The volumetric examination was manual ultrasonic testing in accordance with Appendix III of ASME Section XI.

The surface examination was liquid penetrant testing in accordance with Article 6 of ASME Section V.

The following safe end welds were completely examined in accordance with ASME Section XI:

N1 A & B	Recirculation Outlet
N2 A - K	Recirculation Inlet
N3 A - D	Main Steam Outlet
N4 A - F	Feedwater Inlet
N5 A & B (including extension)	Core Spray Inlet
N6 A & B	Head Instrumentation
N7	Head Vent
N8 A & B	Jet Pump Instrumentation
*N9	CRD Hydraulic Return

*The N9 safe end has been removed and the nozzle has been capped. The nozzle-to-cap weld has not yet been examined, but it can be completely examined.

CATEGORY BG-1

PRESSURE RETAINING BOLTING TWO INCHES
AND LARGER IN DIAMETER

FLANGE CLOSURE NUTS

Nut #1 - N #76 were completely surface examined in accordance with Table IWB-2600 of ASME Section XI. The examination was a wet magnetic particle examination in accordance with Article 7 of ASME Section V.

FLANGE CLOSURE STUDS

Stud #1 - Stud #76 were completely examined by both volumetric and surface techniques. The volumetric examination was ultrasonic in accordance with the requirements of Article 5 of ASME Section V. The surface examination was a wet magnetic particle examination in accordance with Article 7 of ASME Section V.

LIGAMENTS BETWEEN FLANGE STUD HOLES

The ligaments between stud holes 1 - 76 were volumetrically examined in accordance with Table IWB-2600 of ASME Section XI. The volumetric examination was ultrasonic in accordance with General Electric Company specifications.

FLANGE CLOSURE WASHERS

Washer #1 - Washer #76 were visually examined in accordance with Table IWB 2600 of ASME Section XI. The visual examination was in accordance with Article 9 of ASME Section V.

CATEGORY BH
VESSEL SUPPORTS

Weld *CG the support skirt to skirt knuckle attachment weld was completely examined volumetrically in accordance with Table IWB-2600 of ASME Section XI. The volumetric examination was ultrasonic in accordance with Appendix I of ASME Section XI.

* NOTE:

The skirt knuckle was machined from a weld buildup designated as weld FR. Weld FR was examined to the maximum extent possible as an addition to weld CG. Approximately 59 percent of weld seam FR was ultrasonically examined. If FR is to be included in the baseline examination, an exclusion for the unexamined 41 percent is needed.

Recommendation for ISI

Examine only weld CG, the ASME Section XI vessel support weld. If a decision is made to combine welds CG and FR for ISI, an exclusion will be needed for 41 percent of weld buildup FR.

CATEGORY BI-1 .

INTERIOR CLAD SURFACES OF REACTOR VESSELS

VESSEL CLADDING

Six (6) cladding examination patches were visually examined in accordance with Table IWB-2600 of ASME Section XI. The visual examination was in accordance with Article 9 of ASME Section V.

Recommendation for ISI

Cladding examination patches have been deleted from the examination requirements of ASME Section XI by later code years. If the code year selected by PP&L for the ISI plan allows, the cladding examination patches should be deleted from the ISI program..

CATEGORY BN-1

INTERIOR OF REACTOR VESSELS

VESSEL INTERIOR

All items and surfaces above and below the core support plate were visually examined in accordance with Table IWB-2600 of ASME Section XI. The visual examination was in accordance with Article 9 of ASME Section V. Items and surfaces normally accessible for ISI were also photographed to provide a comparison for ISI purposes.

CATEGORY BN-2
INTEGRALLY WELDED CORE SUPPORT
STRUCTURES AND INTERIOR ATTACHMENTS
TO REACTOR VESSELS

All core support and attachment welds were visually examined in accordance with Table IWB-2600 of ASME Section XI. The visual examination was in accordance with Article 9 of ASME Section V.



CATEGORY B0

PRESSURE RETAINING WELDS IN CONTROL ROD HOUSINGS

CRD HOUSING WELDS

The welds in CRD housings were exempted from volumetric examination based upon plant makeup capacity. They were examined for leakage during the system hydro.

Recommendation for ISI

Continue to examine the CRD housings as Category B0 exempted components.

CATEGORY BP

COMPONENTS EXEMPTED FROM
EXAMINATION BY IWB-1220

EXEMPTED COMPONENTS

All components exempted from examination were examined for leakage during the system hydro.

Engineers—Constructors

Fifty Beale Street
San Francisco, California

REPORT #7



Mail Address: P.O. Box 3965, San Francisco, CA 94119

Please Reply To:

P.O. Box 384 / Berwick, Penna. 18603

August 11, 1977

General Electric Company
P.O. Box 382
Berwick, Pennsylvania 18603

RECEIVED

AUG 22 1977

Attention: Mr. E. A. Gustafson
Site Manager

1255 E/102N

Subject: Susquehanna Steam Electric Station
Units 1 and 2 - Job 08856
Discrepant Threads in Unit 1 RPF Flange
8856-M-1

Dear Mr. Gustafson:

Enclosed please find one copy of GE/1&SE Preservice Visual Inspection Report, Control No. 750, for the Unit 1 RPV Flange. This report indicates apparent discrepancies in the threads of stud holes Nos. 16 and 76 of Unit 1 RPV.

Please advise whether these discrepancies are acceptable per the technical requirements of your contract with CB&I and/or whether they have been previously documented and properly dispositioned during manufacture of the vessel.

Your response is requested by August 16, 1977.

Very truly yours,

BECHTEL POWER CORPORATION

E. E. Felton
Field Construction Manager

EEF/JEOS/hk

cc: M. R. Muir J. D. Green
 J. H. Galley S. E. Knight
 M. J. Lidl G. R. Shrader
 H. L. Harris

GENERAL ELECTRIC

REPORT #7

NUCLEAR ENERGY
DIVISION

GENERAL ELECTRIC COMPANY, SUSQUEHANNA SITE, P.O. BOX 382, BERWICK, PA 18603
Phone (717) 542-7391, Dial Comm 8*244-4231

BOILING WATER REACTOR
PROJECTS DEPARTMENT

August 15, 1977
EAG-461

Mr. E. E. Felton
Field Construction Manager
Bechtel Power Corporation
Post Office Box 384
Berwick, Pennsylvania 18603

Subject: Susquehanna Steam Electric Station, Unit #1
RPV Stud Hole Examination, MPL# B11A001

Dear Mr. Felton:

This will acknowledge receipt of your August 11, 1977 letter (M-1-241) regarding the visual examination findings of stud holes Nos. 16 and 76 by I&SE during their In-Service Inspection.

We are enclosing copy of CB&I letter to the writer dated August 12, 1977, which is self-explanatory. We consider the attached letter an acceptable explanation to the I&SE visual findings.

Please advise immediately if you do not concur.

Very truly yours,

GENERAL ELECTRIC CO./NED

E. A. Gustafson
E. A. Gustafson
Resident Site Manager

EAG/mw

Attachment (1)



August 12, 1977

Mr. E. A. Gustafson
General Electric Company
P.O. Box 382
Berwick, Pennsylvania 18603

Re: Stud Hole Inspection
Susquehanna RPV Unit I
CBI Contract 68-3331U
Berwick, Pennsylvania
NPM-355

Dear Mr. Gustafson:

This letter is in response to the Preservice Inspection Report, SQ1-761, dated August 2, 1977 which you passed on to me for a response. The report indicated thread damage on stud holes number 16 and 76.

The referenced damage cannot correctly be called damage. The missing and blunted thread conditions as we understand from Sketches #1 and #2 of the report, are the result of common tool breakage that occurs during the drill, reaming and tapping operations. In the case of both holes, a spade blade cutter broke during the drilling operation causing machine gouges in the side of the hole. These were blended out before proceeding. The resulting cavity in some cases will extend beyond the reamer size which will result in blunt threads or no threads if the cavity was deep enough. We were aware of these particular cases.

The resulting threads in these cases are acceptable as the effective thread length covers 8 3/8" minimum. These are evaluated on a case by case basis and reviewed with the GE Inspector as required by CBI Drawing 4, General Note 15 if not evaluated as a nonconformity requiring a RAD (Request for Acceptance of Nonconformity as a Deviation). These two holes were not evaluated to require a RAD. The missing amount of thread length in hole #76 is very small and the blunted thread in hole #16 involves the removal of material beyond the pitch diameter leaving effective thread strength. The darkened area mentioned is probably due to the water that was in the hole and the oxides that resulted. The change from the blunted threads could also cause this darkened effect. From the description given us, we do not think it is harmful.

The result of the above response is that CBI originally found the thread described acceptable.

Very truly yours,

CHICAGO BRIDGE AND IRON COMPANY

Charles L. Halfast
Charles L. Halfast
Project Manager
New Castle Operations

GENERAL ELECTRIC

REPORT #7

GENERAL ELECTRIC COMPANY, SUSQUEHANNA SITE, P.O. BOX 382, BERWICK, PA 18603
Phone (717) 542-7391, Dial Comm 8*244-4231

DIVISION

BOILING WATER REACTOR
PROJECTS DEPARTMENT

RECEIVED

OCT 07 1977

October 3, 1977
EAG-517

NUCLEAR SERVICES/I&SE

Mr. E. E. Felton
Field Construction Manager
Bechtel Power Corporation
Post Office Box 384
Berwick, Pennsylvania 18603

Subject: Susquehanna Steam Electric Station, Unit #1
RPV Stud Hole Discrepancies; Bechtel NCR-1952,
Bechtel Letter No. M-1-247

Dear Mr. Felton:

This will supplement our letter of August 15, 1977 (EAG-461) and will answer your M-1-247 letter dated August 17, 1977 on the above subject.

We believe that Chicago Bridge & Iron Company has gone into considerable research and explanation of a facit of their manufacturing cycle to explain the above stud hole discrepancies.

We are enclosing copy of CB&I letter to the writer dated September 28, 1977 and based upon data therein, we consider NCR-1952 closed.

Very truly yours,

GENERAL ELECTRIC CO./NED

E. A. Gustafson

E. A. Gustafson
Resident Site Manager

EAG/mw

*Waller
Please
Copy for
Brad
Shank*

Chicago Bridge & Iron Company



531 East Sixth Street
New Castle, Delaware 19720
REPORT #7
Index 325 464
Union FAX Wilmington, Del.
Telephone 302. 328 1371

September 28, 1977

NED RECEIVED

Mr. E. A. Gustafson
GE Site Manager
General Electric Company
P.O. Box 382
Berwick, Pennsylvania

SEP 29 1977

Susquehanna Site

Re: Unit I - Stud Hole Discrepancies
Bechtel NCR No. 1952, Letter M-1-247
Susquehanna Project
CBI Contract 68-3331/2

Gentlemen:

The above referenced letter from Bechtel found that our reply NPM-355, dated August 12, 1977 inadequately explained the discrepancies in stud holes 16 and 76 of RPV Unit I. Bechtel's letter included a Bechtel nonconformance report which left the quality of the two (2) stud holes as indeterminate. The report indicates that documentation was not available to confirm that the discrepancies were properly addressed. Contrary to this, CBI has documented evidence that all the stud holes were inspected and properly reviewed.

In an effort to respond in more detail than we previously did, we offer the following:

First, as part of the tapping sequence, immediately after tapping the hole and prior to moving the drill and tap unit to the next hole, each stud hole is checked with three (3) thread gauges. One is a "Go-Gauge", the second is a "No-Go Gauge" and the third is one with threads in between the "Go" and "No-Go" gauges. These gauges are the means of determining if the threads conform to ASA B1.1 and as indicated in ASA B1.1 (now ANSI B1.1, paragraph 5.5) they are the means used in practice to accept thread tolerances. Each hole is checked before moving to the next hole as it is very difficult if not impossible to reset up exactly over a tapped hole. This tapping sequence is documented on the CBI traveler card set 14E, sequence 4F as completed correctly. Following tapping, all holes are checked dimensionally to meet the CBI drawings. This is documented on CBI traveler card set 14E, sequence 8A. In the case of Unit I this inspection resulted in numerous nonconformities. These nonconformities were resolved through RAD 13, Rev. 1. The conditions generally described in holes 16 and 76 of Bechtel's correspondence were not listed as nonconformities on the RAD.

To further document the inspection of the flange a final visual inspection of all machined areas was again made at the completion of all flange machining and signed off on card set 14E, sequence 8B without any additional nonconformities.

Mr. E. A. Gustafson
September 28, 1977
Page Two

If you review RAD 13, you will see that hole 16 had one nonconformity, the counterbore diameter at the top of the hole was undersized. All other dimensions were found acceptable. As we explained earlier the thread was acceptable as the "Go-Gauge" would go down through the threads properly and the "No-Go Gauge" would not go.

During the dimensional inspection each hole is checked for length of thread and visually inspected for missing thread. CBI drawing 27 requires 8 3/8" minimum of thread meeting ASA B1.1-1960. Each hole is inspected for this and is evaluated knowing that normally more than 8 3/8" of thread results and that being a machined surface, General Note 15 on CBI drawing 4 will accept "tool marks and similar depressions isolated and minor in nature" provided they are not gasket seal surfaces or they do not violate minimum design thicknesses. These areas must be reviewed by the GE inspector.

Evaluating the reference to ASA-B1.1, the ASA B1.1 standard does not determine how much effective thread length must meet ASA B1.1. The design calculations determine this. If you review RAD 13, Rev. 1 and its attached engineering justification for stud 18 which had only 8 1/4" of thread you will find the static load report requires a minimum of 7.20". CBI drawing 27 requires a minimum of 8 3/8" to insure the 7.20".

In the case of hole 76, the small amount of thread missing was evaluated as still leaving 8 3/8" effective length of thread remaining meeting drawing requirements. The area was also isolated and minor in nature. It was therefore not evaluated to be a nonconformity and requiring a RAD. A similar situation existed in a Unit II stud hole but in this case consisted of several small areas throughout the hole with missing thread. Because it was not isolated and minor in nature and difficult to determine if 8 3/8" of effective length of thread existed, a RAD was required to resolve the nonconformity. In the case of the flattened area mentioned in hole 16, the amount of thread that had material missing inside the maximum minor diameter of the internal thread did not decrease the effective length of thread below 8 3/8" or it would have been a nonconformity on the RAD.

In regard to the darkened area mentioned, there are no color requirements for the material or threads in any of the specifications, drawings, standards or codes.

CBI is confident the stud holes meet all requirements of the GE Specification and have been inspected, evaluated and documented properly. We further point out that studs have been installed in the holes, the studs tensioned, the vessel hydrotested, the studs untensioned and the studs removed.

Chicago Bridge & Iron Company

REPORT #7

Mr. E. A. Gustafson
September 28, 1977
Page Three

In conclusion, CBI recommends the proper disposition is to have Bechtel indicate that documentation exists in the RPV vendor records that all stud holes, including the two in question, were inspected and evaluated with nonconformities accepted on CBI RAD 13, Rev. 1.

We hope this is not the beginning of a continual line of requests to respond to visual inspections by those who are not familiar with vessel fabrication and design. We certainly do not intend to respond in such detail or send documentation every time Bechtel has uncovered something they feel does not meet the specification or not explained to their satisfaction. CBI has built the vessel under a GE Specification and continual GE surveillance and inspection and cannot find where we are required to respond to the satisfaction of Bechtel. However, we do wish to make it clear that if GE uncovers something of concern, CBI will be happy to look into it.

We are hopeful that the above explanation and recommended disposition will resolve Bechtel's NCR No. 1952.

Sincerely yours,

CHICAGO BRIDGE AND IRON COMPANY



Charles L. Halfast
Project Manager
New Castle Operations

CLH/lfm

cc: Mr. B. K. Lloyd, Buyer-MC/703
San Jose, California

FINAL REPORT

The final report contains the data required by Section XI of the code regarding indications. The full report includes the parameters necessary to evaluate the data as well as the final evaluations. The calibration and data sheets from the original run list the needed information on calibration and recheck times and transducer information.

During the inspection of a nozzle or vessel weld all data is preserved on files on one or more cassette tapes or floppy disks. These files will be referred to in the following discussion as the 'original files'.

The final report is generated from the original files by performing a several step procedure.

1. Post Editing of the original file

The original file contains all the raw data which is required for reanalyzing any indications found during inspection. In addition, important information such as the setup values for system parameters and data from calibrations are included on the file.

The original file also includes a fair amount of information which is not necessary for post processing. It is customary for the system to print (and save on the file) lines of data relating to evaluation of the indications as they are found. This allows the operator to follow the inspection process as it occurs. These evaluations should be considered as preliminary and are not used in any way for generation of the final report by the post processor program. The lines printed during calibrations and rechecks are not kept: the calibration sheets list the times and amplitudes found at calibration, and RECHECK: UNKNOWN is printed if there is no accepted recheck. The original file also contains operator control and equipment setup commands which are not useful to post processing.

Another major area of unneeded information on the original file is due to the repetition of inspection passes or parameter lists. These may occur for a variety of reasons; only the last lists before a run and non-voided inspections are required for creation of the final report.

Thus, the original file includes a conglomeration of raw data, calibrations, rechecks, important evaluation parameter values, operator comments, preliminary evaluations, aborted run data, extra lists, and hardware control commands. The significant data for a single weld may consist of several passes done in a non-specific order with intervening passes from other weld inspections. The purpose of the post editing procedure is to extract the necessary and sufficient data for a single weld inspection and create a new 'interim' file which contains all the data in a standard order. During the creation of the interim

file, the original file is used but is not altered in any way.

The post editor computer program automatically removes most of the superfluous data. This includes all lines relating to the preliminary evaluation of indications and operator commands used for controlling the inspection hardware. The post editor program automatically retains, unless otherwise directed by the operator, all evaluation parameter values and all raw data from the inspections.

The post editor operator can delete or add lines to the data from the original file as necessary. He may delete lists which are repeated before a run. He may also delete all the data from aborted inspection passes - those passes where the data was discarded and the inspection for the area repeated.

Added lines are usually made in the form of notes or comments. These are sometimes necessary to explain situations that have arisen during post processing. Comments added during post editing are easily identifiable as they are the only lines contained in the final report which begin with an asterisk (*) or dash (-).

The most important job for the post editor operator is to assemble all the data for a single nozzle or vessel weld in a standard order on the interim file. During the inspection, a pass completely around a nozzle or along an entire vessel weld may be interrupted several times by termination of inspection commands. When the interim file is created, these separate parts of a pass are combined so that the post processor treats the data as if it were obtained without interruption. In this way, indications that were in progress at the time of a termination are not cut in half when evaluated by the post processor.

2. Print the Interim File

Although most of the clean up process of the original file data is done automatically by the post editor computer program, the operator does have the responsibility of reorganizing as well as deleting and inserting information. To ensure that this procedure has not produced any errors, the interim file created during post editing is printed. This printout is compared with the printout of the data on the original file(s).

3. Post Process the Interim File: create the final report

Post processing of the interim file is a relatively easy procedure. The post processor reads the values for the evaluation parameters; then processes each line of raw data exactly as if it were coming from the Branson UT hardware. In this way, the entire indication evaluation process is duplicated as if the actual inspection were being performed.

The final report evaluations may differ from the preliminary evaluations obtained during the inspection. This is due to a number of causes:

- a. The post processor combines data from several separate runs. As described above, terminations of runs during a pass may be eliminated during creation of the interim file. An indication~~x~~ which was not completed at the time of the termination will show up as a larger combined indication in the final report.
- b. Post processing may be performed at a different evaluation level. Inspections may be performed collecting and evaluating data at other than the Post Processor evaluation level. The final report can be generated using any evaluation DAC level above the collection level. Obviously, far fewer and much smaller indications will be found in a final report evaluated at 50% DAC compared to the indications evaluated at 20% or 25% on the original file printed during inspection.
- c. The locations of indications may change. The locations of indications are based on measurements which depend on the scanner screw encoder readings at the time the indication was observed. As described below, the position of the transducer package and the position correction distance for angle beam transducers (A4 and B4 parameters) are determined based on the values entered for the calibration block and inspection scanner screw lengths and encoder readings. If these values did not correspond to the true scanner screw lengths and encoder readings, they may be corrected.

If the calibration length to full scale encoder reading ratio was entered incorrectly, it may be corrected for by a line inserted before the UT channel list. If that line is present, the system will print

CALIBRATION SCANNER EQUIVALENTS: LENGTH = nn.nn FULL SCALE = nnnn

and correct the A4 parameters for all channels. The calibration scanner values run with will be printed in the parameter list.

If the inspection device scanner length and full scale ratio were entered incorrectly, they may be corrected for by a line inserted after the UT channel list. The correct length and full scale will be printed on the parameter list. The line 'CORRECTED SCANNER PARAMETERS' will be printed before the list.

A second cause of different locations is due to round off of

F.R. 5/12/81 -3

numbers saved on the original file. The post processor has only these rounded numbers to work with in its evaluations. Usually, a change in one value due to round off is offset by a compensatory change in another value. For example, if the maximum X location of an indication is 0.1 inch greater than the maximum X location of the preliminary report, it will be found that the minimum X location in the final report is also 0.1 inch greater than the value in the preliminary evaluation. Thus, the indication size does not change; the indication location has merely been shifted 0.1 inch in the X direction.

A third cause is that in NOZZLE mode, the BX and EX lines are recalculated from the BX line azimuth, weld reference point, nozzle location, and scanner X offset. If any of these change, the location may change. In the original run, any azimuth change between the BX and EX lines could alter the EX,EY coordinates from what the Post Processor calculates.

- d. Differences may occur due to data loss.
In rare cases, the data on the original file may be incomplete. In a few of these cases, it may be determined that significant data has been lost. In such cases of data loss, comments (beginning with asterisks) may be added to the interim file discussing the significance, if any, of the missing data. These discussions are based on the data surrounding the dropout on the original file, the hardcopy printout obtained on the system terminal during the inspection, and a thorough understanding of the way the computer program analyzes and reports data.

The final report includes all the evaluation data for indications required by Section XI of the code. It also contains the values for all important parameters used in the collection or evaluation of the data.

An option has been made available to print partial reports. These do not include UT channel software DAC parameters, scan lines (unless a scan is found out of sequence), scan limits, some notes and comments, crawler and nozzle stepsize settings, forced locations, indication combinations, average and maximum stepsizes, and CONTINUEs and following BEGIN lines if the responses were set in advance. If the evaluation level is less than 50% DAC, no evaluation tables or final evaluations will be printed.

The following material explains the significance of each type of line in the final report - what the parameters mean and why the line is necessary. The explanation is usually not presented in a mathematical fashion; such a description is available in other documentation. Rather, the approach is taken to indicate in general terms how each

value is used and each report can be interpreted.

Page Headers

PAGE 0002 78 MAR 30 08:11:14 yyyyyyyyyyyyyyyyyyyyyyyyyyy
OF xxxxx

A line similar to the above appears at the top of each page after the first page. The y's represent a page heading chosen by the Post Processor Operator. The number xxxxx is the total number of pages in the report, to be filled in by the operator.

The date and time are taken from the original file, ie. from the page headers on the hardcopy report generated during the inspection. When a new page is started on the final report, it uses the time and date in effect at that point on the original file.

The final report pages will not coincide exactly with the original printouts, so the time listed is only approximate. It is possible for consecutive pages of the final report to have the same time and date. This would occur if more data was being printed in the final report than in the original. Similarly, the final report will not necessarily contain a time and date header for every time and date header of the original file. This occurs when the final report is generating less printout than the original.

Following the time is information chosen by the operator, generally the weld and vessel identification, and the procedure, revision, and ACN numbers..

I. EVALUATION PARAMETERS AND TEST SET-UP

Evaluation Parameters

TABLE IWB-3511.1

ALLOWABLE PLANAR INDICATIONS		
ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T, %	A/T, %
0.00	2.0	2.6
0.05	2.1	2.8
.	.	.
.	.	.

TABLE IWB-3511.3

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ IN.
0	12
4	12
6	18
.	.
.	.

The report includes the evaluation tables used in the original run to evaluate the data. The tables should be taken directly from Section XI of the code and differ only in that the laminar table has a line listed for a vessel thickness of 0 inches. The allowed area is the same as for the thinnest vessel thickness in the original table. This forces the interpolation of allowed indication areas to be constant over the first few inches. This does not affect the evaluation of most runs since the plate thickness is generally not in the 0 - 4 inch range.

UT CHANNEL PARAMETERS

A set of parameters A1 through A5, B1 through B5 are used to evaluate the location and amplitude of reflectors. These are the software DAC parameters. Although they are not printed on the partial reports, they may be gleaned from the original or interim file.

The A1, B1 values are for the TCG formula for times of reflectors between the outer surface and the depth of the T1/2 hole. They are the parameters of a straight line equation used to make a time based correction on the amplitudes reported from the UT hardware for indications having times less than the time obtained for the T1/2 hole during calibration:

$$- \left(\frac{A1}{1000} * \text{time} + B1 \right) * \text{amplitude} = \text{corrected amplitude}$$

In the process of a calibration, the times and amplitudes for the T3/4 and T1/2 holes are retained. This is sufficient data for calculating the A1 and B1 parameters for the above straight line equation.

Note that the value listed for A1 is actually divided by 1000 before being used in the equation. Thus the effect of the time on the TCG is almost insignificant. This is a result of the fact that the Branson hardware also has a three slope TCG adjustment for each channel. The operator typically adjusts these hardware controls so that very little time based correction is required by the software. A1/1000 is thus always small. It is printed with the *1000 factor to make the number more readable.

Most of the software TCG adjustment comes from the value for B1 for the angle beam channels. In setting the hardware TCG, the operator typically sets the amplitudes to read out at slightly over 80 for all the calibration holes. Thus a hardware reading of 80 corresponds to 100% DAC. As described below, the operator typically sets the software so the a report of an amplitude of 100 corresponds to 100% DAC. The B1 parameter has the affect of raising the slightly higher than 80 readings of the Branson to the desired 100 value for amplitudes saved on the original file. If the operator set the hardware to read exactly 80 at the T1/4 and T1/2 holes, B1 would equal exactly 1.25 ($1.25 * 80 = 100$).

A2 and B2 are like A1 and B1 except are derived from the time and amplitude data from the T1/2 and T3/4 holes. A3 and B3 are used for the third slope of the TCG and are derived from the data for the T3/4 hole and the calculated time and amplitude values based on measurements of the T5/4 hole made and entered by the operator.

A4,B4 are used for lateral location correction of a reflector from the transducer location, as is needed for angle beams. During calibration, data is obtained at each hole for the time and the calibration apparatus scanner screw encoder reading. This is sufficient data for determining the values of the parameters of a straight line equation relating time to the distance, measured along the surface, of an indication from the transducer position. This position correction based on time is necessary when calculating the exact location of an indication. If the calibration length to full scale encoder reading ratio has been altered since the run, the A4 parameter is multiplied by

$$\frac{\text{NEW CALIBRATION LENGTH} * \text{OLD FULL SCALE}}{\text{NEW FULL SCALE} * \text{OLD CALIBRATION LENGTH}}$$

If the inspection scanner length to full scale ratio is altered, the A4 value is multiplied by an extra factor of

$$\frac{\text{NEW SCANNER LENGTH} * \text{OLD FULL SCALE}}{\text{NEW FULL SCALE} * \text{OLD SCANNER LENGTH}}$$

A5,B5 are values used to calculate the depth of the reflector. During calibration scanning, the times for each hole are retained. This data, along with the known depths of the calibration block holes, discussed above, is sufficient data for the determination of a straight line equation relating time to depth for the transducer.

ACOUSTIC PARAMETERS

When inspecting vessel welds two complementary location systems are used. The odometer and azimuth encoders provide location data that is quite accurate over short distances. Over longer distances (15-20 inches) the cumulative error inherent in this kind of measurement, aggravated by crawler slippage and manual location adjustments, becomes too large to keep accurate track of the location of the crawler.

The acoustic location system is used to determine a starting location and correct odometer the error accumulated over long distances. Acoustic locations are taken whenever indications are seen or every n scans, where the operator sets n (see below).

The acoustic location system is generally accurate to within 0.25 inches except where there is mechanical or geometrical interference with data collection. When an acoustic location is obtained, it is checked against the presumably nearly accurate odometer based location. If the acoustic location is within the operator-set acoustic location tolerance of the odometer location, it is used to update the odometer.

If the acoustic location is not close enough to the odometer location, the system assumes a mechanical problem (eg. poor contact of the acoustic pulser with the vessel surface) and tries up to three times at different pulser locations to obtain an agreeable acoustic location. If, after three tries, the acoustic location still does not agree with the odometer location, the system assumes some geometrical problem is interfering with the data (eg. a nearby nozzle or bevel altering the sound transmission or path). In such a case, the odometer location is kept as being the most reliable.

The system attempts to obtain locations frequently enough, even in the absence of indications, to 'miss' several times before the cumulative error of the odometer would be unacceptable. Usually, after a few moves, the acoustic location and odometer location will agree sufficiently to allow updating the odometer location.

In some cases, especially where the operator has manually rotated the crawler to keep it on course, the odometer location will be known to have excessive error. In such a case, the operator may choose to 'FORCE' the acoustic location. When this command is used, the system prints all the data necessary to ensure that the acoustic data is good and, therefore, that the location determined from it will be dependable. This data on the original file includes a sensor by sensor report of its contribution to the location process.

In the final report, only the most significant data from this 'FORCE' location procedure is printed:

FORCE ACOUSTIC LOCATION

```
...
X= 538.1 Y= 529.7 DIF.SQ.= 0.87 OK? Y
```

The computer prints the acoustic location and asks "OK?". The operator responds with a "Y" if the location is to be used to update the odometer.

The final report includes the SCAN lines which precede and follow a FORCE operation. These contain the setting of the odometer location before and after the FORCE and, therefore, can be used to determine the magnitude of the correction that was necessary. The

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X,Y values are the acoustically determined coordinates and correspond to the scan line X,Y. The DIF.SQ. is the squared distance between the odometer- and acoustic-determined locations. This can give an idea of the magnitude of the shift in locations.

It is not usually apparent from the data why the FORCE was necessary, ie. whether the crawler slipped, was moved by the operator, etc. The adjustment does not affect the analysis except when data for an indication was collected before and after the FORCE.

The computer checks to see if the change in odometer readings between scans is consistent with the change in X, Y location. This check is not done when the second scan of a pair is numbered 1. If an acoustic location is forced to a different value on scan N, the old value is used to compare to scan N-1 and the new value to compare to scan N+1. If the difference is greater than .9 inches, the system prints the message

*****ODOMETER DISAGREES WITH CHANGE IN LOCATION ON SCAN n

where n is the second scan of the pair. The program may be run with a patch to not perform this check if the irregularities have already been noted and accounted for.

Acoustic Location Parameters

VELOCITY OF SOUND = 0.1172
 LAG TIME = 0.400
 DISTANCE C.F. = 0.0000
 ACOUSTIC LOCATION TOLERANCE = 0.250
 CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 842.10
 SHELL COURSE # 2
 THRESHOLD = 1518
 CRAWLER PULSER LOCATION X = 538.68 Y = 383.60
 REGION 1

SENSOR	GLOBAL #	X	Y
1	1	443.720	196.930
3	42	624.370	195.230
.	.	.	.
.	.	.	.

When the acoustic location system is used, the above list of parameters will be printed. The primary importance of the listed data does not relate to the current evaluation. The values are listed since the identical values must be used in later re-inspections for locations to be reproducible.

The circumference allows "wrap-around": if the circumference is 842.10, an indication at X=841.9 may combine with an indication at X=0.3.

Stepsize Commands

SET CRAWLER MOTOR STEPSIZE SMALL = 0.40 = LARGE = 0.75 =.65
 UPPER LIMIT, OD. UNITS = 80 =75
 MAXIMUM ALLOWABLE STEP, INCHES = 0.8 =
 MAX CHANGE DURING SCAN, INCHES = 0.05 =
 # SCANS/ACOUSTIC LOC = 5 =
 or
 SET NOZZLE STEPSIZE: INCHES SMALL = 0.40 = LARGE = 0.70 =.6
 BIG STEP, ODOMETER UNITS =229 =
 UPPER LIMIT, OD. UNITS = 400 =300
 MAXIMUM ALLOWABLE STEP, DEGREES = 1.2 =1.0
 MAX CHANGE DURING SCAN, INCHES = 0.05 =

These types of lines are printed whenever the operator sets the distance the crawler or nozzle apparatus attempts to move between scans. The small step is attempted after a scan where data has been seen. The large step is attempted after a scan where no data was seen. The UPPER LIMIT is the largest number of odometer units it may attempt to step. If it steps larger than the MAXIMUM ALLOWABLE, the system terminates the run. The MAX CHANGE DURING SCAN is the most the bug or nozzle apparatus is allowed to move during a scan. The BIG STEP is the current estimate of the number of odometer units for the larger stepsize. The "# SCANS/ACOUSTIC LOC" sets the maximum number of scans between acoustic locations.

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EVALUATION PARAMETERS:

REPORT B.E. DATA AT FULL B.E. AMP or REPORT B.E. DATA AT 1/2 B.E. AMP
MAXIMUM B.E. ZDAC FOR EVALUATION = 15 or EVALUATE ALL B.E. DATA

pass was performed. If a parameter value needs changing, the program automatically prints the list again before any inspections can be started.

is generally only on for back echo monitoring on the P scans: its
flaw gate is off.

The calibration and inspection scanner arm LENGTH and FULL SCALE reading are used to calculate the position of the transducer package on the arm. In the above example, the arm is 30.0 inches long with a full scale reading of 3000. This is equivalent to telling the computer that a change of one encoder unit corresponds to a movement of the package by 0.01 inches.

The SCANNER STEPSIZE is the distance the transducer package is moved by the scanner screw between UT data sampling when significant data is found. For example, if no significant data is being reported by the UT transducers, the scanner screw moves the transducer package continuously. As soon as one channel sees a significant reflection, the package is stopped and all UT channels pulsed at that position. Then the package is moved according to the SCANNER STEPSIZE setting (0.050 in the example), stopped, and all UT transducers pulsed again. This continues until a position is reached where none of the transducers obtain significant reflections, at which time the continuous motion is restarted.

The step tolerance is the amount of error possible in the stepsize. This value is required by the computer for calculating the absolute maximum values that are used in separating indications that are near each other but not to be considered one.

MINSEP is the minimum separation between indications that can still be considered separate from each other. Thus, the operator has indicated in the above example that any two reflectors seen by a given UT transducer that are calculated to be within 0.25 inches of each other are to be considered parts of a single large reflector including both.

The 100% DAC level is set to 100. As explained earlier, this setting causes the calibration process to calculate TCG parameters such that the amplitude obtained at each of the calibration block holes (usually 80 or slightly higher) is raised to equal 100. This makes the amplitudes in the final report easy to interpret: a printed amplitude of 34 is equivalent to 34% DAC.

The evaluation level, 50%, is the operator-set amplitude level at which a reflection is to be considered significant for the post processed report. The raw data on the original files includes data for each and every shear wave UT pulse that had a time corrected amplitude equal to or higher than this value or else the final report would have been aborted.

In VESSEL mode, the WELD REFERENCE POINT is a point selected by the operator, usually a weld intersection. It is used for computing the relative X and Y distances as described below for the end-of-scan printout.

In NOZZLE mode, the X weld reference value is the distance from the

center of the nozzle to the centerline of the weld (radial distance). The Y value is not used.

THICKNESS is the vessel thickness. This value is used in indication evaluation for the two % OF T columns in the end-of-scan printout, in determining the allowed size of indications, and in determining the SURFACE or SUBSURFACE nature of an indication in the final end-of-pass analysis.

The shell course number is printed but not used for analysis. The circumference is as in the acoustic list and allows indications to cross the X=0 line.

The laminar evaluation angle is used to determine when an indication sighted by a P, T, or W type channel is to be considered LAMINAR. It is LAMINAR if

$$\tan(\text{LAMINAR ANGLE}) \geq \frac{(\text{THROUGH WALL DEPTH})}{(\text{INDICATION LENGTH})}$$

The angle is set to 10.0 degrees to correspond to the value stipulated in Section XI of the code.

The nonplanar evaluation angle is used to differentiate between PLANAR and NON-PLANAR indications. An indication is PLANAR X (or Y) if

$$\tan(\text{NONPLANAR ANGLE}) \geq \frac{(\text{INDICATION X (or Y) LENGTH})}{(\text{INDICATION Y (or X) LENGTH})}$$

The SURFACE TOLERANCE DISTANCE is included to allow the operator to respond to future clarifications of the inspection code. Section XI illustrates examples of indications lying near the surface which are considered to be semi-circular. This designation increases the size of the indication. It is not clear from the code how near the surface such an indication must be before it can be considered the smaller semi-elliptical shape. If this distance were known, it could be entered as the SURFACE TOLERANCE DISTANCE. By setting this value to 0.0, all surface indications will be conservatively designated by the analysis process as being semi-circular unless they lie exactly on the surface.

The base metal data may be reported at 1/2 or full back echo corrected amplitude. If the data was collected at full back echo amplitude, the post processor will not allow reporting at 1/2 amplitude. The base metal data may be analyzed for all reported reflectors, or only for those reflectors whose back echo corrected amplitude is less than or equal to a certain amount, 15% DAC in this example.

UT Channel Data

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	-45.0 T	-0.80	2.61	200	2060	0	55	-5.00	
	A1=-0.1831	A2= 0.0000	A3= 1.2817	A4= 4.463	A5= 4.581	T1/2=	711		
	B1= 1.289	B2= 1.164	B3= -0.204	B4= 0.010	B5= 0.002	T3/4=	1067		
3	-60.0 T	0.48	2.61	200	2060	0	78	-6.00	
	A1= 0.0000	A2= 0.0916	A3= 1.1902	A4= 5.526	A5= 3.232	T1/2=	979		
	B1= 1.156	B2= 1.067	B3= -0.576	B4= 0.010	B5= 0.057	T3/4=	1501		
.

Like the Evaluation Parameters described above, the settings for the UT channels cannot be altered without re-printing the above type of list. This list consists of all important values for each of the channels which is ON, that is, channels which will be pulsed during an inspection pass.

The scanner separation factor is a translation of $1/2$ MINSEP into scanner encoder units, rounded up. Thus, with MINSEP = 0.250 and 1 encoder unit = 0.01 inches, the SCANNER SEP. FACTOR equals 13. This value is used in determining whether two indications seen by a single channel in a scan should be combined during end-of-scan processing. If one indication is located such that its maximum scanner position + $1/2$ MINSEP (i.e. 13) overlaps a second indication's minimum scanner position - $1/2$ MINSEP, then the two indications are candidates for combination on the basis of nearness in the direction of scanner motion. As described below for TSEP, the two indications must also meet nearness requirements in the depth measurement.

