PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATIONS OF REACTOR WATER CLEANUP SYSTEM PIPING

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

by

GENERAL ELECTRIC COMPANY

July 1993

PILGRIM NUCLEAR POWER STATION

INSERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

TABLE OF CONTENTS

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION I

PILGRIM NUCLEAR POWER STATION

INSERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION 1

INTRODUCTION

This report contains the results of the inservice examinations performed on the Pilgrim Nuclear Power Station Pressure Vessel, National Board No. 20763 and associated components, during the Ninth Refueling and Inspection Outage.

The examinations were performed in accordance with the requirements of:

1. The ASME Boiler and Pressure Vessel Code, 1980 Edition including addenda through Winter 1980.

   a. Section V, Nondestructive Examination.

   b. Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components - Division 1.

2. United States Code of Federal Regulations, Title 10 Energy.

   a. 10CFR21

   b. 10CFR50 Appendix B

   c. 10CFR50 Subpart 55

3. United States Nuclear Regulatory Commission Documents.

   a. Generic Letter 88-01, Inspection of BWR Stainless Steel Piping.

4. American Society for Nondestructive Testing (ASNT).

   a. SNT-TC-1A Personnel Qualification and Certification in Nondestructive Testing, June 1980 Edition.

Examinations were performed on ASME Section XI Category B-J. Examination of twelve non-safety related and ten safety related Reactor Water Cleanup Piping Welds were examined in accordance with Generic Letter 88-01 and BECO Outgoing Letter 2.90.1 40.

Original examination and calibration data, personnel certifications, equipment and material certifications, examination procedures, drawings and data evaluations pertaining to these examinations are being retained by BECO. These documents are available for review at the Pilgrim site.

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION II

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION II

The following Safety Related ASME Section XI Category B-J items, were examined during the Pilgrim Nuclear Power Station Ninth Refueling and Inspection Outage. The items examined and the type(s) performed are listed below. The examination results are detailed in Section VI of this report.

SAFETY RELATED IGSCC EXAMINATIONS
PIPE REPLACEMENT

ASME Section XI Examination Category B-J items examined in accordance with ASME Section XI requirements.

RWCU	12-I-29R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	12-I-32R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	12-I-34R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	12-I-35R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	12-I-31R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	12-I-30R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	12-I-36R	(Valve to Pipe)	Manual UT Surface PT
RWCU	12-I-33R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	12-I-28R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	12-I-27A	(Pipe to Pipe Pen)	Manual UT Surface PT

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION III

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION III

The following NON-Safety Related items, were examined during the Pilgrim Nuclear Power Station Ninth Refueling and Inspection Outage. The items examined and the type(s) performed are listed below. The examination results are detailed in Section VI of this report.

NON-SAFETY RELATED IGSCC EXAMINATIONS
PIPE REPLACEMENT

Examinations in accordance with ASME Section XI requirements.

RWCU	EA-12-29R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	FW -2R	(Flange to Pipe)	Manual UT Surface PT
RWCU	EA-12-31R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	EA-12-32R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	EA-12-27R	(Pipe to Elbow)	Manual UT Surface PT
RWCU	EA-12-28R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	FW-1R	(Pipe to Flange)	Manual UT Surface PT
RWCU	EA-12-30R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	FW-3R	(Pipe to Flange)	Manual UT Surface PT
RWCU	FW-4R	(Flange to Pipe)	Manual UT Surface PT
RWCU	EA-12-26R	(Elbow to Pipe)	Manual UT Surface PT
RWCU	SW-12-21R	(PIPE to ~~ELBOW~~ VALVE)	Manual UT Surface PT

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

REPORT OF EXAMINATION RESULTS

SECTION IV

REPORT OF EXAMINATION RESULTS

SECTION IV

SAFETY RELATED RWCU PIPE REPLACEMENT

SYS	COMPONENT	ISO	CAT	DATA SHEET	METHOD	RESULTS
RWCU	12-I-29R	N/A	B-J	PSI-93-P-011	PT	NRI/C
				PSI-93-E-011	UT-45	NRI/C
RWCU	12-I-30R	N/A	B-J	PSI-93-P-017	PT	NRI/C
				PSI-93-E-031	UT-45	NRI/C
RWCU	12-I-31R	N/A	B-J	PSI-93-P-013	PT	NRI/C
				PSI-93-E-015	UT-45	NRI/C
RWCU	12-I-32R	N/A	B-J	PSI-93-P-014	PT	NRI/C
				PSI-93-E-012	UT-45	NRI/C
RWCU	12-I-34R	N/A	B-J	PSI-93-P-015	PT	NRI/C
				PSI-93-E-013	UT-45	NRI/C
RWCU	12-I-35R	N/A	B-J	PSI-93-P-016	PT	NRI/C
				PSI-93-E-014	UT-45	NRI/C
RWCU	12-I-36R	N/A	B-J	PSI-93-P-020	PT	NRI/C
				PSI-93-E-035	UT-45	NRI/C
RWCU	12-I-27A	N/A	B-J	PSI-93-P-021	PT	NRI/C
				PSI-93-E-044	UT-45	GEO/C
RWCU	12-I-28R	N/A	B-J	PSI-93-P-022	PT	NRI/C
				PSI-93-E-043	UT-45	NRI/C
RWCU	12-I-33R	N/A	B-J	PSI-93-P-023	PT	NRI/C
				PSI-93-E-042	UT-45	NRI/C

