

Indian Point 3
Nuclear Power Plant
P.O. Box 215
Buchanan, New York 10511
914 739.8200



**New York Power
Authority**

STEAM GENERATOR GIRTH WELD INSPECTION REPORT

of the

Indian Point Nuclear Power Station
Unit No. 3
P.O. Box 215
Buchanan NY 10511

For

New York Power Authority
123 Main Street
White Plains, NY 10601

Mid Cycle Outage: III-IV to IV-V
Commercial Service Date: August 30, 1976
Operating Capacity: 965 MWe
Report Date: October 25, 1984

Prepared By:
New York Power Authority
Indian Point Nuclear Power Station
Unit No. 3
P.O. Box 215
Buchanan, NY 10511

8411140263 841109
PDR ADDCK 05000286
PDR
Q

INDEX

	<u>Tab</u>
ISI Certificate - Owner Certificate and Owner's Data Report.....	A
Summary	B
Examination Program	C
Examination Results	D
Indications	E
Certifications and Qualifications	F
Examination Procedures	G

FORM NIS-1 (back)

8. Examination Dates 10/18/84 to 10/19/84 9. Inspection Interval from 9/30/76 to 9/30/86

10. Abstract of Examinations. Include a list of examinations and a statement concerning status of work required for current interval. Reference TAB C.

11. Abstract of Conditions Noted Reference TAB B and E.

12. Abstract of Corrective Measures Recommended and Taken None.

We certify that the statements made in this report are correct and the examinations and corrective measures taken conform to the rules of the ASME Code, Section XI.

Date 27 October 19 84 Signed John Chione By _____
Owner NYPA

Certificate of Authorization No. (if applicable) N/A Expiration Date N/A

CERTIFICATE OF INSERVICE INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of New York and employed by H.S.B.I.&I. Co. of Hartford, Ct. have inspected the components described in this Owners' Data Report during the period 10/18/84 to 10/19/84, and state that to the best of my knowledge and belief, the Owner has performed examinations and taken corrective measures described in this Owners' Data Report in accordance with the requirements of the ASME Code, Section XI.

By signing this certificate neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the examinations and corrective measures described in this Owners' Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date October 29 19 84
Swan Mc Clave
Hartford Steam Boiler Co. Commissions NY2642
Inspector's Signature National Board, State, Province and No.

NEW YORK POWER AUTHORITY
Indian Point Unit No. 3
Mid-Cycle Outage III-IV to IV-V

Steam Generator Girth Weld No. 6
Ultrasonic Examination Summary
1984

Introduction

The following examinations were performed by the New York Power Authority at the Indian Point Unit No. 3 Nuclear Power Plant from October 18, 1984, through October 19, 1984.

1. Inservice examination to Section XI of the ASME Boiler and Pressure Vessel Code 1974 Edition, Summer 1975 Addenda, and as specified in the Indian Point #3 Technical Specification, Section 4.2, Table 4.2-1 (Item 3.8) on the following items:
 - A. Steam Generator #31 Upper Shell to Transition Cone (Weld #6)
 - B. Steam Generator #32 " "
 - C. Steam Generator #33 " "
 - D. Steam Generator #34 " "

The above listed examinations were performed in accordance with an approved program plan located in Tab C of this report.

Examination procedures (Tab G) were approved prior to the examinations and certification documents relative to personnel, equipment and materials were reviewed and determined to be satisfactory.

Inspections, witnessing and surveillance of the examinations and related activities were conducted by personnel from Hartford Steam Boiler Inspection and Insurance Company (100%).

Results

Examinations performed (using 45° Shear Waves in the vertical plane) resulted in a total of six (6) recordable indications being noted on the basis of recording criteria in Ultrasonic examination procedure as follows:

<u>Component</u>	<u>Number of Recordable Indications</u>
SG-31	0
SG-32	1
SG-33	0
SG-34	5

Note: NRI's included on data sheets for information purposes.

These six (6) indications, one (1) in SG-32 and five (5) in SG-34 required further analysis.

This analysis determined that these indications met the criteria of ASME, Section XI, Article IWB, Table IWB-3511-1 for "Allowable Planar Indications" and were accepted.

In addition, evaluations were performed to compare the documented results (including both recordable and non-recordable indications) of the 1983 examination with the current examination. All of the previously documented indications were found. For SG-31 there were no changes; one (1) indication in SG-32 grew in length by 3/8", one (1) small non-recordable indication (18% DAC) not previously documented was found in SG-33, and one (1) indication in SG-34 grew in length by 1/2" and had a 30% increase in DAC (from 45% to 75%). All met the Allowable Planar Indication acceptance criteria of ASME Section XI.

Examinations

Examinations were conducted to review as much of the examination zone as was practical within geometric and physical limitations. When the required examination volume or area could not be examined 100%, the examination was considered to be partial (PAR). Generally, PARs are noted in areas where weld crowns, welded pads and/or welded insulation rings preclude access to some part of the examination area.

In most cases, examinations in these areas were accomplished as a best effort attempt to cover as much of the Code required area or volume (generally, the weld and base metal for 1 "T" on each side) as is possible.

Areas where complete examination of 100% of the required volume or area could not be achieved are indicated by a PAR (partial) notation on the examiner's data sheet, and the limiting cause is noted.

EXAMINATION PROGRAM

MID-CYCLE AUGMENTED INSPECTION PLAN
FOR STEAM GENERATOR GIRTH WELDS.

To provide surveillance of the steam generator welds number 6, after the repairs made during the 1982/1983 outage, the Authority will perform ultrasonic inspection of one hundred and seventy five (175) linear inches of weld. Thirty five (35) inches will be examined on Steam Generators 31, 32 and 33. Seventy (70) inches will be examined on Steam Generator 34.

As specified in the Indian Point #3 Technical Specification, Section 4.2, Table 4.2-1 (Item 3.8), the following areas have been selected for this augmented examination:

<u>Steam Generator</u>	<u>Location on Circumference</u>	<u>Segment Location</u>
31	204" clockwise to 239" from 0 Reference	17-20
32	316" clockwise to 334" from 0 Reference	26-28
	348" clockwise to 365" from 0 Reference	29-31
33	360" clockwise to 395" from 0 Reference	30-33
34	0 Reference clockwise to 18" 505" clockwise to 522" from 0 Reference	0-2 42-0
	168" clockwise to 203" from 0 Reference	14-17

Procedure: Ultrasonic examination will be performed in accordance with Authority nondestructive testing procedure NDEP 9.4-9, Revision 0, "Manual Ultrasonic Examination of Circumferential and Longitudinal Butt Welds in Ferritic Vessels of 2½" Thickness and Greater." Search will be in the vertical plane using 45° angle shear waves.

Evaluation: The results of the augmented inspection will be compared to previously documented baseline inspection results obtained at the completion of the girth weld repair. Acceptance criteria will be in accordance with ASME Code Section XI, 1974 edition, Summer 1975 addenda.



QUALITY ASSURANCE NONDESTRUCTIVE EXAMINATION PROCEDURE

NDEP 9.4.9
7/30/84
DATE: _____
REVISION: 1

CALIBRATION AND WELD ULTRASONIC EXAMINATION DATA

PLANT IP	UNIT 3	DATE 10/19/84	PROCEDURE NDEP-9.4.9	TQM OFF. NO. TABLE 42-1
LOOP 31	COMPONENT OR SYSTEM STEAM GENERATOR		PIPE SIZE 166" DIA	PORT NO. INT-2-1100

WELD TYPE BUTT		CALIBRATION BLOCK COUPLANT INT-33 ULTRACELL-II (P-63)							SEARCH UNIT CABLE BNC TO BNC 6' FT LONG					IDENTIFICATION US138 54-211041		Block Temp 115 Comp. Temp 134	
SERIAL NO. N/A		SERIAL NO. 29190							CONCURRENTIAL SCANS N/A					REP. RATE 1 KHZ		CALIBRATION ERROR	
S. U. SIZE N/A		S. U. SIZE 1/2 x 1"												OFF		INITIALS: 9:15	
S. U. FREQ. 2.25 MHZ		S. U. FREQ. 2.25 MHZ												MIN. FILTER		INTERMEDIATE 9:48	
WELD ANGLE 45°		WELD ANGLE 45°														FINAL: 10:30	
CALIBRATION REFLECTION LOCATION		SIGNAL AMPLITUDE		SWEEP POSITION		DISTANCE FROM SOUND ENTRY POINT TO			SIGNAL AMPLITUDE		SWEEP POSITION		DISTANCE FROM SOUND ENTRY POINT TO			Continuation sheets attached No	
						SCRIBE LINE							50% DAC LOCATIONS			Transfer record attached No	
																This examination was performed in accordance with the procedure stated above 9.4.9	
																OPERATOR LEVEL II	
																Assistant (Level II)	
																Signature: <i>Walter Curcio</i>	
																OPERATING SIGNATURE	

WELD NUMBER	REFR CHECK	RAVE INITIAL DRAW	SCAN DIRECTION				DEFLECTION LIMITATIONS	SURFACE CONDITION		EXAMINATION RESULTS		REMARKS
			1	2	3	4		RAVE METAL	WELD	U.T.	VISUAL	
31-6			✓	✓			WELD CROWN	SMOOTH	GROUND	NRI	NI	
SEC.			PAR				INSULATION RING					
17-20	1/2	1/2			1/2	1/2	WELDED PAD 5"x8"					
AREA												
204-239												

NI = NO INDICATION
RI = RECORDABLE INDICATION
NRI = NO RECORDABLE INDICATION

Operators (Level II) (1) Siraj Memon (2) Wayne Rheaume
Assistant Operator Michael K. Chaney

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO. 3 NUCLEAR POWER PLANT

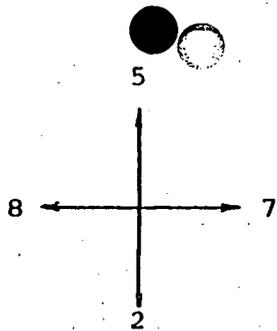


ULTRASONIC INDICATION DATA SHEET

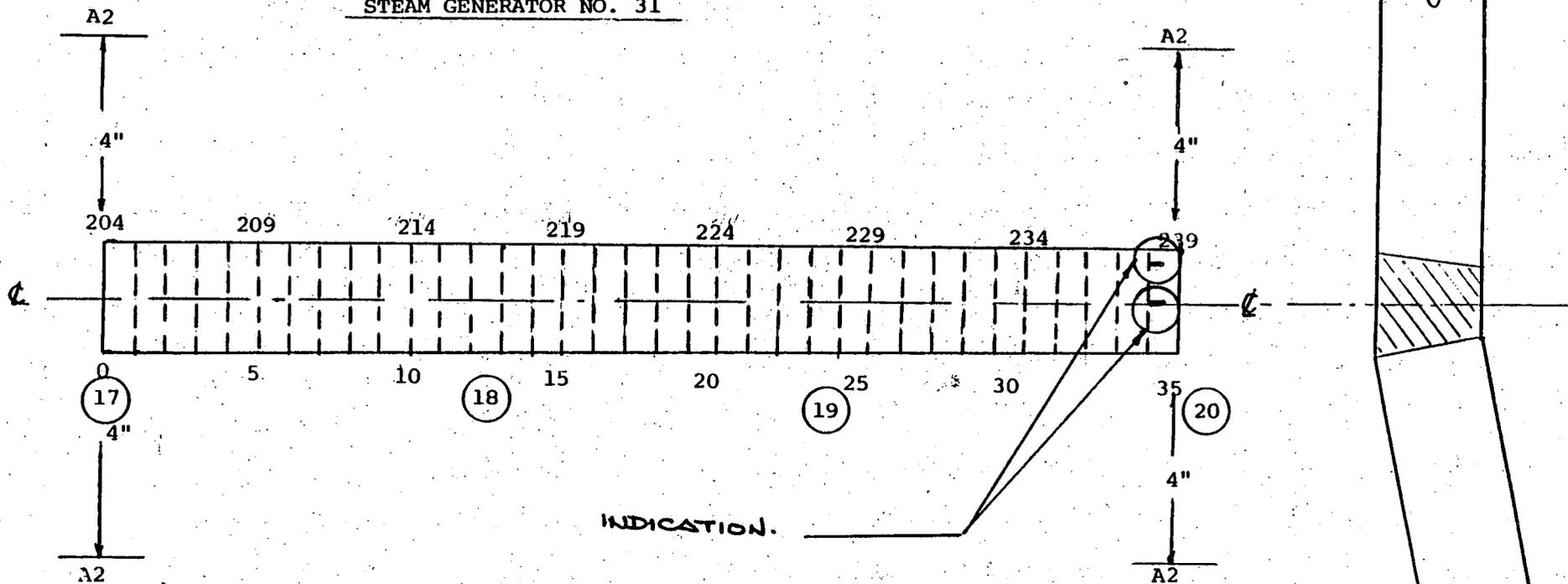
PLANT: IP	UNIT: 3	DATE: 10/19/84
LOOP: 31	SYSTEM OR COMPONENT: STEAM GENERATOR	DRAWING NO.: INT-2-1100
OPERATOR(S): ① SIRAJ MEMON (LEVEL II) ② WAYNE ZHEARNE LEV. II		PROCEDURE NO.: 9.4-9
		STD. THICK.: 3.5"

WELD NUMBER	INDICATION LENGTH		MIN. DEPTH	S.U. POS.	MAX. DEPTH	S.U. POS.	MAX. DAC	BEAN ANGLE	BEAN DIA.	BASE METAL THICK.	WELD THICK.	BASE METAL THICK.	REMARKS
	FROM	TO											PEAK POS
31-6	238.50"	238.50"	4.8	4.50"	5.2	5.50"	25%	45°	2	3.50	3.80	3.70	SBT 5.0
Sec.	238.50"	238.50"	7.6	4.50"	8.0	5.50"	20%	45°	5	3.50	3.80	3.70	SBT 7.6
17-20													
AREA													
204"-239"													

WZ
10/19/84
WZ



STEAM GENERATOR NO. 31



Note: U.T. Examination performed
on o.d. surface of s/g #31

Scale: 1"=4"
65% reduction

J.S.S. 10/19/84 *A. Heane* 10/22/84



QUALITY ASSURANCE NONDESTRUCTIVE EXAMINATION PROCEDURE

NDEP. 9.4.9
7/30/84
DATE: _____
REVISION: 1

CALIBRATION AND WELD ULTRASONIC EXAMINATION DATA

PLANT IP	SHEET 3	DATE 10/19/84	PACKAGING NDEP-9.4.9	TECH. SPEC. NO. TABLE 42-1
LOOP 32	COMPONENT OR SYSTEM STEAM GENERATOR		PIPE SIZE 166" DIA	HEAT NO. INT-2-1100

WELD TYPE BUTT		CALIBRATION BLOCK INT-33 COUPLANT ULTRACELL-II (P.62)						SEARCH UNIT CABLE BNC TO BNC 6' FT LONG				SERIAL NO. 5N-211041		Block Temp 115° F Coop. Temp 133° F	
SERIAL NO.		SERIAL NO. R 9190						CIRCUMFERENTIAL SCANS DIRECTIONS 7 & 8				REF. RATE 1 KHZ		CALIBRATION LEVELS	
W. O. SIZE		W. O. SIZE 1/2" x 1"						N/A				DEFECT OFF		INITIALS 9:55	
W. O. FIN.		W. O. FIN. 2.25 MHZ										DAMPING MIN.		INTERMEDIATE -	
W. O. ANGLE		W. O. ANGLE 45°						SIGNAL		SWEEP		DIRECTION		OPERATOR	
CALIBRATION REFLECTION LOCATION		SIGNAL AMPLITUDE		SWEEP POSITION		DISTANCE FROM SOUND ENTRY POINT TO		SIGNAL AMPLITUDE		SWEEP POSITION		DISTANCE FROM SOUND ENTRY POINT TO		ASSISTANT	
						SCRIBE LINE		50% DAC LOCATIONS				SCRIBE LINE		50% DAC LOCATIONS	
1/4 T				80%		1.5		0.875 0.75 1.06							
1/2 T				50%		3.0		1.66 1.54 2.09							
3/4 T		1		30%		4.5		2.58 2.42 3.09		1		1		1	
1 T		1		42%		6.0		3.50 3.125 4.06		1		1		1	
1 1/4 T		2		20%		7.5		4.60 3.78 5.18		2		2		2	
1 1/2 T		2		12%		9.0		5.50 4.94 6.18		2		2		2	
GAIN		COARSE GAIN 20 FINE 20													
REF. UP.		40 db													

Continuation sheets attached **NO**
Transfer record attached **NO**
This examination was performed in accordance with the procedure stated above **9.4.9**
OPERATOR LEVEL II
(Signature)
ASSISTANT LEVEL II
(Signature)
OPERATING PERSONNEL

WELD NUMBER	APPR CHECK	DATE INITIAL DRAW	SCAN DIRECTION				DEFECTS	INSPECTION LIMITATIONS	SURFACE CONDITION		EXAMINATION RESULTS		REMARKS
			1	2	3	4			MADE METAL	WELD	U.T.	VISUAL	
32-6			✓	✓			WELD CROWN	SMOOTH	GROUND	RI	NI		
SEC.							WELDED PAD 5X8"						
26-28	1	1			1	1	INSULATION RING.						
29-31	2	2			2	2							
AREA													
316-334													
348-365													