The channel number is listed under the CH # column.

The channel ANGLE is listed with the type of channel: transverse (T), parallel (P), weld metal (W), or base metal (B). The actual value entered for the channel angle is not used in any of the evaluation computations; only the sign (+ or -) of this angle is important to the post processor. Therefore, the angle is customarily entered as a nice round value rather than the actual beam angle measured by the operator in compliance with Section XI of the code.

The X and Y OFFSETS are distances measured from the designated zero point on the package. This information is required for determining the exact location of the transducer and, hence, the exact location of a reflector seen by the transducer.

The values for BEGIN and STOP are the encoder values between which the specified channel will be pulsed. These values are set by the operator in a manner which ensures that the required volume of plate is inspected as required by the code.

MN BE is the minimum back echo required for a B type channel. If the system detects that the back echo amplitude reported for a B type channel is less than the value for MN BE, it stops the transducer package. The system continues to pulse only the B type channel until back echo returns. This may occur when momentarily lost couplant returns or, under operator control of the Branson hardware, the loss of back echo condition is overridden. During loss of back echo, no data is taken from other channels and the transducer package does not move.

TSEP is a measurement, in time units for the channel; equal to $1/2$ MINSEP. This is thus based on the A5 value for the channel and is the depth equivalent of the SCANNER SEP. FACTOR described above for combining indications at the end of a scan.

T5/4A is the $5/4$ T amplitude difference measured by the operator.

The A1, B1.. are listed only in the full report, not the partial. These are the values used in evaluating the time, amplitude, depth, and position of a reflector seen by that channel.

II. THE INSPECTION

Start Up Commands

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE

EVALUATION LEVEL = 50% DAC

DISTANCE = 300

SCANNING LIMITS: LOW = 300 HIGH = 2110

WELD: BK -

or

BEGIN UT INSPECTION AND NOZZLE ROTATION = 300

EVALUATION LEVEL = 50% DAC

SCANNING LIMITS: LOW = 30 HIGH = 1800

NOZZLE LOCATION X = 7.23 Y = 170.25

WELD: N4A-

In NOZZLE mode, the "NOZZLE ROTATION =n" is important mainly for the sign of n. The operator may often terminate the run before n degrees are covered, but the sign tells in which direction rotation occurred. A positive number indicates increasing degrees and negative indicates decreasing.

For instance, if +300 was entered, the first azimuth reading was 355.4 degrees, and the last azimuth was 181.1, the area at 50 degrees was covered, but that at 250 was not.

In VESSEL mode, the DISTANCE has no significance except for the sign, which indicates the direction of travel. A positive distance indicates the crawler was traveling forwards; a negative distance indicates it was traveling backwards.

The EVALUATION LEVEL is set during post processing and must be greater than or equal to the test level.

The weld tested is listed. The nozzle location is listed. The scanning limits are listed on the first BEGIN of a series connected by 'CONTINUE? Y's or if they have changed since the last BEGIN. The scan limits give the range of travel for the package, independent of the pulsing limits of the channels.

The scan limits are the attempted endpoints of the scan. The package may actually scan further up or lower down than these numbers. In the partial report, these numbers are not printed. Combined with the channel offsets and pulsing limits, and the scan positions (X, Y and AZIMUTH), they determine the area of coverage.

The indication number for post processing is set automatically and may not match the original numbers.

Scan Lines

SCAN # 2 AZ = 180.2 ODOM = 3482 X = 544.2 Y = 383.0
or
SCAN # 2 AZ = 134.4 ODOM = 2561

The first and last scan line of any run are always printed on a full report. In NOZZLE mode, the scan line gives the scan number, the azimuth reading in degrees, and the odometer reading. VESSEL mode lists the scan number, azimuth reading in degrees, odometer reading, and the X and Y location. Thus it is possible to determine the extent of the inspection for a given pass by looking at the beginning and ending nozzle apparatus or crawler positions.

The azimuth is the angle of the scanner screw. For VESSEL mode, 0 degrees is with the scanner horizontal and the crawler heading up the vessel. For NOZZLE mode, 0 degrees is with the scanner horizontal and to the right of the nozzle. Angles increase in the clockwise direction.

In VESSEL mode, the azimuth may be used to determine the angle of the scanner arm only, not to determine direction traveled. This is done with the FREEZE AZIMUTH command, where the operator sets the azimuth value to be used. FROZEN is written after the AZ 'reading'

on the scan lines.

Scan lines around a forced acoustic location are printed since a discontinuity in location readings may have occurred. Also, if scan numbers are out of order, the message "SCAN NUMBER OUT OF SEQUENCE" is printed. This may indicate that some scan lines are missing but does not necessarily mean that data has been lost.

Sometimes there will be more than one scan # 1; this occurs when one run is terminated and the next begun at the same place, in the same direction, without any gaps. In such a case, the "END OF PASS" and "BEGIN" lines are removed from between the two runs during post editing. The line "*END/BEGIN DELETED" may be inserted. Set-up data may also be removed from between runs if no parameter values were altered.

End-of-Scan Processing

Section XI of the code specifically requires certain data to be recorded for each scan by a transducer which reveals significant reflectors. These reports constitute the bulk of the final report for many welds.

It is unfortunate that Section XI requires this data since it is intended mainly as a necessary step to be taken in a manual inspection process where evaluation and further analysis is not performed during the test. Therefore, it will be found that study of the end-of-scan reports offers little information relevant to evaluation of indications.

The code requires two kinds of printout. The first of these is for shear wave analysis:

		MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
#	ID#	ZDAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ		DEP	REL X	RY/AZ		DEP	SDEP
4	19	81	3.7	308.7	54.6	3.9	309.4	54.6		3.7	307.7	54.6		2.4	48.8
		98	4.0	309.1	55.5	4.1	309.9	55.5		4.1	308.8	55.5		0.4	46.7
		65	3.9	308.5	56.0	4.0	308.7	56.0		3.7	307.9	56.0		3.7	48.0

The above end-of-scan printout for an indication is for P, T, and W type channels. The channel and indication numbers are in the # and ID# columns. In the example above, indication 19 was observed on three successive scans as indicated by the three lines of data without additional channel or indication number values. That is, when one indication is built from several scans, the channel and indication numbers are not relisted.

The information on each line corresponds to the data called for by Section XI of the code and illustrated in the sample table in section I-6330. In VESSEL mode, REL X and RY/AX are the X and Y distances, in inches, from the weld reference point. In NOZZLE

mode, REL X is the distance between the given point of the reflector and the weld line. RY/AZ is the azimuth offset from 0 degrees to the given point of the reflector. 0 degrees is horizontal and to the right of the nozzle, and angles increase in the clockwise direction.

DEP is the depth of the given point in both VESSEL and NOZZLE modes.

REL X, RY/AZ, and DEP are recorded where the % DAC was highest (MAX AMPLITUDE columns), when it first reached the test level (-50% DAC columns), and where it last reached (fell below) the test level (+50% DAC columns).

It will be noted that the end-of-scan printout differs from the sample table in section I-6330 in that it contains RY/AZ columns for all three recording positions rather than just for the MAX AMPLITUDE position. This is necessary because the computer calculates and reports the REL X and RY/AZ positions of the actual indication which may change in both values. The table in section I-6330 records only the location of the transducer which does not change in the RY/AZ value from one set of columns to the next.

The the last two columns list the depth as a percent of thickness (DEP) and the distance from surface as a percent of thickness (SDEP).

The second type of end-of-scan printout is for the B type channels. The code specifically requires that certain data be recorded for every transducer position for which the indication amplitude equals or exceeds the back echo amplitude:

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
9	0	0	283	15	503.9	62.2	3.3	1686
9	0	0	283	22	503.8	62.2	3.3	1698
9	593	13	284	18	503.7	62.2	3.3	1707

For B type channels, the data required in section I-6420(a) is included in the end-of-scan printout. Each pulse yielding data with a % DAC at least as high as the evaluation level or the back echo level lists the channel number, back echo time and amplitude (BET and BEA), and indication time and amplitude (IT and IA). If data is to be reported at 1/2 B.E. amplitude, the pulses need only be at least 1/2 the back echo amplitude.

RELX and RY/AZ are as for the P, T, and W type printout. The depth in inches and the scanner position in encoder units follow.

Data Bridges

CONTINUE? Y

or

CONTINUE? N

In post processing, at the end of a run, a line will query "CONTINUE?". A "Y" answer means the current data will be combined with data from the next run, even if a calibration recheck lies between them. The indication number will not be reset. A "N" answer means the UT inspection data, if any, will be printed out, with its final combinations and evaluations.

The bridge between runs is necessary when several runs were made to complete a single inspection pass but the runs cannot be combined in a way so that the data simulates a continuous run. This is may be due to a recheck in the middle of the run, or combining runs from different days, which means different channel parameters will be used. It may also be due to running first in the postive direction, then the negative to cover both halves of a nozzle (ie. runs of 0 degrees to 180 degrees and 360 degrees to 181 degrees). The result of the 'CONTINUE? Y' is that the computer will still combine any indication data obtained at overlap points (ie. at 0 degrees and 180 degrees).

At every 'CONTINUE? N' there will be printed on full reports

AVERAGE STEPSIZE = x.xx MAXIMUM STEPSIZE = .y.yy

Where x.xx and y.yy are in degrees for NOZZLE mode and in inches for VESSEL mode. These give the average and maximum steps for all the scans combined for this evaluation, except that any step before a scan numbered 1 is ignored. In VESSEL mode, the step is calculated from the odometer readings on the scan lines and translated to inches using the #ODOMETER UNITS/INCH.

LAMINAR/PLANAR Combinations

LAMINAR INDICATIONS JOINING PLANAR INDICATIONS

CH#	LAMINAR #	PLANAR #	DISPOSITION
1	2	3	
1	2	5	

LAMINAR indications may appear which are so close to PLANAR indications that, had they been PLANAR too, they would have combined. These LAMINAR indications and the nearby PLANAR ones are listed by channel and indication number. A space is left for a qualified operator to fill in an evaluation of the possible combination.

Indication Combination Printout

INDICATION COMBINATIONS								
CH#	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX
4	19	S N	325.34	327.44	608.74	610.16	3.62	4.10
4	104	L	331.01	331.22	653.72	653.72	4.09	4.09
<—	105	L	332.06	332.06	652.87	652.87	3.74	3.74
4	104	L	331.01	332.06	652.87	653.72	3.74	4.09
5	24	S Y	244.32	244.44	198.98	199.87	5.75	6.42
<—	26	S Y	244.53	244.63	198.02	198.35	6.21	6.41
—>	24	SMY	244.32	244.63	198.02	199.87	5.75	6.42
<—	27	S N	245.22	245.53	198.74	199.95	5.61	6.50
5	24	S N	244.32	245.53	198.02	199.95	5.61	6.50
.
.

The indication combinations printout has one primary purpose for inclusion in the final report: to account for the disappearance of indication numbers during the combination process.

The first line below the header contains the data for an uncombined indication. For each combination that is made, two additional lines are printed. The first of these, headed by a "<—", contains the data for the indication to be combined with the previous line. The next line contains data for the resultant combined indication.

If there are more combinations for the data, this next line will start with a "—>". When all combinations are complete, the line begins with the channel number instead of the arrow symbol.

In the examples above, indications 104 and 105 were combined, with the result having the lower indication number (104) of the two. Indications 24, 26, and 27 were combined into indication 24, as shown on the last line of the example. In this last case, the combinations resulted in a final indication with an altered type (two SUBSURFACE PLANAR Y indications first combined to form a SUBSURFACE MULTIPLE PLANAR Y, then this combined indication had a further combination with a SUBSURFACE NON-PLANAR to form a final SUBSURFACE NON-PLANAR indication).

The system does not combine two indications, then search for additional combinations. It first looks for and flags all potential combinations of single indications. After all potential indications are flagged, then the system performs the actual combination. In this way, premature combinations do not lead to otherwise unneeded combinations.

Indication combinations are given for the P, T, and W type channel indications. After the channel and indication numbers (or arrow symbols), the type of indication is listed in the T column. The main categories are PLANAR X (X), PLANAR Y (Y), NON-PLANAR (N), and

LAMINAR (L). PLANAR X and Y are subdivided as MULTIPLE PLANAR X or Y (MX or MY), PARALLEL PLANAR X or Y (PX or PY), and a third category where distinguishing MULTIPLE from PARALLEL PLANAR X or Y is impossible by the computer (*X or *Y).

PLANAR and NON-PLANAR are further refined by the prefixed classifications OUTER SURFACE (O), INNER SURFACE (I), and SUBSURFACE (S).

The minimum and maximum X, Y, and depth values are given in inches.

COPLANAR Combinations

COPLANAR X COMBINATIONS										
CH#	IND.	#S	MINX	MAXX	MINY	MAXY	SUM A/TZ	AV. ALLOW/TZ	EVAL	
4	7	8	118.34	118.74	554.99	556.39	3.61	3.63		
	13									
4	7	13	118.74	119.23	554.99	555.32	3.27	2.26	****	
.		
.		

Overlapping PLANAR indications are examined by the program to see if their combined depths are within the limits described in section IWB-3511.1(c) and figure IWB-3514.1 of the December, 1975 edition of the code. The process occurs after the indications have been combined but before the final evaluation. The algorithm used is described elsewhere. The PLANAR X combinations are checked, then PLANAR Y combinations.

In each case, if any combinations are found, the channel number is listed followed by the indication numbers. Only 2 indication numbers are listed per line, so some indication numbers, like 13 above, may be listed without the other information, on the following lines. The X and Y boundaries of the overlapped area are given, followed by its value and allowed value. Asterisks appear in the last column if the value is not less than the allowed value.

Indication Evaluation Table

FINAL EVALUATION TABLE										
CH	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VAL	ALLOWED
4	19	S N	325.30	327.40	608.70	610.10	3.60	4.10	3.10	3.0
									3.10	3.4
4	104	L	331.00	332.00	652.80	653.70	3.70	4.10	0.9	23.1
.
.

The final evaluation table is similar to the combinations table, with the evaluation information added. Indications from all channels are listed; LAMINAR indications fall at the end. Indications are listed so that those near each other in X or Y

location are near each other on the list. In the VAL column is the calculated inspection value for the indication (i.e. A/TX for PLANAR and NON-PLANAR indications, AREA for LAMINAR). The ALLOWED column gives the allowed values, interpolated from the tables listed at the beginning of the report.

X and Y projections are evaluated separately for NON-PLANAR indications, with the X evaluation on the first line and the Y on the second.

The final column is left empty if the indication is within the allowed limit. Four asterisks are printed otherwise. The asterisks mean that the computer's evaluation of the data yields an indication whose size and location exceeds the allowable values; it does not imply that the indication is not allowable by the code. Indications with asterisks require further evaluation: either explanation of the data (such as operator knowledge that a bracket or beveled weld caused spurious data to be obtained by the computer) or re-investigation of the area in question using standard manual UT scanning techniques. The latter approach is required since Section XI of the code was designed for analysis of manually obtained data. The computer is much more diligent and precise in its data collection than is humanly possible and, thus, its evaluations will in general exceed those obtained by manual scanning.

END OF PASS

This is printed after all indication evaluations have been printed. If there were no indications, END OF PASS is the only line printed.

Long Printouts of Indications

>INDICATION COMMANDS: PRINT INDICATION: BN -0019

INDICATION REPORT: CURRENT - BN -0019

UT CHANNEL 4 IND#: 19
 CLASSIFICATION: SUB-SURFACE NON-PLANAR

CHARACTER: (X) ELLIPTICAL
 (Y) ELLIPTICAL

LOCATION:

MINX = 325.3 MAXX = 327.4
 MINY = 608.7 MAXY = 610.1
 MINDEP = 3.6 MAXDEP = 4.1

EVALUATION:

AXIS	A	L	A/L	A/T%	ALLW	LOW	HIGH
(X)	0.24	2.15	0.11	3.10	3.0	(0.10,2.9)	(0.15,3.2)

INDICATION REQUIRES FURTHER EVALUATION

(Y)	0.24	1.41	0.17	3.10	3.4	(0.15,3.2)	(0.20,3.6)
-----	------	------	------	------	-----	------------	------------

NO FURTHER EVALUATION NECESSARY

INDICATION REPORT: HISTORIC - BN -0019

.....

If an indication requires further evaluation, the post processor operator may elect to print a long form version of the data contained in the Evaluation Table described above. This may be done by a command issued in the middle of the report which prints specific indications, or a command before the report which prints all indications requiring further evaluation.

The printout covers one page and contains the same information as was in the evaluation table, with more details. The two sections, current and historic, contain identical information for the base line examination.

The UT channel and indication numbers are listed first, followed by the X and Y character: CIRCULAR, SEMI-CIRCULAR, ELLIPTICAL, SEMI-ELLIPTICAL, or LAMINAR. The minimum and maximum X, Y, and depth values are listed.

PLANAR and NON-PLANAR indications list values for A, L, A/L, A/T%, and the allowed value (ALLW). The A/L and A/T% values used for

interpolation are listed within parentheses in the LOW and HIGH columns. These values are taken from the evaluation table at the beginning of the final report.

LAMINAR indication reports list the indication lengths in the X and Y directions (LX and LY), the true calculated area (RECT), the adjusted area stipulated by the code (AREA), and the interpolated allowed area. No adjustment of the RECT as allowed by the Winter of 1975 code has been made and so the value always equals the AREA.

"***INDICATION REQUIRES FURTHER EVALUATION***" is printed if the indication exceeds the allowed limit in that projection (X or Y). As discussed above, this is merely a sign that additional standard evaluation is required and in no way implies unacceptability of the indication at this point.

"NO FURTHER EVALUATION NECESSARY" is printed if the values are in bounds.

During post processing, only indications having at least one projection requiring further evaluation were selected for the long form evaluation printout.

III. GENERAL ITEMS

COMMENT: XXXXXX

Occasionally, comments are written in the report, either by the operator in the field, or during post editing, to explain changes made. Comments made in the field start with "COMMENT:"; those made during post editing usually begin with an asterisk or a dash.

>

A few ">"s may appear in the printout, usually at the end or near comments. These are fragments of the post processing system and have no importance.

Occasionally, table headers appear in inappropriate places, e.g. at the bottom of a page, with the table headless on the next page. This is due to the fact that the post processor must rely on the layout of the data on the original tape and, in some instances, this causes table headers which fall at inopportune places.

-NOTE: or

*NOTE:

Notes may be inserted during post editing, referencing a separate sheet of explanations. This may be used instead of an in-line comment which might be lengthy or repetitious: several notes may reference the same explanation. The note ID will be followed by a

page number, time, and date. These refer to the page, time, and date listed on the last page read before the note. This is to help the reader relate the note to events shown on the original printout of the run. The Post Editor and Processor are set to always print notes starting with an asterisk, and only print notes starting with a dash on full reports. These choices may be altered during post editing.

GENERAL ELECTRIC

INSTALLATION AND
SERVICE ENGINEERING
DIVISION

GENERAL ELECTRIC COMPANY, MASCHHELLMAC OFFICE COMPLEX, 1000 FIRST AVE.
KING OF PRUSSIA, PENNSYLVANIA 19406

March 22, 1982

GP-KR-2-004

RECEIVED
MAR 26 1982
NUCLEAR REC. SYS.

Mr. E. B. Poser
Bechtel Power Corporation
P. O. Box 3965
San Francisco, CA 94119

RE: PENNSYLVANIA POWER & LIGHT CO.
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT #1
CONTRACT NO. 8856-M-166

SUSQUEHANNA SES
ER 100450
FILE No. 899M166

Dear Mr. Poser:

Enclosed is Summary Report #9 for use of liquid penetrant procedure
18XA7400 in lieu of procedures ISE-QAI-331 and 18XA8402.

Please advise us if you have any questions.

Very truly yours,



E. F. Reczek
NDE Specialist
I&SE, Nuclear Plant Services

EFR/kw

cc: Distribution

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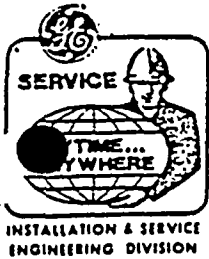
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REPORT #9

SUMMARY REPORT AND JUSTIFICATION FOR THE USE OF LIQUID PENETRANT
PROCEDURE 18XA7400 IN LIEU OF PROCEDURES ISE-QAI-331 AND 18XA8402 ON
SUSQUEHANNA UNIT #1.

LIQUID PENETRANT RE-EXAMINATION RESULTS OF RECIRCULATION INLET NOZZLE
N2C, NOZZLE TO SAFE END WELD ON UNIT #1.

REFERENCE: PENNSYLVANIA POWER AND LIGHT CO.
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT #1
CONTRACT NO. 8856-M-166
RPV PRE-SERVICE EXAMINATION



SUSQUEHANNA UNIT #1

Liquid penetrant (surface) examination of RPV Nozzle to Safe-End and Safe-End to Safe-End Extension Welds is required by ASME Section XI Table IWB 2600 and Contract 8856-M-166 as part of the Susquehanna Unit #1 Pre-Service Examination. Liquid penetrant examinations were performed on these Welds in accordance with either GE-I&SE Procedure ISE-QAI 331 Revision 2 or GE-IS&E Procedure 18XA8402 Revision 1 to satisfy the code and contract requirements.

A liquid penetrant examination on the subject Welds was also required as part of the RPV Internals Installation Sub-Contract FSC-80. This examination was performed per sub-contract requirements after the RPV Systems Hydrostatic Test. The examination was performed in accordance with GE-I&SE Procedure 18XA7400 Revision 1, the approved procedure for the internals installation. The post-hydro examination acceptance criteria was ASME Section III NB 5330 which is more stringent than the Section XI criteria. Indications exceeding the allowable limits of NB 5330 were detected and removed by grinding. This grinding voided the pre-service liquid penetrant examination on the portions of the Welds affected. Additionally one Safe-End was removed and replaced by a Cap. The liquid penetrant examination on this Weld was also performed using 18XA7400 Revision 1 after the systems hydro. The affected Welds are as follows:

N1A	RECIRCULATION OUTLET	NOZZLE TO SAFE-END
N3D	MAIN STEAM OUTLET	NOZZLE TO SAFE-END
N4A	FEEDWATER	NOZZLE TO SAFE-END
N5A	CORE SPRAY	NOZZLE TO SAFE-END EXTENSION
	RECIRCULATION INLET	NOZZLE TO SAFE-END
N9	CRD RETURN	NOZZLE TO CAP

ASME Section XI makes provisions for use of shop and field examinations in lieu of on-site pre-service examinations in IWB2100 b. Provided that 1) hydro is completed, 2) techniques are equivalent, and 3) records are consistent with Section XI requirements.



The following rationale was used to allow the post-hydro LP examinations to serve in lieu of re-performing a pre-service LP examination on the portions of the welds that had repair grinding performed.

1. The indications removed by the post hydro repairs were detected during the pre-service examinations and dispositioned as acceptable per ASME Section XI requirements.
2. An additional hydrostatic test of the Welds was performed prior to the post hydro examinations.
3. No technical difference exists between the three procedures. Cleaning, penetrant application, coverage, developer application, dwell times, temperatures and penetrant materials are equivalent. Only the acceptance criteria differs. A difference exists in the area to be evaluated. Section III requires the Weld plus 1/2"; Section XI requires the Weld plus 1/2T or 1" whichever is the lesser. All post hydro repairs fell within the Weld plus 1/2" area, therefore the additional coverage required by Section XI has not been affected and the original Section XI examinations are still valid for these areas.
4. The records generated satisfy ASME Section XI requirements.

During the comparison of data and procedures described above, Nozzle to Safe-End Weld N2C was noted to have differing results, i.e., rejectable to Section XI and acceptable to Section III on the post hydro data. To resolve these differences a re-examination was performed on the Weld in question. The examination was performed using the Section XI liquid penetrant procedure 18XA8402 and witnessed by Messers. J. Linderg, P.P.&L Q.A.; W. Miller, G.E. Co. Q.A. Level III PT; and E. F. Reczek, G.E. Co. NDE Specialist; W. Rogers, ANII, Factory Mutual Engineering Assoc. Two rounded indications each less than 1/16" in size were detected. These results agree with the post-hydro results.



Enclosed with this report are the following supporting documents:

- o Special Process Control Sheets (SPCS) detailing Post Hydro P.T. results
- o Supplier Deviation Disposition Request #107
- o R.P.V. Nozzle Repair Traveler #17T-4
- o Special Process Control Sheet #17S-4-1 detailing repair P.T. results
- o Special Process Control Sheet #RI-1, Post Hydro P.T. results of Nozzle N2C.
- o P.T. Report #8001-82 dated 2/25/82

E. F. Reczek

E. F. Reczek
NDE Specialist
General Electric Company - I&SE
Nuclear Plant Services

CONCUR:

Wade F. Miller

W. F. Miller, Level III P.T.
NDE Specialist
General Electric Company - I&SE
Engineering

Susquehanna - Job 8856

Supplier Deviation Disposition Request

FO4221.1

10.1.87 File 8/15/1

FOR SUPPLIER USE	
Supplier SDDR No. 107	Date Submitted 11-6-80

NOTE: The reverse side of this form contains the instructions for its preparation and use. Items marked with an asterisk (*) are for Bechtel entries only.

FOR BECHTEL USE	
Bechtel SDDR No. 110	Date Received 1-27-81

Supplier shall complete all blocks 1 through 18 with black ink or typewriter. Use N/A for Not Applicable.

1. Supplier Name: <u>General Electric Co.</u> Address: <u>P.O. Box 129</u> City & State: <u>Berwick, PA</u> Zip: <u>1603</u>					
2. Supplier's Order No. N/A	3. Supplier's Part No. B11-A001	4. Supplier's Part Name	5. Date Deviation Determined 11-4-80	6. Previous SDDR No. & Date 106 10-31-80	
7. Bechtel P.O. No. 8856-FSC-80	8. Bechtel Part No. N/A	9. Bechtel Part Name N/A	10. Bechtel Inspector Notified N/A	11. Bechtel Eng. Notified D. Dhariz	

12. Qty or Serial No. B11-A001	13. Deviation Description (Attach extra sheets, photographs, sketches, etc. as necessary) The following relevant indications were found during the post hydro liquid penetrant examination of the RPV nozzle to safe-end weld. These indications constitute a reject until proven to be non-relevant. Nozzle N1A recirc outler nozzle to safe-end weld. Nozzle N3D main steam outler to safe-end weld. Nozzle N4A, N4D feedwater nozzle to safe-end weld. Nozzle N5A core spray nozzle to safe-end extension.
-----------------------------------	--

14. Supplier's Disposition Classification: ☐ Use As Is ☒ Repair ☐ Modify Bechtel Requirement

15. Proposed Disposition and Technical Justification: (Attach extra sheets, sketches, etc. as necessary)
Grind indications in incremental depths. The total not to exceed the minimum required thickness. Repeat the liquid penetrant test until the surfaces have no unacceptable defects. Blend the depression or errund area uniformly.

16. Associated Supplier Document Change (s):	none	SUSQUEHANNA INTERNALS INSTALLATION
		PROJECT NO. SQL-771
		SUBCONTRACT NO. 8856-FSC-80

17. Cost Effects: none

18. Suppliers Authorized Representative
Signature: [Signature] Title: QC Supervisor
Name: J. Taylor Date: 11-6-80

19. Bechtel Engr. Action: ☒ Proposed Disposition Accepted ☐ Proposed Disposition Rejected
Design Doc. Changes: Yes ☐ No ☒
Spec. Dwg. No. Due Date

20. Bechtel Disposition Statement Including Justification (Attach extra sheets, sketches, etc. as necessary)
Project Engineering concurs with the proposed disposition to REPAIR the indication found on the RPV nozzle to safe-end weld. Repair shall be accomplished in accordance with GE-FDDR-KR1-272, Rev O. Note that grinding shall be done in .015 inch increments. GE-NERB review & approval was received in EAG-3331 dated 1-27-81.

21. Bechtel Acceptance GS: <u>[Signature]</u> OE: <u>[Signature]</u>	Date: <u>2/5/81</u>	22. Supplier <u>[Signature]</u>	Date: <u>2-27-81</u>
23. Bechtel Signature		Date	



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SPECIAL PROCESS CONTROL SHEET

10.7.86
IMP. NO. 70-71-1

S.P.C.S. No. 82-1 887
Page 1 of 2 2-3-81

Ref Traveler No. PHNE-1 Page 1 of 1 Sequence No. 2

Operation: Liquid penetrant examination of recirc. outlet nozzle to safe-end weld.

Procedure of Instruction & Rev. 18XA 7400 Rev 1

Initial & Date:

RAH 11-4-80

ACCEPT

REJECT

COMMENTS

N1A

✓

3 linear indication 3 1/2"
32 edge of nozzle with 15
rounded indications arising
it - less than 64. Replied
3 times - remained same.
see attached info. sheet.

N1B

✓

no relevant indications

SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. C355 - FSC - 80

Traveler signed off:

RAH

Initial

11-4-80

Date

M. GILL

II

Examiner's name and level



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SICS NO. 20-

PAGE 2 of 2

10.1.86

FILE NO. 10.1.86

SUSQUEHANNA UNIT #1

NOZZLE IDENTIFICATION

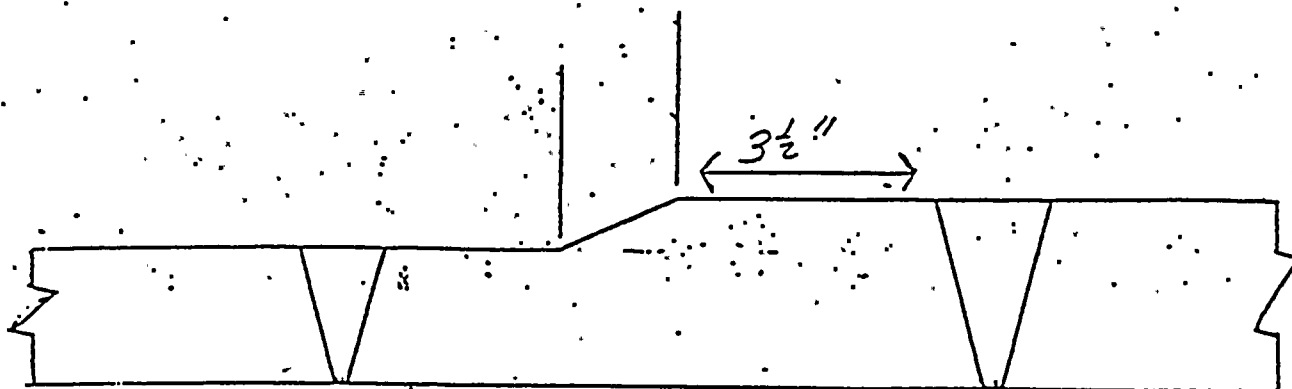
N1A

EXAMINER

M. GILL II

DATE:

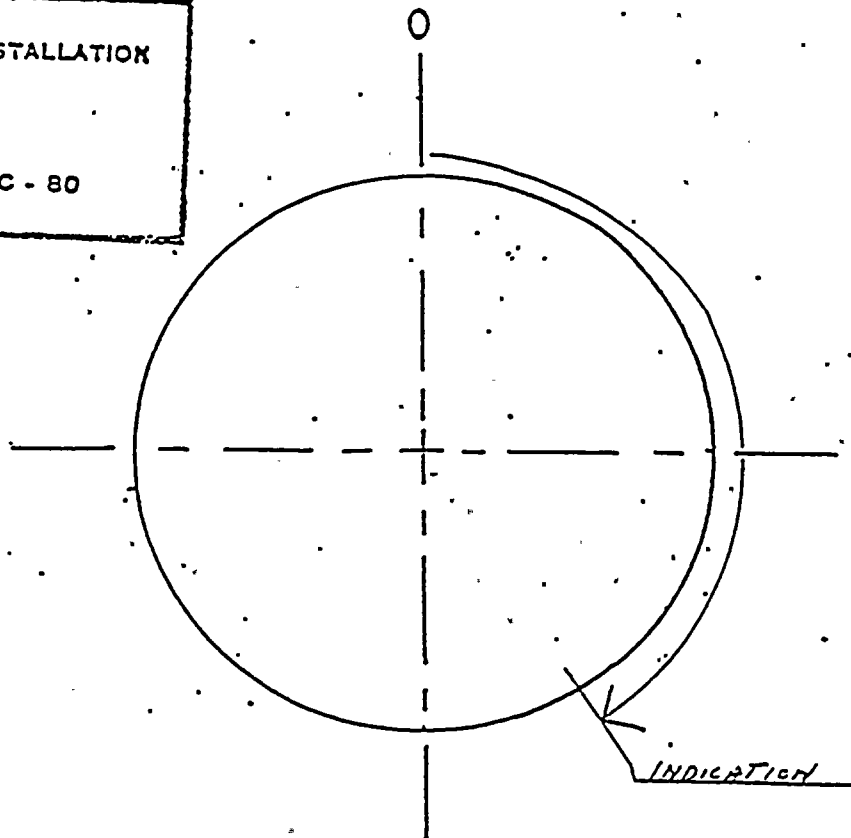
10/29/80



SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. 0656 - FSC - 80





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10.1.86 (S.P.C.S. No. ME-1
FILE NO. 10.1.86 Page 1 of 2
Filed 8/15/81

Ref Traveler No. PNIE-1 Page 1 of 1 Sequence No. 2

Operation: Liquid penetrant examination of main steam outlet nozzle to safe-end weld.

Procedure of Instruction & Rev. 18XA 7400 Rev 1

ACCEPT

REJECT

COMMENTS

N3A

✓

no rejectable indication

N3B

✓

no rejectable indication

N3C

✓

no rejectable indication

N3D

- ✓ ① Rounded indication - $\frac{1}{4}$ " @ 2:00
5 $\frac{1}{4}$ " from safe end edge.
- ② Linear indication $\frac{1}{4}$ " @ 12
transverse to weld, 5 $\frac{1}{2}$ " from
of safe end.
- ③ Linear indication $\frac{1}{4}$ " @ 1:30 - 6
from edge of safe end. (up from 12)
- ④ Linear $\frac{4}{32}$ " @ 3:00 transverse to weld
2" from safe end.
- ⑤ Rounded indication - $\frac{1}{16}$ " @ 7:00 4 $\frac{1}{4}$ " from
edge of safe end. M. Hill II

Traveler signed off -

ROH

11-4-80



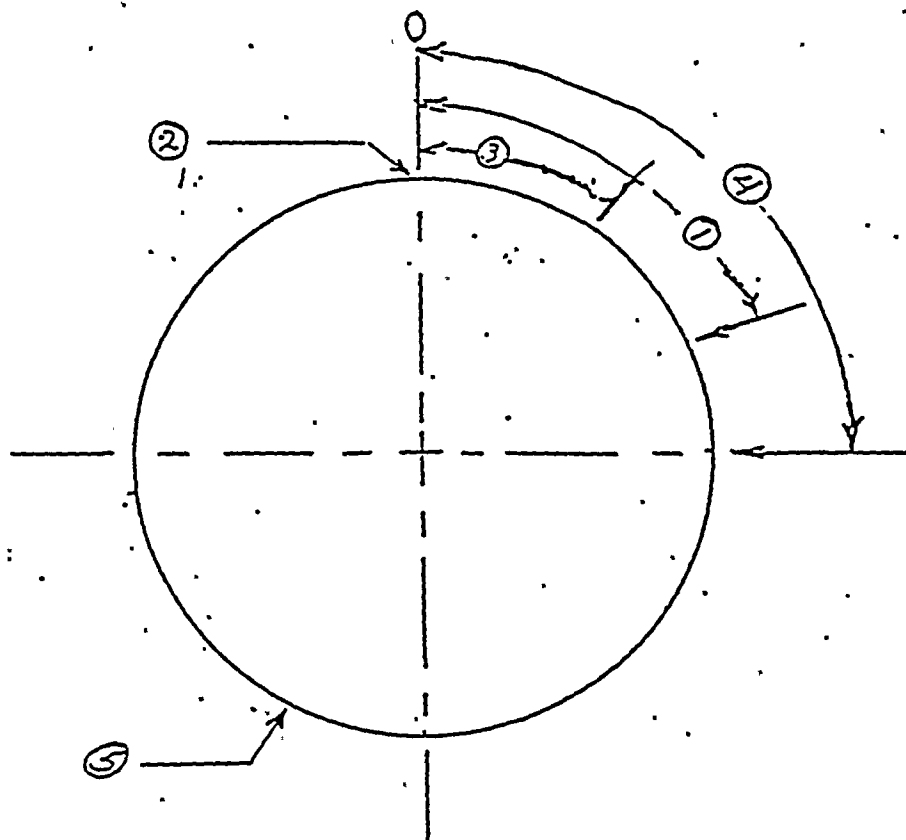
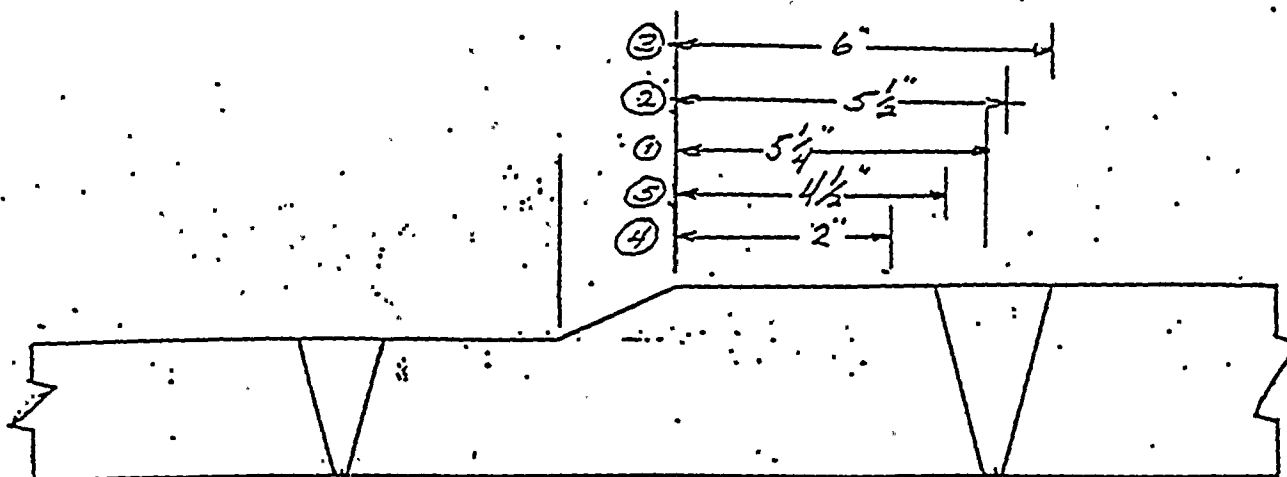
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SUSQUEHANNA UNIT #1

NOZZLE IDENTIFICATION
EXAMINER
DATE

N4D
M. GILL
11-3-80

SPCS NO. 1175-
PAGE 2 of 2
10.1.86





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SPECIAL PROCESS CONTROL SHEET

10.1.86 (S.P.C.S. No. 74-1)
FILE NO. 74-173 Page 1 of 3 875
8-5-81

Ref Traveler No. PHNF-1 Page 1 of 1 Sequence No. 2

Operation: Liquid penetrant examination of feedwater nozzle to safe-end welds.