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
RFO 9 INSERVICE INSPECTION

NRI = NO RECORDABLE INDICATIONS
C = COMPLETE EXAM
R = RESTRICTED EXAM
GEO = I.D. GEOMETRY

REPORT OF EXAMINATION RESULTS

NON-SAFETY RELATED RWCU PIPE REPLACEMENT

SYS	COMPONENT	ISO	CAT	DATA SHEET	METHOD	RESULTS
RWCU	EA-12-27R	N/A	B-J	PSI-93-P-001	PT	NRI/C
				PSI-93-E-005	UT-45	NRI/C
RWCU	FW-4R	N/A	B-J	PSI-93-P-002	PT	NRI/C
				PSI-93-E-010	UT-45	NRI/C
RWCU	FW-3R	N/A	B-J	PSI-93-P-003	PT	NRI/C
				PSI-93-E-009	UT-45	NRI/C
RWCU	FW-2R	N/A	B-J	PSI-93-P-004	PT	NRI/C
				PSI-93-E-004	UT-45	NRI/C
RWCU	EA-12-31R	N/A	B-J	PSI-93-P-005	PT	NRI/C
				PSI-93-E-002	UT-45	NRI/C
RWCU	EA-12-32R	N/A	B-J	PSI-93-P-006	PT	NRI/C
				PSI-93-E-003	UT-45	NRI/C
RWCU	FW-1R	N/A	B-J	PSI-93-P-007	PT	NRI/C
				PSI-93-E-007	UT-45	NRI/C
RWCU	EA-12-28R	N/A	B-J	PSI-93-P-008	PT	NRI/C
				PSI-93-E-006	UT-45	NRI/C
RWCU	EA-12-30R	N/A	B-J	PSI-93-P-009	PT	NRI/C
				PSI-93-E-008	UT-45	NRI/C
RWCU	EA-12-29R	N/A	B-J	PSI-93-P-010	PT	NRI/C
				PSI-93-E-001	UT-45	NRI/C
RWCU	EA-12-26R	N/A	B-J	PSI-93-P-018	PT	NRI/C
				PSI-93-E-033	UT-45	NRI/C
RWCU	SW-12-21R	N/A	B-J	PSI-93-P-019	PT	NRI/C
				PSI-93-E-034	UT-45	NRI/C

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
RFO 9 INSERVICE INSPECTION

NRI = NO RECORDABLE INDICATIONS
C = COMPLETE EXAM
R = RESTRICTED EXAM
GEO = I.D. GEOMETRY

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

PERSONNEL CERTIFICATIONS

SECTION V

CERTIFICATE OF QUALIFICATION

THIS IS TO CERTIFY THAT

PHILIP M. GAINER

IS QUALIFIED IN ACCORDANCE WITH THE GE / NSPD NDE EXAMINATIONS & CERTIFICATION PROCEDURE FQP-03 WHICH IS IN COMPLIANCE WITH THE REQUIREMENTS OF AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING RECOMMENDED PRACTICE.

* CERTIFICATIONS EXPIRE THREE YEARS FROM CERTIFICATION DATE

MAGNETIC PARTICLE TESTING	ASNT - 1980 * CERTIFICATION DATE [	N/A	]	LEVEL	N/A
LIQUID PENETRANT TESTING	ASNT - 1980 * CERTIFICATION DATE [	08/20/91	]	LEVEL	II
ULTRASONIC TESTING	ASNT - 1980 * CERTIFICATION DATE [	08/20/91	]	LEVEL	II
VISUAL TESTING (VT-1)	ASNT / ASME XI * CERTIFICATION DATE [	08/22/91	]	LEVEL	II
VISUAL TESTING (VT-2)	ASME XI - 1984 * CERTIFICATION DATE [	08/22/91	]	LEVEL	II
VISUAL TESTING (VT-3)	ASME XI - 1984 * CERTIFICATION DATE [	08/22/91	]	LEVEL	II
VISUAL TESTING (VT-4)	ASME XI - 1984 * CERTIFICATION DATE [	08/22/91	]	LEVEL	II
RADIOGRAPHIC TESTING	ASNT - 1980 * CERTIFICATION DATE [	N/A	]	LEVEL	N/A

ADDITIONAL REQUIREMENTS OR LIMITATIONS:
EPRI Manual Detection 01/29/92, Specific 08/07/91
IVVI Qualified 09/11/91
UT Manual Sm/Lrg Bore Nozzle Inner Radius Qualified 09/13/91
UT System 2000 Data Acquisition ONLY 01/31/92

Donald G. Yoder

DEPARTMENT LEVEL III

CERTIFICATION ADMINISTRATOR

PERSONNEL QUALIFICATION AND CERTIFICATION SUMMARY.

NAME:	PHILIP M. GAINER	SS #:	208-46-4427

I. EXAMINATION RESULTS

METHOD	LEVEL	GENERAL		SPECIFIC		PRACTICAL		COMPOSITE SCORE	EXAMINED BY
		SCORE	WT.	SCORE	WT.	SCORE	WT.		
PT	II	86.7	0.3	90	0.4	93	0.3	89.9	D.A. YODER
MT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
UT	II	87.5	0.3	88	0.4	97	0.3	90.5	D.A. YODER
VT-1	II	76.7	0.3	93.3	0.4	93.8	0.3	88.4	D.A. YODER
VT-2,3&4	II	82	0.3	90	0.4	91.5	0.3	88	D.A. YODER

II. EDUCATION SUMMARY:

Elizabethtown High School — Graduated 6/16/77
Elizabethtown, PA

III.TRAINING SUMMARY:

The individuals training meets at least the minimum requirements specified in GE's Certification procedures.

Liquid Penetrant	30 Hrs.	Spartan
Magnetic Particle	30 Hrs.	Spartan
Ultrasonics	778 Hrs.	Spartan/GE/Dynacon/Southern Co.
Radiography	120 Hrs.	Spartan
Eddy Current	120 Hrs.	Spartan
Visual	82 Hrs.	Spartan/GE/EPRI
Codes/Stds./Visual	120 Hrs.	Spartan

III.EXPERIENCE SUMMARY:

The individuals experience meets at least the minimum requirements specified in GE's Certification procedures.

This individual has documented NDE experience associated with nuclear power plant components as follows;

50.9 months UT experience
31.4 months PT experience
39.5 months Visual experience

REVIEWED BY: Donald A. Yoder
LEVEL III EXAMINER

DATE: 4/2/92

Vision Acuity Record

NSPD VISION ACUITY RECORD

Name:	GAINER, PHILIP M.			Soc. Sec. No.:	208-46-4427
				Date of Birth:	6-30-59

NEAR VISION TEST	Jaeger J-I	Right Eye	Left Eye	Both Eyes	Results	
	Uncorrected	J-1	J-1	J-1	☑	Acceptable
	Corrected	—	—	—	☐	Unacceptable
DISTANCE VISION TEST		Right Eye	Left Eye	Both Eyes	Results	
	Uncorrected	20/20	20/20	20/20	☑	Acceptable
	Corrected	—	—	—	☐	Unacceptable
COLOR VISION TEST	Ishihara's Test Method				Results	
	Comments: NONE - 14 PLATES				☑	Acceptable
					☐	Unacceptable