(Signature) Level III
10/23/84
B.m. - HSB 10-23-84

NI = NO INDICATION
RI = RECORDABLE INDICATION
NRI = NO RECORDABLE INDICATION

Operators (Level II) (1) Siraj Memon (2) Wayne Rheume
Assistant Operator Michael K. Chaney

Weld Number	Indication Length			Minimum Depth		Maximum Depth		Indic. Depth	Surface (a)	Sub-Surface (2a)	Beam		Base Metal Thick.	Weld Thick. (t)	
	From	To	Length (l)	Div.	Inches	Div.	Inches				Dir.				
1	32-6	348.0	348.625	0.625	5.5	3.21	6.0	3.5	0.29		✓	45°	2 side	3.7"	3.8
2	Note: This indication is not in the weld or heat affected zone (HAZ)														
3															

TABLE IWB-3511-1
ALLOWABLE PLANAR INDICATIONS
Material: Ferritic steels that meet the requirements of NB-2331 and the specified minimum yield strength of 50 ksi or less at 100°F
Thickness Range: 2 1/2 in. and greater

Aspect Ratio, a/l	Surface Indications, $a/l, %$	Subsurface Indications, $a/t, %$
0.00	2.0	2.6Y
0.05	2.1	2.8Y
0.10	2.3	2.9Y
0.15	2.6	3.2Y
0.20	2.9	3.6Y
0.25	3.2	4.1Y
0.30	3.7	4.6Y
0.35	3.7	5.2Y
0.40	3.7	5.8Y
0.45	3.7	6.5Y
0.50	3.7	7.2Y

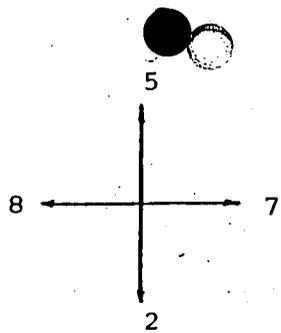
NOTES:

- (1) Dimensions of a and l are defined in IWA-3300. For intermediate flaw aspect ratios a/l , linear interpolation is permissible. Refer to IWA-3200(b).
- (2) Component thickness t is measured normal to the pressure retaining surface of the component. Where the section thickness varies, the average thickness over the length of the planar indication is the component thickness.
- (3) The total depth of a subsurface indication is $2a$.
- (4) $Y = (S/l)/(a/l) = S/a$. If $Y < 0.4$, the flaw indication is classified as a surface indication. If $Y > 1.0$, use $Y = 1.0$.

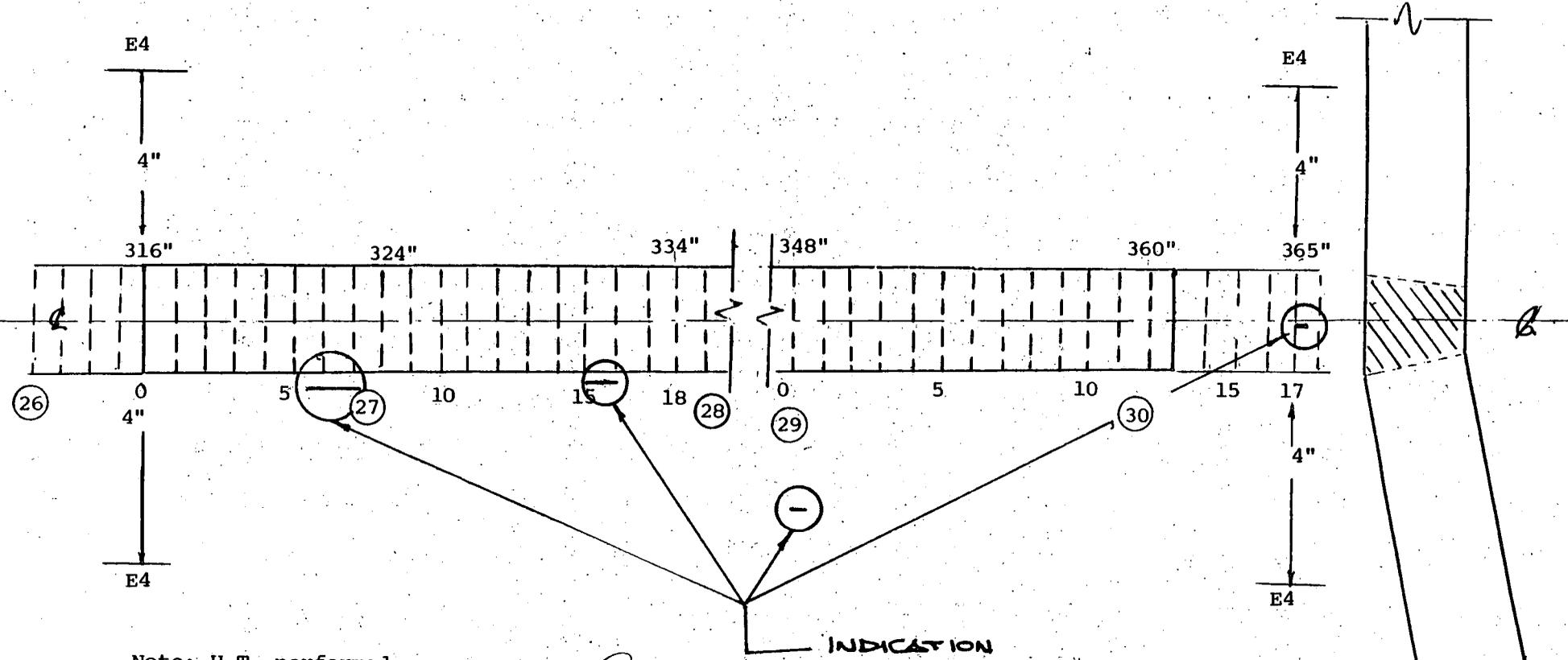
1 $l = 0.625$ $t = 3.7$
 $a = 0.145$
 $a/l = 0.232$
 $S =$ distance to nearest surface.
 $s = 0.2$
 $Y = S/a = N/A$
 $a/t, \% = a/t \times 100 = 3.918$
For max. allowable $a/t, \%$ interpolate from Table IWB-3511-1
'74 Code = 3.920 * $Y = 1$
'81 Code = N/A ** $Y > 1$ then $Y = 1$
'74... Accept... Reject
'81... Accept... Reject

2 $l =$ $t =$
 $a =$
 $a/l =$
 $S =$ distance to nearest surface.
 $S =$
 $Y = S/a =$
 $a/t, \% = a/t \times 100 =$
For max. allowable $a/t, \%$ interpolate from Table IWB-3511-1
'74 Code = * $Y = 1$
'81 Code = ** $Y > 1$ then $Y = 1$
'74... Accept... Reject
'81... Accept... Reject

3 $l =$ $t =$
 $a =$
 $a/l =$
 $S =$ distance to nearest surface.
 $S =$
 $Y = S/a =$
 $a/t, \% = a/t \times 100 =$
For max. allowable $a/t, \%$ interpolate from Table IWB-3511-1
'74 Code = * $Y = 1$
'81 Code = ** $Y > 1$ then $Y = 1$
'74... Accept... Reject
'81... Accept... Reject



STEAM GENERATOR NO. 32



Note: U.T. performed
on o.d. surface of S/G#32

J. J. [Signature] 10/19/84
W. [Signature] 10/22/84

Scale: 1"=4"
65% Reduction.



QUALITY ASSURANCE NONDESTRUCTIVE EXAMINATION PROCEDURE

NDEP 4.9
7/30/84
DATE: _____
REVISION: 1

CALIBRATION AND WELD
ULTRASONIC EXAMINATION DATA

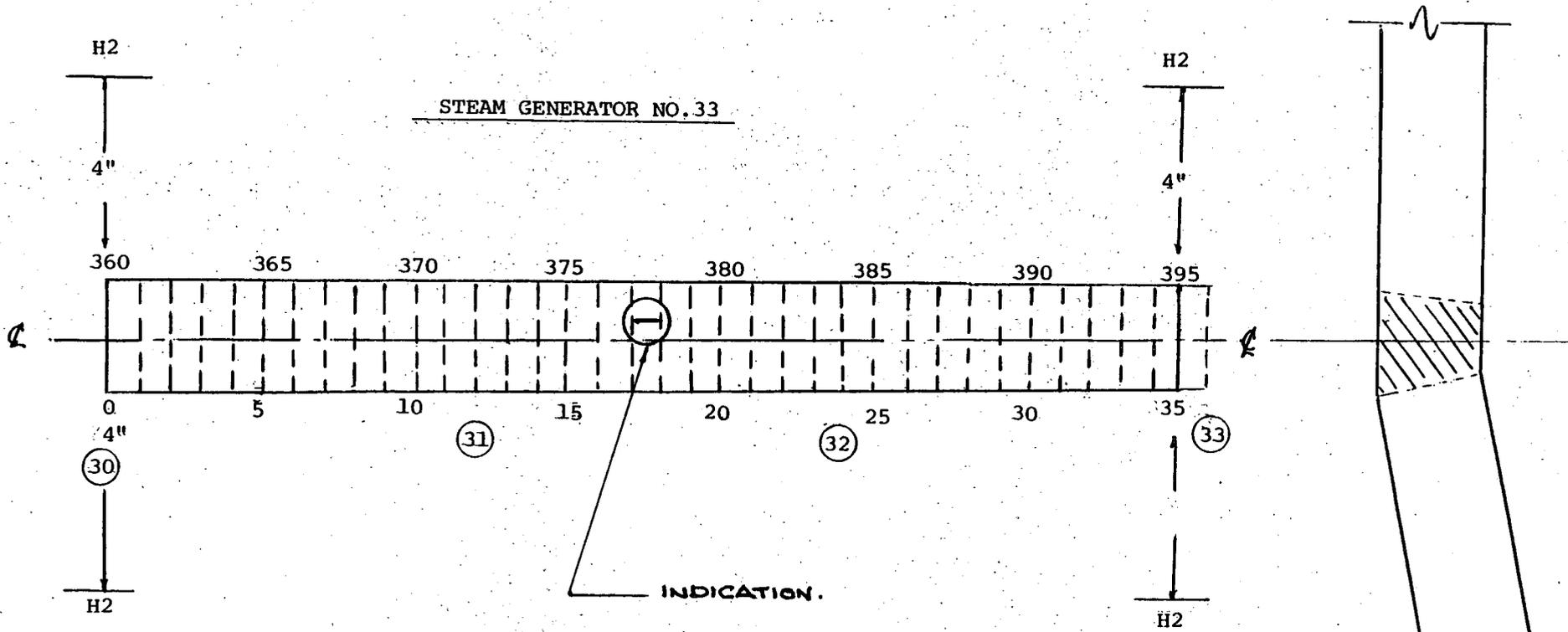
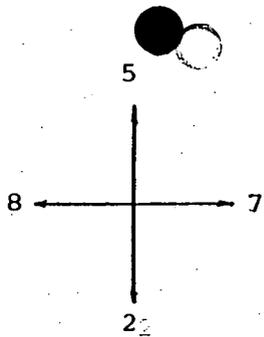
PLANT IP	UNIT 3	DATE 10/19/84	PROCEDURE NDEP-9.4.9	SPEC. REF. NO. TABLE 42-1
LOOP 33	COMPONENT OR SYSTEM STEAM GENERATOR		PIPE SIZE 166 DIA	ARTICLE NO. INT-2-1100

WELD TYPE BUTT		CALIBRATION BLOCK COUPLANT INT-33 ULTRAGELL II (P.625)						SEARCH UNIT CABLE BNC TO BNC 6' FT LONG				SWEPT RANGE SN-211041		Block Temp 115° F Comp. Temp 92° F	
SCANS PER WELD N/A		AREAL SCANS DIRECTIONS 2 & 3 S/N: 29190 1/2" x 1" 2.25 MHZ 45°						CIRCUMFERENTIAL SCANS DIRECTIONS 7 & 8 N/A				REP. RATE 1 KHZ		CALIBRATION ERROR	
CALIBRATION REFLECTION LOCATION		SIGNAL AMPLITUDE		SWEEP POSITION		DISTANCE FROM SOUND ENTRY POINT TO		SIGNAL AMPLITUDE		SWEEP POSITION		DISTANCE FROM SOUND ENTRY POINT TO		REFLECT RESULT OFF	
						SCANS PER WELD						SCANS PER WELD		DAMPING MIN.	
						50% DAC LOCATIONS						50% DAC LOCATIONS		FILTER	
1/4 T						0.875 0.75 1.06								INITIALS 7:55	
1/2 T						1.66 1.54 2.09								INTERMEDIATE - 8:30	
3/4 T		1		1		2.58 2.42 3.09		1		1		1		FINAL 10:30	
1 T		1		1		3.50 3.125 4.06		1		1		1		Continuation sheets attached NO	
1 1/4 T		2		2		4.60 3.98 5.18		2		2		2		Transfer record attached NO	
1 1/2 T		2		2		5.50 4.94 6.18		2		2		2		This examination was performed in accordance with the procedure stated above 9.4.9	
														OPERATOR LEVEL II <i>(Signature)</i> 10/23/84	
														ASSISTANT LEVEL	
														OPERATOR SIGNATURE	
GAIN		COARSE GAIN 20 FINE 10													
ATT. DB.		36 db.													

WELD NUMBER	REFR CHECK	WELD METAL DIAM	SCAN DIRECTION				DEFLECTION LIMITATIONS	SURFACE CONDITION		EXAMINATION RESULTS		REMARKS
			1	2	3 & 4	5		WELD METAL	WELD	U.T.	VISUAL	
33-6			✓	✓			WELD CROWN	SMOOTH	GROUND	NRI	NI	
Sec.				PAR			INSULATION RING					
30-33	1/2	1/2			1/2	1/2	NOZZLE					
AREA												
360-395												

NI = NO INDICATION
RI = RECORDABLE INDICATION
NRI = NO RECORDABLE INDICATION

Operators (Level II) (1) Siraj Memon (2) Wayne Rheaume



Note: U.T. performed on o.d. surface of S/G#33

Scale: 1"=4"
65% Reduction

[Handwritten signature] 10/19/84. *[Handwritten signature]* 10/22/84



QUALITY ASSURANCE NONDESTRUCTIVE EXAMINATION PROCEDURE

NDEP 9.4.9
DATE: 7/30/84
REVISION: 1

**CALIBRATION AND WELD
ULTRASONIC EXAMINATION DATA**

PLANT IP	UNIT 3	DATE 10/18/84	PROCEDURE NDEP-9.4.9	TQM. SPEC. NO. TABLE 42-1
LOOP 34	EQUIPMENT OR SYSTEM STEAM GENERATOR		PIPE SIZE 168" DIA	PIPEW. ID. INT-2-1100

WELD TYPE BUTT		CALIBRATION BLOCK COUPLANT INT-33 ULTRAGEL-II (P-63)						SEARCH UNIT CABLE BNC TO BNC 6' FT LONG				SERIAL NO. US138 SN-211545		Block Temp 84° F Comp. Temp 99° F			
STRAIGHT BEAM SCAN DIRECTION 0		AZIMUTHAL SCANS DIRECTION 3 & 9						CIRCUMFERENTIAL SCANS DIRECTION 7 & 8				REF. RATE 1 KHZ		CALIBRATION CURVES			
S. W. NO.		S/N. R9190						N/A				REFLECT OFF		INITIALS: 2:30			
S. W. SIZE		1/2" x 1"										MIN. FILTER		INTERMEDIATE			
S. W. FINISH		2.25 MHZ															
S. W. AIRER		45°						CALIBRATION LOCATION		SIGNAL AMPLITUDE		SWEEP POSITION		SIGNAL AMPLITUDE		SWEEP POSITION	
DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO		DISTANCE FROM SOUND ENTRY POINT TO	
SCRIBE LINE		50% DAC LOCATIONS		SCRIBE LINE		50% DAC LOCATIONS		SCRIBE LINE		50% DAC LOCATIONS		SCRIBE LINE		50% DAC LOCATIONS		SCRIBE LINE	
1/4 T		80%		1.5		0.875 0.75 1.06											
1/2 T		50%		3.0		1.66 1.54 2.09											
3/4 T		30%		4.5		2.58 2.42 3.09											
1 T		42%		6.0		3.50 3.125 4.06		1		1		1		1		1	
1 1/4 T		20%		7.5		4.60 3.98 5.18		2		2		2		2		2	
1 1/2 T		12%		9.0		5.50 4.94 6.18		2		2		2		2		2	
GAIN		COARSE GAIN 20 FINE 10															
ATT. DB.		36 db.															