Procedure of Instruction & Rev. 18XA 7400 Rev 1

ACCEPT

REJECT

COMMENTS

N4A

LIN. $\frac{3}{32}$ @ 11:00 EDGE OF WELD
VESSEL SIDE $9\frac{3}{8}$ " FROM END
OF SAFE END

N4B

no rejectable indications

N4C

no rejectable indications

N4D

LIN. - $\frac{3}{32}$ " @ 3.00 $8\frac{1}{8}$ " FROM
EDGE OF SAFE END.

N4E

no rejectable indications

N4F

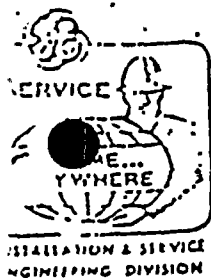
no rejectable indications

SUSQUEHANNA INTERNALS INSTALLATION
PROJECT NO. 801-771
SUBCONTRACT NO. 8058 - FSC - 80

Traveler signed off - RAH
Initial

11-4-80
Date

M. Hill II
Examiner's name and level



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SRES 110. F11-1
TYPE 2-613
FILE NO 10-173

SUSQUEHANNA UNIT #1

NOZZLE IDENTIFICATION

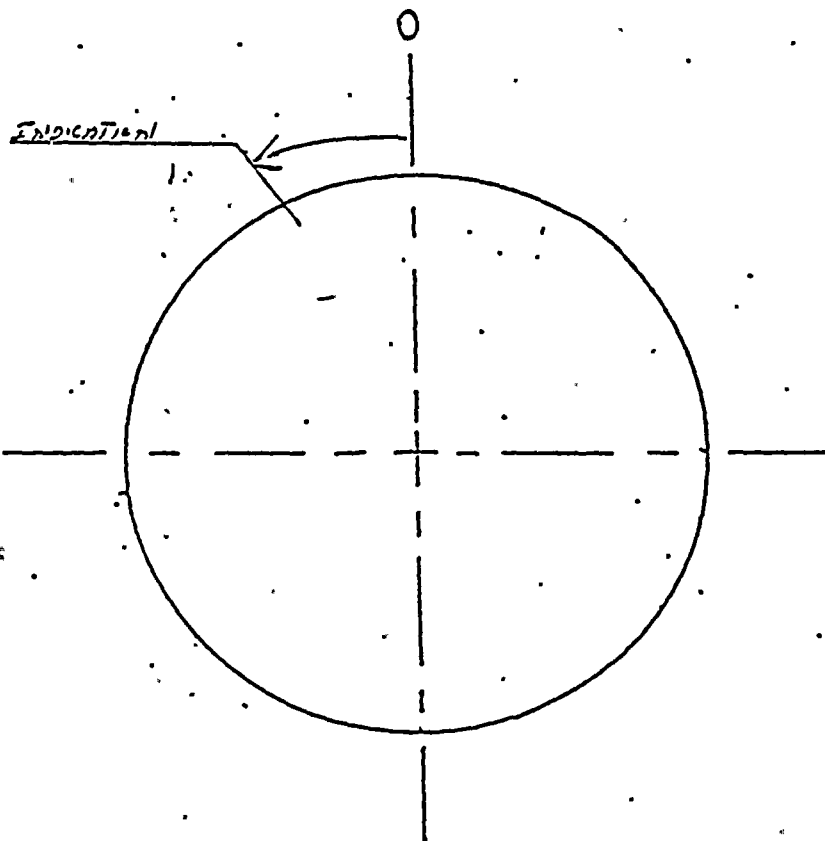
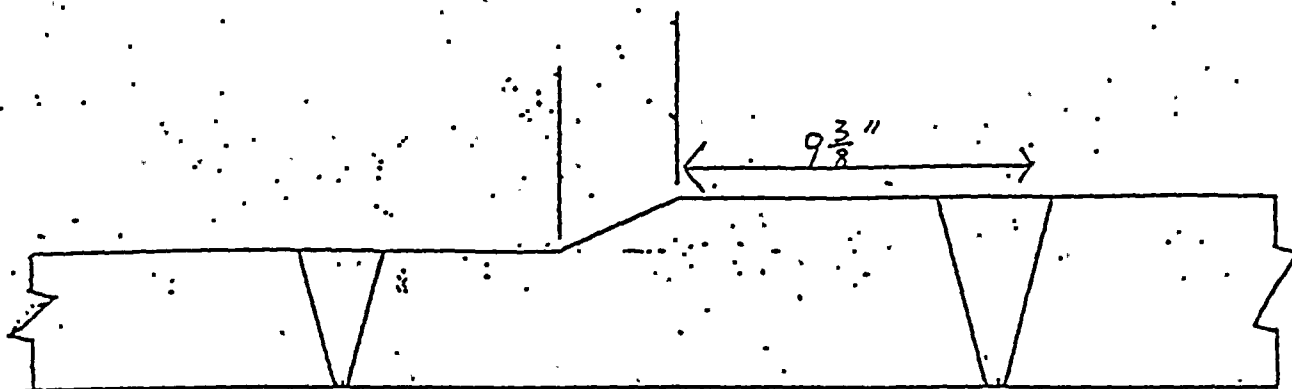
N4A

EXAMINER

M GILL II

DATE

10-30-80





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SAS 10.1.73
PAGE 3 of 3

FILE NO. 10.1.73

SUSQUEHANNA UNIT #1

NOZZLE IDENTIFICATION

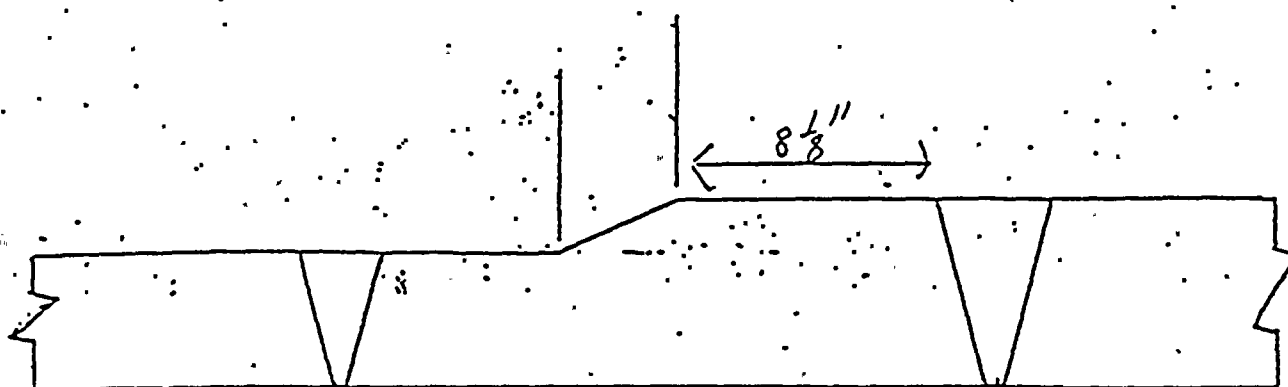
EXAMINER

DATE

N4D

M. GILL II

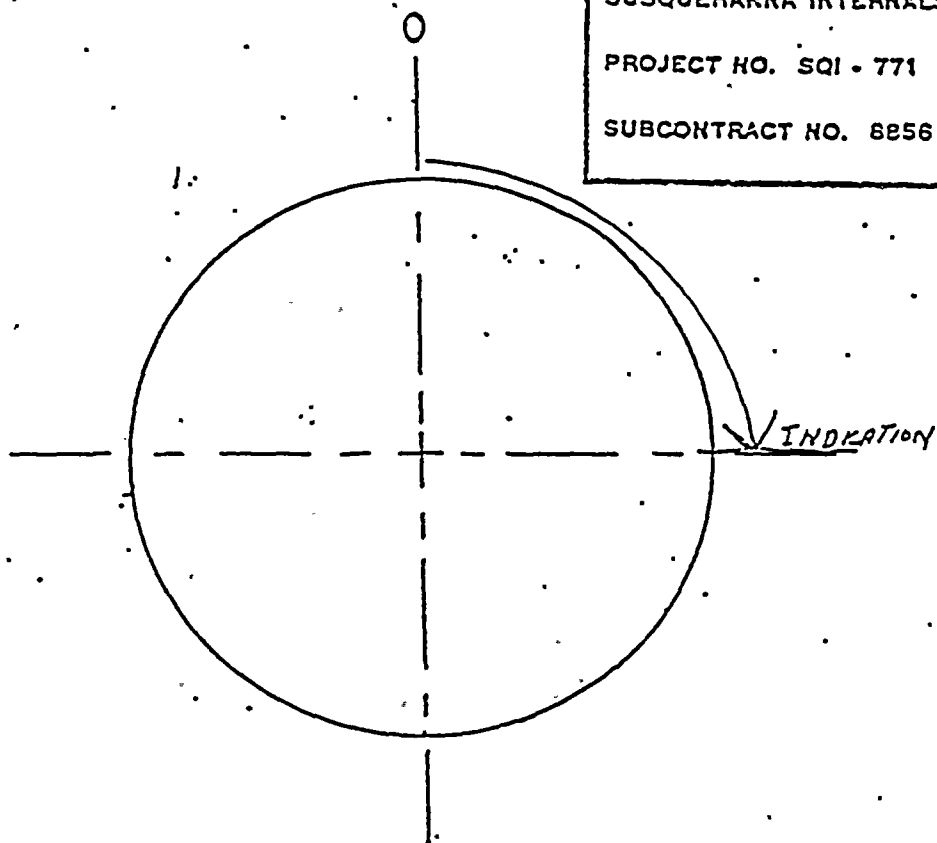
10-30-80

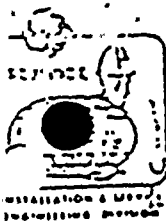


SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. 8256 - FSC - 80





10.1.66
FILE NO. 17-57-5

S.P.C.S. No. CE-1 897

Page 1 of 2 8-3-8

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SPECIAL PROCESS CONTROL SHEET

Ref Traveler No. PUNE-1

Page 1 of 1

Sequence No. 2

Operation: Liquid penetrant examination of core spray nozzle to safe-end to extension welds
Procedure of Instruction & Rev. 18XA 7400 Rev 1

ACCEPT

REJECT

COMMENTS

N5A

N-SE

✓

3 LIN. INDICATIONS @ 9:00
2- $\frac{5}{16}$ " 1- $\frac{1}{16}$ " 2- $\frac{3}{8}$ " FI: m
EDGE OF SAFE END

SE-EXT

✓

no rejectable indications

N5B

N-SE

✓

no rejectable indications

SE-EXT

✓

no rejectable indications

SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. 8856 - FSC - 80

Traveler signed off -

ROH

11-4-80

MM. Hill II



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SFCS 103. CS-1

PAGE 2 of 2

10.1.80

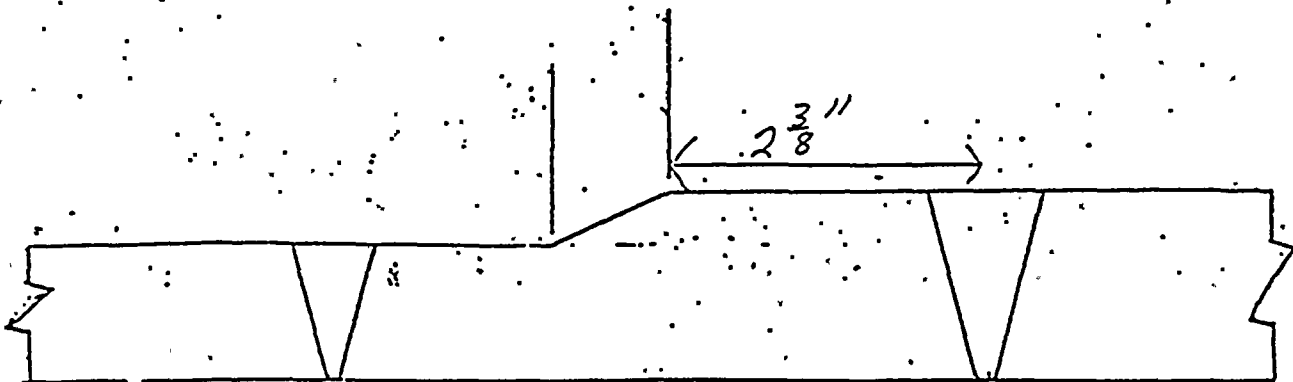
FILE NO. 103-103-103

File 1/1/81

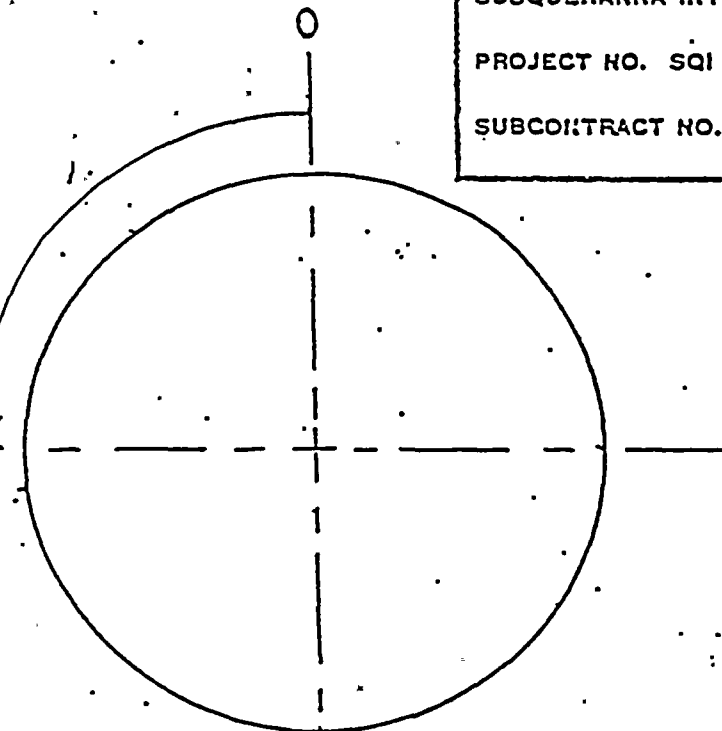
SUSQUEHANNA UNIT #1

NOZZLE IDENTIFICATION
EXAMINER
DATE

NSA
M. GILL
10-30-80



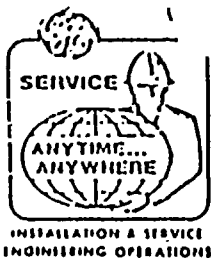
INSERCTIONS



SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. 8856 - FSC - 80



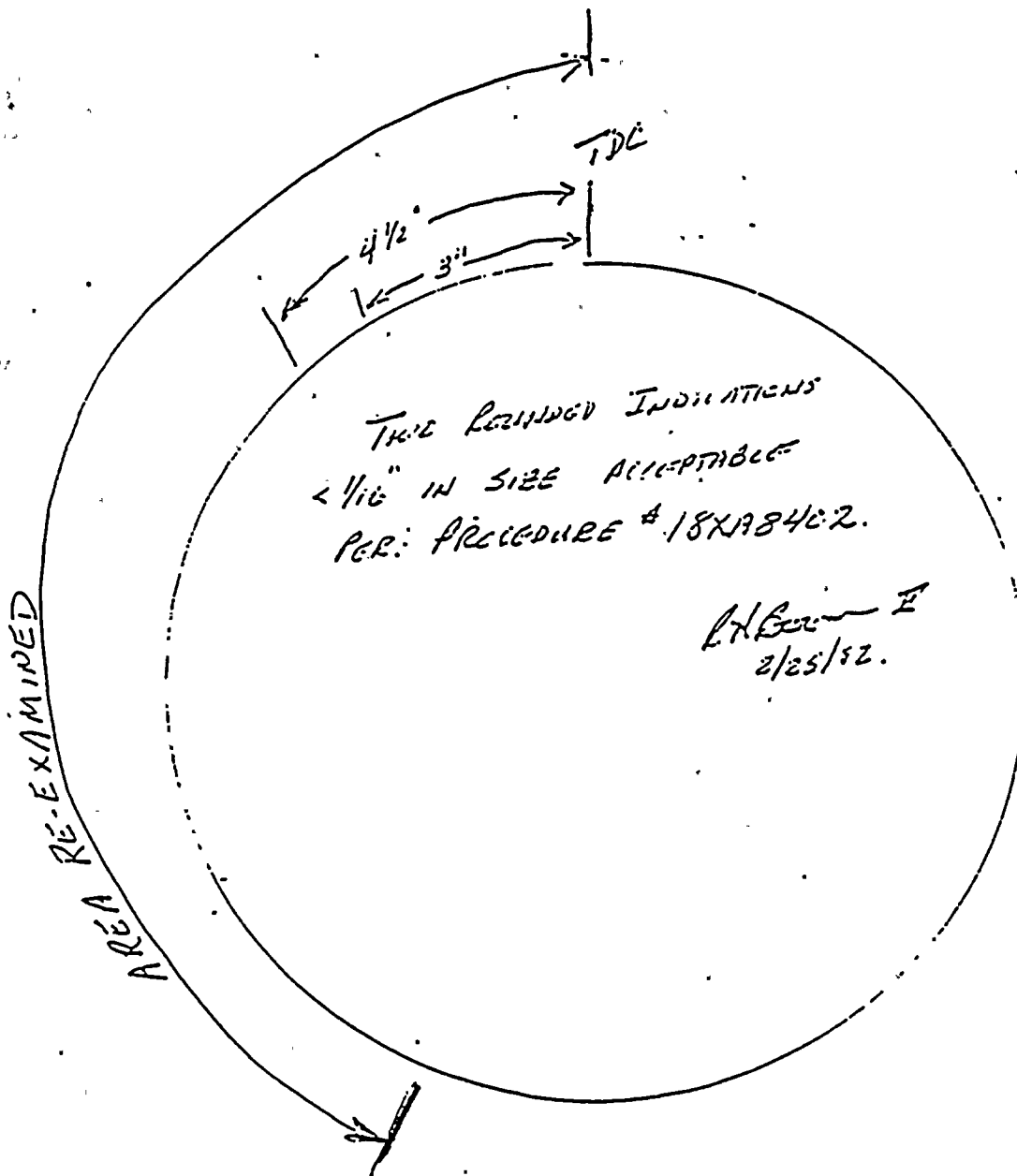
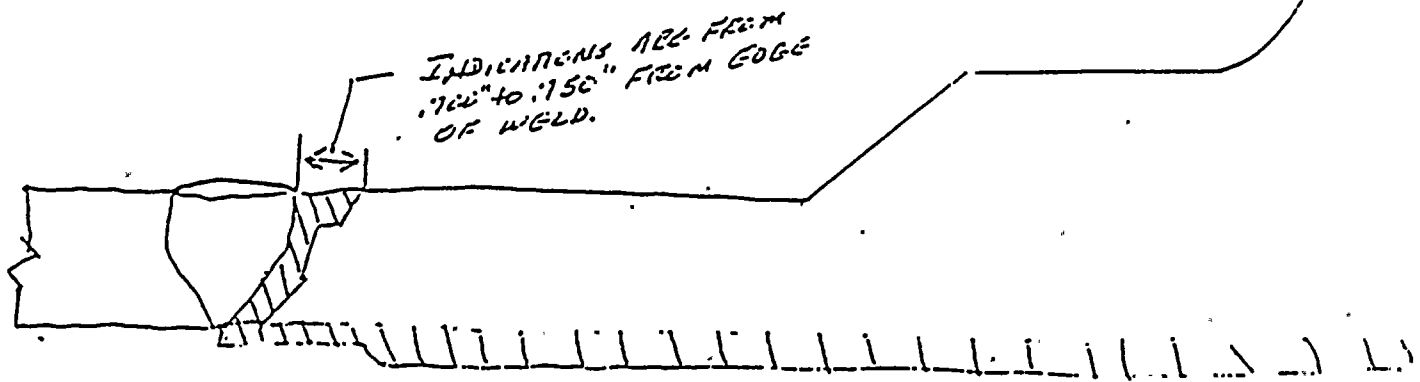
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10.1.99
FILE NO. 10.1.1
File 2/15/81

TRAVELER

DESCRIPTION OF WORK RPV NOZZLE REPAIR
TRAVELER # 17T-4 REV 0 ITEM LIST # N/A JOINT # N/A REPAIR N/A
CODE CLASS N/A LAYOUT # N/A PROJECT Susquehanna Intern
DRAWING # 197R633 REV. 13 PROJECT # SQI-771 PREPARED BY/DATE D. L. Lister 2/15/81
SITE MANAGER APPROVED BY/DATE Ronald W. Dufresne 2/10/81 O.C. APPROVED BY/DATE J. H. 2-10-81 PAGE 1 OF 2
REVIEWED BY R. Morgan (RNF) 2-16-1981 DATE 2-16-81

SEQ	OPERATION EXAMINATION OR TEST	PROCEDURE OR INSTRUCTION AND REVISION	NON-CONFORMITIES		PRODUCTION OPERATION COMPLETED		QC COMPLIANCE VERIFICATION		AI INSPECTOR	CUSTOMER IF REQUIRED
			RE-FER TO	COMPLE-TER BY DATE	BY	DATE	BY	DATE		
1	Grind and/or file all unacceptable indications in 0.015" increments until gone. Dye penetrant examine after each increment.	FDDR# KR1-272, R.O. Spec. # 18XA7400, R.1		<i>2</i> <i>NC# 112</i> <i>2-18-81</i>	<i>PD</i>	<i>2/13/81</i>	<i>PD</i>	<i>M</i> <i>2-16-81</i>		
1A	Nozzle N1A, Recirc. outlet nozzle to safe end.	SPCS 17S-4-1 <u>REV 0</u>			<i>PD</i>	<i>2/13/81</i>	<i>PD</i>	<i>M</i> <i>2-12-81</i>	<i>C</i> <i>A. Morgan</i> <i>2-16-81</i>	
1B	Nozzle N3D, Main Steam outlet to safe end.	SPCS 17S-4-1 <u>REV 0</u>			<i>PD</i>	<i>2/13/81</i>	<i>PD</i>	<i>M</i> <i>2-16-81</i>	<i>WITNESS</i> <i>A. Morgan</i> <i>2-16-81</i>	
1C	Nozzle N4A, Feedwater nozzle to safe end.	SPCS 17S-4-1 <u>REV 0</u>			<i>PD</i>	<i>2/13/81</i>	<i>PD</i>	<i>M</i> <i>2-12-81</i>	<i>C</i> <i>A. Morgan</i> <i>2-16-81</i>	
1D	Nozzle N4D, Feedwater nozzle to safe end.	SPCS 17S-4-1 <u>REV 0</u>			<i>PD</i>	<i>2/12/81</i>	<i>PD</i>	<i>M</i> <i>2-12-81</i>	<i>C</i> <i>A. Morgan</i> <i>2-16-81</i>	
1E	Nozzle N5A, Core Spray nozzle to safe end extension.	SPCS 17S-4-1 <u>REV 0</u>			<i>PD</i>	<i>2/12/81</i>	<i>PD</i>	<i>M</i> <i>2-12-81</i>	<i>C</i> <i>A. Morgan</i> <i>2-16-81</i>	





SHEET 1 OF 2

LIQUID PENETRANT EXAMINATION REPORT
(Color Contrast - Solvent Removable)

PROJECT: SYSGHEHANNA #1 PROJECT NO.: SQI-772-1

REPORT NO.: 8001-82

PROCEDURE NO.: 18XA5402 REVISION NO.: 1

WELD CATEGORY B.F. TEMPERATURE WITHIN 65°F to 125°F ☒ Yes ☐ No

Penetrant Materials:

Penetrant Material Manufacturer MAGNAFLUX CORP.

Cleaning Solvent Type: SKP-11F Batch No. 78G120

Penetrant Type: SKL-11F / SKL-5 Batch No. 78G024

Developer Type: SKD-NF Batch No. 78G139

Examination Results:

Item Identification (e.g. system, component, weld ident. material, part no.)	Accept	Reject	Remarks/Time
<u>DECIRC INLET NR.C. 14226 TO 14226-1</u> <input checked="" type="checkbox"/>			<u>1-1/2 HR.</u> <u>SEE ATTACHED SKETCH</u>

Sketch Attached: #8001 SKETCH Yes ☒ No ☐

Inspector: R.A. Besson Level: II Date: 2/25/

Reviewed by: Wade H. Miller Level: III Accept ☒ Reject ☐

Meets ☒ Does Not Meet ☐ The requirements of Section XI, Wint



10.1.86 ()
S.P.C.S. No. 87-1
Page 1 of 2
Date 8/1/81

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Ref Traveler No. PHKE-1 Page 1 of 2 Sequence No. 2

Operation: Liquid penetrant examination of re-circ. inlet nozzle safe-end welds.

Procedure of Instruction & Rev. 18XA 7400 Rev 1

	<u>ACCEPT</u>	<u>REJECT</u>	<u>COMMENTS</u>
N2A	<u>✓</u>	<u> </u>	<i>no relevant indications</i>
N2B	<u>✓</u>	<u> </u>	<i>no relevant indications</i>
N2C	<u>✓</u>	<u> </u>	<i>no relevant indications - 2-LINEARS AT 11:00 - 1/2" FROM EDGE OF WELD VESSEL SIDE - 501 1/2" LONG WITH A DOT OF PERISITY ON END.</i>
N2D	<u>✓</u>	<u> </u>	<i>no relevant indication</i>
N2E	<u>✓</u>	<u> </u>	<i>no relevant indications</i>

SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. 8856 - FSC - 80

Traveler signed off -

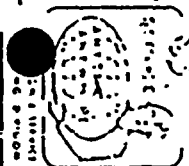
M.L.G. II

10/29/80

M. GILL

II

Continuation name and level



10.1.79
FILE NO. 22-61-1
S.F.C.S. No. 1/S-4-1
Page 1 of 1
SPECIAL PROCESS CONTROL SHEET

Ref Traveler No. 17T-4 RCU 2 Page 1 of 2 Sequence No. 1A, 1B, 1C, 1D, 1E

Operation: RPV NOZZLE REPAIR

Procedure of Instruction & Rev. FDDR & KRI-272, Rev. 0

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THIS IMPRINT IS RED.

NOZZLE	LOCATION	ALL INDICATIONS REMOVED	DYE PENETRANT EXAMINATION
N1A	Recirc Outlet to Safe End	OPD 2/13/81	ACCEPTABLE OPD II 2-12-81
N3D	Main Steam Outlet to Safe End	OPD 2/13/81	ACCEPTABLE OPD II 2-16-81
N4A	Feedwater to Safe End	OPD 2/13/81	ACCEPTABLE OPD II 2-12-81
N4D	Feedwater to Safe End	J. A. Santoni 2/12/81	ACCEPTABLE OPD II 2-12-81
N5A	Core Spray to Safe End Extension	J. A. Santoni 2/12/81	ACCEPTABLE OPD II 2-12-81

Traveler signed off.

Initial GT

Date 2-16-81

SUSQUEHANNA INTERNALS INSTALLITY
PROJECT NO. SQI - 771



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10.1.77

FILE NO. 10.1.77

Filed
6/15/81

TRAVELER

DESCRIPTION OF WORK RPV NOZZLE REPAIR
TRAVELER # 17T-4 REV 0 ITEM LIST # N/A JOINT # N/A REPAIR N/A
CODE CLASS N/A LAYOUT # N/A PROJECT Susquehanna Interna
DRAWING # 197R633 REV. 13 PROJECT # SQI-771 PREPARED BY/DATE J. Sauter 2/10/81
SITE MANAGER APPROVED BY/DATE Ronald P. D. Lerner 2-10-81 O.C. APPROVED BY/DATE J. Sauter 2-10-81 PAGE 2 OF 2
REVIEWED BY R. Morgan (RNF) 2-16-81 DATE _____

SEQ	OPERATION EXAMINATION OR TEST	PROCEDURE OR INSTRUCTION AND REVISION	NON-CON-FORMITIES		PRODUCTION OPERATION COMPLETED		QC COMPLIANCE VERIFICATION		AI INSPECTOR	CUSTOMER IF REQUIRED
			RE-FER TO	COMPLE- TED BY DATE	BY	DATE	BY	DATE		
2	Record and report final minimum thickness of ground areas to GE/NEBG	SPCS 17S-4-2 thru 17S-4-6 <u>REV 0</u>			<u>RJD</u>	<u>7/23/81</u>	<u>J. Sauter</u>	<u>6/15/81</u>		
3	Blend and map all ground areas.	SPCS 17S-4-2 thru 17S-4-6 <u>REV 0</u>			<u>RJD</u>	<u>7/23/81</u>	<u>J. Sauter</u>	<u>6/15/81</u>		
4	Q.A. Audit						<u>J. Sauter</u>	<u>7/24/81</u>	<u>C</u>	

SUSQUEHANNA INTERNALS INSTALLATION

PROJECT NO. SQI - 771

SUBCONTRACT NO. 5 FSC - 00



REPORT #10

VISUAL EXAMINATION OF STEAM DRYER, SHROUD HEAD
AND MOISTURE SEPARATOR DURING FINAL INSTALLATION

The final installation of the Steam Dryer, Shroud Head and Moisture Separator was witnessed by E. F. Reczek, G.E. Co. I&SE Level III Visual Examiner on August 20 and 21, 1982.

The purpose of the examination was to document the results of any accidental damage which might have occurred during the moves. This documentation would then serve as a base line from which future inservice inspection would be compared.

No such damage was observed. However, prior to any lifts, a dent was observed on one of the moisture separator tubes while the separator was still in the equipment pool.

See the enclosed data sheet for a description and location of the dent.

A handwritten signature in cursive script, appearing to read "E. F. Reczek".

E. F. Reczek
Level III V.T.
N.D.E. Specialist

REFERENCE: Pennsylvania Power & Light Company
Susquehanna Steam Electric Station
Unit #1
Contract No. 8856-M-166
RPV Pre-Service Examination

VISUAL EXAMINATION REPORT

STEAM DRYER AND SHROUD AND SEPARATOR

1 SHEET OF

Customer/Station SUSQUEHANNA UNIT #1

VT Procedures 160A7807 ^{SUPP. A} Examiner E. F. RECZEK Level III

Category BN-1 Date 8-20, 21-1982

Direct Visual N/A Remote Visual X

Surface Preparation Methods/Tools used (if any) N/A

Illumination Instrument Used NORMAL LIGHTING

Direct Visual Aids Used NONE

Remote Visual Equipment Used BINOCULARS

Steam Dryer (Figure 1) SATISFACTORY

Shroud Head & Separator (Figure 2) SATISFACTORY, SEE FIG. 4.

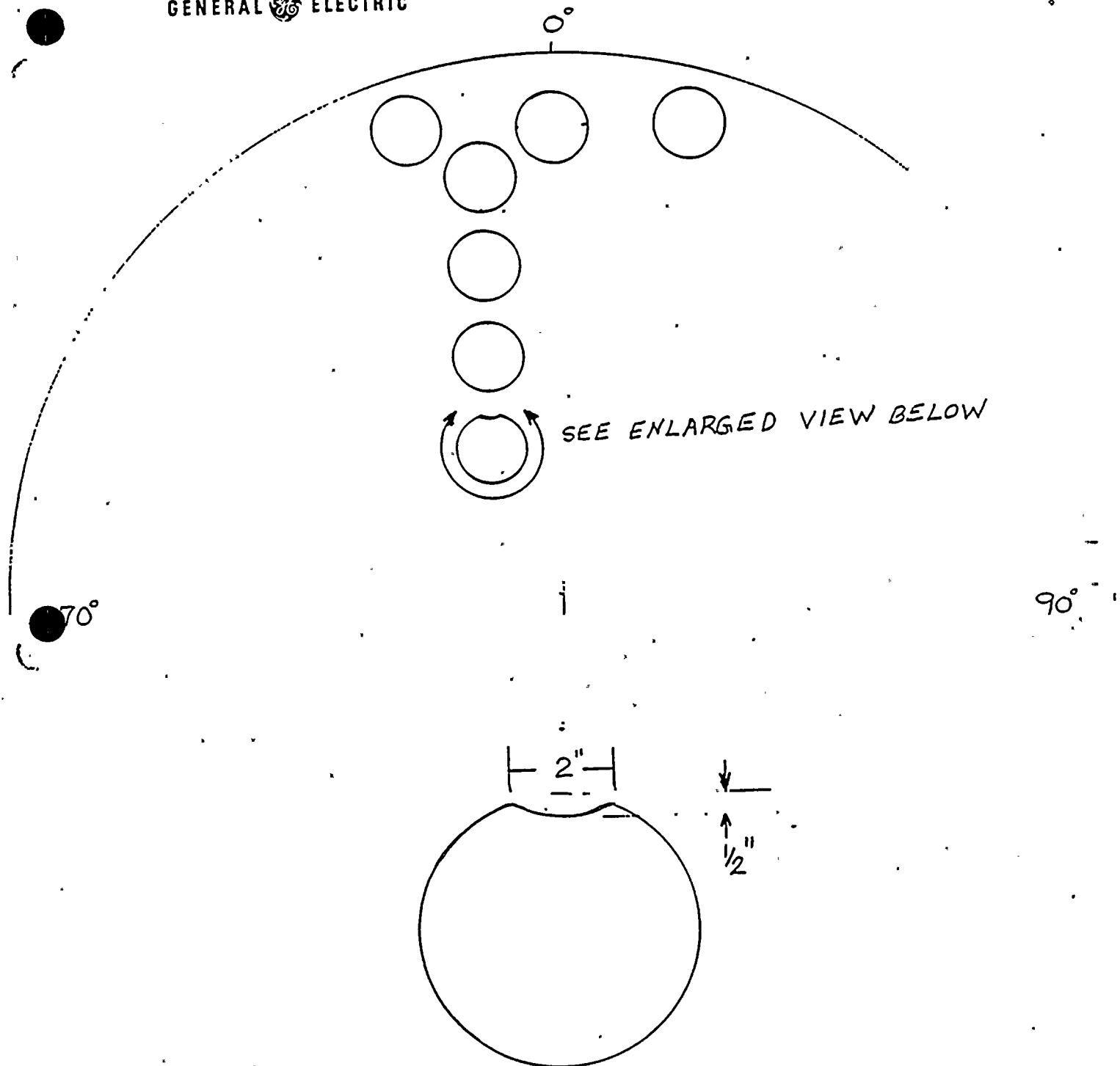
and Report #10 "Visual Examination of Steam Dryer,
Shroud Head and Moisture Separator"

1 Meets ☐ Does Not Meet ☐ the Requirements of ASME Section XI.

1 Level III Review E. F. Reczek Date 8-23-82

Figure 3

GENERAL ELECTRIC



NOTE: THE ABOVE CONDITION IS A SMOOTH DENT
LOCATED AT THE TOP OF THE TUBE.

NO SHARP EDGES WERE OBSERVED

FIG. 4

E. S. Quayle / III
8/23/82



SECTION V

RECORDABLE INDICATION LIST

Project SUSQUEHANNA UNIT #1 Project No. SOI-761
Category BA Procedure ISI-QA-329 (A) Rev. 1

System	Identification Number	Data Sheet No.	Calibration Sheet No.	Indication Description
RPV CIRCUMFERENTIAL WELDS	AC (A)	AC	38, 39 40, 41	1 Spot Indication
	AD (A)	AD	27, 28 29, 30	1 Spot Indication
RPV LONGITUDINAL WELDS	BA (A)	BA	47, 48	26 Spot Indications
	BA (M)	2047 2050	2046 2045	7 Spot Indications
	BC (A)	BC	47, 49	16 Spot Indications
	BC (M)	2052	2045	2 Spot Indications
	BD (A)	BD	44	1 Spot Indication
	BG (A)	BG	37	11 Spot Indication
	BJ (A)	BJ	36	2 Spot Indications

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 -- REV. 2

SUSQUEHANNA I WELD AC
EVALUATION LEVEL = 50% DAC

VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE #: 3
THRESHOLD = 961
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00
REGION: 3

SENSOR	GLOBAL #	X	Y
1	18	520.392	380.676
2	17	499.243	356.796
3	11	501.647	477.516
4	8	150.949	462.156
5	15	81.555	373.116
6	16	103.545	377.676
7	14	781.748	478.596
8	9	219.743	478.836
9	7	48.270	485.376
10	13	717.340	466.356
11	12	611.356	479.976
12	10	364.660	480.816

TABLE IWB-3510

ALLOWABLE PLANAR INDICATIONS		
ASPECT RATIO	SURFACE INDICATIONS	SUBSURFACE INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS IN.	LAMINAR AREA SQ. IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:
VESSEL MODE
SCANNER DIMENSIONS:

PAGE 0002 30 DEC 10 19:58:48 SUSQUEHANNA I WELD AC
OF 04

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
VESSEL LENGTH= 30.00 FULL SCALE= 3000
DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 558.48 Y= 400.50
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7	11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD AC --
VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE # 3
THRESHOLD = 961
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00
REGION 3

SENSOR	GLOBAL	X	Y
1	18	520.392	380.676
2	17	499.243	356.796
3	11	501.647	477.516
4	8	150.949	462.156
5	15	31.555	373.116
6	16	103.545	377.676
7	14	781.748	478.596
8	9	219.743	478.836
9	7	48.270	485.376
10	13	717.340	466.356
13	12	611.356	479.976
14	10	364.660	480.816

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
VESSEL LENGTH= 30.00 FULL SCALE= 3000
DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250

PAGE 0003 80 DEC 11 11:40:47 SUSQUEHANNA I WELD AC
OF 04

100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 552.48 Y= 400.50
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7	11	0.00

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	586	30	100	32	169.36	3.68	1.16	1469
10	586	11	94	34	169.36	3.75	1.09	1462
10	586	7	99	36	169.36	3.82	1.15	1455
10	586	8	99	41	169.36	3.89	1.15	1448
10	586	11	99	41	169.36	3.96	1.15	1441
10	586	9	94	39	169.36	4.04	1.09	1433
10	602	7	103	32	169.36	4.11	1.20	1426

END OF PASS

VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE # 2
THRESHOLD = 20000
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00
REGION 3

SENSOR	GLOBAL #	X	Y
1	18	520.392	380.676
2	17	499.243	356.796
3	11	501.647	477.516
4	8	150.949	462.156
5	15	81.555	373.116
6	16	103.545	377.676
7	14	781.748	478.596
8	9	219.743	478.836
9	7	48.270	485.376
10	13	717.340	466.356
13	12	611.356	479.976
14	10	364.660	480.816

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

VESSEL LENGTH= 30.00 FULL SCALE= 3000

PAGE 0004 80 DEC 12 10:24:39 SUSQUEHANNA I WELD AC
OF 04

DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100. EVALUATION LEVEL = 50.
WELD REFERENCE POINT: X= 558.48 Y= 400.50
THICKNESS = 6.520
SHELL COURSE 2 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13.