List any Restrictions or Corrective Measures Required While Witnessing or Performing Examinations / Inspections:

NONE

If No Comments Write "None"

NONE

RECORDED BY			
	Wade F. Miller	LEVEL III	1-26-93
	Signature	Title	Date

TRANSCRIPT OF CONTINUING EDUCATION ACTIVITIES

Name:
Company:
Address:

SS#:

ELECTRIC POWER RESEARCH INSTITUTE

NONDESTRUCTIVE EVALUATION CENTER

1300 Harris Blvd. • P.O. Box 217097
CHARLOTTE, NC 28221
704/547-6110

Date:

Signature: _____

Henry M. Stephens, Jr.
Training Manager

DATE	COURSE NO. AND DESCRIPTION	EXAMINATIONS	LOCATION	CEUS AWARDED	FILE

Not official without raised seal

TRANSCRIPT OF CONTINUING EDUCATION ACTIVITIES

Name:
Company:
Address:

SS#:

ELECTRIC POWER RESEARCH INSTITUTE

NONDESTRUCTIVE EVALUATION CENTER

1300 Harris Blvd. • P.O. Box 217097
CHARLOTTE, NC 28221
704/547-6110

Date:

Signature: Henry M. Stephens, Jr

Henry M. Stephens, Jr.
Training Manager

DATE	COURSE NO. AND DESCRIPTION	EXAMINATIONS	LOCATION	CEU'S AWARDED	FILE
[illegible]	[illegible]	[illegible]	EPRI NDE Center	[illegible]	[illegible]
[illegible]	[illegible] Visual Examination - Level I	[illegible]	NES	1.0	[illegible]
[illegible]	[illegible] Visual Examination - Level II (Examination Only)	Practical	EPRI	[illegible]	[illegible]
[illegible]	[illegible] Operator Training for Ion Detection of Intergranular Stress Corrosion Cracking Level II Special	General	EPRI NDE Center	4.0	[illegible]
[illegible]	[illegible] Operator Training for Ion Detection of Intergranular Stress Corrosion Cracking Level II-Special (Examination Only)	Specific Manual Practical 83/100 PDA [illegible]21085	EPRI NDE Center	[illegible]	[illegible]
[illegible]	[illegible] Operator Training for Sizing of IGSCC Level II-Special	General (See CE-0247) Specific	EPRI NDE Center	1.	[illegible]
[illegible]	[illegible] Operator Training for Weld Overlay Examination Level II-Special	General (See CE-0247) Specific 98 Manual Practical 97 PDA [illegible]	EPRI NDE Center	[illegible]	[illegible]
[illegible]	[illegible] Operator Training for Ion Detection of Intergranular Stress Corrosion Cracking Level II-Special (Examination Only)	General 96 Manual Practical [illegible]09 PDA [illegible]	EPRI NDE Center		[illegible]
[illegible]	[illegible] Operator Training for Ion Detection of Intergranular Stress Corrosion Cracking Level II-Special (Examination Only)	[illegible]	EPRI NDE Center		[illegible]

Not official without raised seal

PERFORMANCE DOCUMENTATION SUMMARY

ADMINISTRATIVE INFORMATION NO. 4427-012992

Exam Type: [X]Manual [ ]System [X]Detection [ ]Sizing [ ]Overlay

Name Philip Gainer S.S.# 208-46-4427 Date: 1-29-92

Company General Electric Address 22 Technology Parkway
Suite 105 Norcross, GA 30092

Procedure Title Procedure for Manual Ultrasonic Examination of
Similar & Dissimilar Piping Welds for IGSCC

Procedure No. GE-UT-102 Rev. No. 3 Date 8-24-91

THE FOLLOWING ITEMS ARE TO BE WITNESSED BY THE MONITOR
(Note any exceptions below in remarks section)

IGSCC DETECTION PARAMETERS

Search Units(s);
[NOTE] If more than one search unit is used, you must record data for each one.

Search Unit (No.1) 1 2
[Y] [N]

Size: .375" Frequency: 2.25 MHz
Beam Angle: 45 degrees Single/Dual: Single
Wave Mode: Shear

Search Unit (No.2) [Y] [N]

Size: .375" Frequency: 1.5 MHz
Beam Angle: 60 degrees Single Dual: Single
Wave Mode: Shear

Search Unit (No.3) [Y] [N]

Size: 10 mm Frequency: 2.0 MHz
Beam Angle: 70 degrees Single/Dual: Single
Wave Mode: Longitudinal/ID Creeping

Search Unit (No.4) [Y] [N]

Size: 2(10x18)mm Frequency: 2.0 MHz
Beam Angle: 60 degrees Single/Dual: Dual
Wave Mode: Longitudinal

1 - Verified by monitor.
2 - User's procedure complies with generic procedure parameters.
Y=Yes; N=No; NA=Not Applicable; ND=Not Documented

Note: The purpose of this form is to record the IGSCC Detection Parameters actually used during the qualification examination. IGSCC Detection Parameters are relevant to determining an individual's qualification to perform IGSCC examination in accordance with an approved procedure. Supplemental parameters are for general information only. This Summary Form is not intended to preclude the use of the entire IGSCC Detection Parameter range of an approved procedure. The Owners and Users are responsible for determining that qualification is adequate.

INSTRUMENT(S)

	1	2
Instrument: (Used in combination with search unit(s) 1 , 2 ,3&4)	[Y]	[Y]
Manufacturer: Krautkramer Model: USL-48		
Instrument: (Used in combination with search unit(s) NA ,NA ,NA)	[NA]	[NA]
Manufacturer: NA Model: NA		
Instrument: (Used in combination with search unit(s) NA ,NA ,NA)	[NA]	[NA]
Manufacturer: NA Model: NA		

THE FOLLOWING ITEMS ARE TO BE WITNESSED BY THE MONITOR
(note any exceptions below in remarks section)

Scanning Level Sensitivity Used: +14 dB	[Y]	[Y]
Scanning Techniques Comply With Procedure	[Y]	[Y]
Scan Speed (Less than 3 Inches/Second)	[Y]	[Y]
Overlap (25% of Transducer Width with +/-15 Oscillation; 50% without)	[Y]	[Y]
Calibration Within the Procedure Limits	[Y]	[Y]
Profile Data Collected	[Y]	[N]
Recording Criteria	[Y]	[N]