Continuation sheets attached **NO**
Transfer record attached **NO**
This examination was performed in accordance with the procedure stated above **9.4.9**
OPERATOR LEVEL II
(Signature)
ASSISTANT LEVEL
(Signature)

WELD NUMBER	REF. CHECK	DATE INSTAL. OR AM	SCAN DIRECTION				DEFECT LIMITATIONS	SURFACE CONDITION		EXAMINATION RESULTS		REMARKS
			1	3	7 & 9	8		PIPE METAL	WELD	U.T.	VISUAL	
34-6			✓	✓			WELD CROWN	SMOOTH	GROUND	NRI	NI	
SEC.			PAR				INSULATION RING.					
14-17	1/2	1/2			1/2	1/2	WELDED PAD: 5x8"					
AREA												
168"-203"												

(Signature) Level III
10/23/84
BM-HSB 10-23-84

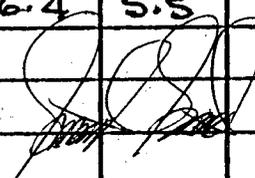
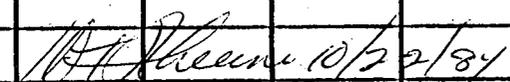
NI = NO INDICATION
RI = RECORDABLE INDICATION
NRI = NO RECORDABLE INDICATION

Operators (Level II) (1) Siraj Memon (2) Wayne Rheume

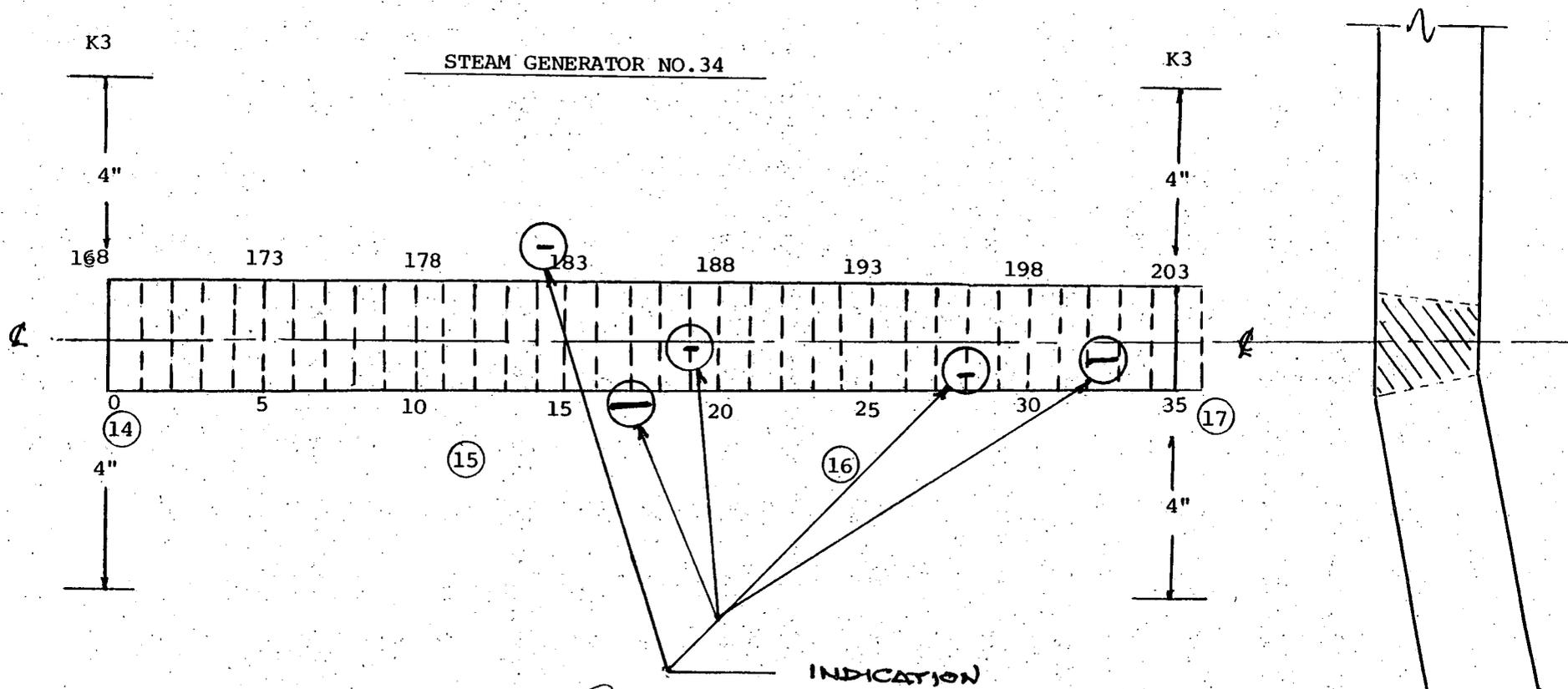
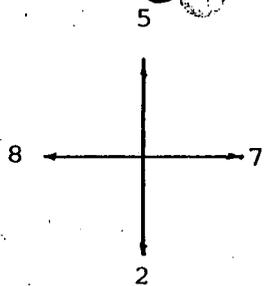


ULTRASONIC INDICATION DATA SHEET

PLANT: IP	UNIT: 3	DATE: 10/18/84
LOOP: 34	SYSTEM OR COMPONENT: STEAM GENERATOR	SKETCH NO. INT-2-1100
OPERATOR(S): ① SIRAJ MEMON (LEVEL II) ② WAYNE RHEAUME lxxII		STD. THICK. 3.5"

WELD NUMBER	INDICATION LENGTH		MIN. DEPTH	S.U. POS.	MAX. DEPTH	S.U. POS.	MAX. DAC	BEAN ANGLE	BEAN DIR.	BASE METAL THICK.	WELD THICK.	BASE METAL THICK.	REMARKS	
	FROM	TO											PEAK POS	
34-6	182.50	182.50	5.8	6.25"	6.8	7.5"	25%	45°	2	3.5	3.8	3.7	SPOT	6.4
SEG.	184.50	185.50	5.5	5.75	6.0	4.0	25%	45°	5	3.5	3.8	3.7		5.8
14-17	187.0	187.0	5.8	3.0	6.6	4.625	10%	45°	2	3.5	3.8	3.7	SPOT	6.2
AREA	196.0	196.0	5.4	4.25	6.0	5.5	10%	45°	5	3.5	3.8	3.7	SPOT	5.8
168-204	199.0	200.0	6.0	4.75	6.4	5.5	15%	45°	5	3.5	3.8	3.7		6.2
 10/18/84.  10/22/84														

scale direction



Note: U.T. Performed
on o.d. surface of S/G#34

J. J. [Signature]
10/18/84 65% Reduction
A. J. [Signature] 10/22/84

Scale: 1"=4"



QUALITY ASSURANCE NONDESTRUCTIVE EXAMINATION PROCEDURE

NDEP 9.4.9
7/30/84
DATE: _____
REVISION: 1

CALIBRATION AND WELD ULTRASONIC EXAMINATION DATA

PLANT IP	UNIT 3	DATE 10/18/84	PROCEDURE NDEP-9.4.9	TYP. REF. MY. TABLE 42-1
BOOK 34	COMPONENT OR SYSTEM STEAM GENERATOR		PIPE SIZE 16" DIA	PIPE NO. INF-2-1100

WELD TYPE BUTT		CALIBRATION BLOCK COUPLANT INT-33 ULTRAGEL-II (P.628)				SEARCH UNIT CABLE BNC TO BNC 6' FT LONG				SIGNALMENT/USL38 5/N-211041		Block Temp 84° F Comp. Temp 99° F	
SYNCHRO BEAM SCAN DIRECTION 0		AREAL SCANS DIRECTION 3 & 0				CIRCUMFERENTIAL SCANS DIRECTION 7 & 0				REF. RATE 1 KHZ		CALIBRATION CURVES	
S. W. NO.		S/N: R 9190				N/A				RESULT OFF		INITIALS: 9:15	
S. W. SIZE		1/2 x 1"								DAMPING MIN.		INTERMEDIATE	
S. W. FINISH		2.25 MHZ								FILTER		FINAL: 12:30	
S. W. ANGLE		45°											
CALIBRATION REFLECTOR LOCATION	SIGNAL AMPLITUDE	SWEEP POSITION	SIGNAL AMPLITUDE	SWEEP POSITION	DISTANCE FROM SOUND ENTRY POINT TO			SIGNAL AMPLITUDE	SWEEP POSITION	DISTANCE FROM SOUND ENTRY POINT TO			OPERATOR SIGNATURE
					SCREVE LINE	SOI DAC LOCATION	SOI DAC LOCATION			SCREVE LINE	SOI DAC LOCATION	SOI DAC LOCATION	
1/4 T			80%	1.5	0.875	0.75	1.06						Continuation sheets attached NO Transfer record attached NO This examination was performed in accordance with the procedure stated above 9.4.9 OPERATOR LEVEL II ① <i>Siraj Memon</i> ② <i>Wayne Rheaume</i> ASSISTANT LEVEL OPERATOR SIGNATURE
1/2 T			50%	3.0	1.66	1.54	2.09						
3/4 T			30%	4.5	2.58	2.42	3.09						
1 T	1	1	42%	6.0	3.50	3.25	4.06	1	1	1	1		
1 1/4 T	2	2	20%	7.5	4.60	3.98	5.18	2	2	2	2		
1 1/2 T	2	2	12%	9.0	5.50	4.94	6.18	2	2	2	2		
GAIN		COARSE GAIN 20 FINE 16											
AFT. UP.		36 db											

WELD NUMBER	REFR CHECK	BASE METAL SCAN	SCAN DIRECTION				DEFLECTION LINEATIONS	SURFACE CONDITION		EXAMINATION RESULTS		REMARKS
			3	5	7 & 0	0		BASE METAL	WELD	U.T.	VISUAL	
34-6			✓	✓			WELD CROWN	SMOOTH	GROUND	RI	NI	
SEC.							INSULATION RING					
42-0	1	1			1	1						
0-2	2	2			2	2						
AREA												
505" 522"												
0'-18"												

NI = NO INDICATION
RI = RECORDABLE INDICATION
NRI = NO RECORDABLE INDICATION

Operators (Level II) (1) Siraj Memon (2) Wayne Rheaume

POWER AUTHORITY OF THE STATE OF NEW YORK
INDIAN POINT NO. 3 NUCLEAR POWER PLANT



ULTRASONIC INDICATION DATA SHEET

PLANT: IP	UNIT: 3	DATE: 10/18/84
LOOP: 34	SYSTEM OR COMPONENT: STEAM GENERATOR	SKETCH NO. INT-2-1100
OPERATOR(S): ① SIRAJ MEMON (LEVEL II) ② WAYNE RHEAUME LEV. II		PROCEDURE NO. 9.4-9
		STD. THICK. 3.5"

WELD NUMBER	INDICATION LENGTH		MIN. DEPTH	S.U. POS.	MAX. DEPTH	S.U. POS.	MAX. DAC	BEAN ANGLE	BEAN DIA.	BASE METAL THICK.	WELD THICK.	BASE METAL THICK.	REMARKS	PEAK POS
	FROM	TO												
3A-6	521.75	0"	5.6	4.25"	6.0	5.0"	20%	45°	5	3.5"	3.8"	3.7"		5.8
SEG.	0.50"	1.50"	5.8	3.50"	6.8	4.5"	20%	45°	2	3.5"	3.8"	3.7"		6.0
0"-2"	5.0	5.25"	3.6	0	4.0	0.50"	25%	45°	2	3.5"	3.8"	3.7"		3.8
42-0"	11.25	12.0"	6.0	6.5"	6.2	6.875	75%	45°	5	3.5"	3.8"	3.7"		6.1
AREA	14.375	15.25"	6.2	6.5"	6.6	7.675	75%	45°	5	3.5"	3.8"	3.7"		6.4
0-18"	506.66	507.43	6.2	4.3	7.2	5.0	50%	45°	5	3.5"	3.8"	3.7"		6.8
505-522	507.0	507.75	5.6	3.5	6.2	4.0	25%	45°	2	3.5"	3.8"	3.7"		5.8
	509.66	510.0"	6.0	4.0	6.6	4.25	45%	45°	2	3.5"	3.8"	3.7"		6.4
	510.75	511.50	5.2	5.0	5.6	5.75	90%	45°	2	3.5"	3.8"	3.7"		5.4
	513.0	514.75	6.4	4.25	7.0	5.125	45%	45°	5	3.5"	3.8"	3.7"		6.8
	512.75	512.75	5.2	5.0	5.6	5.75	90%	45°	2	3.5"	3.8"	3.7"	SPT	5.4
	520.50	520.50	5.9	4.375	6.2	4.75	75%	45°	2	3.5"	3.8"	3.7"	SPT.	6.0

[Handwritten Signature] 10/18/84 *[Handwritten Signature]* 10/22/84

Weld Number	Indication Length			Minimum Depth		Maximum Depth		Indic. Depth	Surface (a)	Sub-Surface (2a)	Beam		Base Metal Thick.	Weld Thick. (t)
	From	To	Length (1)	Div.	Inches	Div.	Inches				∠	Dir.		
34-6	11.25	12.0	0.75"	6.0	3.50	6.2	3.62	0.12		✓	45	5	3.7	3.8
	14.375	15.25	0.875"	6.2	3.62	6.6	3.85 (3.55)	0.07		✓	45	5	3.7	3.8
	510.75	511.50	0.75"	5.2	3.03	5.6	3.27	0.24		✓	45	2	3.5	3.8

TABLE IWB-3511-1
ALLOWABLE PLANAR INDICATIONS
 Material: Ferritic steels that meet the requirements of NB-2331 and the specified minimum yield strength of 50 ksi or less at 100°F.
 Thickness Range: 2 1/2 in. and greater

Aspect Ratio, a/l	Surface Indications, a/l , %	Subsurface Indications, a/l , %
0.00	2.0	2.6Y
0.05	2.1	2.8Y
0.10	2.3	2.9Y
0.15	2.6	3.2Y
0.20	2.9	3.6Y
0.25	3.2	4.1Y
0.30	3.7	4.6Y
0.35	3.7	5.2Y
0.40	3.7	5.8Y
0.45	3.7	6.5Y
0.50	3.7	7.2Y

NOTES:
 (1) Dimensions of a and l are defined in IWA-3300. For intermediate flaw aspect ratios a/l , linear interpolation is permissible. Refer to IWA-3200(b).
 (2) Component thickness t is measured normal to the pressure retaining surface of the component. Where the section thickness varies, the average thickness over the length of the planar indication is the component thickness.
 (3) The total depth of a subsurface indication is $2a$.
 (4) $Y = (S/l)/(a/l) = S/a$. If $Y < 0.4$, the flaw indication is classified as a surface indication. If $Y > 1.0$, use $Y = 1.0$.

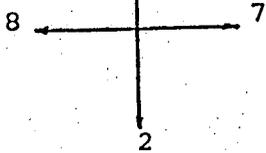
1) $l = 0.75$ $t = 3.7$
 $a = 0.06$
 $a/l = 0.08$
 $S =$ distance to nearest surface.
 $s = 0.08$
 $Y = S/a = N/A$
 $a/t, \% = a/t \times 100 = 1.62$
 For max. allowable $a/t, \%$ interpolate from Table IWB-3511-1
 '74 Code = 2.86 * $Y = 1$
 '81 Code = N/A ** $Y > 1$ then $Y = 1$
 '74... Accept... Reject
 '81... Accept... Reject

2) $l = 0.875$ $t = 3.7$
 $a = 0.035$
 $a/l = 0.04$
 $S =$ distance to nearest surface.
 $s = 0.08$
 $Y = S/a = N/A$
 $a/t, \% = a/t \times 100 = 0.95$
 For max. allowable $a/t, \%$ interpolate from Table IWB-3511-1
 '74 Code = 2.76 * $Y = 1$
 '81 Code = N/A ** $Y > 1$ then $Y = 1$
 '74... Accept... Reject
 '81... Accept... Reject

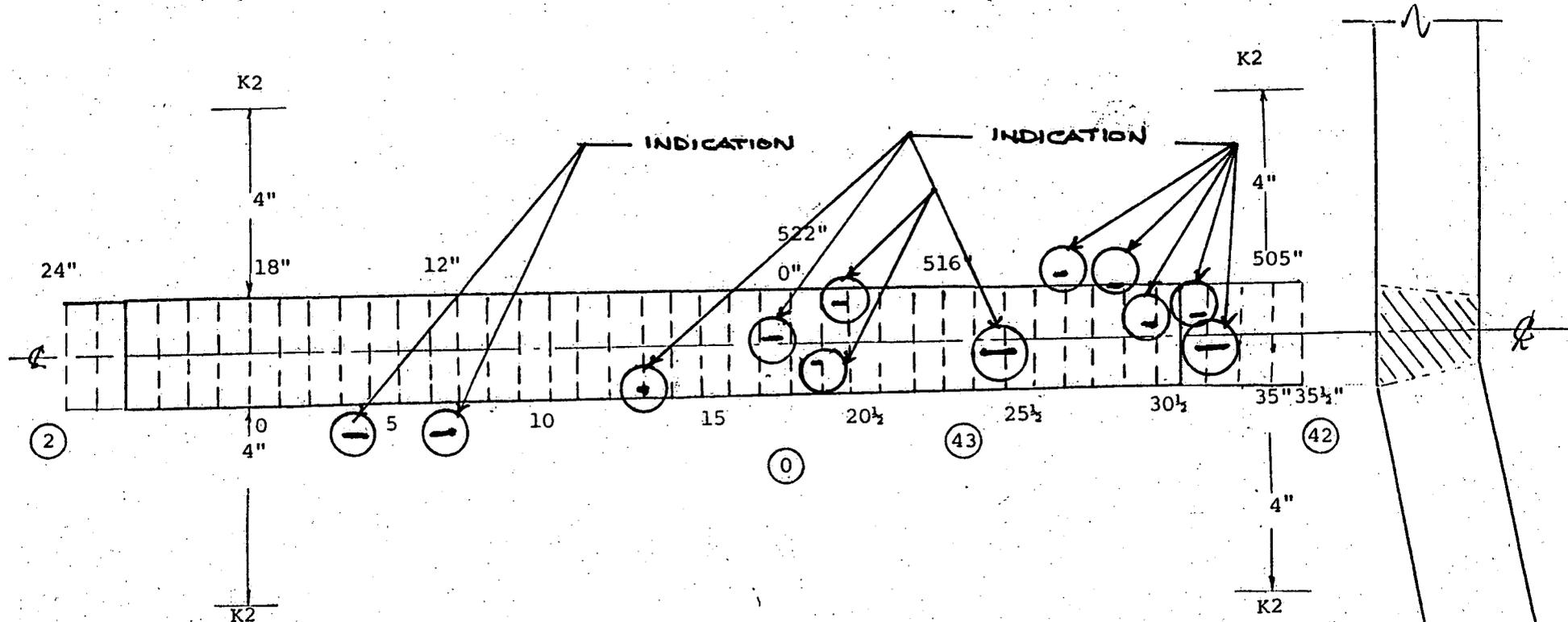
3) $l = 0.75$ $t = 3.8$
 $a = 0.12$
 $a/l = 0.16$
 $S =$ distance to nearest surface.
 $s = 0.23$
 $Y = S/a = N/A$
 $a/t, \% = a/t \times 100 = 3.16$
 For max. allowable $a/t, \%$ interpolate from Table IWB-3511-1
 '74 Code = 3.28 * $Y = 1$
 '81 Code = N/A ** $Y > 1$ then $Y = 1$
 '74... Accept... Reject
 '81... Accept... Reject

Scan direction

5



STEAM GENERATOR NO. 34



Note: U.T. Performed
on o.d. surface of S/G#34

[Handwritten signature] 10/18/84

Scale: 1"=4"
65% Reduction.