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7	11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD AC -

MAX AMPLITUDE				-50% DAC		+50% DAC		% OF T	
#	ID#	%DAC	DEP REL X RY/AZ	DEP REL X RY/AZ	DEP REL X RY/AZ	DEP REL X RY/AZ	DEP	SDEP	
4	1	51	0.8 183.9 -0.4	0.8 183.9 -0.4	0.8 183.9 -0.4	0.8 183.9 -0.4	0.0	12.0	

FINAL EVALUATION TABLE

CH TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
4	45T	1 S Y	742.35	742.35	400.11	400.11	0.77	0.77	0.01	6.51	

END OF PASS

9.6

WELD BG

WELD BJ

WELD BD

SUSQUEHANNA I
WELD AC

Y
X
-0
-0
MAG- 0.050
XMH- 742.3
XMX- 742.3
YMH- 400.1
YHX- 400.1
ZMH- 0.8
ZHX- 0.8

SUSQUEHANNA I
WELD AC

X Y
↑
↓
→
←
MAQ = 0.050
XMM = 742.3
XMX = 742.3
YMM = 489.1
YMX = 489.1
ZMM = 0.8
ZMX = 0.8

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD AD
EVALUATION LEVEL = 50% DAC

VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE # 3
THRESHOLD = 961
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00

REGION 1

SENSOR	GLOBAL #	X	Y
1	30	269.874	631.000
2	29	151.791	632.544
3	28	689.282	633.792
4	27	570.957	632.916
5	26	76.364	604.092
6	31	823.164	604.642
7	25	495.783	604.548
8	24	194.389	522.996
9	23	103.545	528.756
10	22	785.653	514.296
13	21	645.783	520.596
14	20	524.598	522.936
15	19	333.358	521.016

TABLE IWB-3510

ALLOWABLE PLANAR INDICATIONS		
ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:
VESSEL MODE

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OF 04

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
VESSEL LENGTH= 30.00 FULL SCALE= 3000
DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 801.80 Y= 537.50
THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	30	2150	7	11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD AD -

MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
# ID#	%DAC	DEP REL X	RY/AZ	DEP REL X	RY/AZ	DEP REL X	RY/AZ	DEP REL X	RY/AZ	DEP	SDEP		
4	1	73	5.2 78.3 -2.0	5.2 78.3 -2.0	5.2 78.3 -2.0	5.2 78.3 -2.0	5.2 78.3 -2.0	0.0	20.0				

*NOTE: AD-3 (PAGE 10 80 NOV 25 09:35:35)
VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY: CIRCUMFERENCE = 837.72
SHELL COURSE # 3
THRESHOLD = 952
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00
REGION 1
SENSOR GLOBAL # X Y
1 30 269.874 631.000
2 29 151.791 632.544
3 28 689.282 633.792
4 27 570.957 632.916
5 26 76.364 604.092
6 31 823.164 604.642
7 25 495.783 604.548
8 24 194.389 522.996
9 23 103.545 528.756
10 22 785.653 514.296
13 21 645.783 520.596
14 20 524.598 522.936
15 19 333.358 521.016

EVALUATION PARAMETERS:

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OF 04

VESSEL MODE

SCANNER DIMENSIONS:

- CALIBRATION LENGTH= 36.00 FULL SCALE= 36.00
VESSEL LENGTH= 30.00 FULL SCALE= 3000
OD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 801.80 Y= 537.50
THICKNESS = 6.520
SHELL COURSE= 3 CIRCUMFERENCE= 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = .13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4R
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	30	2150	.7	11	0.00

FINAL EVALUATION TABLE											
CH TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EV
4	45T	1 S Y	42.40	42.40	535.46	535.46	5.21	5.22	0.01	6.51	

END OF PASS

VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE = 3
THRESHOLD = 961
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00
REGION 1

SENSOR	GLOBAL #	X	Y
1	30	269.874	631.000
2	29	151.791	632.544
3	28	689.282	633.792
4	27	570.957	632.916
5	26	76.364	604.092
6	31	823.164	604.642
7	25	495.783	604.548
8	24	194.389	522.996
9	23	103.545	529.756
10	22	785.653	514.296
13	21	645.783	520.596
14	20	524.598	522.936
15	19	333.358	521.016

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

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OF 04

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

VESSEL LENGTH= 30.00 FULL SCALE= 3000

DD. UNITS PER INCH= 100.00

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 801.80 Y= 537.50

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
6	45.0 P	-5.45	1.05	850	1950	0	20	0.00
7	60.0 P	-5.45	2.15	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	800	2000	7	11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE

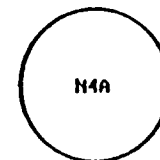
EVALUATION LEVEL = 50% DAC

WELD AD -

END OF PASS

SUSQUEHANNA I
WELD AD

WELD BK



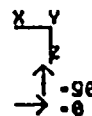
WELD BH

WELD BG

Y
X
-0
-0
MAG- 0.040
XNN- 42.4
XNX- 42.4
YNN- 535.4
YNX- 535.4
ZNN- 5.2
ZNX- 5.2


SUSQUEHANNA I WELD AD

V.13


 NAG- 0.040
 XMN- 42.4
 XMX- 42.4
 YMN- 535.4
 YMX- 535.4
 ZMN- 5.2
 ZMX- 5.2

SUSQUEHANNA I
WELD AD

V.14


 MAQ- 0.100
 XNN- 42.4
 XMX- 42.4
 YNN- 535.4
 YMX- 535.4
 ZNN- 5.2
 ZMX- 5.2

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD BC
EVALUATION LEVEL = 50% DAC

TABLE IWB-3510
ALLOWABLE PLANAR INDICATIONS

ASPECT RATIO	SURFACE INDICATIONS	SUBSURFACE INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2
ALLOWABLE LAMINAR INDICATIONS

COMPONENT THICKNESS T, IN.	LAMINAR AREA A, SQ IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

VESSEL LENGTH= 30.00 FULL SCALE= 3000

OD. UNITS PER INCH= 100.00

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 458.96 Y= 126.50

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0		11	0.00
4	45.0 T	-2.25	2.65	450	2150	0		28	0.00
5	60.0 T	-1.05	2.65	150	2150	0		40	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0		20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0		20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7		11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BC -

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	593	16	364	18	-2.01	80.59	4.24	1932
10	602	10	457	17	-2.06	81.44	5.32	1937
10	600	8	453	15	-1.99	81.45	5.27	1930
10	584	14	448	15	-2.39	81.85	5.21	1970

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	1	57	5.1	-2.0	81.4	5.2	-2.0	81.4	5.1	-2.1	81.4	1.0	20.9
		52	5.1	-2.2	81.9	5.1	-2.1	81.9	5.0	-2.3	81.8	0.5	22.4

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	580	7	413	17	-1.56	84.05	4.81	1887
10	580	8	414	16	-1.58	84.05	4.82	1889
10	581	7	414	18	-1.71	84.03	4.82	1902
10	581	7	413	23	-1.78	84.02	4.81	1909
10	580	7	409	29	-1.84	84.02	4.76	1915
10	591	7	408	29	-1.90	84.01	4.75	1921
10	586	10	402	28	-1.96	84.00	4.68	1928
10	586	11	411	24	-2.03	83.99	4.79	1935
10	582	14	412	21	-2.11	83.98	4.80	1943
10	582	12	415	17	-2.18	83.97	4.83	1950

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	2	79	4.7	-1.9	84.0	4.7	-1.8	84.0	4.7	-2.1	84.0	0.0	27.6
2	3	76	4.4	-1.1	91.1	4.4	-1.0	91.2	4.4	-1.4	91.1	1.0	31.9

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	575	17	186	20	-0.51	105.53	2.19	1781
10	579	10	186	20	-0.58	105.53	2.19	1788
10	579	7	187	16	-0.65	105.53	2.20	1795

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	4	51	2.1	-0.5	105.5	2.1	-0.5	105.5	2.0	-0.5	105.5	1.9	30.2
2	5	51	5.0	-0.7	106.2	5.0	-0.7	106.2	5.0	-0.7	106.2	0.0	23.8

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	573	15	252	15	-1.67	106.67	2.95	1896
10	574	15	252	15	-1.72	106.67	2.95	1901

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	6	84	1.7	-0.6	106.7	1.7	-0.5	106.7	1.7	-0.9	106.7	0.5	25.4

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	582	12	310	18	-1.34	108.68	3.62	1863
10	581	12	313	18	-1.39	108.68	3.65	1868
10	585	12	309	21	-1.46	108.67	3.61	1875
10	586	10	309	29	-1.55	108.67	3.61	1884
10	586	7	309	41	-1.62	108.67	3.61	1891

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	586	7	305	53	-1.68	108.67	3.56	1897
10	586	9	305	61	-1.73	108.67	3.56	1902
10	581	18	305	63	-1.80	108.67	3.56	1909
10	581	27	309	59	-1.87	108.67	3.61	1916
10	581	33	309	50	-1.95	108.66	3.61	1924
10	581	36	310	39	-2.02	108.66	3.62	1931

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	7	128	3.5	-1.8	108.7	3.5	-1.5	108.7	3.6	-2.1	108.7	1.0	44.9

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	585	36	250	37	-3.31	109.98	2.92	2060
10	588	24	250	29	-3.21	109.99	2.92	2050
10	588	22	251	23	-3.06	109.99	2.94	2035

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	8	55	2.7	-3.9	110.0	2.7	-3.9	110.0	2.7	-4.2	110.0	0.0	41.7
2	9	84	2.7	-3.3	110.0	2.7	-3.0	110.0	2.7	-3.5	110.0	0.0	41.7
2	10	65	2.7	-4.0	110.7	2.7	-3.9	110.7	2.7	-4.1	110.7	0.0	40.7
2	11	83	2.8	-2.8	113.1	2.8	-2.7	113.1	2.8	-3.0	113.1	0.0	43.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	591	10	244	78	-4.14	113.91	2.86	2148
10	591	10	473	18	-4.14	113.91	5.50	2148
10	594	8	243	88	-4.07	113.91	2.84	2141
10	594	8	473	22	-4.07	113.91	5.50	2141
10	600	7	244	93	-4.00	113.91	2.86	2134
10	600	7	464	23	-4.00	113.91	5.40	2134
10	605	7	244	93	-3.92	113.91	2.86	2126
10	605	7	469	24	-3.92	113.91	5.46	2126
10	601	7	244	94	-3.85	113.91	2.86	2119
10	601	7	470	24	-3.85	113.91	5.47	2119
10	606	7	244	104	-3.77	113.91	2.86	2111
10	606	7	470	26	-3.77	113.91	5.47	2111
10	681	7	243	110	-3.69	113.91	2.84	2103
10	681	7	469	26	-3.69	113.91	5.46	2103
10	682	7	244	106	-3.62	113.91	2.86	2096
10	682	7	474	22	-3.62	113.91	5.51	2096
10	592	7	243	92	-3.54	113.91	2.84	2088
10	592	7	469	17	-3.54	113.91	5.46	2088
10	589	7	244	62	-3.47	113.91	2.86	2081
10	588	8	244	38	-3.40	113.91	2.86	2074
10	588	9	248	21	-3.34	113.91	2.90	2068

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	12	82	5.3	-3.8	113.9	5.3	-3.5	113.9	5.3	-4.1	113.9	0.0	18.5

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	579	23	164	26	-1.08	114.34	1.93	1842
10	579	25	164	26	-1.15	114.34	1.93	1849
10	579	34	248	44	-3.87	114.34	2.90	2121
10	579	29	248	54	-3.93	114.34	2.90	2127
10	583	28	248	58	-4.01	114.34	2.90	2135

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	584	28	248	61	-4.08	114.34	2.90	2142
10	580	30	248	63	-4.16	114.34	2.90	2150

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	13	68	1.8	-1.1	114.3	1.8	-1.0	114.3	1.9	-1.2	114.3	1.4	27.3
2	14	58	5.6	-4.1	114.3	5.6	-4.1	114.3	5.6	-4.1	114.3	0.0	14.2

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	594	15	250	118	-4.14	114.79	2.92	2148
10	594	15	497	25	-4.14	114.79	5.78	2148
10	591	16	259	113	-4.08	114.79	3.03	2142
10	591	16	497	22	-4.08	114.79	5.78	2142
10	591	18	259	106	-4.00	114.79	3.03	2134
10	591	18	492	20	-4.00	114.79	5.72	2134
10	590	20	259	98	-3.92	114.79	3.03	2126
10	590	22	259	87	-3.85	114.79	3.03	2119
10	589	26	259	70	-3.78	114.79	3.03	2112
10	590	30	259	57	-3.70	114.79	3.03	2104
10	589	32	259	42	-3.63	114.79	3.03	2097
10	573	31	263	31	-3.56	114.79	3.08	2090

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	15	159	2.8	-4.0	113.5	2.7	-3.8	113.5	2.8	-4.2	113.5	0.5	41.7
		211	2.6	-3.7	113.9	2.7	-3.3	113.9	2.6	-4.1	113.9	1.0	40.3
		140	2.8	-4.1	114.3	2.9	-3.7	114.3	2.8	-4.1	114.3	2.4	42.2
		214	2.8	-4.1	114.8	2.8	-3.5	114.8	2.8	-4.1	114.8	0.5	43.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	586	36	261	38	-3.87	117.20	3.05	2121
10	582	33	267	39	-3.93	117.20	3.12	2127
10	583	28	267	34	-4.01	117.20	3.12	2135
10	583	23	270	26	-4.10	117.20	3.16	2144
10	586	20	261	21	-4.19	117.20	3.05	2153
10	601	8	271	41	-4.15	117.68	3.17	2149
10	592	7	272	42	-4.09	117.68	3.18	2143
10	591	9	272	38	-4.01	117.68	3.18	2135
10	591	13	267	33	-3.94	117.68	3.12	2128
10	591	17	276	28	-3.86	117.68	3.23	2120
10	596	15	278	17	-2.98	117.69	3.25	2032
10	593	16	279	19	-2.91	117.69	3.26	2025

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	16	84	3.1	-3.9	117.2	3.1	-3.7	117.2	3.1	-4.1	117.2	0.5	47.0
		96	3.0	-4.1	117.7	3.0	-3.8	117.7	3.0	-4.1	117.7	0.0	46.0

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	575	17	183	17	-0.61	122.29	2.15	1795
10	575	15	182	20	-0.68	122.29	2.14	1802
10	575	11	178	28	-0.75	122.29	2.09	1809
10	575	10	178	33	-0.81	122.29	2.09	1815
10	576	10	179	31	-0.89	122.29	2.10	1823
10	575	14	181	15	-1.03	122.29	2.13	1837

MAX AMPLITUDE						-50% DAC				+50% DAC				% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP		
2	17	86	1.9	-0.8	122.3	2.1	-0.7	122.3	2.0	-0.8	122.3	0.5	31.2		
2	18	63	2.2	-3.5	124.1	2.1	-3.4	124.1	2.2	-3.6	124.1	1.9	31.6		
2	19	69	1.7	-0.6	130.0	1.6	-0.4	130.0	1.7	-0.8	130.0	0.5	24.9		

FINAL EVALUATION TABLE													
CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL	
2	OW	15	S N	454.75	455.62	239.96	241.29	2.63	2.91	2.16	2.99		
										2.16	2.65		
2	OW	14	S Y	454.80	454.80	240.84	240.84	5.59	5.59	0.01	6.51		
2	OW	16	S N	454.81	455.24	243.70	244.18	3.00	3.09	0.72	2.67		
										0.72	2.60		
2	OW	18	S X	455.32	455.53	250.63	250.63	2.07	2.19	0.90	3.94		
2	OW	1	S N	456.64	456.97	207.94	208.37	5.04	5.15	0.81	2.98		
										0.81	2.74		
2	OW	2	S X	456.85	457.18	210.48	210.52	4.62	4.73	0.81	2.96		
2	OW	7	S X	456.85	457.41	235.16	235.17	3.46	3.58	0.90	2.64		
2	OW	3	S X	457.51	457.94	217.61	217.65	4.33	4.45	0.90	2.83		
2	OW	13	S X	457.74	457.94	240.84	240.84	1.79	1.88	0.64	3.31		
2	OW	17	S X	458.07	458.28	248.79	248.79	1.93	2.05	0.90	3.96		
2	OW	19	S X	458.18	458.49	256.52	256.52	1.62	1.72	0.81	3.05		
2	OW	5	S Y	458.22	458.22	232.73	232.73	4.96	4.96	0.01	6.51		
2	OW	4	S X	458.38	458.45	232.03	232.03	1.98	2.09	0.81	6.51		
2	OW	8	L	454.77	455.90	236.47	237.18	2.64	2.73	0.80	12.60		
2	OW	11	L	454.82	456.23	239.55	240.41	2.76	5.31	1.21	12.60		
2	OW	6	L	458.02	458.43	233.19	233.21	1.66	1.68	0.01	12.60		

END OF PASS

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE

EVALUATION LEVEL = 50% DAC

WELD BC -

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	563	16	241	23	-4.30	115.82	2.82	1296
10	562	14	240	23	-4.25	115.82	2.81	1301
10	592	7	293	24	-3.30	115.33	3.42	1395
10	591	8	293	21	-3.35	115.34	3.42	1390
10	591	8	292	25	-3.40	115.34	3.41	1385
10	591	8	292	28	-3.47	115.34	3.41	1378
10	591	7	292	28	-3.54	115.35	3.41	1371
10	591	7	292	23	-3.61	115.35	3.41	1364
10	595	8	293	19	-3.68	115.35	3.42	1357
10	595	11	287	15	-3.74	115.36	3.35	1351
10	581	42	249	69	-3.76	113.66	2.91	1350
10	581	44	245	99	-3.69	113.66	2.87	1357
10	584	37	245	106	-3.62	113.66	2.87	1364
10	584	28	245	106	-3.55	113.65	2.87	1371
10	584	28	487	28	-3.55	113.65	5.66	1371
10	584	16	246	105	-3.49	113.65	2.88	1377
10	584	16	487	27	-3.49	113.65	5.66	1377
10	578	10	245	101	-3.42	113.65	2.87	1384
10	578	10	486	25	-3.42	113.65	5.65	1384
10	569	11	245	94	-3.35	113.65	2.87	1391
10	569	11	487	22	-3.35	113.65	5.66	1391

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	570	18	241	81	-3.29	113.65	2.82	1397
10	570	18	491	18	-3.29	113.65	5.71	1397
10	578	25	249	62	-3.22	113.64	2.91	1404
10	579	30	250	50	-3.15	113.64	2.92	1411
10	578	32	250	43	-3.08	113.64	2.92	1418
10	578	33	250	34	-3.01	113.63	2.92	1425
10	588	30	250	40	-3.13	113.14	2.92	1413
10	592	30	241	42	-3.19	113.14	2.82	1407
10	592	28	246	50	-3.26	113.14	2.88	1400
10	588	24	246	55	-3.32	113.14	2.88	1394
10	592	20	245	67	-3.38	113.14	2.87	1388
10	592	15	246	77	-3.45	113.15	2.88	1381
10	592	15	493	17	-3.45	113.15	5.73	1381
10	592	14	245	87	-3.52	113.15	2.87	1374
10	592	14	497	19	-3.52	113.15	5.78	1374
10	592	13	245	93	-3.59	113.15	2.87	1367
10	592	13	496	20	-3.59	113.15	5.77	1367
10	588	14	249	94	-3.65	113.15	2.91	1361
10	588	14	501	18	-3.65	113.15	5.83	1361
10	589	18	250	89	-3.73	113.16	2.92	1353
10	589	18	501	20	-3.73	113.16	5.83	1353
10	588	24	254	81	-3.80	113.16	2.97	1346
10	588	34	258	62	-3.88	113.16	3.02	1338
10	588	40	258	45	-3.95	113.16	3.02	1331
10	581	27	239	54	-3.74	112.71	2.80	1351
10	580	37	234	46	-3.72	112.71	2.74	1353
10	580	32	238	52	-3.65	112.71	2.79	1360
10	580	30	238	68	-3.59	112.71	2.79	1366
10	580	28	238	81	-3.53	112.71	2.79	1372
10	584	23	239	98	-3.46	112.71	2.80	1379
10	584	18	238	109	-3.39	112.71	2.79	1386
10	584	12	235	114	-3.34	112.71	2.75	1391
10	584	12	468	16	-3.34	112.71	5.45	1391
10	588	8	235	114	-3.27	112.70	2.75	1398
10	588	8	459	17	-3.27	112.70	5.34	1398
10	588	7	235	112	-3.20	112.70	2.75	1405
10	588	7	460	18	-3.20	112.70	5.35	1405
10	587	7	238	103	-3.13	112.70	2.79	1412
10	587	7	468	16	-3.13	112.70	5.45	1412
10	582	9	238	84	-3.06	112.70	2.79	1419
10	582	13	238	62	-2.99	112.70	2.79	1426
10	582	17	238	43	-2.92	112.70	2.79	1433
10	581	20	233	32	-2.86	112.69	2.73	1439
10	582	21	243	24	-2.79	112.69	2.84	1446
10	590	10	262	21	-3.10	112.12	3.06	1416
10	589	10	262	14	-3.18	112.13	3.06	1408
10	589	10	258	18	-3.25	112.13	3.02	1401
10	589	11	261	26	-3.33	112.13	3.05	1393
10	589	15	258	31	-3.38	112.13	3.02	1388
10	589	23	258	36	-3.45	112.13	3.02	1381
10	589	30	257	38	-3.52	112.13	3.01	1374
10	578	22	252	24	-2.47	111.63	2.95	1479
10	580	7	238	20	-2.76	108.75	2.79	1450
10	587	7	245	25	-2.81	108.75	2.87	1445
10	592	7	245	30	-2.87	108.74	2.87	1439
10	592	7	244	32	-2.95	108.74	2.86	1431

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	588	7	244	30	-3.04	108.74	2.86	1422
10	588	8	244	26	-3.11	108.74	2.86	1415
10	584	10	248	20	-3.18	108.74	2.90	1408
10	585	12	248	16	-3.25	108.74	2.90	1401
10	585	15	243	15	-3.31	108.74	2.84	1395
10	575	31	307	46	-1.71	107.04	3.58	1555
10	574	31	307	50	-1.66	107.04	3.58	1560
10	575	23	307	46	-1.59	107.04	3.58	1567
10	575	17	307	34	-1.51	107.04	3.58	1575
10	579	13	302	23	-1.44	107.04	3.53	1582
10	579	10	311	16	-1.38	107.04	3.63	1588
10	571	11	357	15	-5.71	96.09	4.16	1155
10	570	12	347	15	-5.77	96.09	4.05	1149
10	570	10	347	15	-5.84	96.09	4.05	1142
10	593	14	447	20	-0.43	79.76	5.20	1683
10	593	18	446	21	-0.47	79.76	5.19	1679
10	593	18	447	20	-0.54	79.76	5.20	1672
10	593	15	451	21	-0.60	79.76	5.25	1666
10	592	14	451	21	-0.67	79.76	5.25	1659
10	592	14	450	21	-0.75	79.77	5.24	1651
10	591	12	453	19	-0.83	79.77	5.27	1643
10	591	10	453	17	-0.89	79.77	5.27	1637
10	594	10	448	14	-0.96	79.77	5.21	1630
10	582	24	276	43	-3.98	74.21	3.23	1328
10	588	24	283	43	-4.03	74.22	3.31	1323
10	588	26	274	55	-4.10	74.22	3.20	1316
10	588	23	279	66	-4.17	74.22	3.26	1309
10	588	20	273	62	-4.23	74.22	3.19	1303
10	592	20	274	57	-4.31	74.22	3.20	1295
10	593	21	283	48	-4.38	74.23	3.31	1288
10	593	21	283	41	-4.44	74.23	3.31	1282
10	593	19	283	31	-4.51	74.23	3.31	1275
10	593	20	284	20	-4.59	74.23	3.32	1267
10	582	12	278	23	-4.50	73.76	3.25	1276
10	584	8	279	26	-4.47	73.76	3.26	1279
10	583	8	278	30	-4.39	73.75	3.25	1287
10	583	14	274	36	-4.34	73.75	3.20	1292
10	583	23	274	41	-4.28	73.75	3.20	1298
10	579	34	273	42	-4.22	73.75	3.19	1304
10	579	42	274	43	-4.16	73.75	3.20	1310
10	579	28	278	34	-3.49	73.29	3.25	1377
10	586	30	282	41	-3.55	73.29	3.29	1371
10	586	31	277	43	-3.62	73.29	3.24	1364
10	587	31	286	37	-3.69	73.30	3.34	1357

*NOTE: BC-2 (PAGE 30 80 DEC 17 11:54:58)

*NOTE: BC-3 (PAGE 30 80 DEC 17 11:54:58)

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

VESSEL LENGTH= 30.00 FULL SCALE= 3000

OD. UNITS PER INCH= 100.00

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

PAGE 0008 80 DEC 18 13:56:38 SUSQUEHANNA I WELD BC
OF 08

WELD REFERENCE POINT: X= 458.96 Y= 126.50

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150		0	11	0.00
4	45.0 T	-2.25	2.65	450	2150		0	28	0.00
5	60.0 T	-1.05	2.65	150	2150		0	40	-7.00
6	-45.0 P	-5.45	0.60	850	1950		0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950		0	20	-6.00
10	0.0 B	-2.55	0.00	10	2150		7	11	0.00

END OF PASS

*NOTE: BC-4 (PAGE 81 80 DEC 18 14:07:46)

SUSQUEHANNA I WELD BC

WELD AB

$\begin{matrix} y \\ \uparrow \\ x \end{matrix}$
 MAG. 0.100

XMN- 454.8
 XMX- 458.5
 YMN- 208.0
 YMX- 256.5
 ZMN- 1.6
 ZMX- 5.6

N2F

N1D

SUSQUEHANNA I
WELD BC

V.48

Y X
↑
-90
-90
MAG- 0.100

XNN- 454.8
XHX- 458.5
YNN- 298.8
YHX- 256.5
ZNN- 1.6
ZHX- 5.6

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD BD
EVALUATION LEVEL = 50% DAC

VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE = 2
THRESHOLD = 922
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00

REGION 4

SENSOR	GLOBAL #	X	Y
1	1	8.700	198.276
2	2	154.314	205.416
3	3	295.086	204.396
4	4	439.522	190.236
5	5	574.586	207.036
6	6	713.735	205.356
7	15	81.555	373.116
8	16	103.545	377.676
9	17	499.243	356.796
10	18	520.392	380.676
13	13	717.340	466.356
14	9	219.743	478.836
15	12	611.356	479.976

TABLE IWB-3510

ALLOWABLE PLANAR INDICATIONS

ASPECT RATIO	SURFACE INDICATIONS A/T, %	SUBSURFACE INDICATIONS A/T, %
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2

ALLOWABLE LAMINAR INDICATIONS

COMPONENT THICKNESS T, IN.	LAMINAR AREA A, SQ IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:
VESSEL MODE

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD BA
EVALUATION LEVEL = 50% DAC

*NOTE: BA-1 (PAGE 51 80 DEC 17 16:57:07)

TABLE IWB-3510

ALLOWABLE PLANAR INDICATIONS

ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T,%	A/T,%
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2

ALLOWABLE LAMINAR INDICATIONS

COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

VESSEL LENGTH= 30.00 FULL SCALE= 3000

* QD. UNITS PER INCH= 100.00

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 737.82 Y= 126.50

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	40	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00

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SUSQUEHANNA I WELD BA

CH # ANGLE X OFFSET Y OFFSET BEGIN STOP MN BE TSEP T5/4A
10 0.0 B -2.55 0.00 10 2150 7 11 0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BA -

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	583	14	299	15	-5.30	113.74	3.49	1202
10	584	14	308	15	-5.25	113.74	3.60	1207
10	584	14	299	15	-5.18	113.74	3.49	1214
10	584	12	300	15	-5.11	113.74	3.50	1221
10	584	10	309	14	-5.04	113.74	3.61	1228
10	579	8	258	18	-2.49	113.73	3.02	1483
10	578	8	257	18	-2.46	113.73	3.01	1486
10	579	8	257	18	-2.40	113.73	3.01	1492
10	578	7	257	18	-2.33	113.73	3.01	1499
10	578	7	258	15	-2.26	113.73	3.02	1506
10	579	25	144	27	-0.46	92.47	1.70	1686

MAX AMPLITUDE						-50% DAC		+50% DAC		% OF T			
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	1	70	1.7	-0.4	92.5	1.7	-0.5	92.5	1.7	-0.3	92.5	0.0	25.9
2	2	58	4.0	-4.1	91.4	4.0	-4.5	91.4	4.0	-4.1	91.4	0.0	39.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	563	12	252	16	-4.60	89.94	2.95	1272
10	563	13	252	16	-4.56	89.95	2.95	1276
10	563	12	252	19	-4.49	89.95	2.95	1283
10	563	10	248	23	-4.43	89.95	2.90	1289
10	577	8	248	23	-4.37	89.95	2.90	1295
10	577	8	243	20	-4.31	89.95	2.84	1301
10	578	7	253	15	-4.24	89.95	2.96	1308

MAX AMPLITUDE						-50% DAC		+50% DAC		% OF T			
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	3	50	2.8	-4.3	89.9	2.9	-4.4	89.9	2.8	-4.3	89.9	1.9	42.2

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	591	9	238	14	-0.51	83.92	2.79	1681
10	587	13	233	20	-0.58	83.92	2.73	1674
10	586	19	237	23	-0.65	83.92	2.77	1667
10	586	24	237	24	-0.73	83.92	2.77	1659

MAX AMPLITUDE						-50% DAC		+50% DAC		% OF T			
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	4	59	2.6	-0.7	83.9	2.6	-0.8	83.9	2.6	-0.6	83.9	0.0	39.8

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	586	19	192	19	-2.86	75.47	2.25	1446
10	591	27	194	29	-3.25	75.48	2.28	1407
10	592	25	190	31	-3.32	75.48	2.23	1400
10	592	22	190	28	-3.38	75.48	2.23	1394
10	592	20	194	21	-3.44	75.48	2.28	1388
10	593	16	202	18	-3.57	75.49	2.37	1375
10	596	15	198	21	-3.64	75.49	2.32	1368

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CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	597	14	194	20	-3.71	75.49	2.28	1361
10	592	12	202	18	-3.78	75.49	2.37	1354

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	5	50	2.1	-3.3	75.9	2.1	-3.3	75.9	2.1	-3.3	75.9	0.0	31.6
		80	2.1	-3.3	75.5	2.2	-3.6	75.5	2.2	-3.2	75.5	0.5	33.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	590	7	191	20	-2.72	75.01	2.24	1460
10	591	7	191	21	-2.67	75.01	2.24	1465
10	590	7	190	19	-2.60	75.01	2.23	1472
10	598	7	182	23	-0.25	74.96	2.14	1707
10	0	0	178	31	-0.18	74.96	2.09	1714
10	0	0	178	34	-0.10	74.96	2.09	1722
10	0	0	179	46	-0.02	74.95	2.10	1730
10	0	0	179	45	0.05	74.95	2.10	1737
10	0	0	179	42	0.12	74.95	2.10	1744
10	0	0	180	30	0.18	74.95	2.12	1750
10	0	0	184	18	0.25	74.95	2.16	1757
10	0	0	186	23	0.07	74.51	2.19	1739
10	0	0	186	28	0.00	74.51	2.19	1732
10	0	0	185	36	-0.07	74.52	2.17	1725
10	0	0	182	42	-0.13	74.52	2.14	1719
10	0	0	182	42	-0.20	74.52	2.14	1712
10	0	0	177	42	-0.27	74.52	2.08	1705
10	598	7	185	37	-0.35	74.52	2.17	1697
10	593	8	186	31	-0.42	74.52	2.19	1690
10	590	10	186	23	-0.48	74.52	2.19	1684
10	588	16	189	21	-0.54	74.53	2.22	1678
10	589	10	199	16	-1.61	74.55	2.34	1571
10	589	8	190	16	-1.68	74.55	2.23	1564
10	589	7	191	15	-1.74	74.55	2.24	1558
10	593	14	199	16	-2.36	74.56	2.34	1496
10	593	11	199	18	-2.43	74.57	2.34	1489
10	597	7	200	18	-2.50	74.57	2.35	1482
10	599	8	191	20	-2.57	74.57	2.24	1475
10	594	16	196	22	-2.63	74.57	2.30	1469

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	6	51	2.2	-2.7	75.0	2.2	-2.7	75.0	2.2	-2.7	75.0	0.0	33.1
		61	2.1	-2.6	74.6	2.1	-2.8	74.6	2.2	-2.4	74.6	1.0	32.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	582	15	185	22	-3.43	74.13	2.17	1389
10	582	11	194	20	-3.38	74.13	2.28	1394
10	582	10	194	16	-3.31	74.13	2.28	1401
10	588	17	184	17	-2.56	74.11	2.16	1476
10	587	11	188	18	-2.49	74.11	2.21	1483
10	586	7	183	17	-2.43	74.11	2.15	1489
10	582	8	192	17	-2.36	74.11	2.25	1496
10	582	13	192	16	-2.30	74.10	2.25	1502
10	588	8	189	16	-1.37	74.08	2.22	1595
10	593	7	198	15	-1.31	74.08	2.32	1601
10	577	10	191	19	-1.03	74.08	2.24	1629

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SUSQUEHANNA I WELD BA

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	578	14	188	26	-0.96	74.08	2.21	1636
10	577	15	187	29	-0.89	74.07	2.20	1643
10	577	16	187	29	-0.83	74.07	2.20	1649
10	577	17	187	27	-0.77	74.07	2.20	1655
10	574	18	191	22	-0.71	74.07	2.24	1661
10	578	9	191	18	-0.52	74.07	2.24	1680
10	580	7	188	25	-0.46	74.06	2.21	1686
10	588	7	188	26	-0.40	74.06	2.21	1692
10	0	0	188	28	-0.33	74.06	2.21	1699
10	0	0	189	22	-0.27	74.06	2.22	1705
10	0	0	184	16	-0.19	74.06	2.16	1713
10	0	0	193	16	-0.12	74.06	2.27	1720

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	7	59	2.2	-3.5	74.1	2.2	-3.5	74.1	2.2	-3.4	74.1	0.0	33.6

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	583	23	199	26	-0.23	73.63	2.34	1709
10	583	15	198	41	-0.30	73.63	2.32	1702
10	584	10	198	54	-0.38	73.63	2.32	1694
10	584	12	198	57	-0.44	73.63	2.32	1688
10	580	17	198	62	-0.51	73.63	2.32	1681
10	580	24	199	63	-0.58	73.64	2.34	1674
10	579	30	198	60	-0.64	73.64	2.32	1668
10	579	36	202	51	-0.71	73.64	2.37	1661
10	578	35	201	35	-0.78	73.64	2.36	1654
10	582	29	194	37	-2.14	73.67	2.28	1518
10	582	24	194	45	-2.21	73.67	2.28	1511
10	586	21	185	54	-2.28	73.67	2.17	1504
10	586	16	190	65	-2.36	73.67	2.23	1496
10	587	15	191	71	-2.42	73.67	2.24	1490
10	587	19	190	70	-2.49	73.68	2.23	1483
10	588	27	191	63	-2.56	73.68	2.24	1476
10	584	36	190	57	-2.63	73.68	2.23	1469
10	584	46	191	58	-2.69	73.68	2.24	1463
10	584	50	190	53	-2.76	73.68	2.23	1456
10	582	13	198	16	-3.15	73.21	2.32	1417
10	583	12	194	21	-3.08	73.21	2.28	1424
10	582	12	189	31	-3.01	73.21	2.22	1431
10	582	12	189	34	-2.94	73.21	2.22	1438
10	582	11	189	35	-2.87	73.21	2.22	1445
10	582	11	194	29	-2.80	73.21	2.28	1452
10	583	9	200	19	-2.73	73.21	2.35	1459
10	583	10	205	16	-2.67	73.20	2.40	1465
10	583	11	201	20	-2.60	73.20	2.36	1472
10	584	11	197	24	-2.53	73.20	2.31	1479
10	584	14	193	29	-2.46	73.20	2.27	1486
10	584	15	193	33	-2.40	73.20	2.27	1492
10	585	15	193	37	-2.34	73.20	2.27	1498
10	584	16	193	37	-2.26	73.20	2.27	1506
10	584	15	192	34	-2.20	73.19	2.25	1512
10	584	14	193	34	-2.13	73.19	2.27	1519
10	584	13	193	31	-2.06	73.19	2.27	1526
10	583	12	192	29	-1.99	73.19	2.25	1533
10	584	10	192	26	-1.91	73.19	2.25	1541

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SUSQUEHANNA I WELD BA

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	584	10	192	27	-1.84	73.19	2.25	1548
10	584	9	192	29	-1.77	73.18	2.25	1555
10	583	10	192	27	-1.71	73.18	2.25	1561
10	584	13	192	25	-1.64	73.18	2.25	1568
10	580	15	193	23	-1.58	73.18	2.27	1574
10	580	16	192	26	-1.52	73.18	2.25	1580
10	580	16	193	26	-1.46	73.18	2.27	1586
10	580	15	197	18	-1.40	73.18	2.31	1592
10	0	0	208	19	-0.54	73.16	2.44	1678
10	0	0	205	26	-0.47	73.16	2.40	1685
10	0	0	204	30	-0.41	73.15	2.39	1691
10	0	0	202	32	-0.34	73.15	2.37	1698
10	0	0	202	31	-0.27	73.15	2.37	1705
10	0	0	206	21	-0.19	73.15	2.42	1713