Remarks: NA
NA
NA

Mechanized System Information:

Collection: Time/Sample	NA	[NA]
System	NA	[NA]
Scanner	NA	[NA]
Software NA Rev. NA Date NA		[NA]

Remarks: NA
NA
NA

SUPPLEMENTARY SEARCH UNIT PARAMETERS

	1.	2.	3.	4.
Manufacturer	KB-A	KB-A	KRAUTKRAMER	RTD
Model	MSW-QC	MSW-QC	WSY-70	TRL
Serial No.(s)	32367	016233	56526	85-709
Cable Length	6'	6'	6'	6'
Cable Type	RG-174/U	RG-174/U	RG-174/U	RG-174/U
Type of Connectors	BNC-Microdot	BNC-Microdot	BNC-Lemo	BNC-Lemo

1 - Verified by Monitor
2 - User's Procedure Complies with Generic Procedure Parameters
Y=Yes; N=No; NA=Not Applicable; ND=Not Documented

EPRI NDE Center
1300 Harris Blvd., Charlotte, NC 28213
704/547-6174

NOT OFFICIAL WITHOUT RAISED SEAL

R

PERFORMANCE DOCUMENTATION SUMMARY

ADMINISTRATIVE INFORMATION NO. 4427-013192

Exam Type: [ ]Manual [X]System [X]Detection [ ]Sizing [ ]Overlay

Name Phillip Gainer S.S.# 208-46-4427 Date: 1-31-92

Company General Electric Address 22 Technology Park, Suite 105
Norcross, GA 30092

Procedure Title Procedure for Automated Ultrasonic Examination of Similar and Dissimilar Piping Welds for IGSCC

Procedure No. GE-UT-208 Rev. No. 0 Date 12-17-90

THE FOLLOWING ITEMS ARE TO BE WITNESSED BY THE MONITOR
(Note any exceptions below in remarks section)

IGSCC DETECTION PARAMETERS

Search Units(s);
[NOTE] If more than one search unit is used, you must record data for each one.

			1	2
Search Unit (No.1)			[Y]	[N]
Size: .500"	Frequency: 2.25 MHz			
Beam Angle: 45 degree	Single/Dual: Single			
	Wave Mode: Shear			
Search Unit (No.2)			[Y]	[N]
Size: 2(3.5 x 10)mm	Frequency: 4.0 MHz			
Beam Angle: 0 degree	Single Dual: Dual			
	Wave Mode: Longitudinal			
Search Unit (No.3)			[N/A]	[N/A]
Size: N/A	Frequency: N/A			
Beam Angle: N/A	Single/Dual: N/A			
	Wave Mode: N/A			
Search Unit (No.4)			[N/A]	[N/A]
Size: N/A	Frequency: N/A			
Beam Angle: N/A	Single/Dual: N/A			
	Wave Mode: N/A			

1 - Verified by monitor.
2 - User's procedure complies with generic procedure parameters.
Y=Yes; N=No; NA=Not Applicable; ND=Not Documented

Note: The purpose of this form is to record the IGSCC Detection Parameters actually used during the qualification examination. IGSCC Detection Parameters are relevant to determining an individual's qualification to perform IGSCC examination in accordance with an approved procedure. Supplemental parameters are for general information only. This Summary Form is not intended to preclude the use of the entire IGSCC Detection Parameter range of an approved procedure. The Owners and Users are responsible for determining that qualification is adequate.

Name Phillip Gainer

INSTRUMENT(S)

	1	2
Instrument: (Used in combination with search unit(s) 1 ,N/A,N/A)	[Y]	[Y]
Manufacturer: Tecrad Model: Smart 2000		
Instrument: (Used in combination with search unit(s) 2 ,N/A,N/A)	[Y]	[Y]
Manufacturer: Rolls Royce Model: 801 DRF		
Instrument: (Used in combination with search unit(s) N/A, N/A,N/A)	[N/A]	[N/A]
Manufacturer: N/A Model: N/A		

THE FOLLOWING ITEMS ARE TO BE WITNESSED BY THE MONITOR
(note any exceptions below in remarks section)

Scanning Level Sensitivity Used: 10%-30% noise dB	[Y]	[Y]
Scanning Techniques Comply With Procedure	[Y]	[N]
Scan Speed (Less than 3 Inches/Second)	[Y]	[Y]
Overlap (25% of Transducer Width with +/-15 Oscillation; 50% without)	[Y]	[Y]
Calibration Within the Procedure Limits	[Y]	[N]
Profile Data Collected	[Y]	[N]
Recording Criteria	[Y]	[Y]

Remarks: N/A

Mechanized System Information:

Collection: Time/Sample 1 1/2 hr	[Y]
System Smart 2000	[Y]
Scanner Alara	[Y]
Software Tecrad Tomoscan 3.1 Rev. 5 Date ND	[Y]

Remarks: N/A

SUPPLEMENTARY SEARCH UNIT PARAMETERS

	1.	2.	3.	4.
Manufacturer	KB-A	Krautkramer	N/A	N/A
Model	Gamma	MSEB	N/A	N/A
Serial No.(s)	A15085	01122	N/A	N/A
Cable Length	6'	6'	N/A	N/A
Cable Type	RG-174/U	RG-174/U	N/A	N/A
Type of Connectors	BNC/Microdot	BNC/Lemo	N/A	N/A

1 - Verified by Monitor
2 - User's Procedure Complies with Generic Procedure Parameters
Y=Yes; N=No; NA=Not Applicable; ND=Not Documented

CERTIFICATE OF QUALIFICATION

THIS IS TO CERTIFY THAT

EDWARD P. MAZYCK

IS QUALIFIED IN ACCORDANCE WITH THE GE / NSPD NDE EXAMINATIONS & CERTIFICATION PROCEDURE FQP-03 WHICH IS IN COMPLIANCE WITH THE REQUIREMENTS OF AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING RECOMMENDED PRACTICE.