[Handwritten signature] 10/22/84

Weld Number	Indication Length			Minimum Depth		Minimum Depth		Indic. Depth	Surface (a)	Sub-surface (2a)	Beam		Base Metal Thick.	Weld Thick. (t)
	From	To	Length (1)	Div.	Inches	Div.	Inches				Dir.			
1 34-6	512.75	512.75	0 → 2a	5.2	3.03	5.6	3.27	0.24		✓	45	2	3.5	3.8
2 34-6	520.50	520.50	0 → 2a	5.9	3.44	6.2	3.62 (3.38)	0.06		✓	45	2	3.5	3.8
3														

TABLE IWB-3511-1
ALLOWABLE PLANAR INDICATIONS
 Material: Ferritic steels that meet the requirements of NB-2331 and the specified minimum yield strength of 50 ksi or less at 100°F
 Thickness Range: 2½ in. and greater

Aspect Ratio, ¹ a/l	Surface Indications, ² a/l, %	Subsurface Indications, ²⁻⁴ a/l, %
0.00	2.0	2.6Y
0.05	2.1	2.8Y
0.10	2.3	2.9Y
0.15	2.6	3.2Y
0.20	2.9	3.6Y
0.25	3.2	4.1Y
0.30	3.7	4.6Y
0.35	3.7	5.2Y
0.40	3.7	5.8Y
0.45	3.7	6.5Y
0.50	3.7	7.2Y

NOTES:

- (1) Dimensions of a and l are defined in IWA-3300. For intermediate flaw aspect ratios a/l, linear interpolation is permissible. Refer to IWA-3200(b).
- (2) Component thickness t is measured normal to the pressure retaining surface of the component. Where the section thickness varies, the average thickness over the length of the planar indication is the component thickness.
- (3) The total depth of a subsurface indication is 2a.
- (4) $Y = (S/l)/(a/l) = S/a$. If $Y < 0.4$, the flaw indication is classified as a surface indication. If $Y > 1.0$, use $Y = 1.0$.

1 $l = 2a$ $t = 3.5$
 $a = 0.12$
 $a/l = 0.5$
 $S =$ distance to nearest surface.
 $S = 0.23$
 $Y = S/a = N/A$
 $a/t, \% = a/t \times 100 = 3.4$
 For max. allowable a/t, % interpolate from Table IWB-3511-1
 '74 Code = 7.2 * Y = 1
 '81 Code = N/A ** Y > 1 then Y = 1

'74... Accept... Reject
 '81... Accept... Reject

2 $l = 2a$ $t = 3.8$
 $a = 0.03$
 $a/l = 0.5$
 $S =$ distance to nearest surface.
 $S = 0.16$
 $Y = S/a = N/A$
 $a/t, \% = a/t \times 100 = 1.75$
 For max. allowable a/t, % interpolate from Table IWB-3511-1
 '74 Code = 7.2 * Y = 1
 '81 Code = _____ ** Y > 1 then Y = 1

'74... Accept... Reject
 '81... Accept... Reject

3 $l =$ $t =$
 $a =$
 $a/l =$
 $S =$ distance to nearest surface.
 $S =$
 $Y = S/a =$
 $a/t, \% = a/t \times 100 =$
 For max. allowable a/t, % interpolate from Table IWB-3511-1
 '74 Code = _____ * Y = 1
 '81 Code = _____ ** Y > 1 then Y = 1

'74... Accept... Reject
 '81... Accept... Reject

Reportable Indications
Summary

SG-32

Weld Seam 32-6

<u>Location (from "0" Ref.)</u>	<u>Length</u>	<u>% DAC</u>	<u>Exam Date</u>
348.0" to 348.25"	.250"	100% + 6db	05/07/83
348.0" to 348.625"	.625"	100% + 6db	10/19/84

Change = 3/8" in length (increase)

SG-34

Weld Seam 34-6

<u>Location (from "0" Ref.)</u>	<u>Length</u>	<u>% DAC</u>	<u>Exam Date</u>
11.75" to 12.25"	.50"	75%	05/09/83
11.25" to 12.0"	.750"	75%	10/18/84

Change = 1/4" in length (increase). Note: location change of 1/2"

14.375" to 14.75"	.375"	45%	05/09/83
14.375" to 15.25"	.875"	75%	10/18/84

Change = 1/2" in length (increase)
30% DAC (increase)

510.75" to 511.50"	.750"	90%	05/09/83
510.75" to 511.50"	.750"	90%	10/18/84

Change = 0

512.75" to 512.75"	SPOT	90%	05/09/83
512.75" to 512.75"	SPOT	90%	10/18/84

Change = 0

520.50" to 520.50"	SPOT	75%	05/09/83
520.50" to 520.50"	SPOT	75%	10/18/84

Change = 0

NOTES:

1. Some minor variations in operator technique (skill factor) of $\pm 5\%$ are considered acceptable.
2. Review of the above data provides assurance that flaw growth will be detected before it would become significant.



**New York Power
Authority**

Memorandum

April 23, 1984
IP3-QH84-63

TO WHOM IT MAY CONCERN

FROM: D. Frangu

SUBJECT: Indian Point #3 Nuclear Power Plant
Quality Assurance
NDE Requalification - Lonny Gwynn

As the designated corporate Level III, I have overviewed the satisfactory performance of Lonny Gwynn, Ultrasonic Testing (UT) Examiner, Magnetic Particle Testing (MT) Examiner and Liquid Penetrant Testing (PT) Examiner, Radiographic Examination (RT) Level III. In this review, covering the past three years, I judged that performance merits re-certification as a Level III Examiner.

This certification is in accordance with NYPA QA NDEP 1.1, Paragraph 5.7.4B and the American Society for Nondestructive Testing, Recommended Practice No: SNT-TC-1A, 1975 Edition, for the following areas:

<u>Test Title</u>	<u>SNT-TC-1A Supplement</u>
Ultrasonic Examination	C
Magnetic Particle	B
Liquid Penetrant	D
Radiographic Examination	A

Date: 4/23/84

D. Frangu, NDE Specialist
QA Engineer

I concur: A. Klausmann
Vice President
Quality Assurance
& Reliability

DF:lg
cc: IP3-QA File: 3.0.1



POWER AUTHORITY OF THE STATE OF NEW YORK

Eye Examination for certification to ASME Boiler and Pressure Vessel Code, Section III, Appendix IX and SNT-TC-1A

RECEIVED
AUG 20 1984

New York Power Authority
SA Department

NON-DESTRUCTIVE EXAMINATION PERSONNEL QUALIFICATION

NAME SIRAJ MEMON TEST METHOD NONDESTRUCTIVE TESTING
SOCIAL SECURITY # 323-52-3988 QUALIFICATION LEVEL II

- 1. (Cover Left Eye) Right Eye O.D. Chart No. _____
- 2. (Cover Right Eye) Left Eye O.S. Chart No. _____
- 3. Both Eyes O.U. Chart No. _____

Test with glasses, if applicable.

Type of glasses used SINGLE VISION (READING) (example, reading, *bifocal)

*If bifocal, use lower set of lenses.

- 1. (Cover Left Eye) Right Eye O.D. Chart No. 1
- 2. (Cover Left Eye) Left Eye O.S. Chart No. 1
- 3. Both Eyes O.U. Chart No. 1

Color Vision: The following numbers were distinguished in the first 20 plates of the S. Ishihara Test for color blindness. 38 plates, 1971 edition.

Plate 1 <u>12</u>	Plate 6 <u>15</u>	Plate 11 <u>7</u>	Plate 16 _____
Plate 2 <u>8</u>	Plate 7 <u>74</u>	Plate 12 <u>16</u>	Plate 17 _____
Plate 3 <u>29</u>	Plate 8 <u>6</u>	Plate 13 <u>73</u>	Plate 18 _____
Plate 4 <u>5</u>	Plate 9 <u>45</u>	Plate 14 <u>26</u>	Plate 19 _____
Plate 5 <u>53</u>	Plate 10 <u>5</u>	Plate 15 <u>42</u>	Plate 20 _____

I certify that SIRAJ MEMON has been given the above eye tests and has met the requirements of reading the J-1 portion of the chart, and the applicant's color vision test answers are recorded above.

Signed [Signature] Title MD Date 4-30-84

Note: This test complies with the American Society for Nondestructive Testing recommended practices no. SNT-TC-1A (1968 edition) supplements A, B, C & D.

TRUSTEES

ROCK R. CLARK
CHAIRMAN
L. INZALLI
CHAIRMAN
RICHARD M. FLYNN
DEBERT L. MILONCI
WILLIAM F. LIDDY



GEORGE T. BERRY
GENERAL MANAGER
AND CHIEF ENGINEER

LEWIS R. BENNETT
ASSISTANT GENERAL
MANAGER-GENERAL
COUNSEL

WILBUR L. GRONBERG
ASSISTANT GENERAL
MANAGER-ENGINEERING

JOHN W. BOSTON
DIRECTOR OF
POWER OPERATIONS

THOMAS F. MCCRANN, JR.
CONTROLLER

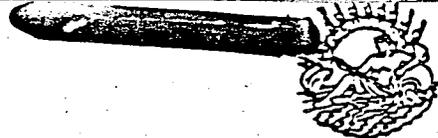
NDEP 1.1
Attachment I

LETTER OF CERTIFICATION

This letter certifies that SIRAJ MEMON has
successfully qualified by training and examination with a
composite grade of 95.35 % as an Authority NDE Level II
TESTER/INTERPRETER in ULTRASONIC method of examin-
ation in accordance with NDEP 1.1

11/20/82
Date


NDE Level II Examiner



POWER AUTHORITY OF THE STATE OF NEW YORK

Eye Examination for certification to ASME Boiler and Pressure Vessel Code, Section III, Appendix IX and SNT-TC-1A

NON-DESTRUCTIVE EXAMINATION PERSONNEL QUALIFICATION

NAME Wayne Rheume TEST METHOD _____
SOCIAL SECURITY # 132-50-9034 QUALIFICATION LEVEL _____

- 1. (Cover Left Eye) Right Eye O.D. Chart No. 2
- 2. (Cover Right Eye) Left Eye O.S. Chart No. 2
- 3. Both Eyes O.U. Chart No. 2

Test with glasses, if applicable. NO

Type of glasses used NONE (example, reading, *biofocal)
*If bifocal, use lower set of lenses.

- 1. (Cover Left Eye) Right Eye O.D. Chart No. _____
- 2. (Cover Right Eye) Left Eye O.S. Chart No. _____
- 3. Both Eyes O.U. Chart No. _____

Color Vision: The following numbers were distinguished in the first 20 plates of the S. Ishihara Test for color blindness. 38 plates, 1971 edition.

Plate 1 <u>12</u>	Plate 6 <u>15</u>	Plate 11 <u>5</u>	Plate 16 <u>42</u>
Plate 2 <u>8</u>	Plate 7 <u>74</u>	Plate 12 <u>7</u>	Plate 17 _____
Plate 3 <u>29</u>	Plate 8 <u>6</u>	Plate 13 <u>16</u>	Plate 18 _____
Plate 4 <u>5</u>	Plate 9 <u>45</u>	Plate 14 <u>73</u>	Plate 19 _____
Plate 5 <u>3</u>	Plate 10 _____	Plate 15 <u>26</u>	Plate 20 _____

I certify that Wayne Rheume has been given the above eye tests and has met the requirements of reading the J-1 portion of the chart, and the applicant's color vision test answers are recorded above.

Signed [Signature] Title MO Date 5-1-84

Note: This test complies with the American Society for Nondestructive Testing recommended practices no. SNT-TC-1A (1968 edition) supplements A, B, C & D.

TRUSTEES
ERICK R. CLARK
AIRMAN
L. INGALES
CHAIRMAN
GEO. M. FLYNN
BERT L. MILONCI
WILLIAM F. LIDDY



GEORGE T. BERRY
GENERAL MANAGER
AND CHIEF ENGINEER

LEWIS R. BENNETT
ASSISTANT GENERAL
MANAGER-GENERAL
COUNSEL

WILBUR L. GRONBERG
ASSISTANT GENERAL
MANAGER-ENGINEERING

JOHN W. BOSTON
DIRECTOR OF
POWER OPERATIONS

THOMAS F. MCCRANN, JR.
CONTROLLER

NDEP 1.1
Attachment I

LETTER OF CERTIFICATION

This letter certifies that Wayne R. Kline has
successfully qualified by training and examination with a
composite grade of 94.1 % as an Authority NDE Level II
Interpret in Ultrasonic method of examin-
ation in accordance with NDEP 1.1

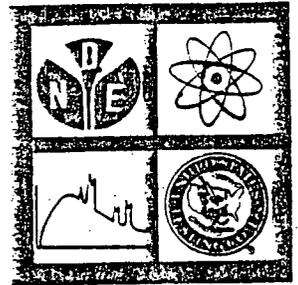
4/22/82
Date

[Signature]
NDE Level III Examiner

Re-cert due 4/85

United States Testing Company, Inc.

NONDESTRUCTIVE EXAMINATION DIVISION
430 Little Clinton Street, Reading, Pa. 19601 (215) 376-7434



NDE PERSONNEL CERTIFICATION RECORD

NAME Michael K. Chaney Per ASNT-TC-1A 1975 Edition ADDRESS P.O. Box 401 Blakeslee, Pennsylvania

EDUCATION

SCHOOL	LOCATION	DATES	CURRICULUM
Provine High	Jackson, Ms.	Graduated 1970	General
Hinds Jr. College	Jackson, Ms.	1970 - 1972	Drafting

TECHNICAL TRAINING

CONDUCTED BY	LOCATION	DATES	METHODS
Chanute Air Force Base	Homestead, Florida	1973 - 1977	MT, PT, UT, RT 426 hrs
Magnaflux	Treose, Pennsylvania	1978 - 1979	MT, PT, UT, RT 82 hrs
Wilsystems	Farmingdale, New Jersey	1980 - 1981	UT 4 weeks

EXPERIENCE

EMPLOYER	ADDRESS	DATES	METHODS
Conam Inspection	Folcroft, Pennsylvania	1982 - Present	UT, RT, PT, MT
U.S. Steel	Fairless, Pennsylvania	1979 - 1981	Metalurgy Sampler
Wilsystems, Inc.	Farmingdale, New Jersey	1980 - 1981	UT
Peabody Testing	Treose, Pennsylvania	1978 - 1979	UT, MT, PT, RT
QC Labs Inc.	Hollywood, Florida	1977 - 1978	MT, PT

EXAMINATION RESULTS

PAGE 6 of 14

METHOD	VISUAL	ULTRASONIC	LIQUID PENETRANT	MAG. PARTICLE
GENERAL	80% x .3 = 24	75% x .3 = 22.5	80% x .3 = 24	70% X .3 = 21.
SPECIFIC	73.3% x .3 = 21.9	90% x .3 = 27	100% x .3 = 30	100% X .3 = 30.
PRACTICAL	96% x .4 = 38.4	87% x .4 = 34.8	85% x .4 = 34	82% X .4 = 32.
COMPOSITE	84.3	85.80	88	83.80
EYE EXAM.	11/9/83	11/9/83	11/9/83	11/9/83
APPROVED LEVEL	II	II	II	II
DATE	11-9-83	9-28-83	9-29-83	9-29-83



UNITED STATES TESTING COMPANY, INC.