MAX AMPLITUDE						-50% DAC				+50% DAC				% OF T	
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP		
2	8	115	2.0	0.0	75.0	2.1	-0.2	75.0	2.0	0.2	74.9	1.0	30.7		
		112	2.0	-0.2	74.5	2.0	-0.6	74.5	2.0	0.1	74.5	1.0	30.2		
		72	2.1	-0.9	74.1	2.1	-0.9	74.1	2.2	-0.7	74.1	0.5	32.6		
		69	2.1	-0.3	74.1	2.1	-0.4	74.1	2.1	-0.3	74.1	0.0	32.6		
		150	2.2	-0.6	73.6	2.2	-0.8	73.6	2.3	-0.1	73.6	1.0	33.6		
		78	2.3	-0.3	73.2	2.3	-0.4	73.2	2.1	-0.2	73.2	2.9	32.6		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	209	18	-2.26	72.74	2.45	1506
10	0	0	204	24	-2.33	72.74	2.39	1499
10	0	0	204	27	-2.40	72.74	2.39	1492
10	598	7	204	26	-2.47	72.75	2.39	1485
10	598	7	209	21	-2.54	72.75	2.45	1478
10	594	7	209	18	-2.60	72.75	2.45	1472
10	593	10	208	19	-2.66	72.75	2.44	1466
10	594	12	209	18	-2.72	72.75	2.45	1460
10	593	15	200	17	-2.79	72.75	2.35	1453
10	586	15	197	16	-3.49	72.77	2.31	1383
10	593	15	204	18	-3.56	72.77	2.39	1376
10	588	15	192	20	-3.76	72.77	2.25	1356
10	589	16	193	26	-3.83	72.77	2.27	1349
10	589	16	193	25	-3.90	72.78	2.27	1342
10	588	18	193	18	-3.97	72.78	2.27	1335
10	584	29	189	29	-3.77	72.35	2.22	1355
10	584	25	189	27	-3.70	72.35	2.22	1362
10	588	22	189	22	-3.63	72.35	2.22	1369
10	587	14	197	17	-3.17	72.34	2.31	1415
10	588	14	198	17	-3.12	72.34	2.32	1420
10	588	14	198	22	-3.05	72.34	2.32	1427
10	587	13	198	24	-2.98	72.34	2.32	1434
10	587	14	198	21	-2.91	72.34	2.32	1441
10	587	15	203	16	-2.84	72.34	2.38	1448
10	587	14	202	16	-2.77	72.34	2.37	1455
10	587	12	194	18	-2.71	72.33	2.28	1461
10	588	11	194	20	-2.64	72.33	2.28	1468
10	588	11	203	18	-2.56	72.33	2.38	1476
10	589	10	204	19	-2.50	72.33	2.39	1482
10	589	9	200	27	-2.43	72.33	2.35	1489

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SUSQUEHANNA T WELD BA

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	593	7	200	34	-2.37	72.33	2.35	1495
10	597	7	200	34	-2.31	72.33	2.35	1501
10	0	0	200	32	-2.25	72.33	2.35	1507
10	0	0	201	30	-2.18	72.33	2.36	1514
10	0	0	200	29	-2.11	72.32	2.35	1521
10	590	7	201	27	-2.04	72.32	2.36	1528
10	586	10	201	23	-1.97	72.32	2.36	1535
10	586	15	205	19	-1.90	72.32	2.40	1542
10	585	8	252	16	-1.30	72.31	2.95	1602
10	582	9	203	14	-1.16	72.31	2.38	1616
10	581	10	206	18	-1.09	72.31	2.42	1623
10	580	10	197	21	-1.02	72.31	2.31	1630
10	580	13	197	22	-0.95	72.30	2.31	1637
10	580	13	197	21	-0.88	72.30	2.31	1644
10	580	12	206	19	-0.81	72.30	2.42	1651
10	580	11	207	17	-0.74	72.30	2.43	1658

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	9	65	2.1	-3.8	72.8	2.1	-3.9	72.8	2.1	-3.7	72.8	0.0	32.1
		81	2.1	-3.8	72.3	2.1	-3.8	72.3	2.1	-3.6	72.3	0.0	32.6

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	588	15	215	18	-1.42	71.90	2.52	1590
10	587	14	215	17	-1.49	71.90	2.52	1583
10	588	15	212	18	-1.68	71.90	2.49	1564
10	589	20	212	21	-1.75	71.90	2.49	1557
10	588	20	212	22	-1.81	71.91	2.49	1551
10	589	18	212	21	-1.88	71.91	2.49	1544
10	589	14	212	19	-1.95	71.91	2.49	1537
10	588	10	206	16	-2.02	71.91	2.42	1530
10	603	7	204	20	-2.37	71.91	2.39	1495
10	608	7	209	27	-2.44	71.92	2.45	1488
10	608	7	209	29	-2.51	71.92	2.45	1481
10	0	0	209	26	-2.57	71.92	2.45	1475
10	0	0	208	19	-2.64	71.92	2.44	1468
10	0	0	212	17	-2.70	71.92	2.49	1462
10	0	0	221	0	-2.90	71.92	2.59	1442
10	596	7	212	18	-2.97	71.92	2.49	1435
10	592	8	212	21	-3.04	71.93	2.49	1428
10	592	12	212	22	-3.12	71.93	2.49	1420
10	592	14	212	19	-3.18	71.93	2.49	1414

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	11	164	2.1	-2.5	73.7	2.2	-3.0	73.7	2.1	-1.6	73.7	1.4	31.6
		88	2.2	-2.8	73.2	2.2	-3.1	73.2	2.2	-2.8	73.2	0.0	33.6
		93	2.2	-2.2	73.2	2.2	-2.5	73.2	2.2	-1.4	73.2	0.0	34.0
		67	2.3	-2.4	72.8	2.3	-2.5	72.8	2.2	-2.3	72.8	1.4	33.6
		84	2.3	-2.3	72.3	2.3	-2.4	72.3	2.2	-1.9	72.3	1.4	34.0
		61	2.3	-1.8	71.9	2.3	-1.9	71.9	2.3	-1.7	71.9	0.0	35.0
		75	2.3	-2.5	71.9	2.3	-2.6	71.9	2.3	-2.3	71.9	0.0	34.5
2	12	57	2.2	-2.9	72.3	2.2	-3.0	72.3	2.2	-2.9	72.3	0.0	34.0
		59	2.3	-3.1	71.9	2.2	-3.2	71.9	2.3	-2.9	71.9	1.4	33.6

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	13	53	2.3	-0.9	72.3	2.3	-1.0	72.3	2.3	-0.8	72.3	0.0	35.9
		63	2.3	-0.9	71.9	2.3	-0.9	71.9	2.3	-0.8	71.9	0.0	35.5
2	14	82	2.0	-0.1	71.9	2.0	-0.1	71.9	2.0	0.2	71.9	0.5	30.2
2	15	50	2.3	-1.4	71.9	2.3	-1.4	71.9	2.3	-1.4	71.9	0.0	35.5

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	589	10	215	15	-1.32	71.01	2.52	1600
10	588	12	215	20	-1.39	71.01	2.52	1593
10	588	14	205	22	-1.46	71.01	2.40	1586
10	584	17	205	24	-1.51	71.01	2.40	1581
10	584	18	206	23	-1.57	71.01	2.42	1575
10	584	15	215	22	-1.64	71.01	2.52	1568
10	583	12	209	17	-1.71	71.01	2.45	1561

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	16	84	2.3	-0.0	71.0	2.3	-0.3	71.0	2.3	0.1	71.0	0.0	35.0
2	17	58	2.3	-1.5	71.0	2.3	-1.6	71.0	2.3	-1.4	71.0	0.0	35.9

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	590	22	279	22	-2.28	70.11	3.26	1504

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	19	60	3.0	-2.5	70.1	3.0	-2.6	70.1	3.1	-2.3	70.1	0.5	46.5
2	20	82	2.8	-3.7	70.1	2.8	-4.0	70.1	2.9	-3.3	70.1	1.0	43.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	585	11	275	15	-1.79	69.21	3.21	1553
10	585	8	270	14	-1.86	69.21	3.16	1546
10	588	13	253	15	-1.86	65.02	2.96	1546
10	586	10	242	21	-1.93	64.61	2.83	1539
10	586	9	242	27	-1.87	64.61	2.83	1545
10	591	7	238	33	-1.80	64.62	2.79	1552
10	580	7	238	34	-1.73	64.62	2.79	1559
10	580	10	233	31	-1.67	64.62	2.73	1565
10	580	13	243	23	-1.60	64.62	2.84	1572

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	21	77	2.8	-1.7	64.6	2.8	-1.8	64.6	2.8	-1.6	64.6	0.0	42.2

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	590	20	296	20	-5.46	58.12	3.46	1186
10	597	20	303	25	-5.44	58.12	3.54	1188
10	597	20	304	22	-5.36	58.12	3.55	1196
10	595	21	306	24	-5.13	57.71	3.57	1219
10	595	17	302	30	-5.20	57.71	3.53	1212
10	595	13	302	32	-5.27	57.71	3.53	1205
10	595	10	302	35	-5.34	57.71	3.53	1198
10	596	8	302	37	-5.41	57.71	3.53	1191
10	600	7	302	38	-5.47	57.71	3.53	1185
10	595	7	302	37	-5.54	57.71	3.53	1178
10	596	7	302	32	-5.61	57.71	3.53	1171
10	595	8	306	25	-5.68	57.71	3.57	1164

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	595	11	301	16	-5.75	57.71	3.51	1157

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	22	78	3.4	-5.4	57.7	3.4	-5.7	57.7	3.4	-5.2	57.7	0.5	47.3
2	23	68	2.3	-3.3	57.3	2.3	-3.4	57.3	2.3	-3.3	57.3	0.0	34.5

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	604	7	316	15	-12.02	55.33	3.69	530
10	608	7	322	18	-11.99	55.33	3.76	533
10	613	7	322	18	-11.92	55.33	3.76	540
10	605	9	321	20	-11.85	55.33	3.75	547
10	601	15	321	20	-11.78	55.33	3.75	554
10	582	22	199	27	-4.77	54.40	2.34	1255
10	581	18	199	26	-4.70	54.40	2.34	1262
10	581	15	194	23	-4.63	54.40	2.28	1269
10	580	13	208	16	-4.56	54.40	2.44	1276

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	24	68	2.3	-4.8	54.4	2.3	-4.8	54.4	2.3	-4.6	54.4	0.5	34.5

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	591	22	294	22	-9.68	52.88	3.43	764
10	591	22	293	22	-9.77	52.88	3.42	755
10	591	21	294	22	-9.84	52.88	3.43	748
10	591	20	294	21	-9.91	52.88	3.43	741

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	25	59	1.8	-0.1	44.3	1.8	-0.2	44.3	1.8	0.0	44.3	0.5	27.8

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	271	0	-4.13	42.11	3.17	1319
10	0	0	265	15	-4.18	42.11	3.10	1314
10	606	7	269	18	-4.25	42.11	3.14	1307
10	606	7	269	20	-4.32	42.11	3.14	1300
10	611	7	269	20	-4.38	42.11	3.14	1294
10	0	0	264	17	-4.44	42.11	3.09	1288
10	590	15	314	15	-14.89	41.77	3.66	243
10	589	14	304	14	-14.86	41.77	3.55	246
10	589	18	303	18	-14.76	41.76	3.54	256
10	598	19	318	26	-14.69	41.76	3.71	263
10	598	16	318	30	-14.62	41.76	3.71	270
10	598	16	318	31	-14.55	41.76	3.71	277
10	598	15	322	25	-14.49	41.76	3.76	283
10	598	11	327	15	-14.42	41.76	3.82	290
10	596	18	230	18	-4.20	39.56	2.69	1312
10	596	12	230	18	-4.27	39.56	2.69	1305
10	604	8	225	16	-4.33	39.56	2.64	1299
10	585	13	293	20	-5.93	38.31	3.42	1139
10	592	13	299	23	-5.86	38.31	3.49	1146
10	593	10	300	24	-5.79	38.31	3.50	1153
10	592	10	308	15	-5.72	38.31	3.60	1160
10	589	10	278	16	-5.32	38.31	3.25	1200
10	585	11	283	18	-5.26	38.31	3.31	1206

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	589	9	278	17	-5.19	38.32	3.25	1213
10	589	10	278	15	-4.58	38.32	3.25	1274
10	589	10	277	16	-4.52	38.33	3.24	1280
10	589	8	281	15	-4.46	38.33	3.28	1286
10	585	10	291	15	-4.14	38.33	3.40	1318
10	589	7	275	14	-4.87	37.86	3.21	1245
10	596	7	273	19	-4.94	37.86	3.19	1238
10	596	7	278	24	-5.01	37.86	3.25	1231
10	596	7	278	25	-5.08	37.86	3.25	1224
10	595	7	277	24	-5.14	37.86	3.24	1218
10	595	8	277	22	-5.21	37.86	3.24	1211
10	596	8	282	20	-5.28	37.85	3.29	1204
10	596	8	283	20	-5.34	37.85	3.31	1198
10	596	7	287	18	-5.41	37.85	3.35	1191
10	593	7	297	14	-5.64	37.85	3.47	1168
10	0	0	299	20	-5.70	37.85	3.49	1162
10	0	0	294	16	-5.78	37.85	3.43	1154
10	589	12	298	15	-6.13	37.84	3.48	1119
10	595	13	309	18	-6.20	37.84	3.61	1112
10	596	14	310	18	-6.27	37.84	3.62	1105
10	595	15	310	17	-6.34	37.84	3.62	1098

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	27	54	3.1	-5.1	37.8	3.1	-5.1	37.8	3.0	-5.0	37.8	1.0	46.5

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	593	13	285	16	-5.70	37.42	3.33	1162
10	599	14	287	24	-5.64	37.42	3.35	1168
10	600	14	288	26	-5.57	37.42	3.36	1175
10	600	13	288	24	-5.50	37.42	3.36	1182
10	599	13	292	22	-5.44	37.42	3.41	1188
10	599	14	292	18	-5.38	37.42	3.41	1194

MAX AMPLITUDE					-50% DAC			+50% DAC			% OF T		
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP
2	28	56	3.2	-4.6	37.4	3.2	-4.6	37.4	3.2	-4.6	37.4	0.0	48.9

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	590	11	280	15	-4.52	36.98	3.27	1280
10	597	11	292	18	-4.59	36.98	3.41	1273
10	601	9	292	18	-4.66	36.98	3.41	1266
10	601	7	292	13	-4.73	36.97	3.41	1259
10	0	0	283	15	-4.99	36.97	3.31	1233
10	0	0	290	18	-5.06	36.97	3.39	1226
10	0	0	289	23	-5.13	36.97	3.38	1219
10	0	0	290	27	-5.20	36.97	3.39	1212
10	606	7	289	28	-5.27	36.97	3.38	1205
10	602	7	289	26	-5.33	36.96	3.38	1199
10	602	8	289	22	-5.40	36.96	3.38	1192
10	598	9	289	19	-5.46	36.96	3.38	1186
10	598	10	290	16	-5.54	36.96	3.39	1178
10	598	10	294	14	-5.61	36.96	3.43	1171
10	602	8	290	15	-5.73	36.96	3.39	1159
10	602	7	298	16	-5.80	36.96	3.48	1152
10	0	0	298	18	-5.88	36.95	3.48	1144

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CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	298	22	-5.97	36.95	3.48	1135
10	0	0	298	25	-6.04	36.95	3.48	1128
10	0	0	298	23	-6.12	36.95	3.48	1120
10	602	7	301	17	-6.20	36.95	3.51	1112

MAX AMPLITUDE					-50% DAC				+50% DAC				% OF T	
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP	
2	29	57	3.2	-5.3	37.0	3.2	-5.3	37.0	3.2	-5.2	37.0	0.0	49.4	
2	30	51	3.3	-6.0	36.9	3.3	-6.0	36.9	3.3	-6.0	36.9	0.0	49.2	

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	596	7	286	17	-6.30	36.46	3.34	1102
10	608	7	298	26	-6.23	36.47	3.48	1109
10	0	0	294	32	-6.15	36.47	3.43	1117
10	0	0	294	33	-6.08	36.47	3.43	1124
10	0	0	298	30	-6.01	36.47	3.48	1131
10	600	7	297	28	-5.93	36.47	3.47	1139
10	601	7	295	26	-5.86	36.47	3.45	1146
10	601	7	294	23	-5.79	36.47	3.43	1153
10	601	7	295	22	-5.73	36.47	3.45	1159
10	0	0	298	17	-5.65	36.48	3.48	1167
10	0	0	300	19	-5.58	36.48	3.50	1174
10	0	0	295	23	-5.51	36.48	3.45	1181
10	599	7	296	23	-5.44	36.48	3.46	1188
10	599	7	296	21	-5.38	36.48	3.46	1194
10	599	7	296	21	-5.32	36.48	3.46	1200
10	588	8	289	22	-5.24	36.48	3.38	1208
10	588	9	293	17	-5.17	36.48	3.42	1215
10	596	12	307	17	-5.11	36.02	3.58	1221
10	594	8	309	15	-5.18	36.02	3.61	1214
10	594	7	305	15	-5.24	36.02	3.56	1208
10	0	0	305	15	-5.38	36.01	3.56	1194
10	0	0	296	18	-5.45	36.01	3.46	1187
10	0	0	287	20	-5.51	36.01	3.35	1181
10	0	0	291	23	-5.58	36.01	3.40	1174
10	0	0	291	20	-5.65	36.01	3.40	1167
10	0	0	287	16	-5.71	36.01	3.35	1161
10	582	14	326	20	-6.59	35.57	3.80	1073
10	589	13	329	28	-6.51	35.57	3.84	1081
10	589	12	330	28	-6.45	35.57	3.85	1087
10	589	12	330	25	-6.37	35.57	3.85	1095
10	589	11	333	20	-6.30	35.57	3.88	1102
10	589	11	329	14	-6.23	35.57	3.84	1109
10	589	7	301	16	-5.36	35.59	3.51	1196
10	595	7	306	20	-5.30	35.59	3.57	1202
10	589	7	300	21	-5.23	35.59	3.50	1209
10	584	8	300	21	-5.16	35.59	3.50	1216
10	585	10	305	16	-5.09	35.59	3.56	1223
10	584	12	279	15	-5.01	35.59	3.26	1231
10	584	12	279	22	-4.94	35.59	3.26	1238
10	584	13	271	25	-4.87	35.59	3.17	1245
10	586	13	285	16	-4.80	35.60	3.33	1252
10	587	28	278	32	-4.81	35.19	3.25	1251
10	587	26	283	36	-4.89	35.19	3.31	1243
10	587	28	283	39	-4.97	35.19	3.31	1235
10	587	30	283	40	-5.04	35.19	3.31	1228

CH# BET BEA IT IA RELX RY/AZ DEP SCNR
10 588 32 284 36 -5.11 35.19 3.32 1221

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T	
#	ID#	%DAC	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
2	31	51	3.2	-4.8	35.6	3.2	-4.8	35.6	3.2	-4.8	35.6	0.0	48.9
		82	3.2	-5.0	35.2	3.2	-5.2	35.2	3.2	-4.7	35.2	1.0	48.4

EVALUATION PARAMETERS:

VESSEL MODE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

VESSEL LENGTH= 30.00 FULL SCALE= 3000

DD. UNITS PER INCH= 100.00

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 737.82 Y= 126.50

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0		11	0.00
4	45.0 T	-2.25	2.65	450	2150	0		28	0.00
5	60.0 T	-1.05	2.65	150	2150	0		40	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0		20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0		20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7		11	0.00

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	589	8	347	10	-2.51	32.01	4.06	1479
10	589	11	339	18	-2.44	32.01	3.97	1486
10	596	27	341	27	-3.32	31.57	3.99	1398
10	596	20	341	24	-3.39	31.57	3.99	1391
10	596	16	336	19	-3.46	31.57	3.94	1384
10	601	7	343	16	-3.63	31.57	4.02	1367
10	602	7	342	20	-3.69	31.57	4.00	1361
10	601	8	333	22	-3.75	31.57	3.90	1355
10	602	8	338	30	-3.82	31.57	3.96	1348
10	602	8	333	38	-3.90	31.57	3.90	1340
10	602	8	329	49	-3.98	31.57	3.85	1332
10	602	7	328	53	-4.05	31.57	3.84	1325
10	602	7	324	50	-4.11	31.57	3.80	1319
10	602	7	324	46	-4.17	31.57	3.80	1313
10	597	7	324	42	-4.24	31.57	3.80	1306
10	597	7	325	40	-4.30	31.57	3.81	1300
10	596	9	324	39	-4.36	31.57	3.80	1294
10	596	11	325	36	-4.42	31.57	3.81	1288
10	596	14	329	31	-4.49	31.57	3.85	1281
10	596	18	329	23	-4.55	31.57	3.85	1275
10	596	14	319	18	-4.70	31.58	3.74	1260
10	595	12	319	20	-4.77	31.58	3.74	1253

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	595	8	320	21	-4.84	31.58	3.75	1246
10	590	11	320	18	-4.91	31.58	3.75	1239
10	582	27	313	31	-4.92	31.13	3.67	1238
10	581	28	312	38	-4.79	31.13	3.66	1251
10	581	22	308	49	-4.72	31.13	3.61	1258
10	581	16	308	58	-4.65	31.13	3.61	1265
10	582	12	189	14	-4.58	31.13	2.22	1272
10	582	12	308	61	-4.58	31.13	3.61	1272
10	585	8	307	62	-4.51	31.13	3.60	1279
10	585	7	307	57	-4.44	31.13	3.60	1286
10	0	0	308	45	-4.38	31.13	3.61	1292
10	0	0	309	33	-4.31	31.13	3.62	1299
10	592	7	308	26	-4.25	31.13	3.61	1305
10	592	7	309	23	-4.19	31.13	3.62	1311
10	592	7	313	26	-4.12	31.12	3.67	1318
10	592	7	314	29	-4.05	31.12	3.68	1325
10	592	7	328	32	-3.98	31.12	3.84	1332
10	592	7	328	34	-3.90	31.12	3.84	1340
10	592	7	328	33	-3.83	31.12	3.84	1347
10	0	0	324	27	-3.77	31.12	3.80	1353
10	0	0	325	21	-3.70	31.12	3.81	1360
10	592	7	317	21	-3.63	31.12	3.71	1367
10	591	7	307	26	-3.55	31.12	3.60	1375
10	587	9	313	28	-3.49	31.12	3.67	1381
10	586	11	316	27	-3.42	31.12	3.70	1388
10	586	12	317	22	-3.36	31.12	3.71	1394
10	586	12	321	18	-3.29	31.12	3.76	1401
10	587	15	322	17	-3.23	31.12	3.77	1407

MAX AMPLITUDE						-50% DAC				+50% DAC				% OF T	
#	ID#	%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP		
2	33	84	3.7	-4.0	31.6	3.8	-4.5	31.6	3.8	-3.9	31.6	1.0	41.5		
		89	3.6	-4.5	31.1	3.7	-4.8	31.1	3.7	-4.3	31.1	0.5	43.4		
		51	3.8	-3.9	31.1	3.8	-3.9	31.1	3.8	-3.9	31.1	0.0	42.0		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	585	22	303	29	-3.07	30.70	3.55	1423
10	591	13	308	25	-3.15	30.71	3.61	1415
10	592	10	309	30	-3.22	30.71	3.62	1408
10	592	8	309	34	-3.28	30.71	3.62	1402
10	592	7	309	34	-3.35	30.71	3.62	1395
10	593	8	309	33	-3.41	30.71	3.62	1389
10	593	8	309	30	-3.48	30.71	3.62	1382
10	593	8	313	25	-3.55	30.71	3.67	1375
10	593	8	313	24	-3.62	30.71	3.67	1368
10	593	8	323	28	-3.69	30.71	3.78	1361
10	593	8	323	29	-3.76	30.72	3.78	1354
10	593	9	323	26	-3.82	30.72	3.78	1349
10	593	10	323	20	-3.89	30.72	3.78	1341
10	593	11	323	14	-3.97	30.72	3.78	1333
10	584	15	302	15	-3.78	30.33	3.54	1352
10	580	14	313	22	-3.33	30.32	3.67	1397
10	580	13	313	20	-3.27	30.32	3.67	1403
10	584	10	313	20	-3.20	30.32	3.67	1410
10	583	12	313	18	-3.13	30.32	3.67	1417
10	584	15	314	17	-3.05	30.32	3.68	1425

LAMINAR INDICATIONS JOINING PLANAR INDICATIONS
CH# LAMINAR # PLANAR # DISPOSITION

2 11 12
2 11 15

FINAL EVALUATION TABLE

CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
2	OW	33	S N	733.03	733.92	157.62	158.07	3.63	3.83	1.53	2.63	
										1.53	3.43	
2	OW	30	S Y	731.78	731.78	163.45	163.45	3.32	3.32	0.01	6.51	
2	OW	27	S X	732.68	732.81	164.36	164.36	3.02	3.10	0.64	4.32	
2	OW	24	S X	733.05	733.19	180.90	180.90	2.25	2.30	0.37	3.06	
2	OW	19	S X	735.21	735.54	196.61	196.62	2.97	3.08	0.81	2.98	
2	OW	15	S Y	736.40	736.40	198.40	198.40	2.32	2.32	0.01	6.51	
2	OW	12	S N	734.64	734.85	198.42	198.84	2.19	2.30	0.82	3.72	
										0.82	2.78	
2	OW	8	S N	736.86	738.00	199.65	201.46	1.92	2.32	3.05	3.08	
										3.05	2.67	
2	OW	5	S N	734.18	734.64	201.98	202.40	2.05	2.18	1.00	2.86	
										1.00	2.95	
2	OW	3	S X	733.39	733.45	216.45	216.45	2.76	2.87	0.61	6.51	
2	OW	31	L	732.64	733.08	161.69	162.09	3.16	3.21	0.18	12.60	
2	OW	28	L	732.49	733.23	163.46	163.94	3.18	3.22	0.35	12.60	
2	OW	25	L	737.64	737.79	170.77	170.78	1.83	1.84	0.00	12.60	
2	OW	23	L	734.42	734.55	183.75	183.75	2.25	2.25	0.00	12.60	
2	OW	22	L	732.14	732.62	184.21	184.21	3.37	3.43	0.00	12.60	
2	OW	21	L	735.95	736.22	191.11	191.12	2.74	2.76	0.00	12.60	
2	OW	20	L	733.81	734.43	196.62	196.62	2.81	2.87	0.00	12.60	
2	OW	6	L	733.92	737.98	197.50	201.51	1.96	2.35	16.28	12.60	
2	OW	4	L	737.03	737.17	210.42	210.42	2.59	2.59	0.00	12.60	
2	OW	2	L	733.27	733.73	217.88	217.89	3.96	3.98	0.00	12.60	
2	OW	1	L	737.29	737.44	218.97	218.98	1.67	1.69	0.00	12.60	
10	OB	34	L	733.44	734.12	157.62	157.63	3.61	3.81	0.00	12.60	
10	OB	32	L	731.67	732.83	162.51	164.35	3.31	3.56	2.14	12.60	
10	OB	26	L	733.38	733.69	168.61	168.61	3.09	3.17	0.00	12.60	
10	OB	18	L	734.92	735.71	198.42	199.24	2.35	2.59	0.65	12.60	
10	OB	10	L	737.28	738.07	199.65	201.46	2.08	2.44	1.43	12.60	

END OF PASS

PAGE 0014 80 DEC 17 22:52:06 SUSQUEHANNA I WELD BA
OF 16

INDICATION REPORT: CURRENT - BA -0008

UT CHANNEL 2 0 W INDICATION == 8
CLASSIFICATION: SUB-SURFACE NON-PLANAR

CHARACTER: (X) ELLIPTICAL
(Y) ELLIPTICAL

LOCATION:

MINX = 736.86 MAXX = 738.00
MINY = 199.65 MAXY = 201.46
MINDEP = 1.92 MAXDEP = 2.32

EVALUATION:

AXIS	A	L	A/L	A/T%	ALLOW	LOW	HIGH
(X)	0.20	1.14	0.17	3.05	3.08	(0.15,2.91)	(0.20,3.25)

NO FURTHER EVALUATION NECESSARY

(Y) 0.20 1.81 0.11 3.05 2.67 (0.10,2.61) (0.15,2.91)

◆◆◆INDICATION REQUIRES FURTHER EVALUATION◆◆◆

INDICATION REPORT: HISTORIC - BA -0008

UT CHANNEL 2 0 W INDICATION == 8
CLASSIFICATION: SUB-SURFACE NON-PLANAR

CHARACTER: (X) ELLIPTICAL
(Y) ELLIPTICAL

LOCATION:

MINX = 736.86 MAXX = 738.00
MINY = 199.65 MAXY = 201.46
MINDEP = 1.92 MAXDEP = 2.32

EVALUATION:

AXIS	A	L	A/L	A/T%	ALLOW	LOW	HIGH
(X)	0.20	1.14	0.17	3.05	3.08	(0.15,2.91)	(0.20,3.25)

NO FURTHER EVALUATION NECESSARY

(Y) 0.20 1.81 0.11 3.05 2.67 (0.10,2.61) (0.15,2.91)

◆◆◆INDICATION REQUIRES FURTHER EVALUATION◆◆◆

COMMENTS:

PAGE 0015 30 DEC 17 22:52:06 SUSQUEHANNA I WELD BA
OF 16

INDICATION REPORT: CURRENT - BA -0006

UT CHANNEL 2 0 W INDICATION == 6
CLASSIFICATION: LAMINAR

CHARACTER: LAMINAR

LOCATION:

MINX = 733.92 MAXX = 737.98
MINY = 197.50 MAXY = 201.51
MINDEP = 1.96 MAXDEP = 2.35

EVALUATION:

LX	LY	RECT	AREA	ALLOW
4.06	4.01	16.28	16.28	12.60

◆◆INDICATION REQUIRES FURTHER EVALUATION◆◆

INDICATION REPORT: HISTORIC - BA -0006

UT CHANNEL 2 0 W INDICATION == 6
CLASSIFICATION: LAMINAR

CHARACTER: LAMINAR

LOCATION:

MINX = 733.92 MAXX = 737.98
MINY = 197.50 MAXY = 201.51
MINDEP = 1.96 MAXDEP = 2.35

EVALUATION:

LX	LY	RECT	AREA	ALLOW
4.06	4.01	16.28	16.28	12.60

◆◆INDICATION REQUIRES FURTHER EVALUATION◆◆

COMMENTS:

PAGE 0016 80 DEC 17 22:52:06 SUSQUEHANNA I. WELD BA
OF 16

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BA -

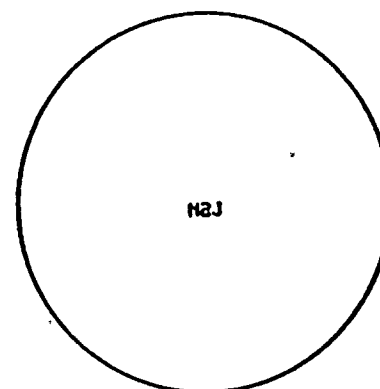
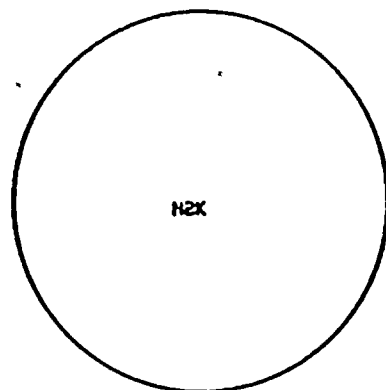
CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	588	10	190	21	-0.41	32.08	2.24	1770
10	587	10	190	24	-0.47	32.09	2.24	1776
10	581	10	190	21	-0.51	32.09	2.24	1780
10	577	12	194	17	-0.58	32.10	2.28	1787
10	582	21	296	35	-4.06	32.79	3.47	2135
10	583	23	301	38	-4.02	32.78	3.53	2131
10	583	23	301	41	-3.94	32.78	3.53	2122
10	583	24	301	45	-3.87	32.77	3.53	2115
10	582	26	301	48	-3.80	32.77	3.53	2108
10	582	28	306	49	-3.73	32.76	3.59	2101
10	582	30	306	49	-3.66	32.76	3.59	2094
10	582	30	306	48	-3.58	32.75	3.59	2086
10	581	30	306	44	-3.50	32.75	3.59	2078
10	582	33	307	45	-3.43	32.74	3.60	2071
10	582	37	307	41	-3.37	32.74	3.60	2065
10	586	10	307	17	-3.77	33.20	3.60	2106
10	586	11	304	20	-3.81	33.20	3.56	2110
10	586	10	299	18	-3.88	33.21	3.50	2117
10	587	8	299	18	-3.95	33.21	3.50	2124
10	591	7	308	17	-4.02	33.22	3.61	2131
10	591	7	308	17	-4.09	33.22	3.61	2138
10	596	7	332	15	-4.17	33.23	3.89	2146
10	601	7	332	16	-4.26	33.23	3.89	2155
10	598	7	338	25	-4.18	33.66	3.96	2147
10	601	7	337	24	-4.11	33.66	3.95	2140
10	601	7	333	22	-4.03	33.65	3.90	2132
10	601	7	342	18	-3.97	33.65	4.00	2125
10	595	8	328	14	-3.85	33.64	3.84	2113
10	595	12	328	17	-3.78	33.64	3.84	2106
10	595	10	339	19	-3.60	34.63	3.97	2088
10	595	9	338	21	-3.56	34.62	3.96	2084
10	595	10	338	21	-3.48	34.62	3.96	2076
10	595	12	338	20	-3.41	34.61	3.96	2069
10	595	19	338	19	-3.34	34.61	3.96	2062
10	583	13	338	15	-2.82	35.04	3.96	2010
10	583	10	342	15	-2.83	35.04	4.00	2011
10	583	12	342	16	-2.91	35.05	4.00	2019
10	583	14	341	17	-2.99	35.05	3.99	2027

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	581	12	233	26	-0.88	85.13	2.74	1816
10	580	12	233	24	-0.62	85.11	2.74	1790
10	587	13	240	27	-0.57	85.11	2.82	1785
10	586	14	239	24	-0.51	85.11	2.81	1779
10	586	14	398	17	-2.81	85.73	4.66	2009

END OF PASS

*NOTE: BA-3 (PAGE 19 80 DEC 17 23:56:15)

SUSQUEHANNA I
WELD BA



X
Y
MAG. 0.100

XHN 731.7
XHX 738.1
YHN 157.6
YHX 219.0
ZHN 1.7
ZHX 4.0

SUSQUEHANNA I
WELD BA

V.32

Y X
↑
→ -99
-99
MAQ- 0.100
XMH- 731.7
XMX- 738.1
VMH- 157.6
VMX- 219.0
ZMH- 1.7
ZMX- 4.0

CATEGORY B-A

(Continued)

* See note BD-3

** Indication 8 required further evaluation: A manual examination was performed in the area of concern. The one indication recorded automatically was found to be two indications when examined manually. The reason for this is the stepping motion of the automatic scanning device. The calculations per ASME Code Section XI paragraph IWB-3510 including Winter 1975 Addenda are as follows:

Indication 8:

Allowed

#1	$2a = .2$ $a = .1$	$\frac{a}{L_1} = \frac{.1}{1.00} = 0.10$	2.61%
----	-----------------------	--	-------

$L_1 = 1.00$

$L_2 = .85$

$t = 6.52$

$\frac{a}{L_2} = \frac{.1}{.85} = 0.12$	2.73%
---	-------

$a/t = 1.53\% = \text{value}$

#2	$2a = 0$ $a = 0$
----	---------------------

$L_1 = .65$

$L_2 = 1.1$

$\frac{a}{L_1} = \frac{.1}{.65} = 0.12$

$\frac{a}{L_2} = \frac{0}{1.1} = 0$

$\frac{a}{t} = \frac{.0}{6.52} = 0$

Allowed

2.32%

Indications 1 & 2 Combined

$$2a = .3$$
$$a = .15$$

$$\frac{a}{l_1} = \frac{.15}{1.19} = .08 > \text{Allowed } 2.53\%$$

$$l_1 = 1.9$$

$$l_2 = 1.3$$

$$\frac{a}{l_2} = \frac{.15}{1.3} = .12 > 2.73\%$$

$$t = 6.52$$

$$\frac{a}{t} = \frac{.15}{6.52} = \frac{2.3\%}{2} \quad \text{Value } 2.3\%$$

The data and calibration sheets used for this examination are attached.

** Indication #6 as evaluated by the computer requires further evaluation. However, the computer does not include paragraph IWB-3360 in its calculations. When paragraph IWB-3360 is used, the area is reduced to 12.21 square inches in area rather than the 16.28 square inches shown. This is less than the maximum acceptable limit allowed by code. None of the laminar indications were evaluated in accordance with paragraph IWB-3360. Since none of the laminar indications require further evaluation (with the exception of indication #6 as discussed above) and all are still within acceptable limits of section XI, no further calculations are deemed necessary.

** The evaluation of laminar indication #11 joining planar indication #12 is as follows:

$$a = .1$$

$$\frac{a}{l_1} = \frac{.1}{1.8} = .059 > \text{Allowed } 2.42\%$$

$$l_1 = 1.8$$

$$\frac{a}{l_2} = \frac{.1}{1.8} = .056 > 2.42\%$$

$$l_2 = 1.8$$

$$\frac{a}{t} = \frac{.1}{6.52} = 1.53\%$$

** The evaluation of laminar indication #11 joining planar indication #15 is as follows:

			<u>Allowed</u>
$a = .1$	$\frac{a}{l_1} = \frac{.1}{1.7} = .059$	$>$	2.42%
$l_1 = 1.7$			
$l_2 = 1.8$	$\frac{a}{l_2} = \frac{.1}{1.8} = .056$	$>$	2.42%
	$\frac{a}{t} = \frac{.1}{6.52} = 1.53\%$		

*** See note BJ-3

GENERAL ELECTRIC
NUCLEAR ENERGY DIVISION

REV. NO. 1

21A3800AB

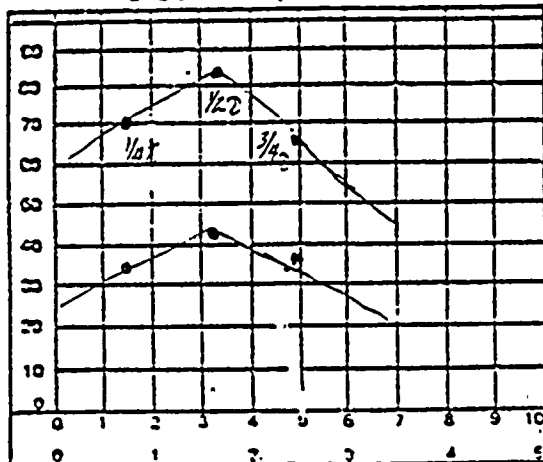
SHEET NO. 20

VESEL UT CALIBRATION DATA SHEET

Cal. Sheet No. Su5001

Site Susquehanna ☒ Preoperational ☐ I.S.I.
Procedure No. 21A3800AB Rev. 1 Cal. Clock No. S/N 1
Date 5/19/81 Couplant Ultra Gel II Cal. Std. Temp. 65° °F
Examiner H.W. Clay ASNT Level II
Recorder E.J. Gentry ASNT Level III
Equipment Date: Instrument Model No. KKUSM 2 Shoe No. N/A
Instrument Serial No. 69084 Code No. RG-58 u.
Transducer Size 1" Ø Frequency 2.25 MHz
Transducer Serial No. C09128 IIW 2 Beam Angle 0°

DAC Curve: Range 0 - 5 0 - 10



Hole Depth T Inches	Gain P 1X	Max. Ampl.	"W" Inch	D or MP Inch	SDH or FBH
1/4	1.55	1X	70	3.25	1.55 SDH
1/2	3.2	1X	85	4.85	3.2 7
3/4	4.8	1X	65	1.6	4.8 4
7/8	N/A	1X			N/A

Calibration in Depth (D) ☒ or Mean Path (MP) ☐

Instrument Settings:

	Start	Finish
Attenuation	N/A	N/A
Sweep	2.5	2.5
Delay	687	687
Scanning Gain	20	20
Evaluating Gain	14	14
Filter Position	N/A	N/A
Rep Rate	N/A	N/A
Damping	OFF	OFF
Reject	N/A	N/A

6 dB Change for 2 x

Initial Calibration Time 0900

Periodic Checks

Time	Value	Last Data Sheet
<u>1250</u>		
Final Check		
<u>1300</u>	<u>100%</u>	<u>0002</u>
	DAC.	