* CERTIFICATIONS EXPIRE THREE YEARS FROM CERTIFICATION DATE

MAGNETIC PARTICLE TESTING	ASNT - 1980 * CERTIFICATION DATE [	05/27/92]	LEVEL	II
LIQUID PENETRANT TESTING	ASNT - 1980 * CERTIFICATION DATE [	08/13/91]	LEVEL	II
ULTRASONIC TESTING	ASNT - 1980 * CERTIFICATION DATE [	08/14/91]	LEVEL	II
VISUAL TESTING (VT-1)	ASNT / ASME XI * CERTIFICATION DATE [	05/21/90]	LEVEL	I
VISUAL TESTING (VT-2)	ASME XI - 1984 * CERTIFICATION DATE [	N/A]	LEVEL	N/A
VISUAL TESTING (VT-3)	ASME XI - 1984 * CERTIFICATION DATE [	N/A]	LEVEL	N/A
VISUAL TESTING (VT-4)	ASME XI - 1984 * CERTIFICATION DATE [	N/A]	LEVEL	N/A
RADIOGRAPHIC TESTING	ASNT - 1980 * CERTIFICATION DATE [	N/A]	LEVEL	N/A

ADDITIONAL REQUIREMENTS OR LIMITATIONS:

EPRI IGSCC Detection 07/31/92, Specific 08/05/92

Donald A. Goder

DEPARTMENT LEVEL III

CERTIFICATION ADMINISTRATOR

PERSONNEL QUALIFICATION AND CERTIFICATION SUMMARY

NAME: EDWARD MAZYCK | SS #: 249-25-6527

I. EXAMINATION RESULTS

METHOD	LEVEL	GENERAL		SPECIFIC		PRACTICAL		COMPOSITE SCORE	EXAMINED BY
		SCORE	WT.	SCORE	WT.	SCORE	WT.		
MT	II	90.1	0.3	100	0.4	94	0.3	95.2	D.A. YODER
PT	II	86.8	0.3	90	0.4	96	0.3	90.8	D.A. YODER
UT	II	87.5	0.3	98	0.4	95	0.3	89.9	D.A. YODER
VT-1	I	96.7	0.5	100	0.2	91.8	0.3	95.8	D.A. YODER
VT-2,3, & 4	N/A	N/A	0.3	N/A	0.4	N/A	0.3	N/A	N/A
RT	N/A	N/A	0.3	N/A	0.4	N/A	0.3	N/A	N/A

II. EDUCATION SUMMARY:

R.B. Stall High School, North Charleston, SC Graduated 06/78

III. TRAINING SUMMARY:

The individuals training meets at least the minimum requirements specified in GE's Certification procedures.

Liquid Penetrant	12 Hrs.
Magnetic Particle	28 Hrs.
Ultrasonics	80 Hrs.
Visual	8 Hrs.

III. EXPERIENCE SUMMARY:

The individuals experience meets at least the minimum requirements specified in GE's Certification

This individual has documented NDE experience associated with nuclear power plant components as follows:

17.6 Mos. UT Experience
682 Hrs. PT Experience
717 Hrs. MT Experience
88 Hrs. VT Experience

REVIEWED BY: Donald A. Yoder
LEVEL III EXAMINER

DATE: 1/15/93

Vision Acuity Record

NSPD VISION ACUITY RECORD

Name:	EDWARD P. MAZYCK	Soc. Sec. No.:	249-25-6527
		Date of Birth:	02/05/59

NEAR VISION TEST	Jaeger J-I	Right Eye	Left Eye	Both Eyes	Results	
	Uncorrected	J-1	J-1	J-1	[X]	Acceptable
	Corrected				[ ]	Unacceptable
DISTANCE VISION TEST		Right Eye	Left Eye	Both Eyes	Results	
	Uncorrected	20/25	20/25	20/25	[X]	Acceptable
	Corrected				[ ]	Unacceptable
COLOR VISION TEST	Ishihara's Test Method				Results	
	Comments: RED/GREEN DEFIENCY				[X]	Acceptable
					[ ]	Unacceptable

List any Restrictions or Corrective Measures Required While Witnessing or Performing Examinations / Inspections:

If No Comments Write "None"

Mr. Mazyck has demonstrated ability to locate quantity, dimensional characteristics, brilliance, contrast and location of indications in methods of certification.

RECORDED BY	Jamie Walker	QA Specialist	09/27/92
	Signature	Title	Date

TRANSCRIPT OF CONTINUING EDUCATION ACTIVITIES

Name: Edward P. Mazyck
Company: G.E. Nuclear
Address: 22 Technology Park
Suite 105
Norcross ,GA 30092

SS#: 349-25-6527

ELECT POWER RESEARCH INSTITUTE

NONDESTRUCTIVE EVALUATION CENTER

1300 Harris Blvd. • P.O. Box 217097
CHARLOTTE, NC 28221
704/547-6110

Date: 19-AUG-1992 PAGE 1 of 1

Signature: Henry M. Stephens, Jr.

Henry M. Stephens, Jr.
Training Manager

DATE	COURSE NO. AND DESCRIPTION	EXAMINATIONS		LOCATION	CEUS AWARDED	FILE
23-JUL-1992 31-JUL-1992	910 -UT Operator Training for the Detection of Intergranular Stress Corrosion Cracking Level II Special	Manual Practical PDS# 6527-073192	86/100	EPRI NDE Center	6.4	CE-0580
5-AUG-1992	910 -UT Operator Training for the Detection of Intergranular Stress Corrosion Cracking Level II Special Examination Only	Specific	83	EPRI NDE Center	---	E0-5845
19-AUG-1992	910 -UT Operator Training for the Detection of Intergranular Stress Corrosion Cracking Level II Special Examination Only	General	86	EPRI NDE Center	---	E0-5870

Not official without raised seal

PERFORMANCE DOCUMENTATION SUMMARY

ADMINISTRATIVE INFORMATION NO. 6527-073192

Exam Type: [X]Manual [ ]System [X]Detection [ ]Sizing [ ]Overlay

Name Edward P. Mazyck S.S.# 249-25-6527 Date: 7-31-92

Company General Electric Address 22 Technology Parkway
Suite 105 Norcross, GA 30092

Procedure Title Procedure for Manual Ultrasonic Examination of
Similar & Dissimilar Piping Welds for IGSCC

Procedure No. GE-UT-102 Rev. No. 3 Date 8-24-91

THE FOLLOWING ITEMS ARE TO BE WITNESSED BY THE MONITOR
(Note any exceptions below in remarks section)

IGSCC DETECTION PARAMETERS

Search Units(s);
[NOTE] If more than one search unit is used, you must record data for each one.