PHYSICAL EXAMINATION RECORD

ANSI N45.2.6

Name Chawey Michael K. Employee No. _____
(Last) (First) (Initial)

How do you rate your general health? Excellent ✓
Good _____
Fair _____

Do you feel that you are physically capable of performing your assigned inspection activities? yes

Use this space for explanation of "No" answer. _____

I certify that the above statements are true and complete to the best of my knowledge.

11-9-83 (Date) Signature Michael K. Chawey

	VISION	Require-ments	Right	Left
1. Snellen Far Distance Vision (Concrete, Reactor Vessels and Containment Inspectors Only)		<u>20-40</u>		
a) Uncorrected			_____	_____
b) Corrected			_____	_____
2. Jaeger Near Distance Vision		J-1 Ltrs.		
a) Uncorrected			_____	_____
b) Corrected			<u>OK</u>	<u>OK</u>
3. Distinguish Primary Colors			<u>OK</u>	<u>OK</u>

11-9-83
(Date)

Kevin J MacBarnett
(Signature Eye Examiner)

United States Testing Company, Inc.

430 LITTLE CLINTON STREET
READING, PENNSYLVANIA 19601



REPORT

To Whom It May Concern;

This letter assigns Kevin MacConnell, Tim Calligy, and Nick Magnapara as my Designated Representatives for the purpose of administering eye examinations in accordance with USF-HOB-PC-1A Certification of Nondestructive Personnel Procedure.

Joseph W. Dreibelbis, Level III

PAGE 8 of 14

KRAUTKRAMER BRANSON
Mifflin County Industrial Park
P.O. Box 350
Lewistown, Pennsylvania 17044

CERTIFICATE OF CALIBRATION

Model USL 38 Serial No. 211545

The accuracy of the instrument described above has been confirmed by factory standard test equipment and laboratory reference standards traceable to the National Bureau of Standards.

This instrument meets or exceeds the specifications of Krautkramer Branson.

Certified By Bill Noland
Title QC Technician

Date Certified June 30, 1984

PAGE 9 of 14

KRAUTKRAMER BRANSON
Mifflin County Industrial Park
P.O. Box 350
Lewistown, Pennsylvania 17044

CERTIFICATE OF CALIBRATION

Model USL-38 Serial No. 211041

The accuracy of the instrument described above has been confirmed by factory standard test equipment and laboratory reference standards traceable to the National Bureau of Standards.

This instrument meets or exceeds the specifications of Krautkramer Branson.

Certified By Bill Noland
Title QC Technician

Date Certified Sept 14, 1984

PAGE 10 of 14



ULTRASONIC INSTRUMENT LINEARITY RECORD

Ultrasonic Instrument _____

Calibration Block (describe) _____

Model No. USL38 Serial No. 211041

110 TYPE I

Transducer _____

Brand AEROTECH (FOR HORIZ) Frequency 2.25 Size 1" Straight Beam
 " KB-A (FOR VERT. & ANPL.) " 2.25 " .250" Angle Beam

HORIZONTAL LINEARITY

VERTICAL LINEARITY

Signal amplitudes in % FSH

Back Reflect.	Grid Loc.	Accept. Limits
1	1	1
2	2	1.90-2.10
3	3	2.85-3.15
4	4	3.80-4.20
5	5	4.75-5.25
6	6	5.70-6.30
7	7	6.65-7.35
8	8	7.60-8.40
9	9	8.55-9.45
10	10	10

No.	Actual Higher Signal	(Calculate)		Actual Lower Signal
		1/2 of Higher	Accept. Limits*	
1	100	(50)	(47 1/2) - (52 1/2)	49 1/2
2	90	(45)	(42 1/2) - (47 1/2)	44
3	80	(40)	(37 1/2) - (42 1/2)	39
4	70	(35)	(32 1/2) - (37 1/2)	34
5	60	(30)	(27 1/2) - (32 1/2)	30
6	50	(25)	(22 1/2) - (27 1/2)	25
7	40	(20)	(17 1/2) - (22 1/2)	20
8	30	(15)	(12 1/2) - (17 1/2)	15
9	20	(10)	(7 1/2) - (12 1/2)	10 1/2
10		()	() - ()	

*Acceptance Limits are 1/2 of the Higher Signal $\pm 5\%$ FSH.

Amplitude Control Linearity

Initial Amplitude	dB Change	Result	Limit
80% FSH	Down 6	40 %	32% - 48%
80% FSH	Down 12	20 %	16% - 24%
40% FSH	Up 6	80 %	64% - 96%
20% FSH	Up 12	80 %	64% - 96%

This instrument is considered:

Acceptable
 Not Acceptable

PAGE 11 of 14

Signed _____

W. Keane

Date _____

8/24/84



POWER AUTHORITY OF THE STATE OF NEW YORK

ULTRASONIC INSTRUMENT LINEARITY RECORD

EQUIPMENT

INSTRUMENT _____ TRANSDUCER _____ CALIBRATION BLOCK _____ DATE 10/18/84
 MAKE KRAUTKRAMER SIZE 1 x 1/2" MAKE INT-33 PROCEDURE 9.4-9
 MODEL USL-38 FREQ. 2.25MHZ S/N D8366-5 OPERATOR S. MEMON
 SERIAL # 211041 SERIAL # R9190 MAT'L A533 PLANT IP
 COUPLANT ULTRA GELL ANGLE 45° GRADE "A" UNIT 3
D-623

VERTICAL LINEARITY

Signal amplitudes in % FSR

CONTROL SETTINGS

SINGLE
 DAMPING DAMP
 REJECT OFF
 REP. RATE 1KHZ

No.	Actual Higher Signal	(Calculate) 1/2 of Higher	Accept. Limits*	Actual Lower Signal
1		()	()-()	
2		()	()-()	
3		()	()-()	
4		()	()-()	
5		()	()-()	
6		()	()-()	
7		()	()-()	
8		()	()-()	
9		()	()-()	

Acceptance Limits $\pm 2\%$ of 50% of the Larger Amplitude.

[Handwritten Signature]

10/18/84

Amplitude Control Linearity

Initial Amplitude	dB Change	Result	Limit
80% FSH	Down 6	40	36% - 42%
80% FSH	Down 12	20	16% - 22%
40% FSH	Up 6	80	76% - 84%
20% FSH	Up 12	80	79% - 92%

CONTROL SETTINGS _____ DAMPING SINGLE DAMP REJECT OFF REP. RATE 1KHZ

(✓) Acceptable

() Not Acceptable

This instrument is considered:



POWER AUTHORITY OF THE STATE OF NEW YORK

ULTRASONIC INSTRUMENT LINEARITY RECORD

EQUIPMENT

INSTRUMENT TRANSUCER CALIBRATION BLOCK DATE 10/18/84
 MAKE KRAUTKRAMER SIZE 1 x 1/2" MAKE INT-33 PROCEDURE 9.4.9
 MODEL USL-38 FREQ. 2.25MHZ S/N D8306-5 OPERATOR S. MEMON
 SERIAL # 211545 SERIAL # R9190 MATL A533 PLANT 1P
 COUPLANT ULTRA CELL ANGLE 45° GRADE "A" UNIT 3
D-623

VERTICAL LINEARITY

CONTROL SETTINGS

Signal amplitudes in % FSH

DAMPING	REJECT	REP. RATE	No.	Actual Higher Signal	(Calculate) 1/2 of Higher	Accept. Limits*	Actual Lower Signal
<u>SINGLE</u> <u>DAMP</u>	<u>OFF</u>	<u>1KHZ</u>	1	100	(50)	(47 1/2) - (52 1/2)	50
			2	90	(45)	(42 1/2) - (47 1/2)	45
			3	80	(40)	(37 1/2) - (42 1/2)	40
			4	70	(35)	(32 1/2) - (37 1/2)	35
			5	60	(30)	(27 1/2) - (32 1/2)	30
			6	50	(25)	(22 1/2) - (27 1/2)	25
			7	40	(20)	(17 1/2) - (22 1/2)	20
			8	30	(15)	(12 1/2) - (17 1/2)	15
			9	20	(10)	(7 1/2) - (12 1/2)	10

Acceptance Limits + 2% of 50% of the Larger Amplitude.

[Handwritten signature]

10/18/84

Amplitude Control Linearity

Initial Amplitude	dB Change	Result	Limit
80% FSH	Down 6	40	36% - 42%
80% FSH	Down 12	20	16% - 22%
40% FSH	Up 6	80	76% - 84%
20% FSH	Up 12	80	79% - 92%

CONTROL SETTINGS _____ DAMPING SINGLE
DAMP REJECT OFF REP. RATE 1KHZ

(✓) Acceptable

This instrument is considered:

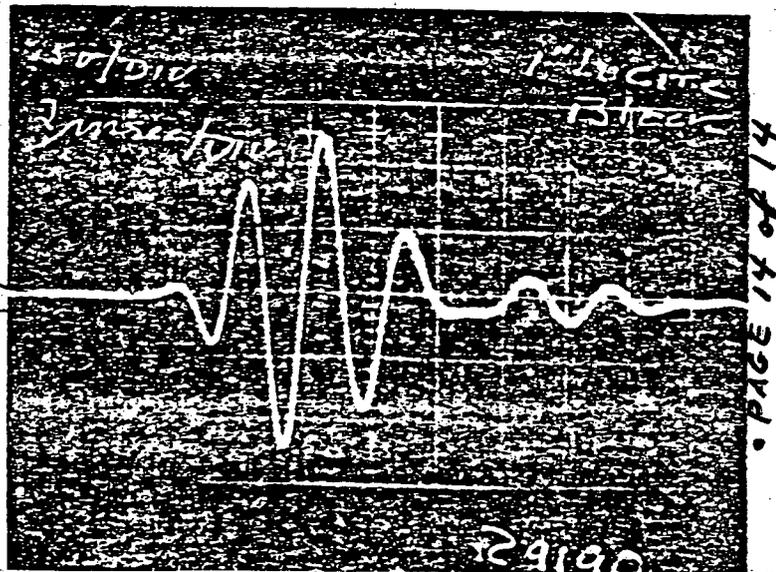
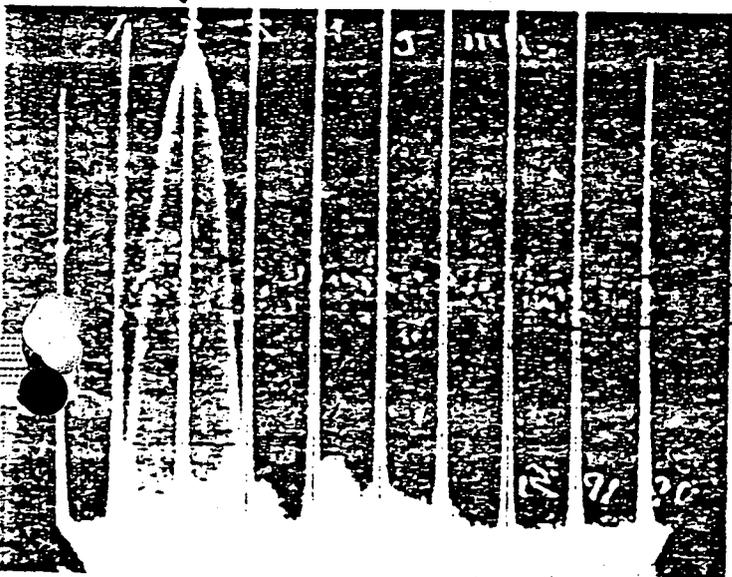
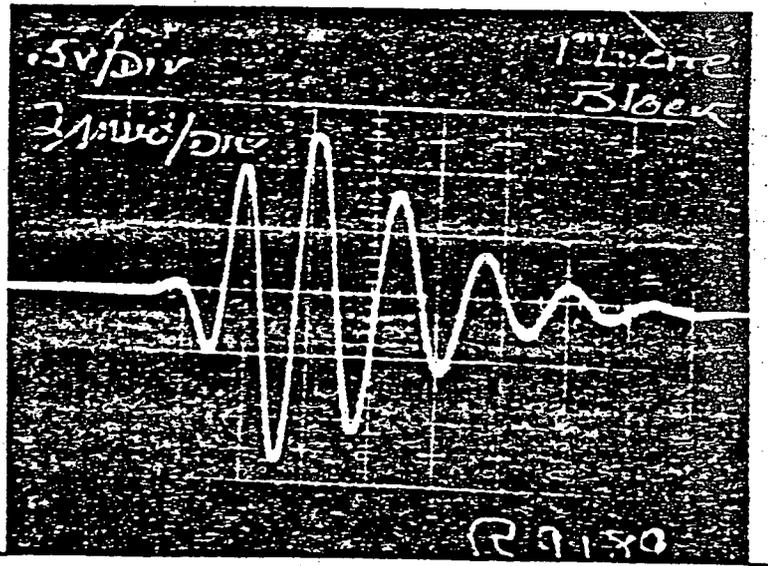
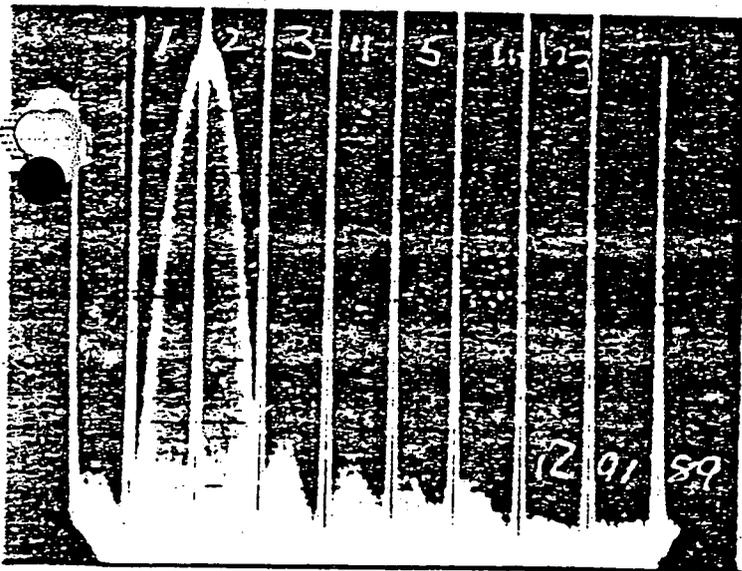
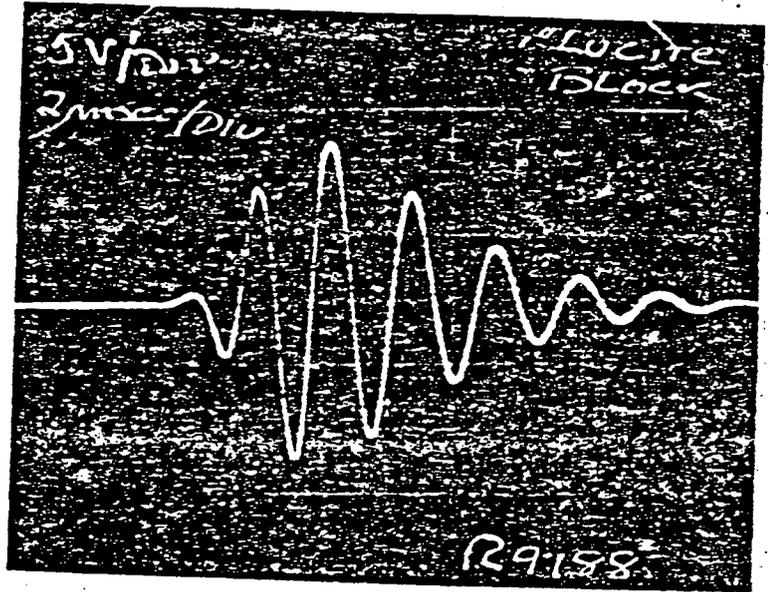
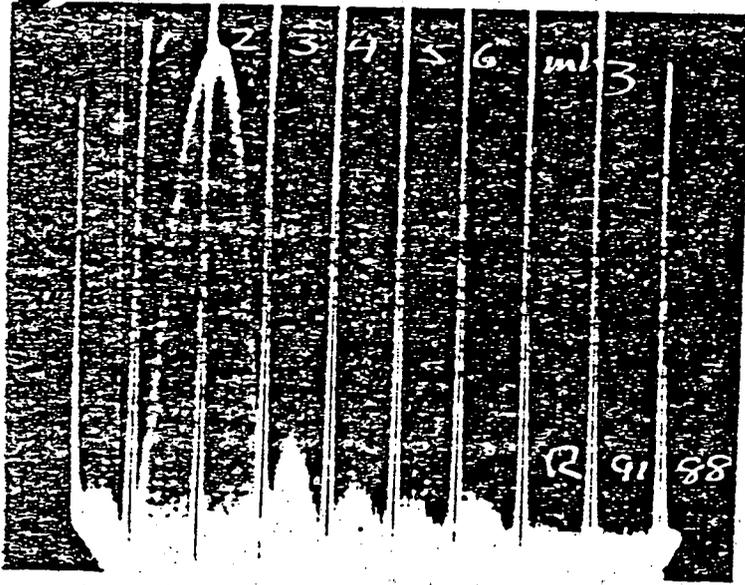
() Not Acceptable

harisonic

HARISONIC LABORATORIES, INC

RECEIPT INSPECTED - OK

BY *Tommy Boyer*
VIRGINIA CORP OF RICHMOND



PAGE 14 OF 14



**New York Power
Authority**

Quality Assurance

Nondestructive Examination Procedure



TITLE: Manual Ultrasonic examination of circumferential and longitudinal butt welds in ferretic vessels of 2½" thick and greater		NDEP <u>9.4-9</u>
APPROVAL:  _____ NDE - Level III		DATE <u>7/30/84</u>
CONCURRENCE:  _____ Director - Quality Assurance		REVISION <u>1</u>
APPLICABILITY: Nuclear Power Plants	SUPERSEDES: NDEP 9.4-9 Rev. 0	

*Note: Rev. 1 issued to change
typographical errors only*

Joe Frazer Level III



NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

MANUAL ULTRASONIC EXAMINATION OF CIRCUMFERENTIAL
AND LONGITUDINAL BUTT WELDS IN FERRITIC VESSELS
OF 2 1/2" THICK AND GREATER

1.0 PURPOSE

The ultrasonic examination specified herein applies to the use of manual pulse/echo examination of circumferential and longitudinal full penetration welds in ferritic vessels.