Figure 6a. SAMPLE CALIBRATION DATA SHEET

CAL SHT # 545001

GENERAL ELECTRIC

NUCLEAR ENERGY DIVISION

DOCUMENT NO. 21A3800AB REV. NO. 1
SHEET NO. 21

Angle Beam Spread of 1X 45° _____ or 60° _____ (Made once per calibrated system - Calibration standard combination)														
Hole Depth	Trailing Ray								Leading Ray					
	10% DAC		25% DAC		50% DAC		100% DAC		50% DAC		25% DAC		10% DAC	
	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP
1/4T														
1/2T														
3/4T														

Amplitude Linearity Check (Made Daily)			
100%FSH	50	% FSH	50%FSH 25
50%	N/A	-	40% 29
20%	40	-	30% 15
10%	N/A	-	20% N/A
5%	32	-	

Control Linearity (Made Daily)			
100%FSH	-60	40	(32-48)
50%	-12db	18	(16-24)
40%	-8db	85	(64-96)
20%	-12db	90	(54-96)

Equip. Data - Angle Beam
For Linearity Checks

Code Clock T 6.52

Transducer Data

Serial No. C09128

Beam Angle 0

Size 1/2" Freq 2.25

Spec No. NA Cable No. RG-384

Check Made By [Signature]

Checks on 1114-2

Check on 1/8" SDH for Field Calib

Checks @ Max Amp. for Both Near & Far

Positions in % Screen Height

1/8" SDH	Near	Far
Max. Amp.	N/A	*
Metal Path		

Reviewed by [Signature] SNT-TC Level III

Figure 6b. SAMPLE CALIBRATION DATA SHEET

GENERAL  ELECTRIC

NUCLEAR ENERGY DIVISION

DOCUMENT NO. 21A3800AB
SHEET NO. 23

REV. NO. 1

VESSEL EXAMINATION DATA SHEET

Exam Sheet No. 0002

Cal. Sheet No. 505001

Site Susquehanna ☒ Operational ☐ In Shop

Date 5/19/81

Examiner A. W. Day Level II

Recorder E. O. Kersh Level III

Weld Seam ID No. B1

Beam Angle 0° ☒ 45° ☐ 60° ☐

Procedure No. 21A38001B

Revision 1

Scan Sensitivity 20 db = 2x

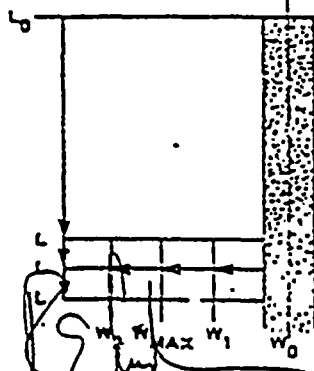
Evaluation Sensitivity 14 db = 1x

Couplant Ultragel II

Component Temperature 69 °F.

L	DAC Max	W ₁ (1/2 Max)	WF ₁ (50% DAC)	W _m (Max DAC)	WF ₂ (50% DAC)	W ₂ (1/2 Max)	D ₁ (1/2 Max)	DF ₁ (50% Max)	D _m (Max DAC)	DF ₂ (50% DAC)	D ₂ (1/2 Max)	Continuous or 180° Transverse or Parallel	CW or CCW Top or Bottom
73.1	50			1.15					2.2				
73.4	156		.85	1.2	1.5			2.2	2.2	2.2			
73.8	80		1.0	1.2	1.7			2.0	2.0	2.1			
74.1				1.3					2.1				
74.35	50			.9					1.9				
74.7	200		.4	1.0	1.5			1.9	1.9	1.9			
75.0	50			.7					1.9				

REFLECTOR PARALLEL (P)
TO WELD



Reference System

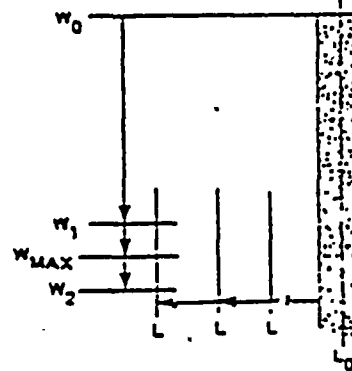
L₀ = AA

W₀ = BA

Looking down on vessel
CW is to right of weld
and
CCW is to left of weld

Top is too head
end of vessel

REFLECTOR TRANSVERSE
(T) TO WELD



Reviewed by E. W. Day

ENT-TC Level

Figure 8. SAMPLE EXAMINATION DATA SHEET

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
VESSEL LENGTH= 30.00 FULL SCALE= 3000
DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 802.82 Y= 263.50
THICKNESS = 6.520
SHELL COURSE 2 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7	11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BD -

# ID#	%DAC	MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
		DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	SDEP
5 1	59	6.6	2.1	-0.9	6.6	2.3	-0.9	6.6	1.9	-0.9	0.0	-0.7			
	79	6.8	1.5	-0.7	6.8	2.3	-0.7	6.8	1.3	-0.7	0.5	-4.0			
6 2	86	6.5	1.3	-0.9	6.6	1.6	-0.9	6.5	1.2	-0.9	0.5	-0.7			
	79	6.8	1.5	-0.7	6.8	2.3	-0.7	6.8	1.3	-0.7	0.5	-4.0			

*NOTE: BD-3 (PAGE 25 80 DEC 15 15:53:23)

FINAL EVALUATION TABLE

CH TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
6 -45P	1 I N	804.03	805.14	262.53	262.76	6.55	6.79	-0.40	1.82		
								-0.40	1.61		

END OF PASS

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BD -

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	582	39	289	39	-0.65	77.26	3.36	1605
10	583	21	281	42	-0.71	77.26	3.27	1599
10	583	20	286	42	-0.79	77.26	3.33	1591

END OF PASS

*NOTE: BD-2 (PAGE 39 80 DEC 15 17:46:11)

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD.BJ
EVALUATION LEVEL = 50% DAC

VELOCITY OF SOUND = 0.1164
LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 836.66
SHELL COURSE # 4
THRESHOLD = 20000
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00

REGION 2

SENSOR	GLOBAL #	X	Y
1	30	269.532	631.000
2	18	519.734	380.676
3	11	501.012	477.516
4	27	570.234	632.916
5	26	76.267	604.092
6	15	81.452	373.116
7	14	780.759	478.596
8	9	219.465	478.836
9	7	48.209	485.376
10	22	784.659	514.296
13	12	610.582	479.976
14	20	523.934	522.936
15	19	332.936	521.016

TABLE IWB-3510

ASPECT RATIO	SURFACE INDICATIONS A/T, %	SUBSURFACE INDICATIONS A/T, %
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2

COMPONENT THICKNESS T, IN.	LAMINAR AREA A, SQ IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:
VESSEL MODE

PAGE 0002 30 DEC 08 14:54:25 SUSQUEHANNA I WELD BJ
OF

-- SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
VESSEL LENGTH= 30.00 FULL SCALE= 3000
DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020.
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 558.48 Y= 400.50
THICKNESS = 6.520
SHELL COURSE 4 CIRCUMFERENCE = 836.66
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0	11	0.00
4	45.0 T	-2.25	2.65	450	2150	0	28	0.00
5	60.0 T	-1.05	2.65	150	2150	0	38	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0	20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0	20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7	11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BJ --

# ID#	%DAC	MAX AMPLITUDE			-50% DAC			+50% DAC			% OF T	
		DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	REL	X RY/AZ	DEP	SDEP
5	1	64	6.2	7.7 123.9	6.3	7.7	123.9	6.2	7.8	123.9	1.4	4.1

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	578	7	305	15	-2.24	50.45	3.54	1577
10	579	14	306	15	-2.22	50.45	3.55	1579
10	578	7	305	14	-2.15	50.45	3.54	1586
10	578	7	305	18	-2.09	50.45	3.54	1592
10	577	7	304	18	-2.03	50.45	3.53	1598
10	578	7	304	17	-1.97	50.45	3.53	1604
10	578	8	300	13	-1.91	50.45	3.48	1610

FINAL EVALUATION TABLE

CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
5	60T	1	S X	566.13	566.27	524.39	524.39	6.17	6.25	0.59	3.90	

END OF PASS

*NOTE: BJ-3 (PAGE 26 30 DEC 08 16:09:04)

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BJ --

PAGE 0003 80 DEC 08 18:02:41 SUSQUEHANNA I WELD BJ
OF

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	301	19	7.99	98.85	3.49	951
10	0	0	305	22	8.06	98.85	3.54	944
10	0	0	299	21	8.13	98.85	3.47	937
10	0	0	300	18	8.20	98.85	3.48	930
10	0	0	308	14	8.27	98.85	3.57	923

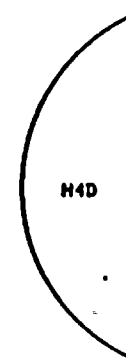
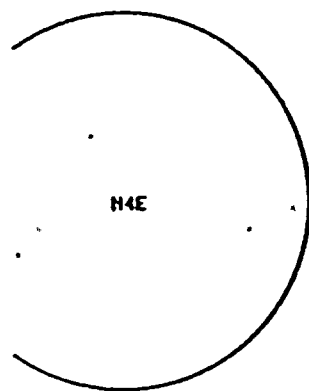
FINAL EVALUATION TABLE

CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
10	0B	2	L	566.47	566.75	499.35	499.35	3.47	3.57	0.00	12.60	


END OF PASS

SUSQUÉHANNA I WELD BJ

WELD AD




V.54


 MAG- 0.100
 XMH- 566.4
 XMH- 566.7
 YMH- 499.3
 YMH- 499.3
 ZMH- 3.5
 ZMH- 3.6

SUSQUEHANNA I WELD BJ

V.55


 MAG- 0.100
 XMH- 566.4
 XHX- 566.7
 VMH- 499.3
 VMX- 499.3
 ZMH- 3.6
 ZHX- 3.6

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD B6
EVALUATION LEVEL = 50% DAC

VELOCITY OF SOUND = 0.1164
- LAG TIME = 1.000
DISTANCE C.F. = 0.0000
ACOUSTIC LOCATION TOLERANCE = 0.250
CYLINDRICAL GEOMETRY, CIRCUMFERENCE = 837.72
SHELL COURSE # 3
THRESHOLD = 961
CRAWLER PULSER LOCATION X = 0.00 Y = 0.00
REGION 2

SENSOR	GLOBAL #	X	Y
1	30	269.874	631.000
2	18	520.392	380.676
3	11	501.647	477.516
4	27	570.957	632.916
5	26	76.364	604.092
6	15	81.555	373.116
7	14	781.748	478.596
8	9	219.743	478.836
9	7	48.270	485.376
10	22	785.653	514.296
13	12	611.356	479.976
14	20	524.598	522.936
15	19	333.358	521.016

TABLE IWB-3510

ALLOWABLE PLANAR INDICATIONS		
ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

TABLE IWB-3510.2

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ. IN.
0	10
6	10
8	20
10	30
12	40

EVALUATION PARAMETERS:
VESSEL MODE

PAGE 0002 20 DEC 09 10:10:02 SUSQUEHANNA I WELD BG
OF 03

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
VESSEL LENGTH= 30.00 FULL SCALE= 3000
DD. UNITS PER INCH= 100.00
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 0.00 Y= 400.50
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0° NON-PLANAR= 10.0°
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-2.55	0.00	1200	2150	0		11	0.00
4	45.0 T	-2.25	2.65	450	2150	0		28	0.00
5	60.0 T	-1.05	2.65	150	2150	0		39	-7.00
6	-45.0 P	-5.45	0.60	850	1950	0		20	0.00
7	-60.0 P	-5.45	1.75	850	1950	0		20	-6.00
10	0.0 B	-2.55	0.00	10	2150	7		11	0.00

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BG -

#	ID#	MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
		%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP		
2	1	67	2.6	6.4	11.3	2.7	6.4	11.3	2.6	6.3	11.3	1.0	39.8		
		96	2.4	6.9	11.8	2.4	7.0	11.8	2.5	6.4	11.8	0.5	37.4		
2	2	59	2.6	6.8	11.3	2.6	6.8	11.3	2.5	6.7	11.3	1.4	38.8		
		96	2.4	6.9	11.8	2.4	7.0	11.8	2.5	6.4	11.8	0.5	37.4		
2	3	50	2.4	5.9	11.8	2.4	5.9	11.8	2.4	5.9	11.8	0.0	36.4		
2	4	52	2.5	7.8	12.3	2.5	7.9	12.3	2.5	7.8	12.3	0.0	38.8		
2	5	58	2.9	7.0	14.9	2.8	7.1	14.9	2.8	6.9	14.9	1.0	42.7		
		52	3.0	7.3	15.4	3.0	7.4	15.4	3.0	7.3	15.4	0.0	45.5		
2	6	64	2.6	6.4	16.8	2.6	6.5	16.8	2.6	6.4	16.8	0.0	40.3		
2	7	90	2.8	6.1	17.8	2.9	6.3	17.8	2.9	5.9	17.8	0.0	44.1		
2	8	79	2.3	2.7	18.2	2.4	2.8	18.2	2.3	2.6	18.2	0.5	35.9		
2	9	54	2.1	5.0	19.2	2.1	5.0	19.2	2.0	4.9	19.2	0.5	31.2		
2	10	77	2.9	4.9	22.6	2.9	5.1	22.6	2.9	4.9	22.6	0.0	45.1		
2	11	52	5.1	3.0	26.6	5.1	3.0	26.6	5.1	3.0	26.6	0.5	21.4		
		70	5.0	2.7	26.9	5.1	2.8	26.9	5.1	2.5	26.9	0.0	22.4		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	591	11	455	18	3.46	31.77	5.30	1621

PAGE 0003 80 DEC 09 10:44:56 SUSQUEHANNA I WELD BG
OF 03

MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
ID#	%DAC	DEP	REL X RY/AZ	DEP	REL X RY/AZ	DEP	REL X RY/AZ	DEP	REL X RY/AZ	DEP	SDEP		
2	12	76	5.2 3.3 31.8	5.2	3.5 31.8	5.1	3.0 31.8	1.4	20.0				

FINAL EVALUATION TABLE												
CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
2	OW	11	S N	2.48	3.04	427.06	427.37	4.95	5.13	1.44	3.03	
										1.44	4.12	
2	OW	12	S X	3.02	3.53	432.27	432.28	5.12	5.23	0.81	2.63	
2	OW	9	S X	4.95	5.01	419.68	419.68	2.04	2.07	0.28	4.13	
2	OW	3	S Y	5.89	5.89	412.30	412.30	2.36	2.37	0.01	6.51	
2	OW	1	S N	6.25	7.00	411.84	412.30	2.42	2.64	1.71	2.90	
										1.71	3.61	
2	OW	5	S N	6.88	7.39	415.43	415.88	2.79	2.97	1.43	3.14	
										1.43	3.30	
2	OW	8	L	2.58	2.78	418.70	418.70	2.35	2.37	0.00	12.60	
2	OW	10	L	4.87	5.06	423.14	423.14	2.94	2.95	0.00	12.60	
2	OW	7	L	5.93	6.26	418.28	418.28	2.84	2.89	0.00	12.60	
2	OW	6	L	6.37	6.51	417.28	417.28	2.62	2.63	0.00	12.60	
2	OW	4	L	7.80	7.87	412.76	412.76	2.52	2.52	0.00	12.60	

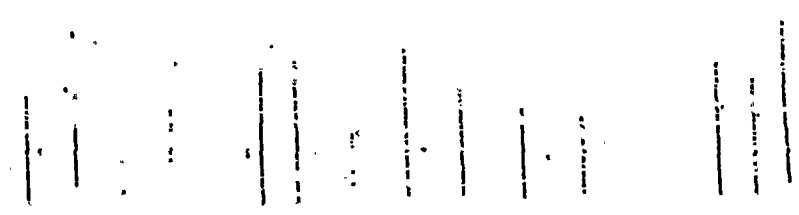
END OF PASS

BEGIN UT INSPECTION AND CRAWLER MOTION SEQUENCE
EVALUATION LEVEL = 50% DAC
WELD BG -

END OF PASS


◆NOTE: BG-2 (PAGE 13 80 DEC 09 14:01:41)
◆NOTE: BG-3 (PAGE 13 80 DEC 09 14:01:41)

SUSQUEHANNA I:
WELD BG



V. 59

WELD AC


 MAG. 0.100
 XMN. 2.5
 XMX. 7.5
 YMN. 411.8
 YMX. 432.3
 ZMN. 8.0
 ZMX. 5.2

WELD BD

SUSQUEHANNA I
WELD BG

V.60

Y X
↑
-90
-90
MAG= 0.100
XMM= 2.5
XMX= 7.9
YMM= 411.8
YMX= 432.3
ZMM= 2.0
ZMX= 5.2



STRAIGHT BEAM EXAMINATION DATA SHEET

Weld Seam ID No: BA

/X/Preoperational /I.S.I.

Date 12/14/76 . .

Examiner M. HART Level III

Recorder T. MULLIGAN Level 1 T

Procedure 15E-QA1-325

Revision 2

Scanning Sensitivity 1X (38 dB out)

Evaluation Sensitivity 1X (33 dB out)

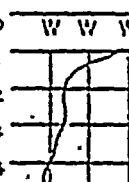
Couplant Glycerine

Component Temperature 63 °F

Lo= AA Ro= A

$$R_o = N/A \quad W_o = BA$$

WELD C

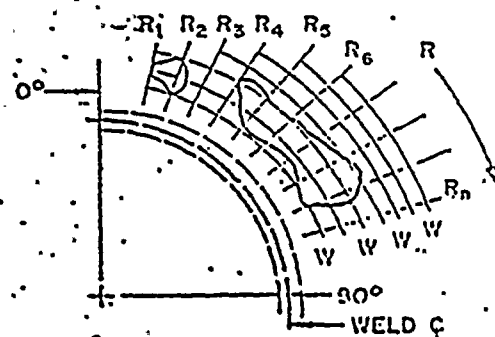


L0
L1
L2
L3
L4
L5
L6

W W W W W W W W

..LOOKING DOWN ON VESSEL
CW IS TO RIGHT OF WELD
CCW IS TO LEFT OF WELD

• NOZZLE WELD REFERENCE SYSTEM



Reviewed by: Charles E. Dieringer.

SNT-TC Level III

☒ Acceptable to Section XI

☐ Unacceptable to Section X



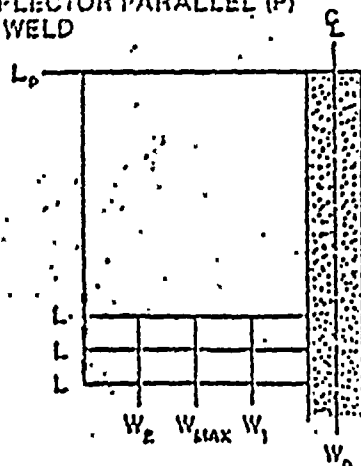
CONTROL No. 2
Exam Sheet No. 2050
Cal. Sheet No. 2045

VESSEL EXAMINATION DATA SHEET

Site Susquehanna I SQI-761 ☒ Preoperational ☐ I.S.I. Date 12/14/73
Examiner M. HART Level III Recorder T. MULLIGAN Level IT
Weld Seam ID No. BA Beam Angle 0° ☒ 45° ☐ 60°
Procedure No. ISE-QA1-325 Revision 2
Scan Sensitivity 2x (+6db) Evaluation Sensitivity 1x (0db)
Couplant Glycerine Component Temperature 63° F

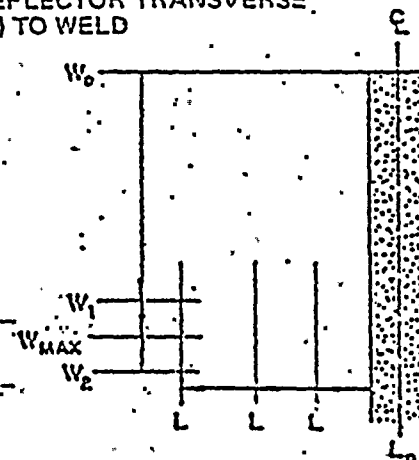
L	DAC Max	W1 (25% DAC)	WF1 (50% DAC)	Win (Max DAC)	WF2 (50% DAC)	W2 (25% DAC)	D1 (25% DAC)	DF1 (50% Max)	Dm (Max DAC)	DF2 (50% DAC)	D2 (25% DAC)	Continuous or spot, T or P	CW or CCW Top or Bottom	RAT ZON
36.75	43%			2.75	/				3.4			S	CCW	7-3
51.50	100%			1.62	/				3.5			S	CCW	7-5
61.25	75%			2.50	/				2.0			S	CCW	7-5
71.25	100%	+4db		2.50	/				1.8			S	CCW	7-6
74.00	100%	+2db		2.00	/				1.8			S	CCW	7-7
83.75	100%	+4db		.75					2.9			S	CCW	7-7
90.75	75%			3.50	/				3.9			S	CCW	7-8
120.50	43%			1.75	/				3.6			S	CCW	7-10

REFLECTOR PARALLEL (P) TO WELD



Reference System

REFLECTOR TRANSVERSE (T) TO WELD



Looking down on vessel
CW is to right of weld
and
CCW is to left of weld

Lo = AA
Wo = BA

Reviewed by: George E. Jorhyn
SNP-TC Level III

☒ Acceptable to Section
☐ Unacceptable to Section

V. 62

GENERAL ELECTRIC

GENERAL ELECTRIC

100-TTD-0101

WID SA

100-TTD-0101

SW	AMP	AXIS	DATE	NO	REMARKS
A	35%	0° 0' 0"	3007	7-2	1st
B	50%	0° 0' 0"	3007	7-3	1st
C	35%	0° 0' 0"	3007	7-4	1st
D	50%	0° 0' 0"	3008	7-5	1st
E	100%	0° 0' 0"	3008	7-6	1st
F	75%	0° 0' 0"	3008	7-7	1st
G	100%	0° 0' 0"	3008	7-8	1st
H	100%	0° 0' 0"	3008	7-9	1st
I	100%	0° 0' 0"	3008	7-10	1st
J	75%	0° 0' 0"	3008	7-11	1st
K	100%	0° 0' 0"	3008	7-12	1st

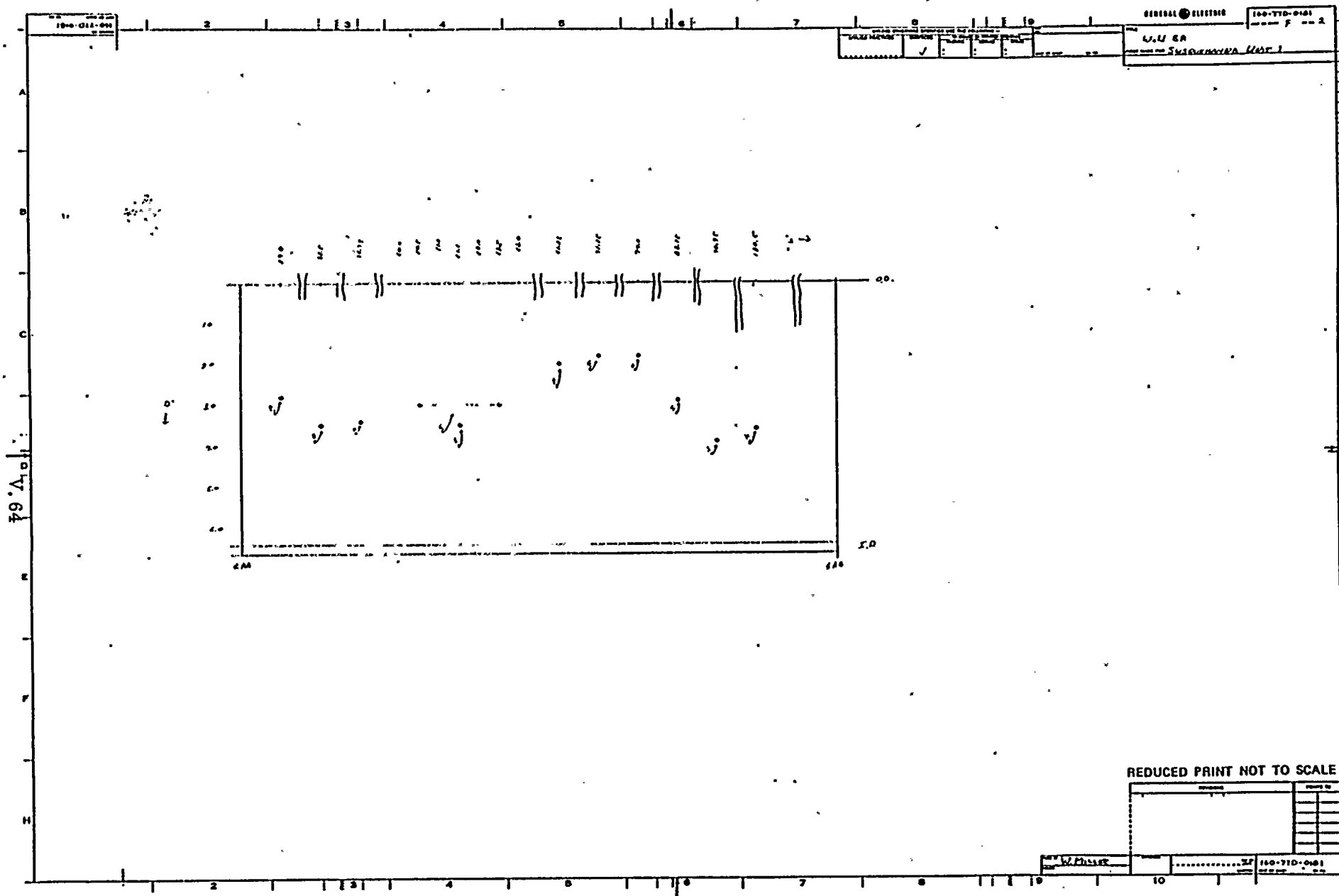
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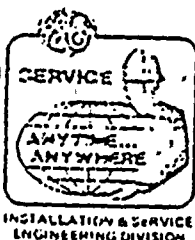
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REDUCED PRINT NOT TO SCALE

100-TTD-0101

V. 63





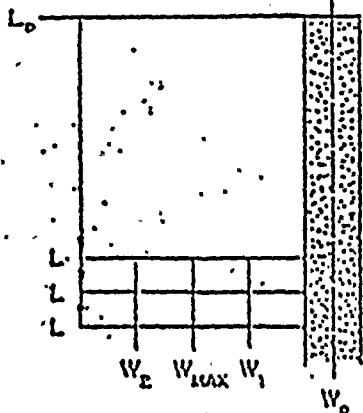
Control No. 10
Exam Sheet No. 2052
Cal. Sheet No. 2045

VESSEL EXAMINATION DATA SHEET

Site Susquehanna I SOI-761 ☒ Preoperational ☐ I.S.I. Date 12/14/76
Examiner M. HART Level III Recorder T. MULLIGAN Level IT
Weld Seam ID No. B-C Beam Angle 0° ☒ 45° ☐ 60°
Procedure No. ISE-QA1-325 Revision 2
Scan Sensitivity 2X (+6db) Evaluation Sensitivity 1X (+0db)
Couplant Glycerine Component Temperature 63° Wm. 84/170°F

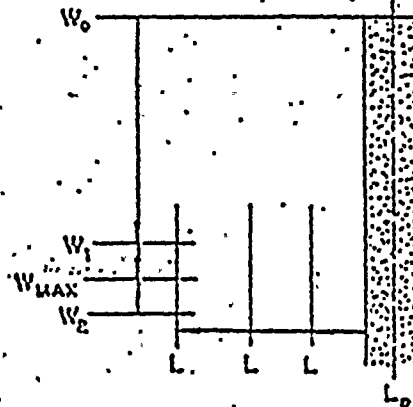
L	DAC Max	W1 (25% DAC)	WF1 (50% DAC)	Wm (Max DAC)	WF2 (50% DAC)	W2 (25% DAC)	D1 (25% DAC)	DF1 (50% Max)	Dm (Max DAC)	DF2 (50% DAC)	D2 (25% DAC)	Continuous or spot, T or P	CW or CCW Top or Bottom	RAD ZON
78"	50%			2.0"					1.8"			S	CCW	27-6
94"	100%			1.75"					3.0			S	CCW	27-7

REFLECTOR PARALLEL (P)
TO WELD



Reference System

REFLECTOR TRANSVERSE
(T) TO WELD



Looking down on vessel
CW is to right of weld
and
CCW is to left of weld

LO = AA

W0 = BC

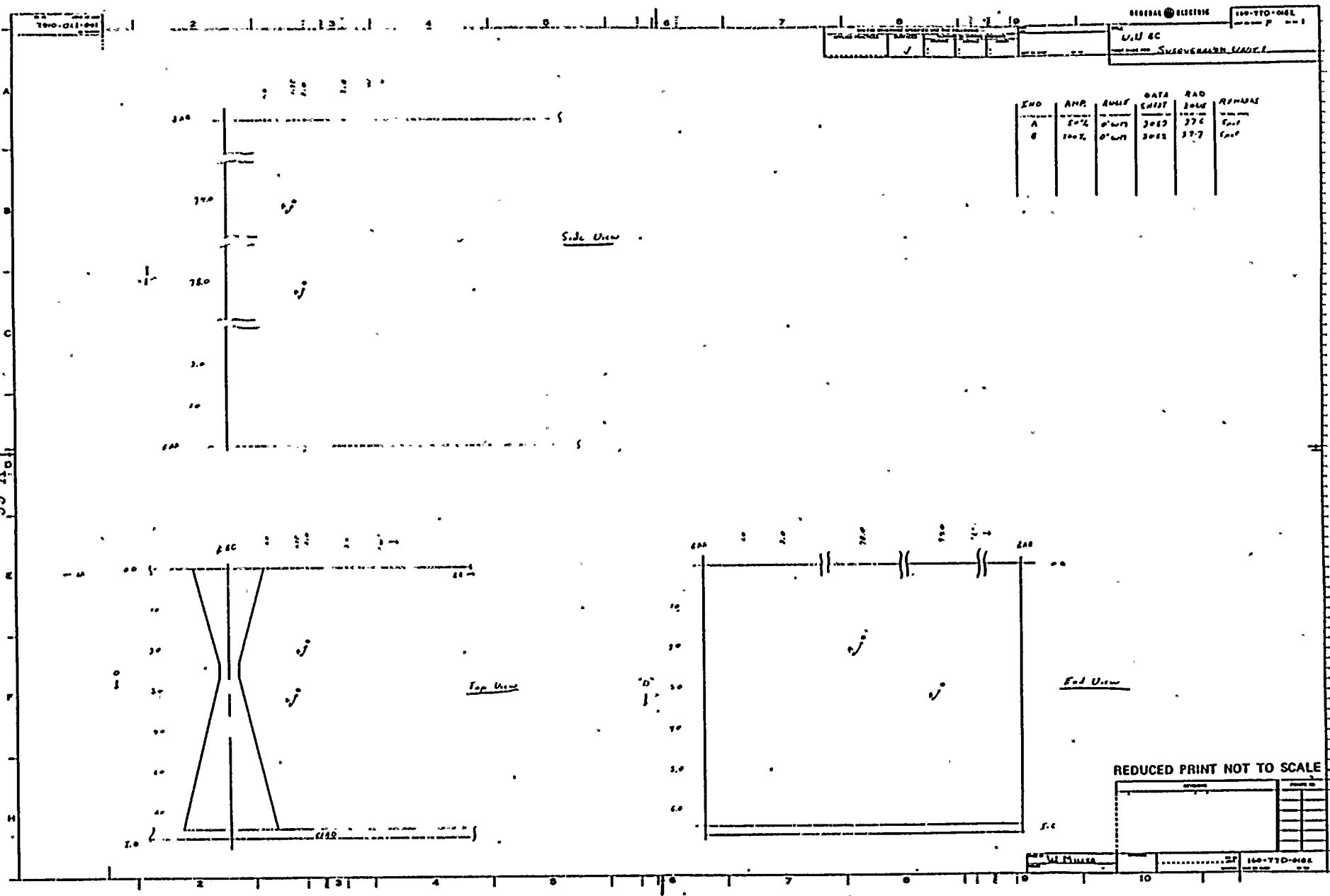
Reviewed by: George E. Lockyer
SNT-TC Level III

☒ Acceptable to Section X
☐ Unacceptable to Section

V. 65

GENERAL ELECTRIC

99.V.66





INSTALLATION & SERVICE
ENGINEERING DIVISION

VESSEL UT CALIBRATION DATA SHEET

Cal. Sheet No. 2045

Site SUSQUEHANNA #1

Procedure No. ISE-QAI-325 Rev. 2

Date 12-14-76 Couplant GLYCERINE

Examiner M. HART

Recorder T. MULLIGAN

☒ Preoperational ☐ I.S.I.

Calib. Block No. RPV STD. #1

Cal. Std. Temp. 68 °F

ASNT Level III

ASNT Level I-T

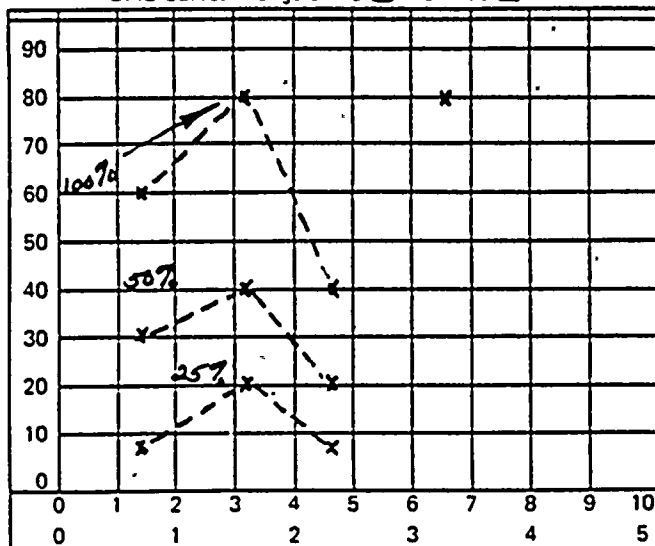
Equipment Data: Instrument Model No. SONARAY (BRANSON) Shoe No. N/A

Instrument Serial No. 11998 Cable No. J6 (122") 594

Transducer Size 1.0 Frequency 2.25 MHz

Transducer Serial No. 015238 IIW-2 Beam Angle 0 °


DAC Curve: Range 0 - 5 ☐ 0 - 10 ☒



Instrument Settings:

	Start	Finish
Attenuation	9.75	9.75
Sweep	10/6.25	10/0.85
Delay	1/3.58	1/3.58
Scanning Gain	54db	54db
Evaluating Gain	48db	48db
Filter Position	OUT	OUT
Rep Rate	AUTO	AUTO
Damping	OFF	OFF
Reject	OFF	OFF

6 db Change for 2 X

Hole Depth "T" Inches	Gain @ 1X	Max. Amp.	"W" Inch	D or  Inch	SDH or FBH	
1/4	1.4	1X	60%	N/A	1.4	SDH
1/2	3.05	1X	80%	N/A	3.05	SDH
3/4	4.65	1X	40%	N/A	4.65	SDH
2% Notch	N/A	1X	N/A	N/A	N/A	N/A

Initial Calibration Time 1640

Periodic Checks:

Time	Value	Last Data Sheet

Calibration in Depth (D) ☒ or Metal Path (MP) ☐

Final Check:

2015 80% 2035

GENERAL ELECTRIC

2045

CAL SHEET 2045

Angle Beam Spread @ 1X 45° ~~X~~ or 60°
 (Made once per calibrated system — Calibration standard combination)

Hole Depth	Trailing Ray						Leading Ray							
	10% DAC		25% DAC		50% DAC		100% DAC		50% DAC		25% DAC		10% DAC	
	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP
1/4T	1.2	1.2	1.3	1.3	1.4	1.4	1.6	1.6	1.9	1.7	2.0	1.8	2.1	1.85
1/2T	*	*	2.65	2.8	2.8	2.9	3.4	3.2	3.9	3.4	4.1	3.6	*	*
3/4T	*	*	4.05	4.4	4.3	4.5	4.9	4.8	5.6	5.2	5.9	5.3	*	*

Amplitude Linearity Check (Made Daily)

100%FSH 52 % FSH 50%FSH 28 % FSH
 90% " 48 " 40% " 20 "
 80% " 40 " 30% " 15 "
 70% " 35 " 20% " 10 "
 60% " 30 "

Control Linearity (Made Daily)

80%FSH -6db 39 (32-48)
 80% " -12db 20 (16-24)
 40% " + 6db 82 (64-96)
 20% " +12db 88 (64-96)

* COULD NOT RESOLVE THESE POINTS DUE
 TO LOW AMPLITUDE OF SIGNAL RESPONSE.
 M.R.H.

Equip. Data — Angle Beam For Linearity Checks

Code Block J RFV #1 6.52"
 Transducer Data:
 Serial No. 015234
 Beam Angle 44°
 Size .5 x 1.0 Freq 2.25 MHz
 Shoe No 7641 Cable No 56

Check Made By:

myles Hart

Reviewed by

George E. Jorky III
 SNT-TC Level

Checks on IIW-2

Block on 1/8" SDH for Field Calib.