Search Unit (No.1) 1 [Y] 2 [N]

Size: .375" Frequency: 1.5 MHz
Beam Angle: 45 degrees Single/Dual: Single
Wave Mode: Shear

Search Unit (No.2) [Y] [N]

Size: .375" Frequency: 1.5 MHz
Beam Angle: 60 degrees Single Dual: Single
Wave Mode: Shear

Search Unit (No.3) [Y] [N]

Size: 10 mm Frequency: 2.0 MHz
Beam Angle: 70 degrees Single/Dual: Single
Wave Mode: Longitudinal/ID Creeping

Search Unit (No.4) [Y] [N]

Size: 2(3.5x10)mm Frequency: 4.0 MHz
Beam Angle: 0 degrees Single/Dual: Dual
Wave Mode: Longitudinal

1 - Verified by monitor.
2 - User's procedure complies with generic procedure parameters.
Y=Yes; N=No; NA=Not Applicable; ND=Not Documented

Note: The purpose of this form is to record the IGSCC Detection Parameters actually used during the qualification examination. IGSCC Detection Parameters are relevant to determining an individual's qualification to perform IGSCC examination in accordance with an approved procedure. Supplemental parameters are for general information only. This Summary Form is not intended to preclude the use of the entire IGSCC Detection Parameter range of an approved procedure. The Owners and Users are responsible for determining that qualification is adequate.

INSTRUMENT(S)

	1	2
Instrument: (Used in combination with search unit(s) 1 , 2 ,3&4)	[Y]	[Y]
Manufacturer: Stavely Model: Sonic 136		
Instrument: (Used in combination with search unit(s) NA ,NA ,NA)	[NA]	[NA]
Manufacturer: NA Model: NA		
Instrument: (Used in combination with search unit(s) NA ,NA ,NA)	[NA]	[NA]
Manufacturer: NA Model: NA		

THE FOLLOWING ITEMS ARE TO BE WITNESSED BY THE MONITOR
(note any exceptions below in remarks section)

Scanning Level Sensitivity Used: +14 dB	[Y]	[Y]
Scanning Techniques Comply With Procedure	[Y]	[Y]
Scan Speed (Less than 3 Inches/Second)	[Y]	[Y]
Overlap (25% of Transducer Width with +/-15 Oscillation; 50% without)	[Y]	[Y]
Calibration Within the Procedure Limits	[Y]	[Y]
Profile Data Collected	[Y]	[N]
Recording Criteria	[Y]	[N]

Remarks: NA
NA
NA

Mechanized System Information:

Collection: Time/Sample	NA	[NA]
System	NA	[NA]
Scanner	NA	[NA]
Software NA Rev. NA Date NA		[NA]

Remarks: NA
NA
NA

SUPPLEMENTARY SEARCH UNIT PARAMETERS

	1.	2.	3.	4.
Manufacturer	KB-A	KB-A	KRAUTKRAMER	KRAUTKRAMER
Model	MSW-QC	MSW-QC	WSY-70	MSEB
Serial No.(s)	F04907	18287	56526	02168
Cable Length	6'	6'	6'	6'
Cable Type	RG-174/U	RG-174/U	RG-174/U	RG-174/U
Type of Connectors	BNC-Microdot	BNC-Microdot	BNC-Lemo	BNC-Lemo

1 - Verified by Monitor
2 - User's Procedure Complies with Generic Procedure Parameters
Y=Yes; N=No; NA=Not Applicable; ND=Not Documented

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

MATERIAL CERTIFICATIONS

SECTION VI

Receiving Inspection Report

GE-NUCLEAR ENERGY NSPD

FILE NO 10.1.2

Client: TECHNICAL SERVICES CENTER

Project: VARIOUS

ORIGINAL COPY WHEN THIS IMPRINT IN RED.

RIR No.: 93-RIR-02

PART 1 - RECEIVING

Description: ASSORTED NDE CALIBRATION STANDARDS

Purchase Order No.: 1DNA3-007

Product Spec. No.: N/A

PART 2 - CHARACTERISTICS	PART 3 - STATUS	
Description	Accept	Not Accept*
1. Quantity 61 ☑ P.O. Complete ☐ Partial	N/A	N/A
2. Shipping Damage ☐ Yes ☑ No	☑	
3. Lab Tests Required By Dedication Documentation ☐ Yes ☑ No	☑	
4. LABORATORY TESTING, INC. TEST REPORT NO. C-65810		
5.		
6.		
7.		
8.		
9.		
10.		

* List Any Not Acceptable Characteristics By Number, Reason for Not Accepting.

Comments:

CHEMICAL ANALYSIS FOR CHROMIUM AND NICKEL CONTENT ONLY ON THE VARIOUS STANDARDS TO IDENTIFY WHETHER THEY WERE CARBON OR STAINLESS.

☐ Reference NCR No.: N/A

PART 4 - VERIFICATION

	Yes	No	N/A
Recorded Markings and Characteristics Meet ~~Product Specification~~ Requirements	☑	☐	☐
Material Certifications and Test Reports Meet ~~Product Specification~~ Requirements	☑	☐	☐
Heat/Lot Numbers Correspond With ~~Material Certifications and~~ Test Reports	☑	☐	☐
Data Reports Acceptable (Code -Samped Items Only)	☐	☐	☑
Serial Numbers Match Data Reports (Code-Stamped Items Only)	☐	☐	☑
Material Certifications and Test Reports Acceptable for Owner Purchased Items Only	☐	☐	☑

Inspected By:	Accepted By:	Reviewed By: (as required)
Date 27 JAN 93	Date	Date

☑ Supplemental Data Attached

TELE: (215) 249-9898
FAX: (215) 249-9656

Certificate of Conformance No. 98021

TERMS: NET - 30 DAYS

LABORATORY TESTING INC.
P.O. Box 249 Dublin, Pennsylvania 18917

SHIPPING ADDRESS
120 MILL STREET, DUBLIN, PA 18917

SOLD TO
GE Nuclear Energy
999 W. Valley Road, Suite 107
Wayne, PA 19087
Attn: Accounts Payable

SHIP TO
Attn: Robert Z. Bouch

CUST. P.O.	LAB REPORT NO.	SHIPMENT	INVOICE DATE
IDNA3007	C-65810	Complete	1/22/93

DESCRIPTION

61 pcs. Various Sized Test Pieces
See Breakdown below

*CORRECTED CERTIFICATION (1/26/93)