2.0 APPLICABILITY

This procedure is applicable to, and describes requirements for manual ultrasonic examination of full penetration circumferential and longitudinal butt welds 2 1/2" thick and greater in ferritic vessels. This procedure complies with ASME Code, Section XI.

3.0 REFERENCES

3.1 NDEP 1.1 Procedure for Qualification and Certification of Nondestructive Examination Personnel.

4.0 ATTACHMENTS

4.1 APPENDIX A - Supplemental calibration parameters.

4.2 Fig. 1 - Typical calibration block.

4.3 Fig. 2 - Extent of metal examination.

4.4 Fig. 3 - Examination references.

4.5 APPENDIX B - Ultrasonic examination data.

4.6 APPENDIX C - Ultrasonic indication data sheet.

4.7 APPENDIX D - Ultrasonic transfer data sheet.

4.8 APPENDIX E - Instrument calibration data for welds 2 1/2" thick or greater in ferritic vessels.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

5.0 GENERAL

5.1 TEST PERSONNEL

All personnel performing the nondestructive examinations in accordance with this procedure shall be qualified and certified to at least Level I in accordance with SNT-TC-1A and NDEP 1.1 Procedure for Qualification and Certification of Nondestructive Examination Personnel.

NOTE: At least one member of each examination crew shall have a minimum qualification of Level II. A Level II or III individual shall be responsible for witnessing the final interpretation on all ultrasonic examinations. He shall be responsible for the recording and acceptance of required data on ultrasonic examination reports.

5.2 TEST EQUIPMENT

5.2.1 Ultrasonic flaw detection instruments shall be of the pulse echo type with an A-Scan presentation.

5.2.2 Transducers used shall be a maximum of one (1) square inch in area and not less than 2.25 MHz nominal frequency. The transducers used for angle beam tests shall be affixed to suitable wedges designed to induce sound beams in the material under test at the required angles. The beam angles shall be within $\pm 2^\circ$ of nominal. Other frequencies and/or angles may be used if required to conduct the examinations or investigations.

5.3 COUPLANT

A suitable liquid, semi-liquid, or paste couplant medium, such as water, oil, glycerin, or grease shall be applied to the test surface. Couplants used to ensure the transmission of ultrasonic beams shall contain not more than one percent (1%) by weight, of residual sulphur and halogens.

5.4 GENERAL REQUIREMENTS

5.4.1 Generally the examinations conducted in accordance with this procedure will be done from the O.D. surface. When examinations or evaluations are to be conducted from an

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

I.D. clad surface, calibration must be accomplished through the clad of the appropriate calibration block and noted on the report. For I.D. examinations the search unit size and configuration shall be such that coupling distance does not exceed .010".

- 5.4.2 The calibration standards used shall be made of ultrasonically sound material of the same specification, product form and heat treatment as one of the materials in the assembly to be examined.
- 5.4.3 Examined areas shall be dry wiped to remove excess couplant.
- 5.4.4 Unless otherwise specified the area to be examined shall include the weld and the adjacent base material for one wall thickness on either side.
- 5.4.5 The material shall be examined, where practical, from both sides of the weld by a straight beam and two angle beams of 45 and 60 degrees.
- 5.4.6 Prior to starting an examination, the areas to be examined and contacted by the search unit shall be cleaned to ensure that it is free of dirt, loose scale, machining or grinding particles, weld spatter or other loose foreign matter that would impair the free movement of the search unit or affect the inspection results. If such conditions are detected, they will be rectified prior to conducting the examination.
- 5.4.7 To assure complete coverage of the volume, the transducer shall be indexed with at least a 10% overlap with each pass. The scanning rate shall not exceed 6 inches per second.

6.0 PROCEDURE

6.1 BASE METAL STRAIGHT BEAM CALIBRATION AND EXAMINATION

- 6.1.1 Prior to performing angle beam examinations, the base material through which the angle beam will pass (Ref: Fig. 2) shall be completely scanned with a straight beam search unit to detect reflectors which might affect the interpretation of the results of the angle beam examination.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

- 6.1.2 The sensitivity of the instrument shall be adjusted at a location free of indications so that the first back reflection from the far side of the plate will be 50 to 80 percent of full screen height. The sensitivity as adjusted above shall be continuously monitored during the examination and adjusted as necessary to maintain it within the stated amplitude.
- 6.1.3 For components having weld deposited cladding on the inside surface, the base metal straight beam examination shall be conducted concurrently and at the same sensitivity as the straight beam examination described in paragraph 6.5 below.
- 6.1.4 Areas containing indications (principally laminar) that will affect angle beam examinations shall be noted, considered during the examination, and reported on the data sheet.

6.2 INSTRUMENT CALIBRATION

Instrument calibration shall be verified at the beginning of each day of examination in accordance with the following requirements:

- 6.2.1 Amplitude Linearity Verification - Position an angle beam search unit on the calibration block so that indications can be observed from both the 1/2 and 3/4T holes. Adjust the search unit position to give a 2 to 1 ratio of amplitudes between the two indications, with the larger set at 80% of full screen height. Without moving the search unit, adjust sensitivity (gain) to successively set the larger indication from 100% to 20% of full screen height, in 10% increments (or 2 DB steps if a fine control is not available), and read the smaller indication at each setting. The reading must be within plus or minus 2 1/2% of 50% of the larger amplitude. The readings must be estimated to the nearest 1% of full screen.
- 6.2.2 Amplitude Control Linearity Verification - Position an angle beam search unit on a calibration block so that the indication from the 1/2 T hole is peaked on the screen. With the increases and decreases in attenuation shown in the following table, the indication must fall within the specified limits.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

<u>Indication set at % of full screen</u>	<u>DB Control Change</u>	<u>Indication limits, % of full screen</u>
80%	- 6DB	36 - 42
80%	- 12DB	16 - 22
40%	+ 6DB	76 - 84
20%	+ 12DB	79 - 92

Note: Minus denotes decrease in amplitude;
Plus denotes increase.

The readings must be estimated to the nearest 1% of full screen.

6.3 EXAMINATION SYSTEM CALIBRATION

Calibration shall include the complete ultrasonic examination system. Any change in search units, shoes, couplants, cables, ultrasonic instruments, or any other parts of the examination system shall be causes for recalibration.

6.3.1 Calibration shall be verified at the beginning of each day of examination, and at the end of each examination category or every four hours, whichever is less, and with any change of examination personnel. A DECREASE in sensitivity of more than 2 DB shall require recalibration and re-examination of all items examined since the previous acceptable calibration or check. An INCREASE in sensitivity of more than 2 DB shall require recalibration and re-examination and data correction of all indications reported since the previous acceptable calibration or check.

6.3.2 The instrument sweep range and a distance amplitude curve (DAC) shall be established utilizing the response from the applicable basic calibration holes in accordance with the following:

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

NOTE: When necessary, sweep position locations of the calibration reflectors may be altered to accommodate the examination area thickness within 90% of the sweep length.

6.4 ANGLE BEAM CALIBRATION

6.4.1 Sweep Range Calibration

- A. Position the search unit for the maximum response from the 1/4 T side drilled hole. Adjust the left edge of this indication to line 2 on the screen with the delay control.
- B. Position the search unit for the maximum response from the 3/4 T hole. Adjust the left edge of this indication to line 6 on the screen with the range control. △
- C. Repeat delay and range control adjustments until the 1/4 T and 3/4 T hole reflections start at sweep lines 2 and 6 respectively.
- D. Position the search unit for maximum response from the square notch on the opposite surface. The indication will appear near sweep line 8.
- E. Two divisions on the sweep equals 1/4 T.

6.4.2 Distance - Amplitude Correction

- A. Position the search unit for maximum response from the hole which gives the highest amplitude.
- B. Adjust the sensitivity control to provide an 80% of full screen indication from the hole. Mark the peak of the indication on the screen with a grease pencil or other suitable marker. △
- C. Decrease the peaked signal by 6DB and mark this amplitude on the screen to establish the 50% DAC point.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

- D. Re-establish the primary DAC response level by increasing the 50% amplitude by 6DB.
- E. Position the search unit for maximum response from each of the remaining calibration holes.
- F. Mark the peak of these indications on the screen.
- G. Repeat step 3 and 4 for each of the remaining calibration holes.
- I. Connect the screen marks from the side drilled holes to provide the primary DAC and the 50% Distance Amplitude Curve.

6.5 STRAIGHT BEAM CALIBRATION

6.5.1 Sweep Range Calibration

- A. Position the search unit on the calibration block and obtain the maximum response from the 1/4T side drilled hole. Adjust the left edge of this indication to line 2 on the screen with the delay control.
- B. Position the search unit for the maximum response from the 3/4 T hole. adjust the left edge of this indication to line 6 on the screen with the range control.
- C. Repeat delay and range control adjustments until the 1/4T hole reflections start at sweep lines 2 and 6.

6.5.2 Distance Amplitude Correction

- A. Position the search unit for maximum response from the 1/4 T hole.
- B. Adjust the sensitivity control to provide an 80% of full screen indication from the hole. Mark the peak of the indication on the screen with a grease pencil or other suitable marker.

- C. Position the search unit for maximum response from each of the remaining calibration holes.
- D. Mark the peaks of these indications on the screen.
- E. Connect the screen marks and extend through the thickness to provide the distance amplitude curve for the drilled holes.

6.6 WELD EXAMINATION

Examinations shall be performed for reflectors parallel and transverse to the weld utilizing the procedures outlined below. Scan sensitivity shall be a minimum 2X the reference sensitivity.

6.6.1 Reflectors Parallel to the Weld

The scan pattern shall start at one edge of the area to be examined with the ultrasonic search unit transmitting an angle beam perpendicular to the weld. The search unit shall be moved towards and away from the weld such that the calibrated beam passes through the whole area of the weld and base metal to be examined. Concurrent with this scan, the search unit shall be angled 15° right and 15° left and progressively indexed along the length of the weld such that the whole scan pattern follows a "saw-tooth" pattern. The "pitch" of the "saw-tooth" shall be such that on each pass the ultrasonic beam covers at least 10 per cent of the area covered by the previous adjacent pass. The weld and required amount of adjacent base metal is to be fully examined by this procedure. When practical, the examination shall be accomplished from both sides of the weld.

6.6.2 Reflectors Transverse to the Weld

- A The search unit shall be placed on one edge (i.e., 1 weld thickness from the edge of the weld) of the inspection area directing the angle beam into the material parallel to the weld axis. From this position, the search unit shall be moved parallel to the weld and indexed toward the opposite side of the

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

weld such that the next scan will cover at least 10 percent of the area covered by the previous adjacent scan. Parallel scans shall be repeated in this manner until the opposite side of the weld and base metal is reached and examined.

- B. Welds having high or uneven reinforcement shall be ground flat for at least 90% of the weld width prior to performing the examination.
- C. The examination in 6.6.1 and 6.6.2 shall be repeated with the transducer turned 180 degrees.

6.6.3 Extent of Examination

Volume and area subject to examination and extent of scan length shall be in accordance with Fig. 2.

6.7 CALIBRATED STRAIGHT BEAM EXAMINATION

- 6.7.1 A calibrated straight beam examination shall be performed on the weld and heat affected zone utilizing adjacent parallel scans with at least a 10 percent overlap.
- 6.7.2 Scanning shall be performed at a gain setting of 2 times the reference level (6DB increase in amplitude). Recording of indications shall be carried out with the gain control set at the reference level.

6.8 INVESTIGATION OF INDICATIONS

- 6.8.1 All indications exceeding 20% of the primary reference DAC (40% of scanning DAC) shall be investigated to determine maximum response, location and type of indication. Indications are generally categorized as flaw, geometric, or metallurgical.
- 6.8.2 All flaw indications which produce a response greater than 50 percent of the primary response reference level DAC curve will be investigated to the extent the examiner can characterize and report data relevant to the shape, orientation, location, and possible source of the indication producing area.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

- A. Prior to the performance of any investigations to further characterize flaw indications, the examination system shall be additionally calibrated in accordance with the requirements of Appendix A.
- B. Reflector length shall be determined by positioning the search unit such that the sound beam is directed perpendicular to the long axis of the discontinuity and by moving the transducer parallel with this axis in each direction from the position of maximum signal amplitude. The extremities of the discontinuity shall be defined as the points where the signal amplitudes drop to 50% of the calibrated DAC line. The size and location of recordable indications shall be recorded and evaluated.

6.8.3 Indications which are positively determined to result from the geometric configuration of the component and that exceed the recording level for flaws shall be acknowledged by recording the length and location, i.e. at ID., from 175° to 270°.

6.8.4 Indications resulting from the metallurgical structure within the material shall be investigated and considered when assessing the effectiveness of the examinations. Restrictions or variations to the examination due to the metallurgical structure shall be recorded.

6.8.5 Investigation and recording of indications shall be performed at the reference frequency and sensitivity. Other frequencies or beam angles may be used as an aid in investigating or interpreting examination results.

6.9 EXAMINATION RESULTS AND DOCUMENTATION

All data relative to the examinations and the recordable indications shall be documented and evaluated.

6.9.1 Data Recording

The locations of all recordable indications noted during the performance of non-destructive examinations shall be recorded with reference to datum points established.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

- A. The length and location of all recordable indications parallel to the weld shall be recorded by the distance along the axis of the weld from the datum (or related reference) point, to each end of the indication (starting and finishing points defining the length). ◀
- B. The depth and width and location of all recordable indications parallel to the weld shall be recorded by the perpendicular distance from the centerline of the weld to each side of the indication (starting and finishing points defining the width).
- C. The length and location of all recordable indications transverse to the weld shall be similarly recorded by the perpendicular distance from the centerline of the weld to each end of the indication.
- D. The depth and width and location of all recordable indications transverse to the weld shall be similarly recorded by the distance along the axis of the weld from the datum or related reference point to each side of the indication.
- E. All measurements between a datum point and a recordable indication circumferentially around a vessel or pipe weld shall be taken in a clockwise direction. (In the same direction as examination scan 7.)
- F. The clockwise direction shall be established as viewed from the top of a vessel (viewed in the direction of examination scan 5).
- G. The length and width (depths) of recordable ultrasonic indications shall be determined to the points where the signal amplitude response falls to a value of 50 percent of the calibration DAC level (DAC plus 6 db).
- H. All measurements of recordable ultrasonic indications shall be referred to the point of sound entry of the search unit or the centerline of the search unit, whichever being applicable.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

- I. When a recordable indication located transverse to the weld is found to extend either side of the datum reference point, the distances from the datum to the ends shall be identified as to the direction of measurement. This shall be achieved by utilizing the scan direction reference identities applicable to the side of the weld in conjunction with the measurement. (i.e. 4" (2), 6 1/2" (5) etc.)

6.9.2 An indication is defined as any ultrasonic response where the amplitude visibly exceeds the ultrasonic noise level.