Checks @ Max Amp. for Both Near & Far

Positions in % Screen Height

1/8" SDH	Near	Far
Max. Amp.	N/A	%
Metal Path	"	"



VESSEL UT CALIBRATION DATA SHEET

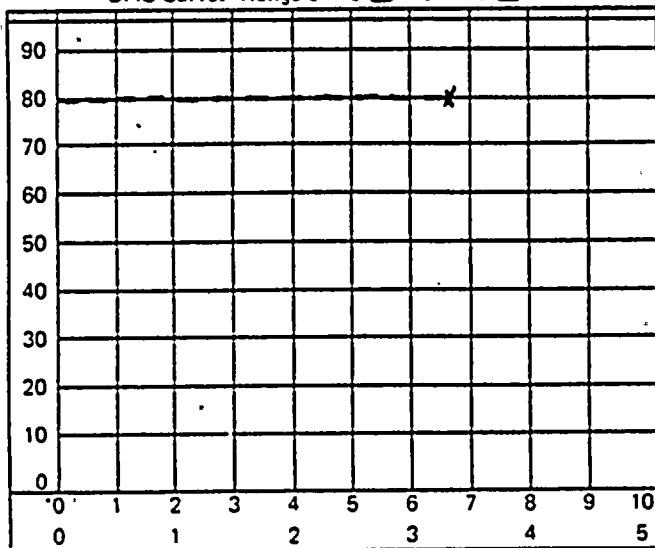
Cal. Sheet No. 2046

Site SUSQUEHANNA #1
 Procedure No. ISE-QAI-325 Rev. 2
 Date 12-14-76 Couplant GLYCERINE
 Examiner M. HART
 Recorder T. MULLIGAN

☒ Preoperational ☐ I.S.I.
 Calib. Block No. R2V STD. #1
 Cal. Std. Temp. 68°F
 ASNT Level III
 ASNT Level I-T

Equipment Data: Instrument Model No. SONARAY (BRANSON) Shoe No. N/A
 Instrument Serial No. 11998 Cable No. 56 (122") 594
 Transducer Size 1.0 Frequency 2.25 MHz
 Transducer Serial No. 015238 IIW-2 Beam Angle 0°

DAC Curve: Range 0 - 5 ☐ 0 - 10 ☒



Instrument Settings:

	Start	Finish
Attenuation	9.75	9.75
Sweep	10/0.85	10/0.85
Delay	1/3.58	1/3.58
Scanning Gain	38dB OUT	38dB OUT
Evaluating Gain	38dB OUT	38dB OUT
Filter Position	OUT	OUT
Rep Rate	AUTO	AUTO
Damping	OFF	OFF
Reject	OFF	OFF

0 db Change for 1 X

Hole Depth "T" Inches	Gain @ 1X	Max. Amp.	"W" Inch	D or Inch	SDH or FBH
1/4	1X				
1/2	1X	N/A			
3/4	1X				
BACK REFLECTOR	N/A	80%		6.8	N/A

Initial Calibration Time 1645

Periodic Checks:

Time Value Last Data Sheet

Calibration in Depth (D) ☒ or Metal Path (MP) ☐

Final Check:

2020 80% 2058

GENERAL ELECTRIC

2046

CAL SHT. 2046

Angle Beam Spread @ 1X 45° X or 60° _____
 (Made once per calibrated system - Calibration standard combination)

Hole Depth	Trailing Ray								Leading Ray							
	10% DAC		25% DAC		50% DAC		100% DAC		50% DAC		25% DAC		10% DAC			
	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP
1/4T																
1/2T																
3/4T																

SEE CAL. SHEET NO. 2045 FOR
 BEAM SPREAD DETERMINATIONS.

Amplitude Linearity Check (Made Daily)

100%FSH	<u>52</u>	% FSH	50%FSH	<u>28</u>	% FSH
90% "	<u>48</u>	"	40% "	<u>20</u>	"
80% "	<u>40</u>	"	30% "	<u>15</u>	"
70% "	<u>35</u>	"	20% "	<u>10</u>	"
60% "	<u>30</u>	"			

Control Linearity (Made Daily)

80%FSH	-6db	<u>39</u>	(32-48)
80% "	-12db	<u>20</u>	(16-24)
40% "	+ 6db	<u>82</u>	(64-96)
20% "	+12db	<u>88</u>	(64-96)

Equip. Data - Angle Beam For Linearity Checks

Code Block T RPV #1 6.52"

Transducer Data:

Serial No. 015234Beam Angle 44°Size 1.5x1.0 Freq 2.25MHzShoe No 7641 Cable No J6

Check Made By:

mylar Hart

Checks on IIW-2

Block on 1/8" SDH for Field Calib.

Checks @ Max Amp. for Both Near & Far
 Positions in % Screen Height

1/8" SDH	Near	Far
Max. Amp.	N/A%	%
Metal Path	"	"

Reviewed by

George E. Jorkner III
 SNT-TC Level

SECTION V

RECORDABLE INDICATION LIST

Project SUSQUEHANNA UNIT #1 Project No. SQI-761
Category BD Procedure 325 (M) 2
ISI-QA-330 (A) Rev. 1

System	Identification Number	Data Sheet No.	Calibration Sheet No.	Indication Description
NOZZLE TO VESSEL WELDS	N1A (A)	N1A	5,6	2 Spot Indications
	N2K (A)	N2A	7	1 Spot Indication
	N4A (A)	N4A	15,16 17	1 Spot Indication
	N4C (A)	N4C	10,11	5 Spot Indications
	N4E (A)	N4E	13	2 Spot Indications
	N4F (A)	N4F	16,17	1 Spot Indication
	N5B (A)	N5B	13	7 Spot Indications
	N9 (M)	4094 4093 1106	4092 4091 1104	8 Spot Indications

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD N1A
EVALUATION LEVEL = 50% DAC

TABLE IWB-3512.1
ALLOWABLE PLANAR INDICATIONS

ASPECT RATIO	SURFACE INDICATIONS	SUBSURFACE INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3
ALLOWABLE LAMINAR INDICATIONS

COMPONENT THICKNESS T, IN.	LAMINAR AREA A, SQ IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -25.91

SCANNER STEP SIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 29.31 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4R
2	0.0 W	-1.28	-1.12	20	600	0	11	0.00
4	-45.0 T	-2.00	1.22	20	1200	0	28	-5.00
5	-60.0 T	-3.20	1.22	20	1550	0	39	-6.00
10	0.0 B	-1.28	-1.12	20	1700	7	11	0.00

PAGE 0002 80 OCT 28 17:29:25 SUSQUEHANNA I WELD N1A
OF 03

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 0.00 Y = 161.50
WELD N1A-

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	290	18	1.12	252.08	3.36	222
10	0	0	290	19	1.19	252.08	3.36	229
10	0	0	286	15	1.29	252.07	3.32	239

MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T			
ID#	%DAC	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	SDEP
2	1	78	3.4	1.1	252.1	3.4	1.1	252.1	3.4	1.3	252.1	0.0		47.8	

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	296	11	1.15	252.58	3.43	225

FINAL EVALUATION TABLE												
CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
2	OW	1	L	9.06	9.11	189.50	189.66	3.40	3.41	0.01	19.56	
10	OB	2	L	8.82	9.11	189.50	189.66	3.32	3.43	0.05	19.56	

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -26.16

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 28.31 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
4	-45.0 P	-1.45	-0.75	30	650	0	20	-5.00
5	-60.0 P	-1.45	0.44	30	650	0	20	-6.00
10	0.0 B	-3.75	1.15	10	800	7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =-360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 0.00 Y = 161.50
WELD N1A-

END OF PASS

PAGE 0003 80 OCT 28 19:54:53 SUSQUEHANNA I WELD N1A
QF 03

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -26.16

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= -28.31 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	45.0 P	-1.45	0.75	30	650	0		20	-5.00
5	60.0 P	-1.45	-0.44	30	650	0		20	-6.00
10	0.0 B	-3.75	1.15	30	650	7		11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360

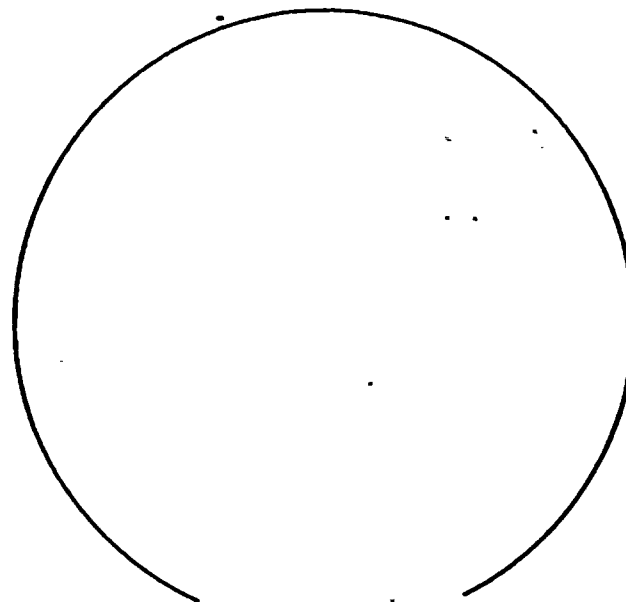
EVALUATION LEVEL = 50% DAC

NOZZLE LOCATION X = 0.00 Y = 161.50

WELD N1A-

END OF PASS

SUSQUEHANNA I
WELD N1A



Y
X
MAG. 0.100
XMM. 8.8
XMX. 9.1
YMM. 189.6
YMX. 189.7
ZMM. 3.3
ZMX. 3.4

V.75

SUSQUEHANNA I
WELD N1A

V.76

X Y
↑
-99
0
MAQ= 0.100
XMH= 8.8
XMX= 9.1
YMH= 189.6
YMX= 189.7
ZMH= 3.3
ZMX= 3.4

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD N2K
EVALUATION LEVEL = 50% DAC

TABLE IWB-3512.1

ALLOWABLE PLANAR INDICATIONS		
ASPECT RATIO	SURFACE INDICATIONS	SUBSURFACE INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-1.28	-1.12	30	500	0	11	0.00
4	-45.0 T	-2.00	1.22	30	1100	0	28	-5.00
5	-60.0 T	-3.20	1.22	30	1450	0	38	-6.00
10	0.0 B	-1.28	-1.12	30	1650	7	11	0.00

PAGE 0002 80 OCT 29 13:22:14 SUSQUEHANNA I WELD N2K
OF 03

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 766.87 Y = 181.00
WELD N2K-

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	596	7	352	8	15.90	6.24	4.23	1605
10	600	7	352	8	16.00	6.23	4.23	1615
10	592	18	131	18	13.84	12.86	1.58	1399
10	0	0	300	7	1.80	213.77	3.61	194

FINAL EVALUATION TABLE											
CH TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
10	OB	1	L	782.71	782.71	191.59	191.59	3.61	3.61	0.00	19.56

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPL: B.E. DATA AT FULL B.E. AMP

MAINT 1 B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4R
4	-45.0 P	-1.45	-0.75	30	650		0	20	-5.00
5	-60.0 P	-1.45	0.44	30	650		0	20	-6.00
10	0.0 B	-3.75	1.15	30	650		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =-360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 766.87 Y = 181.00
WELD N2K-

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50.

PAGE 0003 80 OCT 29 14:33:44 SUSQUEHANNA I WELD N2K
. OF. 03..

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 1 CIRCUMFERENCE = 836.58

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	45.0 P	-1.45	0.75	30	650		0	20	-5.00
5	60.0 P	-1.45	-0.44	30	650		0	20	-6.00
10	0.0 B	-3.75	1.15	30	650		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360

EVALUATION LEVEL = 50% DAC

NOZZLE LOCATION X = 766.87 Y = 181.00

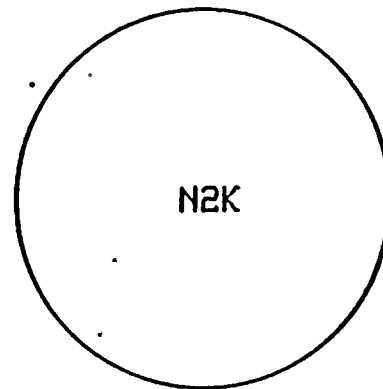
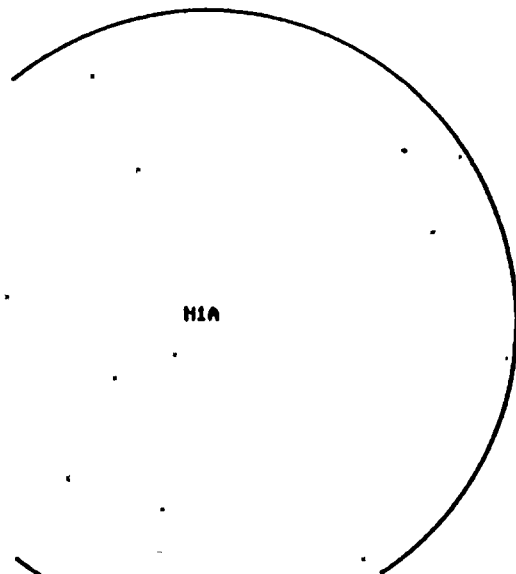
WELD N2K-

END OF PASS

*NOTE: N2K-2 (PAGE 28 80 OCT 29 14:57:11)

SUSQUEHANNA I

V. 80



Y
X
→
MAG = 0.100

XMN = 782.7
XMX = 782.7
YMN = 191.6
YMX = 191.6
ZMN = 3.6
ZMX = 3.6

SUSQUEHANNA I
WELD N2K

V.81

X Y
↑
-90
→ 0
MAG- 0.100
XMH- 782.7
XMY- 782.7
YMH- 191.6
YMY- 191.6
ZMH- 3.6
ZMY- 3.6

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD N4A
EVALUATION LEVEL = 50% DAC

TABLE IWB-3512.1

ALLOWABLE PLANAR INDICATIONS		
ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0° NON-PLANAR= 10.0°

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	-45.0 T	-2.00	1.22	30	1100	0		28	-5.00
5	-60.0 T	-3.20	1.22	30	1450	0		39	-6.00
10	0.0 B	-1.28	-1.12	30	1650	7		11	0.00

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OF 03

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 69.81 Y = 498.50
WELD N4A-

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	555	8	407	12	1.52	356.82	4.74	166
10	566	9	405	14	1.61	356.80	4.72	175
10	565	9	401	13	1.70	356.79	4.67	184
10	560	20	259	23	0.90	27.34	3.02	104
10	..0	0	219	11	0.38	81.54	2.55	51

FINAL EVALUATION TABLE											
CH TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
10	0B	1	L	67.22	67.22	481.07	481.07	2.55	2.55	0.00	19.56

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	-45.0 P	-1.45	-0.75	30	500		0	20	-5.00
5	-60.0 P	-1.45	0.44	30	500		0	20	-6.00
10	0.0 B	-3.75	1.15	30	500		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =-360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 69.81 Y = 498.50
WELD N4A-

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

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OF 03

WELD REFERENCE POINT: X= 17.25 Y= 0.00
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	45.0 P	-1.45	0.75	30	500	0		20	-5.00
5	60.0 P	-1.45	-0.44	30	500	0		20	-6.00
10	0.0 B	-3.75	1.15	30	500	7		11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 69.81 Y = 498.50
WELD N4A-

END OF PASS

*NOTE: N4A-4 (PAGE 16 80 NOV 06 18:39:04)

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 17.25 Y= 0.00
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

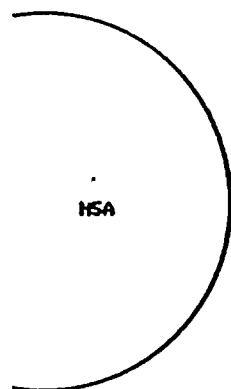
CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-1.28	-1.12	30	500	0		11	0.00
10	0.0 B	-1.28	-1.12	30	1650	7		11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 69.81 Y = 498.50
WELD N4A-

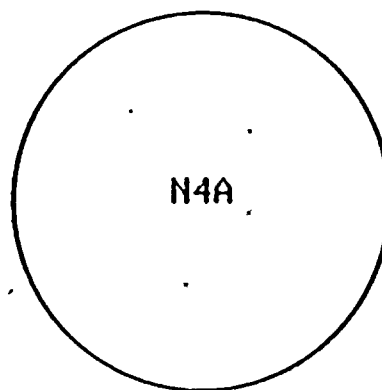
END OF PASS

*NOTE: N4A-5 (PAGE 22 80 NOV 06 19:03:35)

V.85



HSA



N4A

UCLD 80

SUSQUEHANNA I

X
Y
MAG. 0.100
XMM 67.2
XMY 67.2
YMM 481.1
YMY 481.1
ZMM 22.5
ZMY 22.5

N4A

98.86

X Y
↑
-20
-20
MAG- 0.100
XMH- 67.2
YMH- 67.2
VMH- 481.1
VHX- 481.1
ZMH- 2.6
ZHX- 2.6

SUSQUEHANNA I

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2.

SUSQUEHANNA I WELD N4C
EVALUATION LEVEL = 50% DAC

TABLE IWB-3512.1

ALLOWABLE PLANAR INDICATIONS		
ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ. IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = -5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-1.28	-1.12	30	500	0	11	0.00	
4	-45.0 T	-2.00	1.22	30	1100	0	28	-5.00	
5	-60.0 T	-3.20	1.22	30	1550	0	39	-6.00	
10	0.0 B	-1.28	-1.12	30	1650	7	11	0.00	

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OF 03

SUSQUEHANNA I WELD N4C

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 349.03 Y = 498.50
WELD N4C-

#	ID#	MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
		%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP		
2	1	54	3.8	3.7	40.9	3.8	3.7	40.9	3.8	3.7	40.9	0.0	41.5		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	580	16	289	20	13.58	52.58	3.36	1373
10	591	15	295	18	13.49	52.59	3.43	1364
10	0	0	288	10	13.34	52.60	3.35	1349
10	0	0	303	0	1.03	107.61	3.53	117
10	0	0	303	0	0.95	107.63	3.53	109
10	0	0	304	16	0.93	108.53	3.54	107
10	0	0	304	15	0.99	108.52	3.54	113
10	0	0	304	14	1.09	108.50	3.54	123

#	ID#	MAX AMPLITUDE				-50% DAC				+50% DAC				% OF T	
		%DAC	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	REL X	RY/AZ	DEP	SDEP		
2	3	59	3.4	0.9	108.5	3.4	0.9	108.5	3.4	1.1	108.5	0.0	47.8		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	304	0	1.03	108.91	3.54	117
10	0	0	300	11	0.94	108.93	3.49	108
10	0	0	297	11	10.14	146.54	3.46	1029
10	0	0	307	10	10.06	146.55	3.57	1021
10	0	0	301	0	9.95	146.56	3.50	1010
10	577	10	290	10	10.65	149.60	3.38	1080
10	588	10	301	11	10.68	149.60	3.50	1083
10	589	10	302	11	10.78	149.59	3.52	1093
10	593	9	310	10	10.89	149.58	3.61	1104

FINAL EVALUATION TABLE												
CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
2	0W	1	S Y	333.19	333.19	484.79	484.79	3.82	3.82	0.01	6.50	
2	0W	3	L	354.81	354.85	481.10	481.26	3.42	3.42	0.01	19.56	
10	0B	2	L	330.45	330.45	474.20	474.20	3.35	3.35	0.00	19.56	
10	0B	4	L	354.54	354.96	481.07	481.29	3.49	3.54	0.09	19.56	
10	0B	5	L	371.73	371.88	483.40	483.51	3.46	3.57	0.02	19.56	

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

PAGE 0003 80 OCT 31 19:51:53 SUSQUEHANNA I WELD N4C
OF 03

EVALUATION ANGLES: LAMINAR=10.0 NON-PLANAR=10.0

SURFACE TOLERANCE DISTANCE=0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	-45.0 P	-1.45	-0.75	30	650		0	20	-5.00
5	-60.0 P	-1.45	-0.44	30	650		0	20	-6.00
10	0.0 B	-3.75	1.15	30	650		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =-360

EVALUATION LEVEL = 50% DAC

NOZZLE LOCATION X = 349.03 Y = 498.50

WELD N4C-

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR=10.0 NON-PLANAR=10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	45.0 P	-1.45	0.75	30	650		0	20	-5.00
5	60.0 P	-1.45	-0.44	30	650		0	20	-6.00
10	0.0 B	-3.75	1.15	30	650		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360

EVALUATION LEVEL = 50% DAC

NOZZLE LOCATION X = 349.03 Y = 498.50

WELD N4C-


END OF PASS

SUSQUEHANNA I

N4C

N9A

06°V



MAG- 0.100

XNN-	330.5
XNX-	371.9
VNN-	474.2
VNX-	484.8
ZNN-	3.4
ZNX-	3.8

SUSQUEHANNA I

N4C

V.91

X Y
-90
0
MAG- 0.100

XMH- 330.6
XMX- 371.0
YMH- 474.3
YMX- 484.8
ZMH- 3.4
ZMX- 3.8

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD N4E
EVALUATION LEVEL = 50% DAC

*NOTE: N4E-1 (PAGE 124 80 NOV 03 13:41:11)

TABLE IWB-3512.1

ALLOWABLE PLANAR INDICATIONS		
ASPECT RATIO	SURFACE INDICATIONS	SUBSURFACE INDICATIONS
A/L	A/T,%	A/T,%
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS T, IN.	LAMINAR AREA A, SQ IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

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OF 03

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-1.28	-1.12	30	500	0	11	0.00
4	-45.0 T	-2.00	1.22	30	1100	0	28	-5.00
5	-60.0 T	-3.20	1.22	30	1450	0	39	-6.00
10	0.0 B	-1.28	-1.12	30	1650	7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 628.29 Y = 498.50
WELD N4E-

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	304	8	4.79	53.41	3.54	493
10	569	9	295	12	1.12	85.89	3.43	126
10	568	9	294	14	1.02	85.91	3.42	116
10	0	0	275	8	0.86	101.74	3.20	100

FINAL EVALUATION TABLE

CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
10	0B	2	L	631.98	631.98	480.76	480.76	3.20	3.20	0.00	19.56	
10	0B	1	L	615.15	615.15	480.80	480.80	3.54	3.54	0.00	19.56	

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= .36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
4	-45.0 P	-1.45	-0.75	30	500	0	20	-5.00
5	-60.0 P	-1.45	0.44	30	500	0	20	-6.00
10	0.0 B	-3.75	1.15	30	500	7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =365
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 628.29 Y = 498.50
WELD N4E-

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

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OF 03

SCANNER DIMENSIONS:

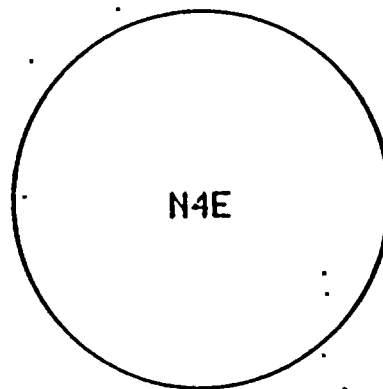
CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 17.25 Y= 0.00
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	45.0 P	-1.45	0.75	30	500		0	20	-5.00
5	60.0 P	-1.45	-0.44	30	500		0	20	-6.00
10	0.0 B	-3.75	1.15	30	500		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION = -365
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 628.29 Y = 498.50
WELD N4E-

END OF PASS

V. 95



WELD B.

SUSQUEHANNA I

MAQ- 0.100

XMH-	615.2
XMX-	631.9
YMH-	480.8
YMX-	480.8
ZMH-	3.3
ZMX-	3.5

N4E

V.96

X Y
↑
→ -90
MAG- 0.100
XMM- 615.2
XMX- 631.9
YMM- 480.8
YMX- 480.8
ZMM- 3.8
ZMX- 3.5

SUSQUEHANNA I

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA I WELD N4F
EVALUATION LEVEL = 50% DAC

TABLE IWB-3512.1
ALLOWABLE PLANAR INDICATIONS

ASPECT RATIO	SURFACE INDICATIONS	SUBSURFACE INDICATIONS
A/L	A/T,%	A/T,%
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3
ALLOWABLE LAMINAR INDICATIONS

COMPONENT THICKNESS T, IN.	LAMINAR AREA A, SQ IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
4	-45.0 T	-2.00	1.22	30	1100	0	28	-5.00
5	-60.0 T	-3.20	1.22	30	1450	0	39	-6.00
10	0.0 B	-1.28	-1.12	30	1650	7	11	0.00

PAGE 0002
OF 03

SUSQUEHANNA I WELD N4F

BEGIN UT INSPECTION AND NOZZLE ROTATION =365
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 767.91 Y = 498.50
WELD N4F-

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	.575	9	301	12	1.96	146.94	3.50	210
10	.574	9	299	13	2.05	146.93	3.48	219

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	-45.0 P	-1.45	-0.75	30	500	0	0	20	-5.00
5	-60.0 P	-1.45	0.44	30	500	0	0	20	-6.00
10	0.0 B	-3.75	1.15	30	500	7	7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =-365
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 767.91 Y = 498.50
WELD N4F-

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

V.98

PAGE 0003 80 NOV 06 12:05:38 SUSQUEHANNA I WELD N4F
OF 03

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
4	45.0 P	-1.45	0.75	30	500		0.	20	-5.00
5	60.0 P	-1.45	-0.44	30	500		0	20	-6.00
10	0.0 B	-3.75	1.15	30	500		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 767.91 Y = 498.50
WELD N4F-

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600
NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80
SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020
MINSEP = 0.250
100% DAC = 100 EVALUATION LEVEL = 50
WELD REFERENCE POINT: X= 17.25 Y= 0.00
THICKNESS = 6.520
SHELL COURSE 3 CIRCUMFERENCE = 837.72
EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0
SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-1.28	-1.12	30	500		0	11	0.00
10	0.0 B	-1.28	-1.12	30	1650		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 767.91 Y = 498.50
WELD N4F-

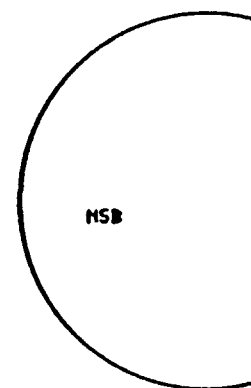
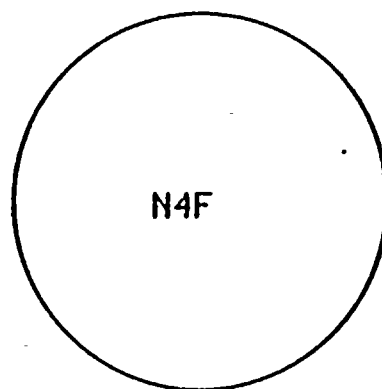
#	ID#	%DAC	DEP	REL	X	RY/AZ	-50% DAC	+50% DAC	% OF T
							DEP	REL	SDEP
2	1	51	3.3	0.5	79.8	3.3	0.5	79.8	0.0 48.7

FINAL EVALUATION TABLE

CH	TYPE	IND#	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
2	0W	1	S Y	764.77	764.77	481.00	481.00	3.34	3.34	0.01	6.50	-----

END OF PASS

*NOTE: N4F-4 (PAGE 13 80 NOV 06 18:28:59)



SUSQUEHANNA I

Y
X
MAG- 0.100

XNN- 764.8
XNX- 764.8
YNN- 481.0
YNX- 481.0
ZNN- 3.3
ZNX- 3.3

V.100

N4F

SUSQUEHANNA I

X Y
↑
-90
-0
MAG- 0.100

XMH- 764.8
XMX- 764.8
YMH- 481.0
YMX- 481.0
ZMH- 3.3
ZMX- 3.3

GENERAL ELECTRIC
POST PROCESSOR: VERSION 3 - REV. 2

SUSQUEHANNA-I WELD N5B
EVALUATION LEVEL = 50% DAC

TABLE IWB-3512.1

ALLOWABLE PLANAR INDICATIONS		
ASPECT	SURFACE	SUBSURFACE
RATIO	INDICATIONS	INDICATIONS
A/L	A/T, %	A/T, %
0.00	1.90	2.30
0.05	2.00	2.40
0.10	2.20	2.60
0.15	2.40	2.90
0.20	2.70	3.30
0.25	3.10	3.70
0.30	3.50	4.10
0.35	3.50	4.60
0.40	3.50	5.20
0.45	3.50	5.90
0.50	3.50	6.50

TABLE IWB-3511.3

ALLOWABLE LAMINAR INDICATIONS	
COMPONENT THICKNESS	LAMINAR AREA
T, IN.	A, SQ IN.
0	12
4	12
6	18
8	24
10	30
12	36
14	42
16	48

EVALUATION PARAMETERS:

NOZZLE MODE T SCAN

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -15.80

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN BE	TSEP	T5/4A
2	0.0 W	-1.28	-1.12	30	500	0	11	0.00
4	-45.0 T	-2.00	1.22	30	1100	0	28	-5.00
5	-60.0 T	-3.20	1.22	30	1450	0	39	-6.00
10	0.0 B	-1.28	-1.12	30	1650	7	11	0.00

PAGE 0002 80 NOV 03 11:48:30 SUSQUEHANNA I WELD N5B
 OF 04

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
 EVALUATION LEVEL = 50% DAC
 NOZZLE LOCATION X = 698.10 Y = 484.50
 WELD N5B-

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	304	9	2.08	13.62	3.54	222
10	0	0	308	9	1.95	20.44	3.59	209
10	0	0	307	8	1.85	20.46	3.57	199
10	0	0	321	0	1.60	135.61	3.74	174
10	0	0	296	10	2.04	161.83	3.45	218
10	0	0	301	8	1.96	161.84	3.50	210
10	0	0	300	10	1.85	161.86	3.49	199
10	0	0	295	8	1.74	161.88	3.43	188
10	598	7	295	13	1.65	162.70	3.43	179
10	0	0	291	12	1.74	162.68	3.39	188
10	0	0	295	23	1.85	162.66	3.43	199
10	0	0	296	26	1.96	162.64	3.45	210
10	0	0	296	20	2.06	162.62	3.45	220
10	0	0	301	10	2.16	162.61	3.50	230

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T			
ID#	%DAC	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	SDEP
2	4	74	3.4	2.0	162.7	3.4	1.8	162.7	3.4	2.1	162.6	0.0	47.8		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	291	10	2.21	163.30	3.39	235
10	0	0	308	9	1.92	164.05	3.59	206
10	0	0	304	12	2.02	164.03	3.54	216
10	0	0	305	17	2.12	164.01	3.55	226
10	0	0	306	12	2.22	164.00	3.56	236
10	0	0	306	9	2.32	163.98	3.56	246
10	0	0	310	10	2.44	163.96	3.61	258
10	0	0	300	9	2.45	164.76	3.49	259
10	0	0	296	8	2.37	164.77	3.45	251
10	0	0	301	9	2.26	164.79	3.50	240
10	0	0	300	10	2.16	164.81	3.49	230
10	0	0	310	9	2.02	166.93	3.61	216
10	0	0	314	10	1.72	167.58	3.66	186
10	0	0	314	13	1.80	167.57	3.66	194
10	0	0	314	21	1.89	167.55	3.66	203
10	0	0	314	21	2.00	167.53	3.66	214
10	0	0	316	13	2.10	167.52	3.68	224

MAX AMPLITUDE						-50% DAC			+50% DAC			% OF T			
ID#	%DAC	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	REL	X	RY/AZ	DEP	SDEP
2	6	52	3.5	2.0	167.5	3.5	1.9	167.6	3.5	2.0	167.5	0.0	46.8		

CH#	BET	BEA	IT	IA	RELX	RY/AZ	DEP	SCNR
10	0	0	306	11	2.17	168.41	3.56	231
10	0	0	301	10	2.08	168.42	3.50	222
10	0	0	304	8	1.98	168.44	3.54	212

FINAL EVALUATION TABLE												
CH	TYPE	IND	T	MINX	MAXX	MINY	MAXY	DMIN	DMAX	VALUE	ALLOW	EVAL
2	OW	4	L	716.33	716.53	478.73	478.81	3.41	3.42	0.01	19.56	
2	OW	6	L	716.79	716.90	480.34	480.37	3.46	3.48	0.00	19.56	
10	OB	3	L	711.57	711.57	471.31	471.31	3.74	3.74	0.00	19.56	
10	OB	2	L	680.11	680.20	477.79	477.82	3.57	3.59	0.00	19.56	
10	OB	5	L	716.15	717.11	478.48	479.41	3.39	3.61	0.89	19.56	
10	OB	1	L	679.31	679.31	479.95	479.95	3.54	3.54	0.00	19.56	
10	OB	7	L	716.63	717.13	480.14	480.65	3.50	3.68	0.25	19.56	

END OF PASS

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

SURFACE TOLERANCE DISTANCE= 0.0000

REPORT B.E. DATA AT FULL B.E. AMP

MAXIMUM B.E. %DAC FOR EVALUATION = 5

UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 W	-3.75	1.15	0	0		0	11	0.00
4	-45.0 P	-1.45	-0.75	30	500		0	20	-5.00
5	-60.0 P	-1.45	0.44	30	500		0	20	-6.00
10	0.0 B	-3.75	1.15	30	500		7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION = -360

EVALUATION LEVEL = 50% DAC

NOZZLE LOCATION X = 698.10 Y = 484.50

WELD N5B-

END OF PASS

2 TURNED OFF

EVALUATION PARAMETERS:

NOZZLE MODE P SCAN COUNTER-CLOCKWISE

SCANNER DIMENSIONS:

CALIBRATION LENGTH= 36.00 FULL SCALE= 3600

NOZZLE LENGTH= 36.00 FULL SCALE= 3600 OFFSETS: X= -16.05

SCANNER STEPSIZE = 0.050 STEP TOLERANCE = 0.020

MINSEP = 0.250

100% DAC = 100 EVALUATION LEVEL = 50

WELD REFERENCE POINT: X= 17.25 Y= 0.00

THICKNESS = 6.520

SHELL COURSE 3 CIRCUMFERENCE = 837.72

EVALUATION ANGLES: LAMINAR= 10.0 NON-PLANAR= 10.0

PAGE 0004 80 NOV 03 13:01:37 SUSQUEHANNA I WELD N5B
OF 04

SURFACE TOLERANCE DISTANCE= 0.0000
REPORT B.E. DATA AT FULL B.E. AMP
MAXIMUM B.E. %DAC FOR EVALUATION = 5
UT CHANNEL DATA: SCANNER SEP. FACTOR = 13

CH #	ANGLE	X OFFSET	Y OFFSET	BEGIN	STOP	MN	BE	TSEP	T5/4A
2	0.0 T	3.75	-1.28	0	0	0	0	11	0.00
4	45.0 P	-1.45	0.75	30	500	0	0	20	-5.00
5	60.0 P	-1.45	-0.44	30	500	0	0	20	-6.00
10	0.0 B	-3.75	1.15	30	500	7	7	11	0.00

BEGIN UT INSPECTION AND NOZZLE ROTATION =360
EVALUATION LEVEL = 50% DAC
NOZZLE LOCATION X = 698.10 Y = 484.50
WELD N5B-

END OF PASS

*NOTE: N5B-2 (PAGE 122 80 NOV 03 13:20:46)

SUSQUEHANNA I

N4F

N4E

N5B

V.106

Y
X
NAG • 0.100
XMH • 679.3
XMX • 717.1
YMH • 471.3
YMX • 480.7
ZMH • 3.4
ZMX • 3.7

SUSQUEHANNA I

N5B

V.107

X Y
↑
-90
0
MAG- 0.100
XNN- 670.3
XHX- 717.1
YNN- 471.3
YHX- 480.7
ZNN- 3.4
ZHX- 3.7



Control No. 441
Exam Sheet No. 4094
Cal. Sheet No. 4092

STRAIGHT BEAM EXAMINATION DATA SHEET

Laminar Reflectors in Base Metal

Site Susquehanna I SGI 761

☒ Preoperational

☐ I.S.I.