DESCRIPTION BREAKDOWN

61 pcs. Test Pieces, Identified as CAL-STEP-050, CAL-STEP-053, *CAL-IIW2-005, *CAL-IIW2-007, *CAL-IIW2-013, *CAL-IIW1-003, *CAL-RHOM-001, *CAL-RHOM-003, CAL-STEP-014, CAL-STEP-015, CAL-STEP-017, CAL-STEP-047, CAL-STEP-049, *CAL-RESO-001, CAL-DSCB-002, CAL-DSCB-003, CAL-STEP-002, CAL-STEP-010, CAL-DPTH-018, CAL-STEP-005, *CAL-IIW2-009, *CAL-IIW2-012, *CAL-IIW2-004, CAL-RHOM-006, CAL-GUT5-002, CAL-GUT1-001, CAL-DPTH-004, CAL-DPTH-006, CAL-DPTH-007, CAL-DPTH-008, CAL-DPTH-009, CAL-DPTH-010, CAL-DPTH-011, CAL-DPTH-013, CAL-DPTH-015, CAL-DPTH-016, CAL-DPTH-017, CAL-DPTH-019, CAL-STEP-003, CAL-STEP-013, CAL-STEP-018, CAL-STEP-023, CAL-STEP-048, CAL-STEP-051, CAL-STEP-052, CAL-STEP-054, CAL-RHOM-002, CAL-RHOM-004, CAL-RHOM-010, CAL-RHOM-011, CAL-RHOM-015, *CAL-IIW1-001, *CAL-IIW1-008, *CAL-IIW2-010, *CAL-IIW2-011, CAL-WLLY-002, CAL-WLLY-005, CAL-WLLY-008, CAL-WLLY-010, CAL-WLLY-016, CAL-WLLY-017

MERCURY CONTAMINATION - During the testing and inspection, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing a single boundary of containment.

Steven L. Kosztya
Manager, Analytical Services

By: _____
AUTHORIZED SIGNATURE

TELE: (215) 249-9898
FAX: (215) 249-0656

Certificate of Conformance NO. 98021

TERMS: NET - 30 DAYS

LABORATORY TESTING INC.
P.O. Box 249 Dublin, Pennsylvania 18917

SHIPPING ADDRESS
120 MILL STREET, DUBLIN, PA 18917

GE NUCLEAR ENERGY
P.O. #IDNA3007

L.T.I. Lab Report #C-65810

*CORRECTED CERTIFICATION (1/26/93)

B. Thirty-nine pieces of the referenced samples were analyzed by Wet Chemical Analysis in order to determine their Chromium and Nickel contents only in accordance with Customer's instructions with the following results:

IDENTIFIED AS	CHROMIUM	NICKEL
*CAL-IIW2-004	17.36	8.28
CAL-RHOM-006	17.56	7.72
CAL-GUT5-002	18.13	9.91
CAL-GUT1-001	17.25	12.82
CAL-DPTH-004	17.12	8.58
CAL-DPTH-006	16.81	7.38
CAL-DPTH-007	18.79	8.51
CAL-DPTH-008	18.45	8.79
CAL-DPTH-009	18.20	8.84
CAL-DPTH-010	16.55	8.16
CAL-DPTH-011	16.63	7.77
CAL-DPTH-013	18.04	8.88
CAL-DPTH-015	16.41	7.21
CAL-DPTH-016	18.07	8.73
CAL-DPTH-017	17.18	8.01
CAL-DPTH-019	18.90	8.48
CAL-STEP-003	17.39	8.48
CAL-STEP-013	18.20	9.66
CAL-STEP-018	18.54	8.72
CAL-STEP-023	19.52	9.88
CAL-STEP-048	18.81	9.59
CAL-STEP-051	18.05	10.05
CAL-STEP-052	20.12	10.50
CAL-STEP-054	19.27	10.30
CAL-RHOM-002	17.62	8.62
CAL-RHOM-004	17.63	7.86
CAL-RHOM-010	17.64	7.98
CAL-RHOM-011	18.50	8.36
CAL-RHOM-015	17.57	9.13
*CAL-IIW1-001	15.55	8.73
*CAL-IIW1-008	17.67	7.74
*CAL-IIW2-010	17.83	8.90

- - CHEMICAL ANALYSIS RESULTS CONTINUED ON NEXT PAGE - -

MERCURY CONTAMINATION - During the testing and inspection, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing a single boundary of containment.

Steven L. Kosztya
Manager, Analytical Services

By: _____
AUTHORIZED SIGNATURE

TELE: (215) 249-0892
FAX: (215) 249-0856

Certificate of Conformance No. 98021

TERMS: NET - 30 DAYS

LABORATORY TESTING INC.
P.O. Box 249 Dublin, Pennsylvania 18917

SHIPPING ADDRESS
120 MILL STREET, DUBLIN, PA 18917

GE NUCLEAR ENERGY
P.O. #IDNA3007

L.T.I. Lab Report #C-65810

*CORRECTED CERTIFICATION (1/26/93)

B. WET CHEMICAL ANALYSIS RESULTS (Continued...) - (39) pieces were analyzed in order to determine their Chromium and Nickel contents only in accordance with Customer's instructions:

IDENTIFIED AS	CHROMIUM	NICKEL
*CAL-IIW2-011	16.79	8.40
CAL-WLLY-002	17.63	7.86
CAL-WLLY-005	17.86	7.93
CAL-WLLY-008	16.76	7.32
CAL-WLLY-010	17.35	8.61
CAL-WLLY-016	16.69	7.77
CAL-WLLY-017	16.33	7.48

FOR CUSTOMER INFORMATION ONLY: Material is closest to the range of Austenitic Stainless Steel.

MERCURY CONTAMINATION - During the testing and inspection, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing a single boundary of containment.