6.10 DATA REPORTING

All information with respect to the performance of non-destructive examinations shall be recorded on the data sheets similar to those attached in the Appendices of this document. △

- 6.10.1 All information applicable to the calibration of ultrasonic equipment prior to the performance of examinations shall be recorded on the Ultrasonic Examination Report sheet in accordance with the requirements of Appendix A.
- 6.10.2 All information applicable to the examination of vessel or component welds shall be recorded on the Ultrasonic Examination Report sheet in accordance with the requirements of Appendix A.
- 6.10.3 All information applicable to the evaluation of indications to be recorded during the performance of ultrasonic examinations shall be recorded on the Ultrasonic Indication Data Sheet in accordance with the requirements of Appendix B.
- 6.10.4 During the performance of ultrasonic examination the information shall be recorded on the Ultrasonic Examination Data Sheet in accordance with the requirements of Appendix C.
- 6.10.5 The performance of instrument calibration as required prior to the examination of welds in accordance with this Procedure shall be recorded as required by Appendix E.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix A

APPENDIX A

SUPPLEMENTAL CALIBRATION PARAMETERS

1.0 CALIBRATION CORRECTION FOR PERPENDICULAR PLANAR REFLECTORS

1.1 Position the search unit for maximum amplitude from the square notch on the opposite surface. "X" marks the peak of the indication on the screen near sweep line 8.

1.2 Couple the search unit to the square notch in the examination surface. Position for maximum amplitude from the square notch. "X" marks the peak of the indication on the screen near sweep line 0.

NOTE: The opposite surface square notch may give an indication 2 to 1 above DAC at 45° and 1/2 DAC at 60°. The square notch in the examination surface will give a low amplitude if detected. Therefore, the indication from the square notch must be considered when evaluating reflectors at the top or bottom surface.

2.0 REFLECTOR POSITION DETERMINATION

2.1 Tabulate the flaw-to-search unit "setback" dimensions for each of the calibrated depths. These dimensions are obtained by measuring the distance between the sound exit point of the search unit and a point on the scanning surface normal to a selected calibration reflector, when the signal from the reflector is "peaked" on the CRT. This measurement shall be obtained for the calibration reference reflectors at 1/4T, 1/2T, 1 1/4T and the 1 T notch.

3.0 VERTICAL BEAM SPREAD DETERMINATION

3.1 Measurements of beam spread shall be made on side drilled holes.

3.2 Position the search unit to obtain a maximum response from the 1/4 T hole. Move the search unit toward the hole until the signal amplitude equals the 50% DAC line.

3.3 Measure the distance from the sound exit point of the search unit to the hole as stated in 2.1 and record this measurement in the appropriate block on the calibration sheet. ◀

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1
Appendix A

- 3.4 Move the search unit away from the hole until the indication equals the 50% DAC line.
- 3.5 Measure the distance from the sound exit point of the search unit to the hole as stated in 2.1 and record this measurement in the appropriate block on the calibration sheet.
- 3.6 Repeat the above measurements on each of the remaining calibration holes.

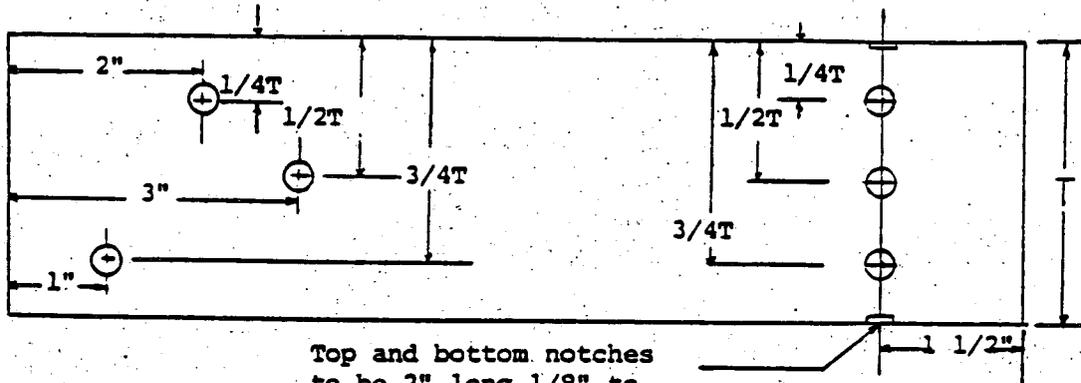


POWER AUTHORITY OF THE STATE OF NEW YORK
 QUALITY ASSURANCE
 NONDESTRUCTIVE EXAMINATION
 PROCEDURE

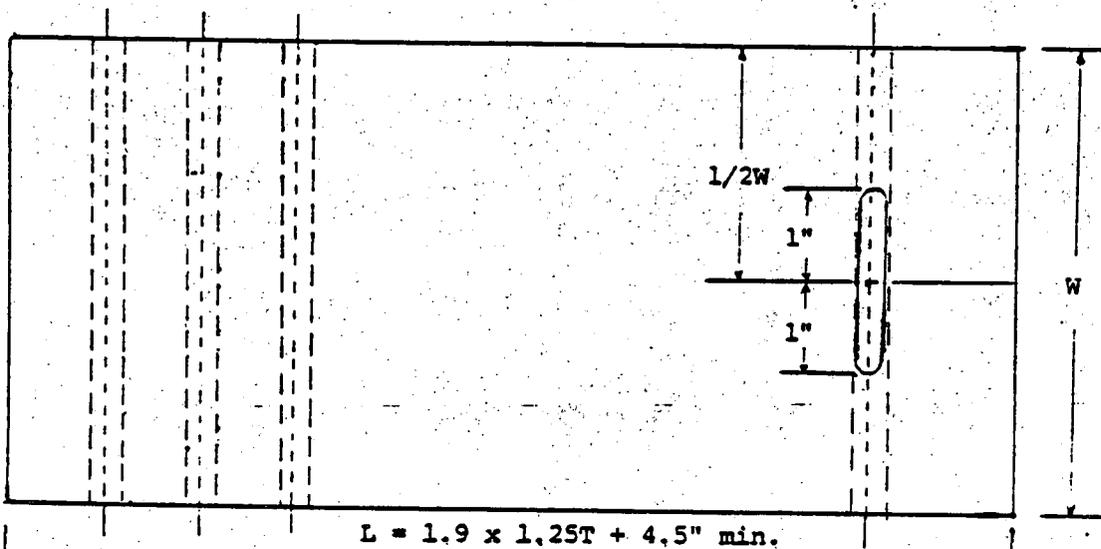
NDEP: 9.4-9

DATE: 7/30/84

REVISION: 1
 Appendix A



Top and bottom notches
 to be 2" long 1/8" to
 1/4" dia. flat end mill
 notches 2% T deep.



Production Material Thickness (t)	Hole Diameter (d)
Over 2" thru 4"	3/16"
Over 4" thru 6"	1/4"
Over 6" thru 8"	5/16"
Over 8" thru 10"	3/8"
Over 10"	See Note 1

¹For each increase in thickness of 2 inches or fraction thereof, the hole diameter shall increase 1/16 inch.

"ILLUSTRATIVE ONLY"

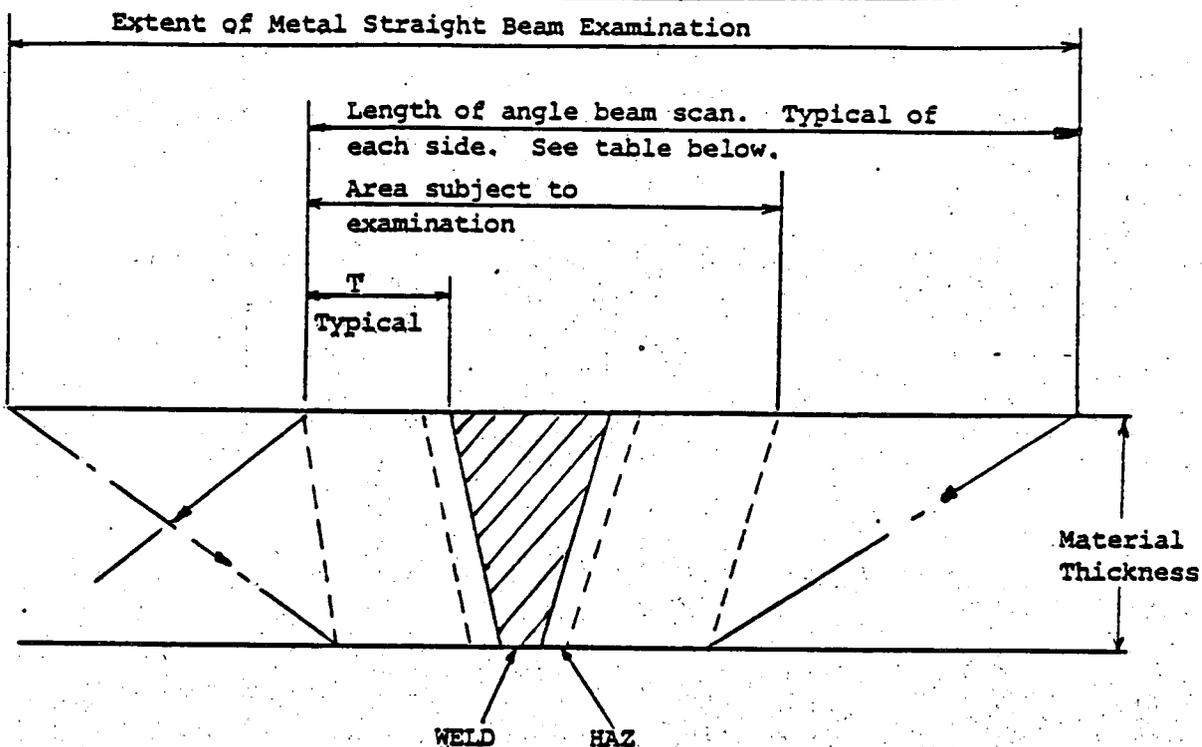
TYPICAL CALIBRATION BLOCK

FIGURE 1



POWER AUTHORITY OF THE STATE OF NEW YORK
 QUALITY ASSURANCE
 NONDESTRUCTIVE EXAMINATION
 PROCEDURE

NDEP: 9.4-9
 DATE: 7/30/84
 REVISION: 1
 Appendix A



For angle beam scan length, add the following from each side of the weld fusion line.

Material Thickness	45°	60°
2.5"	3.75	5.75
3"	4.5	6.75
3.5"	5.25	8.0
4"	6.0	9.0
4.5"	6.75	10.0
5"	7.5	11.0
5.5"	8.25	12.5
6"	9.0	13.5
6.5"	9.75	14.5
7" and greater	$T + T/2$	$1.73T + T/2$

Straight beam scan length shall be in accordance with the 60° angle beam scan length.

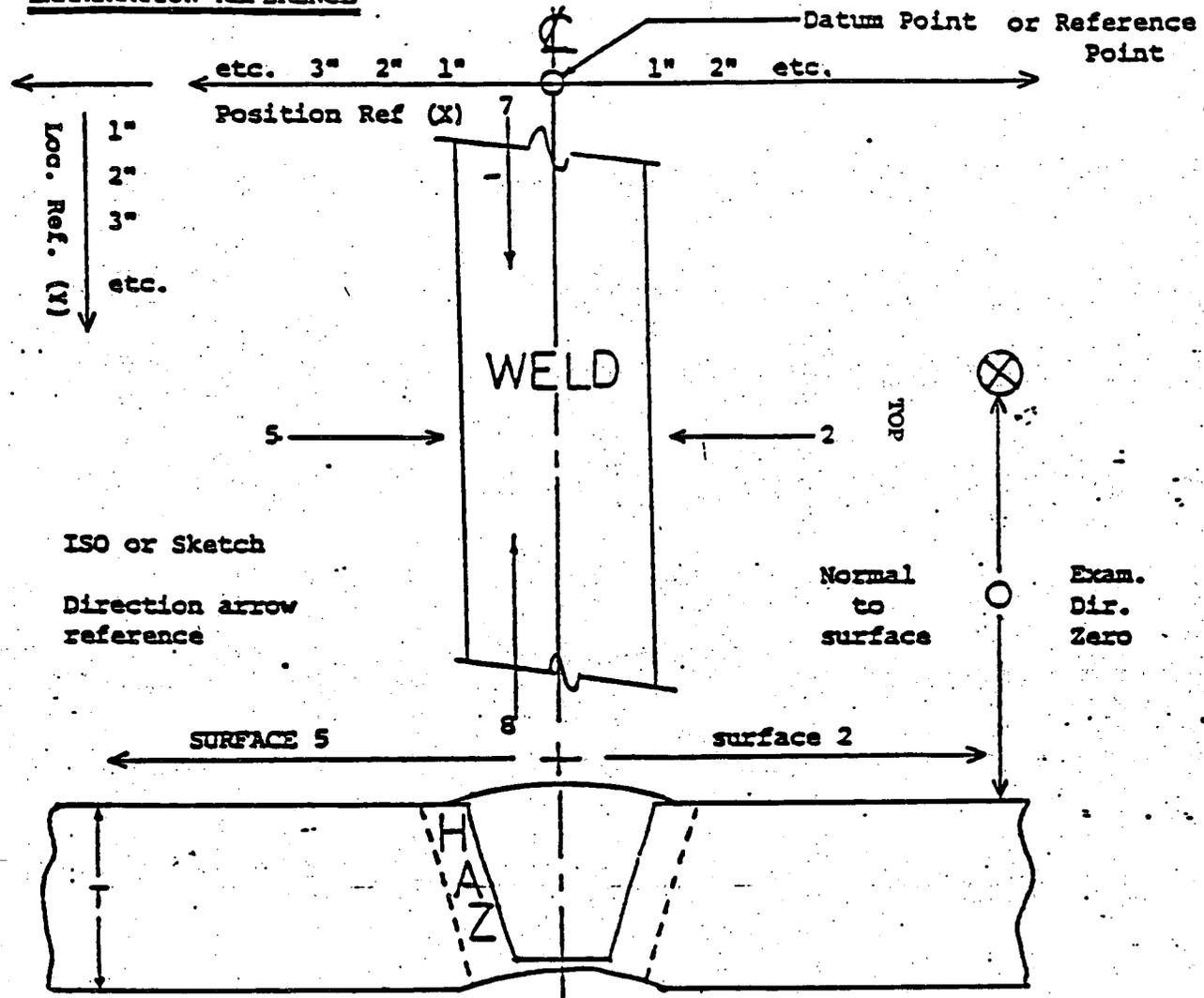
FIGURE 2



POWER AUTHORITY OF THE STATE OF NEW YORK
 QUALITY ASSURANCE
 NONDESTRUCTIVE EXAMINATION
 PROCEDURE

NDEP: 9.4-9
 DATE: 7/30/84
 REVISION: 1
 Appendix A

EXAMINATION REFERENCE



ISO or Sketch
 Direction arrow
 reference

Normal
 to
 surface

Exam.
 Dir.
 Zero

Examination Reference Key

- VESSELS - As viewed from "TOP"
 - Circumferential Welds - Direction 7, points clockwise
 - Vertical Welds . . . - Direction 7, points down
- PIPE - As viewed in direction of orientation arrow (toward face of clock)
 - Circumferential Welds - Direction 7, points clockwise
 - Vertical Welds - Direction 7, points in direction of arrow

FIGURE 3

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix B

APPENDIX B

ULTRASONIC EXAMINATION DATA

The ultrasonic examination report form shall be completed in accordance with the following requirements. (Refer to the attached sample form for block number references.)

Block No.	INFORMATION REQUIRED
1	Enter Plant Name
2	Enter Plant unit number
3	Enter Date of examination
4	Enter Examination procedure number
5	Enter Plant Technical Specification reference item number applicable to area being examined (to be entered by the data coordinator)
6	Enter Unit loop identity (if applicable)
7	Enter Identity of component or system
8	Enter Size of pipe, diameter and schedule
9	Enter Sketch or Iso number
10	Enter Weld type (i.e. circ. butt weld)
11	Enter Calibration Block Identification Number
12	Enter search unit cable length
13	Make no entry if the examination is conducted from the O.D. surface of a pipe of components. Identify examination surface if other than these.
14	Enter search unit serial number
15	Enter search unit size
16	Enter search unit frequency
17	Enter search unit beam angle (i.e. 0°, 45° or 60° etc.)
18	Enter calibration reference reflector (i.e. 1/4T, 1/2T, 3/4T, etc. or as node reference 1/8, 2/8, 3/8 etc.)
19, 21 & 25	Enter signal amplitude from reference reflector as a percentage or full screen height
20, 22 & 26	Enter the location of the reference reflector signal along the horizontal axis of the CRT screen (i.e. sweep location)
23 & 27	Enter the distance from the search unit sound exit point to the point on the block surface, vertically above the location of the reference reflector, when the search unit is positioned for the maximum reference response.

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix B

24 & 28 Enter the distance from the search unit sound exit point to the point on the block surface, vertically above the location of the reference reflector, when the search unit is positioned to obtain a response of 50 percent of that from the reference response.

NOTE: Information required for items 23, 24, 27 and 28 above is only to be recorded when specifically required by the Inspection Program Coordinator or his designate.