Weld Seam ID No. N9

Date 12/20/76

Examiner S. Mette Level II

Recorder R. Hoyer Level I

Procedure ISE QAI-325

Revision 2

Scanning Sensitivity 1X

Evaluation Sensitivity 1X

Couplant Glycerine

Component Temperature 70 °F

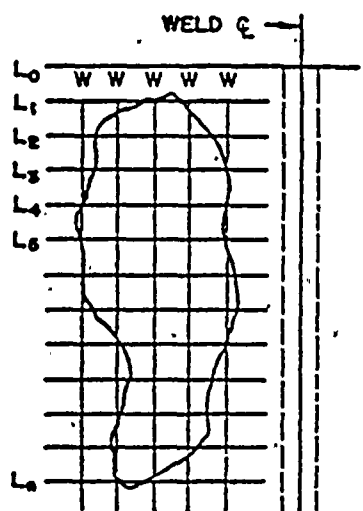
Lo = N/A

Ro = TDC °C

Wo = N9

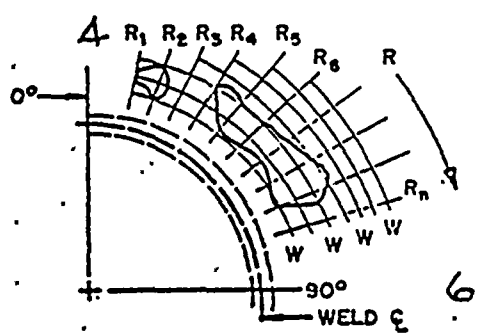
$\frac{W}{D}$ R°	W.	D	Ind. Amp.	B.R. Amp.	** CW or CCW Top of Bottom
10.5	2.3	3.5	15	2	ccw
6.5	5.4	3.0	32	14	cw
7.5	3.05	3.0	32	20	cw
10.0	6.9	3.0	15	5	cw
17.6	5.5	2.8	30	20	cw

synt
synt
synt
synt
synt



**LOOKING DOWN ON VESSEL
CW IS TO RIGHT OF WELD
CCW IS TO LEFT OF WELD

*NOZZLE WELD REFERENCE SYSTEM



Reviewed by: George E. Johnson
SNT-TC Level III

☒ Acceptable to Section XI
☐ Unacceptable to Section XI



Control No. 442
Exam Sheet No. 4093
Cal. Sheet No. 4091

EXAMINATION DATA SHEET

Straight Beam and Angle Beam of Nozzle to Vessel Weld

Site Susquehanna I SQI-761 ☒ Preoperational ☐ I.S.I. Date 12/20/76

Examiner S. Motta Level II Recorder R. Hooper Level I

Weld Seam ID No. N9 Beam Angle 0° ☒ 45° ☐ 60° ☐

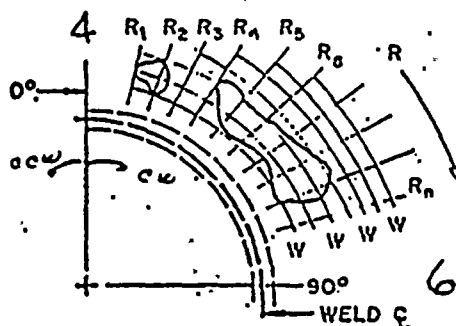
Procedure No. ISE-QAI-325 Revision 2

Scan Sensitivity 2X Evaluation Sensitivity 1X

Couplant Glycerine Component Temperature 70 °F

R	Max DAC	W ₁ (25% DAC)	WF ₁ (50% DAC)	W _m (Max DAC)	WF ₂ (50% DAC)	W ₂ (25% DAC)	D ₁ (25% DAC)	DF ₁ (50% DAC)	D _m (Max DAC)	DF ₂ (50% DAC)	D ₂ (25% DAC)
ccw 10.5	55			2.3					3.5		
cw 7.5	100	48		3.05					3.0		

NOZZLE WELD REFERENCE SYSTEM



Reviewed by: George E. Lockyer

SNT-TC Level III

☒ Acceptable to Section XI
☐ Unacceptable to Section XI



Control No. 444
Exam Sheet No. 1106
Cal. Sheet No. 1104

EXAMINATION DATA SHEET

Straight Beam and Angle Beam of Nozzle to Vessel Weld

Site Susquehanna I SQI-761 ☒ Preoperational ☐ I.S.I. Date 12-27-76

Examiner D. BERGEY Level III Recorder G. BRAGAN Level IT

Weld Seam ID No. N9 Beam Angle 0° 45^\circ 60° ☒

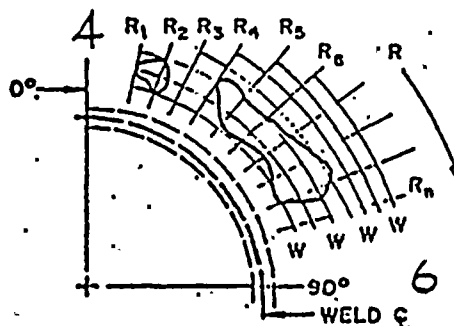
Procedure No. ISE-QAT-325 Revision 2

Scan Sensitivity 4X(28db) Evaluation Sensitivity 1X(14db)

Couplant Glycerine Component Temperature 68 $^\circ\text{F}$

R	Max DAC	W ₁ (25% DAC)	WF ₁ (50% DAC)	W _m (Max DAC)	WF ₂ (50% DAC)	W ₂ (25% DAC)	D ₁ (25% DAC)	DF ₁ (50% DAC)	D _m (Max DAC)	DF ₂ (50% DAC)	D ₂ (25% DAC)
34"	50%			.4					5.0		
ANTITRANSducer MOVEMENT CAUSES LOSS OF Signal											

NOZZLE WELD REFERENCE SYSTEM



Reviewed by: George E. Lockyer

SNT-TC Level III

☒ Acceptable to Section XI

☐ Unacceptable to Section XI

9910-011-000

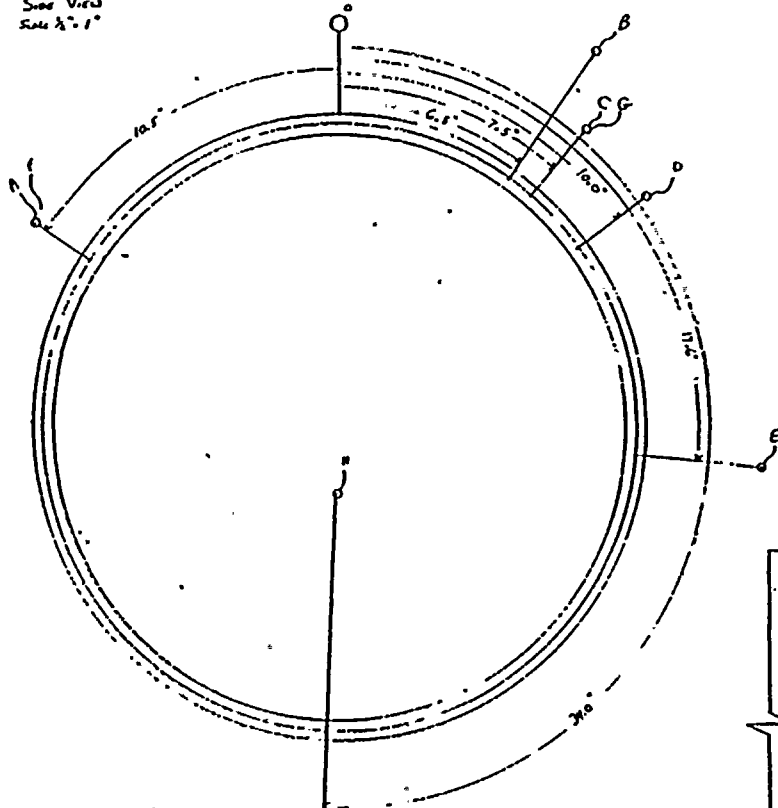
ORIGINAL ELECTING

100-770-0100

APPROVED	CHECKED	DATE	BY

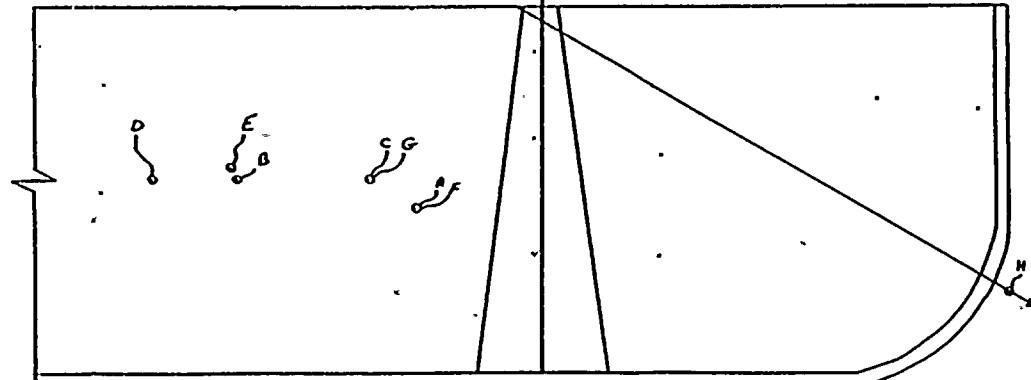
House N9
SILVER HAWK UNIT 1

Side View
Scale 1/2" = 1'



NO.	REV.	ANGLE	DATE	BY	REMARKS
1	1	0°	10/11	3-4	SAF
2	1	0°	10/11	4-5	SAF
3	1	0°	10/11	4-5	SAF
4	1	0°	10/11	4-5	SAF
5	1	0°	10/11	5-6	SAF
6	1	0°	10/11	5-6	SAF
7	1	0°	10/11	4-5	SAF
8	1	0°	10/11	4-5	SAF
9	1	60°	10/11	7-8	SAF

House N9



End View
Full Scale

REDUCED PRINT NOT TO SCALE

APPROVED	CHECKED	DATE	BY

100-770-0100

100-770-0100



VESSEL UT CALIBRATION DATA SHEET

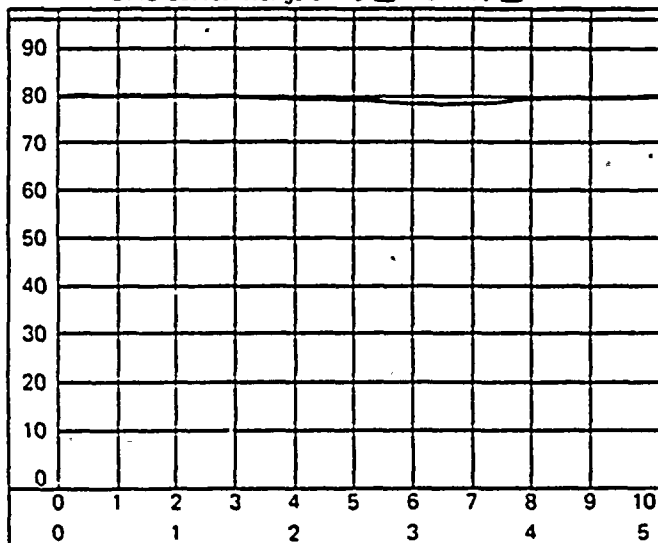
Cal. Sheet No. 4092

Site Susquehanna I SQI 761
 Procedure No. ESL-QRI-525 Rev. 2
 Date 12/20/76 Couplant Glycerine
 Examiner S. Mathe
 Recorder R. Hooper

☒ Preoperational ☐ I.S.I.
 Calib. Block No. RPU STD #1
 Cal. Std. Temp. 70°F
 ASNT Level II
 ASNT Level I

Equipment Data: Instrument Model No. Sonic MHI Shoe No. N/A
 Instrument Serial No. 732203 Cable No. 213 6' 54/4
 Transducer Size 1" dia Frequency 2.25 MHz
 Transducer Serial No. K 22614 IIW-2 Beam Angle 0°

DAC Curve: Range 0 - 5 ☐ 0 - 10 ☒



Instrument Settings:

	Start	Finish
Attenuation	-	-
Sweep	10/1.6	10/1.6
Delay	0.84	0.84
Scanning Gain	-6	-6
Evaluating Gain	-6	-6
Filter Position	0 PP	0 PP
Rep Rate	34	34
Damping	0 PP	0 PP
Reject	0 PP	0 PP

— db Change for — X

Hole Depth "T" Inches	Gain @ 1X	Max. Amp.	"W" Inch	D or MP Inch	SDH or FBH
1/4	1.4	1X	N/A	1.4	SDH
1/2	3.05	1X		3.0	SDH
3/4	4.65	1X		4.6	SDH
2% Notch	N/A	1X			N/A

Initial Calibration Time 1745

Periodic Checks:

Time	Value	Last Data Sheet
	NONE	

Calibration in Depth (D) ☒ or Metal Path (MP) ☐

Final Check:

1830 80 4094

4092

Angle Beam Spread @ 1X 45° or 60°
(Made once per calibrated system - Calibration standard combination)

Hole Depth	Trailing Ray						Leading Ray							
	10% DAC		25% DAC		50% DAC		100% DAC		50% DAC		25% DAC		10% DAC	
	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP
1/4T														
1/2T														
3/4T														

N/A

Amplitude Linearity Check
(Made Daily)

100%FSH	_____	% FSH	50%FSH	_____	% FSH
90% "	_____	"	40% "	_____	"
80% "	40	"	30% "	_____	"
70% "	_____	"	20% "	_____	"
60% "	_____	"			

Control Linearity
(Made Daily)

80%FSH	-6db	(32-48)
80% "	-12db	(16-24)
40% "	+ 6db	(64-96)
20% "	+12db	(64-96)

See Cal Sheet
4083

Equip. Data - Angle Beam
For Linearity Checks

Code Block T _____
Transducer Data:
Serial No. _____
Beam Angle _____
Size _____ Freq _____
Shoe No _____ Cable No _____
Check Made By: _____

Checks on IIW-2

Block on 1/8" SDH for Field Calib.
Checks @ Max Amp. for Both Near & Far
Positions in % Screen Height

1/8" SDH	Near	Far
Max. Amp.	%	%
Metal Path	N/A	"

Reviewed by

George E. Lockyer III

SNT-TC Level



VESSEL UT CALIBRATION DATA SHEET

Cal. Sheet No. 4091

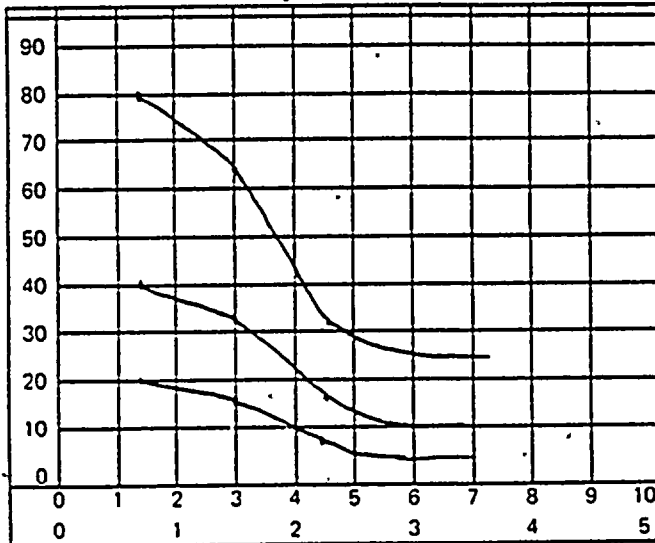
INSTALLATION & SERVICE
ENGINEERING DIVISION

Site Saugubam I SGT 761
 Procedure No. ISL-001-325 Rev. 2
 Date 12/20/76 Couplant Glycerine
 Examiner S. M. H. G.
 Recorder R. Hooper

☒ Preoperational ☐ I.S.I.
 Calib. Block No. RPO STD #1
 Cal. Std. Temp. 76 °F
 ASNT Level II
 ASNT Level I

Equipment Data: Instrument Model No. Senic Mk I Shoe No. N/A
 Instrument Serial No. 732203 Cable No. 213 6' 59/4
 Transducer Size 1" Frequency 2.25 MHz
 Transducer Serial No. K22614 IIW-2 Beam Angle 0°

DAC Curve: Range 0 - 5 ☐ 0 - 10 ☒



Instrument Settings:

	Start	Finish
Attenuation	-	-
Sweep	10/1.6	10/1.6
Delay	0.87	0.87
Scanning Gain	+6	+6
Evaluating Gain	00	00
Filter Position	0.11	0.11
Rep Rate	34	34
Damping	0.11	0.11
Reject	0.11	0.11

6 db Change for 2 x

Hole Depth "T" Inches	Gain @ 1X	Max. Amp.	"W" Inch	D or MP Inch	SDH or FBH	
1/4	1.4	1X	80	N/A	1.4	SDH
1/2	3.05	1X	64	↓	3.0	SDH
3/4	7.65	1X	32		4.6	SDH
2% Notch	N/A	1X	→			N/A

Initial Calibration Time 1735

Periodic Checks:

Time	Value	Last Data Sheet

Calibration in Depth (D) ☒ or Metal Path (MP) ☐

Final Check:

1810 80 4093

GENERAL ELECTRIC

4091

Angle Beam Spread @ 1X 45° or 60°
(Made once per calibrated system - Calibration standard combination)

Hole Depth	Trailing Ray						Leading Ray							
	10% DAC		25% DAC		50% DAC		100% DAC		50% DAC		25% DAC		10% DAC	
	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP
1/4T														
1/2T														
3/4T														

Amplitude Linearity Check (Made Daily)

100%FSH	_____	% FSH	50%FSH	_____	% FSH
90% "	_____	"	40% "	_____	"
80% "	40	"	30% "	_____	"
70% "	_____	"	20% "	_____	"
60% "	_____	"			

Control Linearity (Made Daily)

80%FSH	-6db	_____	(32-48)
80% "	-12db	_____	(16-24)
40% "	+ 6db	_____	(64-96)
20% "	+12db	_____	(64-96)

See Cal Sheet
4083

Equip. Data - Angle Beam For Linearity Checks

Code Block T _____
Transducer Data:
Serial No. _____
Beam Angle _____
Size _____ Freq _____
Shoe No _____ Cable No _____
Check Made By: _____

Checks on IIW-2

Block on 1/8" SDH for Field Calib.
Checks @ Max Amp. for Both Near & Far,
Positions in % Screen Height

1/8" SDH	Near	Far
Max. Amp.	_____%	_____%
Metal Path	N/A	"

viewed by

George E. Jackson III
SNT-TC Level



VESSEL UT CALIBRATION DATA SHEET

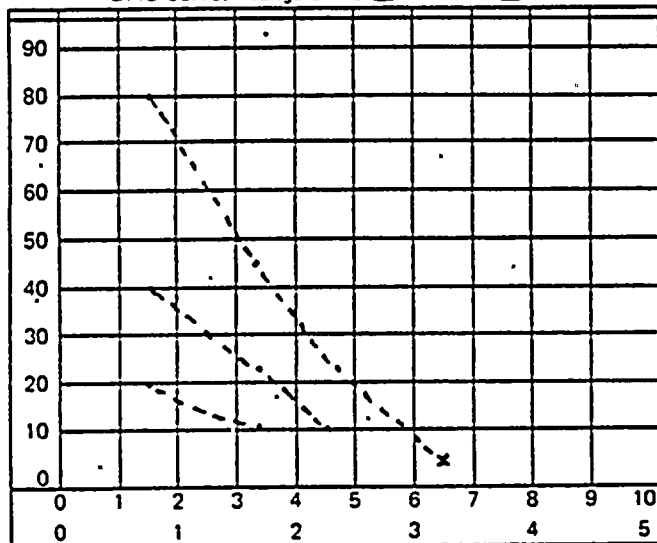
Cal. Sheet No. 1104

Site Susquehanna I
 Procedure No. 152-011-725 Rev. 2
 Date 12-27-76 Couplant GLYCERINE
 Examiner D. BERGAY
 Recorder G. BRAGAN

☒ Preoperational ☐ I.S.I.
 Calib. Block No. RTN STD #1
 Cal. Std. Temp. 70 °F
 ASNT Level III
 ASNT Level IT

Equipment Data: Instrument Model No. BRANSON 303 Shoe No. 76N4
 Instrument Serial No. 1176203 Cable No. S4 BNC-BNC 12'
 Transducer Size 1/2" x 1" Frequency 2.25 MHz
 Transducer Serial No. 015231 IIW-2 Beam Angle 62°

DAC Curve: Range 0 - 5 ☐ 0 - 10 ☒



Instrument Settings:

	Start	Finish
Attenuation	60/A.8	60/A.8
Sweep	50	50
Delay	1	1
Scanning Gain	60/28in	60/28in
Evaluating Gain	60/14in	60/14in
Filter Position	OUT	OUT
Rep Rate	3	3
Damping	OFF	OFF
Reject	OFF	OFF

14 db Change for 4 x

Hole Depth "T" Inches		Gain @ 1X	Max. Amp.	"W" Inch	D or MP Inch	SDH or FBH
1/4	1.6 "	1X	80%	3.0 "	1.6	SDH
1/2	3.2 "	1X	45%	5.9 "	3.2	SDH
3/4	4.8 "	1X	21%	8.8 "	4.8	SDH
2% Notch	6.34 "	1X	5%	11.1 "	6.4	N/A

Initial Calibration Time 1335 hrs

Periodic Checks:

Time	Value	Last Data Sheet
<u>1555</u>	<u>80%</u>	<u>1106</u>

Calibration in Depth (D) ☒ or Metal Path (MP) ☐
5/4T hole NOT DISCERNABLE
ON CRCT

Final Check:

1555 hrs

GENERAL ELECTRIC

Angle Beam Spread @ 1X 45° or 60° ☒

(Made once per calibrated system — Calibration standard combination)

Hole Depth	Trailing Ray						Leading Ray							
	10% DAC		25% DAC		50% DAC		100% DAC		50% DAC		25% DAC		10% DAC	
	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP	W	D or MP
1/4T	2.2	1.3	2.5	1.4	2.8	1.5	3.0	1.6	4.1	2.1	4.4	2.2	4.7	2.3
1/2T	4.5	2.8	4.7	2.9	5.2	3.0	5.9	3.2	7.0	4.0	7.8	4.2	8.6	4.3
3/4T	*		7.4	4.2	8.0	4.6	11.1 8.8	6.4 4.8	9.1	5.0	9.9	5.6	*	

Amplitude Linearity Check
(Made Daily)

100%FSH	<u>50</u>	% FSH	50%FSH	<u>25</u>	% FSH
90% "	<u>45</u>	"	40% "	<u>20</u>	"
80% "	<u>40</u>	"	30% "	<u>15</u>	"
70% "	<u>35</u>	"	20% "	<u>9</u>	"
60% "	<u>31</u>	"			

Control Linearity
(Made Daily)

80%FSH	-6db	<u>41</u>	(32-48)
80% "	-12db	<u>20</u>	(16-24)
40% "	+ 6db	<u>80</u>	(64-96)
20% "	+12db	<u>77</u>	(64-96)

* DATA NOT DISCERNABLE
ON CRT

Checks on IIW-2

Block on 1/8" SDH for Field Calib.

Checks @ Max Amp. for Both Near & Far
Positions in % Screen Height

1/8" SDH	Near	Far
Max. Amp.	<u>N/A</u>	<u>A</u> %
Metal Path	"	"

Equip. Data — Angle Beam
For Linearity Checks

Code Block T 6.52 "

Transducer Data:

Serial No. 015231

Beam Angle 62°

Size 1/2"x1" Freq 2.25mhz

Shoe No 76N4 Cable No S4(12')

Check Made By: D. Berger

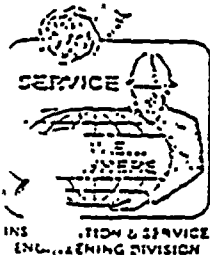
Reviewed by George E. Jockhiser III
SNT-TC Level

SECTION V

RECORDABLE INDICATION LIST

Project SUSQUEHANNA UNIT #1 Project No. SQI-761Category BG-1 Procedure ISI-QA-317 Rev. 1

System	Identification Number	Data Sheet No.	Calibration Sheet No.	Indication Description
THREADS IN FLANGE STUD HOLES	STUD HOLE	N/A	N/A	Control No. 750. Blunted and discolored threads. Reference Report #7 in Section IV.
	#16			
	#76	N/A	N/A	Control No. 750. Missing threads. Reference Report #7 in Section IV.



CONTROL No 750

VISUAL EXAMINATION REPORT

PRESERVICE INSPECTION PROJECT
PENNSYLVANIA POWER AND LIGHT CO.
SUSQUEHANNA 1

CUSTOMER/STATION Susquehanna Unit 1

SYSTEM N/A

COMPONENT Threads in flange base-metal

MATERIAL N/A

VT PROCEDURE No. ISE-QAI 317 Rev. 1

GOVERNING SPEC. N/A

(For ISI Information Only)

EXAM or COMP. No. N/A

☒ PRESERVICE ☐ ISI

CATEGORY B-G-1

ITEM No. N/A ISOMETRIC No. N/A

VT EXAMINATION DETAILS

☒ Direct Visual ☐ Remote Visual Surface Condition Machined

Surface Preparation Methods/Tools Used (if any) Brushing and cleaning

Illumination Instruments Used Flashlight

Direct Visual Aids Used None

Remote Visual Equipment Used None

VT EXAMINATION AREA STUD HOLES #1 - #76

HANGERS AND SUPPORTS

Discontinuity	Yes	No	Reading
Settling			
Misalignment			
Broken Members			
Gauges			
Arc Strikes			
Ind Marks			
ovement			
Other (Identify)			

PIPE WELDS AND BASE MATERIAL

Discontinuity	Yes	No
Ground Blend Areas		
Undercuts		
Corrosion Buildup		
Gauges		
Evidence of Leakage		
Arc Strikes		
Other (Identify)		



PRESERVICE INSPECTION PROJECT
PENNSYLVANIA POWER AND LIGHT CO.
SUSQUEHANNA
STUDS, AND WASHERS

Control No. 750

PUMP AND VALVE INTERNALS

	Yes	No
Discontinuity		
Loose Members	N/A	
Cracks		X
Corrosion		X
Gauges		X
Thread Damage	X	
Others (Identify)	N/A	

	Yes	No
Discontinuity		
Pitting		
Corrosion		
Erosion		
Foreign Material		
Gauged Parts (Identify)		

N/A

* #16 & #76 See sketch on other side

Wear	
Others (Identify)	

Photo	N/A
Roll	Frame

Sketch	X	Yes*	No
--------	---	------	----

*On Reverse Side

COMMENTS

Reviewed by B. Williams 8/4/77
See NCR 007 wsm 8/5/77

VISUAL EXAMINER'S NAME AND LEVEL

Richard D. Jones
LEVEL II

DATE 8/5/77

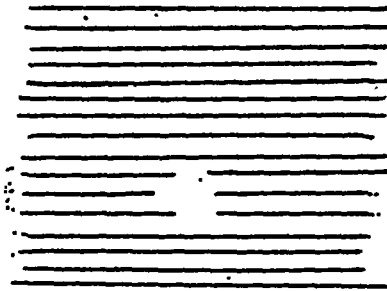
#16 Bottom third of threads noted to have a change in color and thread size. See Sketch #1

THIS PORTION OF THREADS
HAD BLUNTED EDGES

DARKED AREA OF DISCOLORATION
THIS PORTION OF THREADS
HAD SHARP EDGES

SKETCH #1

#76 Threads 5, 6 and 7 from bottom have part of thread missing.
See Sketch #2.



SKETCH #2



SUSQUEHANNA UNIT #1

SECTION VI

EQUIPMENT AND MATERIALS LIST

1. ULTRASONIC INSTRUMENTS

<u>MODEL NO.</u>	<u>SERIAL NO.</u>
Branson - 303A	1176203
Branson - 303A	1176202
Branson - 301	11993
Branson - 301	11938
Branson - 303	510198
Sonic - MK-1	732203
Sonic - MK-1	765049
Magnaflux - PS702A	721214
USM2 - MT	977266
USL - 38	906110
USM2 - MT	1077269
Krautkramer - Branson	22587F

2. TRANSDUCERS

2.1 2.25 MHz Frequency

<u>S/N</u>	<u>SIZE</u>	<u>S/N</u>	<u>SIZE</u>
015238	1.00"	E 18022	0.50"
015231	1/2X1"	12138	1.00"
015234	1/2X1"	E 31735	0.50"
015235	1/2X1"	L 08767	0.50"
015237	1.00"	L 08764	0.50"
K 22614	1.00"	E 31737	0.25"
K 22615	1.00"	E 31738	0.25"
K 22617	1.00"	E 31740	0.50"
9M385	1/2X1"	A 10921	0.50"
B 10805	0.75"	A 10920	0.50"
J 04729	0.75"	A 10919	0.50"
B 10804	0.75"	A 10922	0.50"
B 07016	1.00"	K 23982	1.00"
K 23981	1.00"	K 23980	1.00"
H 31928	1.00"	K 23979	1.00"
		C 09128	1.00"



2.2 1.0 MHz FREQUENCY

S/N	SIZE
L 03515	1.00"
I 03625	0.75"
I 03627	0.50"
A 13733	1.00"
F 16832	0.50"
F 16837	0.50"

3.0 WEDGES

S/N	ANGLE	S/N	ANGLE
SQ-1	45°	MS-9	60°
SQ-2	45°	F-31	60°
MS-4	45°	PA-1	35°
MS-3	45°	PA-2	35°
MS-6	45°	PA-3	45°
SQ-3	33°	PA-4	45°
SQ-4	33°	PA-5	45°
SQ-5	33°	PA-6	45°
SQ-6	33°	PA-7	45°
SQ-19	45°	X-1	60°
SQ-20	45°	X-2	45°
SQ-21	45°	X-3	45°
SQ-22	45°	X-4	45°
SQ-23	45°	4	45°
SQ-24	45°	MS-11	45°
SQ-25	45°	76N1	45°
SQ-26	45°	76N3	60°
SQ-27	45°	2	60°
SQ-28	45°	1	45°
SQ-29	45°	F1	45°
SQ-30	45°	76N4	60°
SQ-31	33° L.W.	76N2	45°
SQ-32	33° L.W.		
SQ-33	33° L.W.	11	60°
SQ-34	33° L.W.	N1	45°
SQ-35	33° L.W.	77N1	45°
SQ-36	33° L.W.		
SQ-12	33° L.W.		



3.1 NOZZLE INNER RADIUS

<u>RH</u>	<u>LH</u>
2	1
4	3
6	5
8	7
10	9
12A	11A
12B	11B
14	13
16	15
18	17

3.2 FEEDWATER INNER RADIUS

<u>ZONE</u>	<u>S/N</u>
1	SSQ-N4-Z1-CW
1	SSQ-N4-Z1-CCW
2	SSQ-N4-Z2-CW
2	SSQ-N4-Z2-CCW
3	SSQ-N4-Z3

4.0 CABLES

<u>S/N</u>	<u>TYPE</u>	<u>SIZE</u>
A-1	BNC-MICRODOT	6.5'
A-2	BNC-MICRODOT	6.5'
P-13	BNC-MICRODOT	6.5'
V-4	BNC-MICRODOT	6.5'
V-30	BNC-MICRODOT	6.5'
S-1	BNC-MICRODOT	6.5'
23	BNC-MICRODOT	6.5'
S-10	BNC - BNC	6.0'
S-4	BNC - BNC	6.0'
P	BNC - BNC	6.0'
J-6	BNC - BNC	10.0'
S-4	BNC - BNC	15.5'
S-0	BNC - BNC	6.0'
Z-13	BNC - BNC	6.0'
V	BNC - BNC	10.0'
E-8	BNC - BNC	10.0'
S-41	BNC - BNC	6.0'
S-16	BNC - BNC	6.5'



<u>S/N</u>	<u>TYPE</u>	<u>SIZE</u>
S-46	BNC - BNC	12.0'
F-2	BNC - BNC	6.0'
F-1	BNC - BNC	6.0'
6	BNC - BNC	6.0'
31	BNC-MICRODOT	6.0'

5.0 LIQUID PENETRANT MATERIAL

<u>TYPE</u>	<u>BATCH NO.</u>
SKL-HF/S	786024
SKD-NF	78G139
SKC-C	78G120
SKL-HF	6L021
SKD-S-	6L019
SKC-C	6L001

6.0 GLYCERINE

Lot Number	DP-06186-002
	DP-06157-002

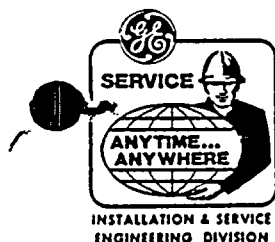
7.0 PYROMETER

S/N 69-1382

8.0 M. T. EQUIPMENT

Model CRQ-10 S/N 72348

9.0 IIW-2 U.T. CALIBRATION BLOCK S/N-2



SECTION VII

SUSQUEHANNA PROCEDURES

<u>PROCEDURE</u>	<u>REVISION</u>	<u>PROCEDURE NO.</u>
Straight Beam Examination - Laminar Reflectors in Base Metal	2	ISE-QAI-219
Personnel Qualification and Certification Program and Supplement	2	ISE-QAI-300
Personnel Qualification and Certification Program and Supplement "A" - Visual	0	ISE-QAI-311
Visual Examination	1	ISE-QAI-317
UT Examination of Support Skirt to RPV Weld	3	ISE-QAI-321
UT Examination of Similar and Dis- similar metal welds	3	ISE-QAI-322
RPV Weld Centerline Paint Instruction	2	ISE-QAI-323
UT Examination of Nozzle Inner Radius and Supplement No. 1 and Mandatory Supplement	2	ISE-QAI-324
UT Examination of RPV Welds	2	ISE-QAI-325
UT Examination of Flange-to Vessel Weld and Flange Ligament Areas	4	ISE-QAI-326
UT Examination of Reactor Vessel Closure Studs	4	ISE-QAI-327
Wet Magnetic Particle Examination of Reactor Vessel Closure Studs	3	ISE-QAI-328



SUSQUEHANNA PROCEDURES (continued)

<u>PROCEDURE</u>	<u>REVISION</u>	<u>PROCEDURE NO.</u>
Remote Automatic Examination of RPV Welds	1	ISE-QAI-329
Remote Automatic Ultrasonic Examination of RPV Nozzle Welds	1	ISE-QAI-330
Liquid Penetrant Examination	2	ISE-QAI-331
Ultrasonic Examination of Feedwater Inner Radius Zone 2	1	ISE-QAI-332
Ultrasonic Examination of Feedwater Inner Radius Zone 3	1	ISE-QAI-333
Ultrasonic Examination of Feedwater Inner Radius Zone 1	1	ISE-QAI-334
General Visual Examination Procedure including Supplements A - L	1	160A7807
Liquid Penetrant Examination	1	18XA8402
Liquid Penetrant Examination	1	18XA7400



SECTION VIII.

PERSONNEL

All personnel performing examinations at Susquehanna Steam Electric Station Unit Number 1 were certified by examination in accordance with American Society for Non-Destructive Testing Recommended Practice No. SNT-TC-1A (June 1975 Edition).

The Susquehanna PSI Examination was performed on a team basis, each team consisting of a Level II or Level III and Level IT minimum.

The formal organization interface diagram is shown in Table 1.



SECTION VIII.

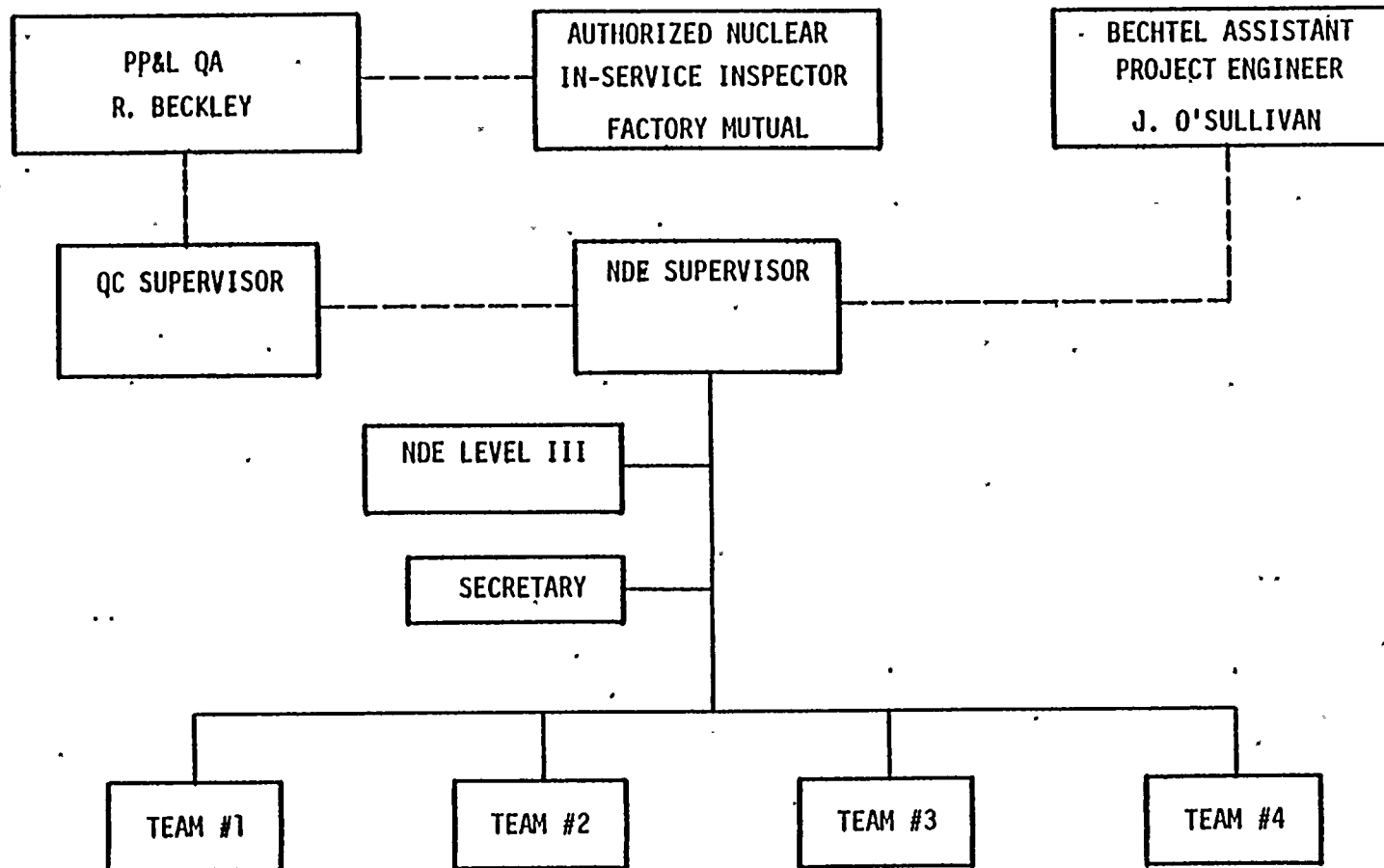
PERSONNEL

<u>NAME</u>	<u>LEVEL OF CERT.</u>	<u>METHOD</u>	<u>LEVEL OF CERT.</u>	<u>METHOD</u>	<u>LEVEL OF CERT.</u>	<u>METHOD</u>
Albenese, J. J.	II	UT				
Bain, V. J.	III	UT				
Bergey, D. W.	III	UT				
Bolden, G.	I	UT				
Boone, R.	II	UT	II	PT		
Bragan, G. L.	IT	UT				
Brown, F.	II	UT	II	PT	II	MT
Clay, A. W.	II	UT				
Clayton, K.			II	PT		
Demetrio, J. P.	IT	UT				
Difilippo, D. J.	II	UT	II	PT		
Dufresne, R.	II	VT				
Edwards, R. E.	II	UT				
Field, F.	II	UT	II	PT		
Flaherty, P	II	UT	II	PT		
Hart, M. P.	III	UT				
Heath, M. A.	II	UT	II	PT		
Hooper, R. C.	I	UT				
Jones, J.	III	UT				
Indan, E. A.	II	MT				
Kenney, V. P.					III	VT
Koch, T. L.	II	UT				
Kollock, A. S.	III	UT				
Le Thang	II	UT				
Lindeman, R. I.	III	UT				
Lockyer, G. E.	III	UT				
May, R. C.	I	UT				
McCabe, L.			II	PT		
Metra, S.	II	UT				



<u>NAME</u>	<u>LEVEL OF CERT.</u>	<u>METHOD</u>	<u>LEVEL OF CERT.</u>	<u>METHOD</u>	<u>LEVEL OF CERT.</u>	<u>METHOD</u>
Mills, C. E.	II	UT				
Miller, W. F.	III	UT	II	VT	II	PT
Moore, R. L.	III	UT	III	MT		
Mortenson, S.	II	UT				
Mulligan, T. K.	IT	UT				
Shove, C.			II	PT	II	VT
Quinn, P.			I	PT		
Ramsey, P. R.	I	UT				
Reczek, E. F.	III	UT	II	PT		
Smith, R. D.	III	UT				
Voget, D.	II	UT				
Wagner, R. W.	III	UT	III	MT		
Wilkins, B. W.	III	VT				
Zielinski, J.	II	UT	II	MT		

TYPICAL ORGANIZATION
PRE-SERVICE INSPECTION
SUSQUEHANNA #1



Examination Teams consisting
of a Level II and a Level IT
minimum in the required discipline.