Block No.	Information Required
29	Enter ultrasonix instrument identity
30	Enter the U.T. instrument Rep. Rate setting when calibrated
31	Enter the U.T. instrument Reject Control setting when calibrated
32	Enter the U.T. Instrument Damping Control setting when calibrated
33	Enter the U.T. instrument Filter Switch setting when calibrated
34	Enter the time of initial calibration and subsequent calibration checks together with the initials of the operator. Record calibration block and component temperatures.
35	Indicate if continuation sheet(s) have been utilized for recording weld examination data.
36	Indicate if examination transfer data sheets have been completed for welds covered by this data sheet.
37	Indicate if any field changes are applicable to the procedure utilized for the performance of the examination.
38	Operators signature certifying the examinations have been performed in accordance with the requirements of the referenced procedure and field changes.
39	Enter the gain control setting of the U.T. instrument after calibration
40	Enter the D.B. control settings of the U.T. instrument after calibration
41	Enter the identify (as given on the referenced sketch) of the weld being examined
42	If a transfer is found to be necessary, indicate by entering a 'Y' in this space. If not necessary indicate by entering a 'N'. Ensure that a transfer data sheet is completed and indicate its attachment in space 36

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix B

Block No. INFORMATION REQUIRED

- 43 Indicate that the required straight beam examination of the area to be examined has been performed
- 44, 45 & 46 Indicate here that the required angle beam examinations have been performed
- 47 Indicate here if calibrated straight beam examination has been performed
- 48 Indicate in these spaces that the required examinations have been performed. Enter any limitations preventing the performance of the required examinations such as obstructions due to opip] supports, etc. Indicate approximate extent of limitation
- 49 Indicate condition of the base metal adjacent to the weld, i.e. as cast; hand ground, etc.
- 50 Indicate the condition of the weld surface; i.e. as welded; ground flat, etc.
- 51 Indicate the results of the ultrasonic examination by inserting the notation 'RI' if indications with an amplitude greater than 50 percent of the primary reference response are noted. Ensure that an ultrasonic indication data sheet is completed for each such indication. Should indications be found which are greater than 20 percent, but not exceeding 50% percent of the primary reference response this shall be indicated by inserting the notation 'NRI' in the space provided.
- 52 Indicate here if indications are noted as the result of performing an examination in accordance with the requirements of this Procedure. The results should be reported by inserting the notations 'RI' or 'NI' as appropriate.
- 53 Enter any information necessary to explain unusual examination problems. The presence of geometric reflectors, with an amplitude greater than the recording level, should be noted here with a brief indication of the approximate extent, i.e. Root reflector 50% max. for 360°.

Notes: Ultrasonic examination data continuation sheets shall, if utilized, also be completed in accordance with the above instructions as applicable to the twenty-two items of information required.

NI - NO INDICATION

NRI - NO RECORDABLE INDICATION (But examiner investigation required.)

RI - RECORDABLE INDICATION



QUALITY ASSURANCE NONDESTRUCTIVE EXAMINATION PROCEDURE

P: 9.4-
DATE: 7/30/84
REVISION: 1
Appendix

CALIBRATION AND WELD ULTRASONIC EXAMINATION DATA

PLANT ①		UNIT ②		DATE ③		PROCEDURE ④		TECH. OFF. ⑤					
LOOP ⑥			COMPONENT OR SYSTEM ⑦				PIPE SIZE ⑧		DEPTH IN ⑨				
WELD TYPE ⑩		CALIBRATION BLOCK ⑪				SEARCH UNIT CABLE ⑫			INSTRUMENT ⑲	Block Temp _____ Coop. Temp _____			
EXAM. NUMBER ⑬	STRAIGHT BEAM SCAN DIRECTION 0		AXIAL SCANS DIRECTIONS 2 & 8				CIRCUMFERENTIAL SCANS DIRECTIONS 7 & 8			REP. RATE ⑳	CALIBRATION CURVE		
S. U. NO.	⑭									REJECT ㉑			
S. U. SIZE	⑮									DAMPING ㉒	㉔		
S. U. FREQ.	⑯									FILTER ㉓			
WELD ABILITY	⑰												
CALIBRATION REFLECTOR LOCATION	SIGNAL AMPLITUDE	SWEEP POSITION	SIGNAL AMPLITUDE	SWEEP POSITION	DISTANCE FROM SOUND ENTRY POINT TO DESCRIBE LINE 50% DAC LOCATIONS		SIGNAL AMPLITUDE	SWEEP POSITION	DISTANCE FROM SOUND ENTRY POINT TO DESCRIBE LINE 50% DAC LOCATIONS		㉕		
⑩	⑲	⑳	㉑	㉒	㉓	㉔	㉕	㉖	㉗	㉘	Continuation sheets attached Transfer record attached This examination was performed in accordance with the procedure stated above <input checked="" type="checkbox"/>		
GAIN	㉙												
REF. DB.	㉚										㉛		
WELD NUMBER	REF. CHECK	DATE INITIAL SCAN	SCAN DIRECTION 2 5 7 & 8 8				INSPECTION LIMITATIONS		SURFACE CONDITION BASE METAL WELD		EXAMINATION RESULTS U.T. VISUAL		REMARKS
④①	④②	④③	④④	④⑤	④⑥	④⑦	④⑧		④⑨	④⑩	④⑪	④⑫	④⑬

APPENDIX B ATTACHMENT
(Ref. Page 4 of 6)

TYR INDICATION LAYOUT

STEAM GENERATOR

ID SURFACE INSPECTION

NDEP 9.79

Date: 7/30/84

Revision: 1

Appendix B

THICKNESS

SHELL ---- 3.50"

TRANSITION -- 3.70"

WELD ---- 3.80"

ANGLE BEAM
SEARCH UNIT (TRANSDUCER)

SEARCH UNIT POSITION

4.50"

3.80"

2.50"

2.10"

2.0"

DATUM LINE
R-LINE.

3.50"

SHELL

ID SURFACE

OD SURFACE

CRT 1 DIV. = 0.875"
4 DIV.
4 DIV.

REINFORCEM

3.50"

CENTER LINE OF WELD

TRANSITION CONE

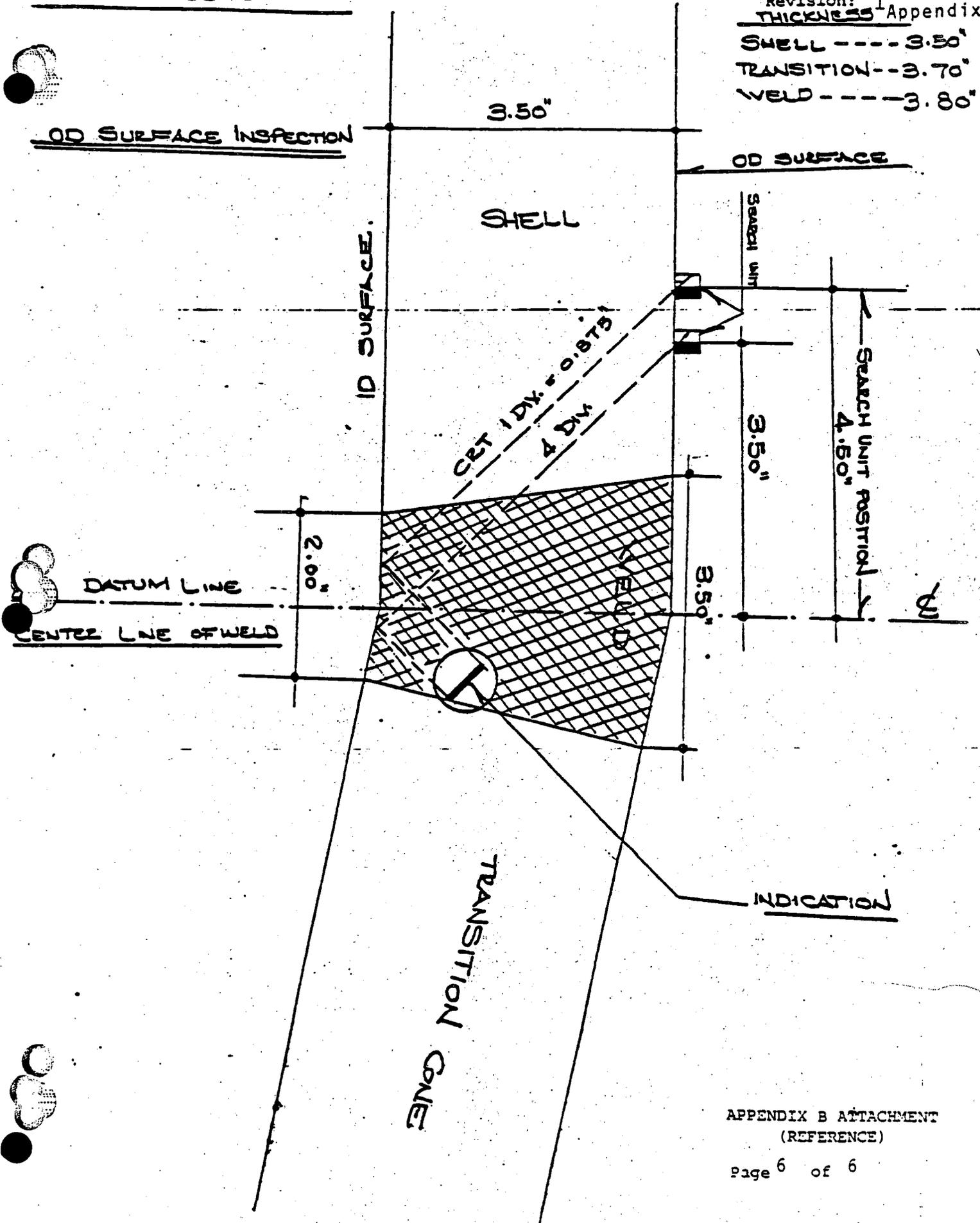
INDICATION

APPENDIX B ATTACHMENT
(REFERENCE)

STEAM GENERATOR

Date: 7/30/84
Revision: 1 Appendix E

THICKNESS
SHELL ---- 3.50"
TRANSITION -- 3.70"
WELD ---- 3.80"



APPENDIX B ATTACHMENT
(REFERENCE)

NEW YORK POWER AUTHORITY
NONDESTRUCTIVE EXAMINATION PROCEDURE

NDEP: 9.4-9

DATE: 7/30/84

REVISION: 1
Appendix C

APPENDIX C

ULTRASONIC INDICATION DATA SHEET

The ultrasonic indication data sheet shall be completed in accordance with the following requirements. (Refer to the attached sample form for block number references.)

Block No.	INFORMATION REQUIRED
1	Enter Plant Name
2	Enter Plant unit number
3	Enter Date of examination
4	Enter Unit loop idnetity (if applicable)
5	Enter Identity of component or system
6	Enter Sketch or Iso number
7	Enter identity of operator performing examination
8	Enter the thickness of the calibration standard utilized to establish the DAC
9	Enter examination procedure number
10	Enter the identity (as given on the referenced sketch) of the weld being examined
11	Measure and record here the distance from the reference datum point to the nearest end of the indication at the point where the response signal has reduced to an amplitude of 50 percent of the DAC
12	Similarly measure and record the distance from the datum point to the furthest end of the indication
13	Measure and record the sound path distance (depth) to the half amplitude point of the reflector nearest to the surface (i.e. minimum depth)
14	Measure and record the distance from the point of sound entry to the reference datum point
15	Measure and record the sound path distance to the half amplitude point of the reflector furthrese from the surface (i.e. maximum depth)
16	Again measure and record the distance from the point of sound entry for maximkm depth to the reference datum point
17	Record the maximum signal response from the indication either as a percentage of DAC (i.e. 150%) or in terms of the attenuation required to reduce the signal amplitude to the DAC level (i.e. DAC + 6db)

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix C

Block No.	INFORMATION REQUIRED
18	Record the search unit refracted angle in the material
19	Indicate the direction that the search unit is pointing when recording the indication. This may be achieved by utilizing the scan direction references of Figure 3 (i.e. 2, 5, 7 or 8)
20	Measure and record the base metal thickness on the side of the weld <u>opposite</u> the direction of the ISO arrow
21	Measure and record the weld thickness at or near the centerline of the weld
22	Measure and record the base metal thickness on the side of the weld in the direction of the ISO arrow
23	Record any additional information necessary to characterize the reflector

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix D

APPENDIX D

ULTRASONIC TRANSFER DATA SHEET

The ultrasonic transfer data sheet shall be completed in accordance with the following. (Refer to the attached sample form for block number references.)

Block No.	INFORMATION REQUIRED
1	Date examination performed
2	Procedure utilized
3	Signature of operator(s) performing the examination
4	Plant name
5	Plant unit number
6	Sketch or ISO number as applicable
7	Calibration reference level db value
8	Db value from calibration block with amplitude at 80%
9	Db value from examination area with amplitude at 80%
10	Db difference between A and B above
11	Enter the corrected reference calibration db value
12	List weld numbers for which the above transfer is applicable

NDEP: 9/4-9
Date: 7/30/84
Revision: 1
Appendix D

DATE 1
PROCEDURE 2
OPERATOR 3

PLANT 4 UNIT 5 SKETCH/ISO No. 6

REF. CAL DB VALUE 7

DB VALUE CAL. BLOCK (A) 8

DB VALUE EXAM. ITEM (B) 9

DB DIFFERENCE BETWEEN A & B 10

IF (B) IS LESS THAN (A) CHANGE REF. DB VALUE BY THIS AMOUNT TO INCREASE SENSITIVITY. IF (B) IS GREATER THAN (A) CHANGE THE REF. DB VALUE BY THIS AMOUNT TO DECREASE SENSITIVITY. RECORD CORRECTED REF. CAL. DB VALUE 11.

THE ABOVE TRANSFER CORRECTION IS APPLICABLE TO WELD(S) NUMBERS:

12 _____

NEW YORK POWER AUTHORITY

NDEP: 9.4-9

NONDESTRUCTIVE EXAMINATION PROCEDURE

DATE: 7/30/84

REVISION: 1

Appendix E

APPENDIX E

INSTRUMENT CALIBRATION DATA FOR WELDS

2 1/2 INCHES THICK OR GREATER IN FERRITIC VESSELS

The instrument calibration data sheet shall be completed in accordance with the following requirements. (Refer to the attached sample form for block number references.)

Block No.	INFORMATION REQUIRED
1	Date of examination
2	Examination procedure number
3	Signature of operator
4	Plant name
5	Plant unit number
6	Make of instrument (Branson, Automation, etc.)
7	Instrument model number
8	Instrument serial number
9	Couplant used
10	Transducer size
11	Transducer frequency
12	Transducer serial number
13	Beam angle
14	Smaller signal amplitude with larger at 100%
15	Smaller signal amplitude with larger at 90%
16	Smaller signal amplitude with larger at 80%
17	Smaller signal amplitude with larger at 70%
18	Smaller signal amplitude with larger at 60%
19	Smaller signal amplitude with larger at 50%
20	Smaller signal amplitude with larger at 40%
21	Smaller signal amplitude with larger at 30%
22	Smaller signal amplitude with larger at 20%
23	Damping control setting during above verification
24	Reject control setting during above verification
25	Rep. rate control setting during above verification
26	Signal amplitude change from 80% with -6db change
27	Signal amplitude change from 80% with -12db change
28	Signal amplitude change from 40% with -6db change
29	Signal amplitude change from 20% with -12db change
30	Damping control setting during above verification
31	Reject control setting during above verification
32	Rep. rate control setting during above verification

NDEP: 9.4-9
Date: 7/30/84
Revision: 1
Appendix E

DATE 1
PROCEDURE 2
OPERATOR 3
PLANT 4
UNIT 5

EQUIPMENT

<u>INSTRUMENT</u>		<u>TRANSDUCER</u>	
MAKE <u>6</u>		SIZE <u>10</u>	
MODEL <u>7</u>		FREQ. <u>11</u>	
SERIAL NO. <u>8</u>		SERIAL NO. <u>12</u>	
COUPLANT <u>9</u>		ANGLE <u>13</u>	

AMPLITUDE LINEARITY VERIFICATION

1ST SIGNAL AMPLITUDE	<u>100Z</u>	<u>90Z</u>	<u>80Z</u>	<u>70Z</u>	<u>60Z</u>	<u>50Z</u>	<u>40Z</u>	<u>30Z</u>	<u>20Z</u>
2ND SIGNAL AMPLITUDE	<u>14</u>	<u>15</u>	<u>16</u>	<u>17</u>	<u>18</u>	<u>19</u>	<u>20</u>	<u>21</u>	<u>22</u>
2ND SIGNAL ALLOWABLE AMPLI.	48-52Z	47-43	42-38	37-33	32-28	28-23	22-18	17-13	12-8
CONTROL SETTINGS: DAMPING	<u>23</u>	REJECT	<u>24</u>	REP. RATE	<u>25</u>				

NDEP: 9.4-9
Date: 7/30/84
Revision: 1
Appendix E

AMPLITUDE CONTROL LINEARITY VERIFICATION

ORIGINAL SIGNAL AMPLITUDE	DB CONTROL CHANGE	SIGNAL AMPLITUDE	SIGNAL AMPLITUDE LIMITS
80% FSH	-6DB	<u>26</u>	36 - 42
80% FSH	-12DB	<u>27</u>	16 - 22
40% FSH	+6DB	<u>28</u>	76 - 84
20% FSH	+12DB	<u>29</u>	79 - 92

NOTE: MINUS DENOTES DECREASE IN AMPLITUDE; PLUS DENOTES INCREASE

CONTROL SETTINGS: DAMPING 30 REJECT 31 REP. RATE 32