Steven L. Kosztya
Manager, Analytical Services

By: _____
AUTHORIZED SIGNATURE

TELE: (215) 249-0896
FAX: (215) 249-0856

Certificate of Conformance No. 98021

TERMS: NET - 30 DAYS

LABORATORY TESTING INC.
P.O. Box 249 Dublin, Pennsylvania 18917

SHIPPING ADDRESS
120 MILL STREET, DUBLIN, PA 18917

GE NUCLEAR ENERGY
P.O. #IDNA3007

L.T.I. Lab Report #C-65810

*CORRECTED CERTIFICATION (1/26/93)

A. Twenty-two pieces of the referenced samples were analyzed by Wet Chemical Analysis in order to determine their Chromium and Nickel contents only in accordance with Customer's instructions with the following results:

IDENTIFIED AS	CHROMIUM	NICKEL
CAL-STEP-050	0.29	0.42
CAL-STEP-053	0.03	0.03
*CAL-IIW2-005	0.04	0.01
*CAL-IIW2-007	0.04	0.01
*CAL-IIW2-013	0.06	0.03
*CAL-IIWI-003	0.01	0.01
*CAL-RHOM-001	0.02	0.03
*CAL-RHOM-003	0.03	0.08
CAL-STEP-014	0.09	0.08
CAL-STEP-015	0.09	0.08
CAL-STEP-017	0.09	0.08
CAL-STEP-047	0.03	0.02
CAL-STEP-049	0.01	0.01
*CAL-RESO-001	0.03	0.02
CAL-DSCB-002	0.03	0.01
CAL-DSCB-003	0.06	0.10
CAL-STEP-002	0.04	0.02
CAL-STEP-010	0.03	0.02
CAL-DPTH-018	4.44	0.21
CAL-STEP-005	0.88	1.90
CAL-11W2-009	0.88	1.64
CAL-11W2-012	0.81	1.76

FOR CUSTOMER INFORMATION ONLY: Material is closest to the range of Carbon and or Alloy Steel.

MERCURY CONTAMINATION - During the testing and inspection, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing devices employing a single boundary of containment.

Steven L. Kosztya
Manager, Analytical Services

By: Steven L. Kosztya
AUTHORIZED SIGNATURE

PACIFIC TRANSDUCER CORPORATION
2301 Federal Avenue, Los Angeles, California 90064-1482, U.S.A.
Phone: (310) 478-1134 • FAX: (310) 312-0826

CALIBRATION REPORT AND CERTIFICATE

DATA ON EQUIPMENT TO BE CALIBRATED

Certificate No. 2174

Owner: GENERAL ELECTRIC
Equipment: SURFACE THERMOMETER
Model: 312F, 0/250F
Tolerance: +/- 2% OF FULL SCALE
All readings in degrees: Fahrenheit

Purchase Order: IDNA2044
Manufacturer: PTC
Serial Number: See Attached Pg.2
Date Calibrated: 03/03/93
Date Due: 03/03/94

CALIBRATION DATA

BEFORE CALIBRATION (as received)

AFTER CALIBRATION (as returned)

Although no specific points were logged, instruments referred to on this certificate were calibrated at 3 or more points over the range and found to be within published accuracy.

DATA FOR STANDARD(S) USED IN CALIBRATION

	TEST 1	TEST 2	TEST 3	TEST 4
Instrument:	RTD METER	GLASS THERMOMETER		
Manufacture:	OMEGA	BROOKLYN		
Model:	DP81R	ASTM 63F		
Serial:	701402	76-368		
Calibrated:	09/14/92	12/30/92	/ /	/ /
Calibration Due:	03/14/93	12/30/93	/ /	/ /
Calibrated by:	PTC	TEMP STD LAB		
Traceable to:	*NIST#240884	*NIST#240884		

Calibration was performed in conformance with MIL-STD-45662A

QUALITY CONTROLER: Greg Ikuta DATE: 3/3/93
Greg Ikuta

*National Institute of Standards and Technology, formerly NBS (Naticnal Bureau of Standards)

PACIFIC TRANSDUCER CORPORATION
2301 Federal Avenue, Los Angeles, California 90064-1482, U.S.A.
Phone: (310) 478-1134 • FAX: (310) 312-0826

CALIBRATION REPORT AND CERTIFICATE

PG. 2

Certificate No. 2174

COMPANY: GENERAL ELECTRIC

DATE CALIBRATED: March 03, 1993
DUE DATE: March 03, 1994

PURCHASE ORDER: 1DNA2044

MODEL NUMBER: 312F

SERIAL NUMBER:
120166, 119885, 119782, 119607, 119343, 119375, 119319, 119397, 119574, 119399, 119808, 119562, 119264, 119393, 119389, 120161, 119392, 119242, 119355, 119270, 119340, 119374, 119372, 119329, 119366, 119314, 119370, 119369, 119915, 119367, 119925, 199354, 119398, 199341, 119390, 119380, 119246, 119080, 119927, 119386, 119581, 119778, 119903, 119976, 119358, 119369, 119351, 120163, 119316, 119338

Greg Ikuta — 3/3/93

Greg Ikuta — *DATE*
Q.A. Manager
Pacific Transducer Corp.

GE Nuclear Energy

CERTIFICATE of CALIBRATION

This "Certificate of Calibration" is to document the requirements of General Electric's procedure GE-ADM-1007, "CALIBRATION OF NONDESTRUCTIVE EXAMINATION EQUIPMENT". Additional documentation is maintained at the Technical Services Center.

The equipment used to obtain calibration data is traceable to the National Institute of Standards, formerly (NBS) National Bureau of Standards.

MANUFACTURER: Staveley Instruments MODEL: SONIC-136

SERIAL NUMBER: 689 H CAL. DATE: 3-30-93

CAL. DUE: 3-29-94

CALIBRATED BY:

REVIEWED BY:

DATE 30MAR93

CERTIFICATE OF CALIBRATION

This Certificate attests that the equipment/standards used are in compliance with MIL-STD-45662A and are traceable to N.I.S.T. The calibration performed complies with MIL-STD-45662A, Staveley Instruments QA manual, Calibration Program Procedures, Factory Specifications and Accuracy.

DESCRIPTION:

MODEL NO. 136 Plus CALIBRATION DATE 08/05/92
SERIAL NO. 7641 RECALL/DUE DATE 08/05/93
SPO/MODULES _____

CALIBRATION PERFORMED TO Factory Specification

TEST EQ./STANDARDS	SERIAL NO.	DUE DATE
OSCILLOSCOPE	B050123	04/93
VOLT METER	51701342	04/93

TESTS WERE CONDUCTED AT AN AMBIENT TEMPERATURE OF 72 +/- 4° AND RELATIVE HUMIDITY RANGE OF 30-55 %.

SERVICE INFORMATION ☒ N/A

CERTIFIED FOR _____
SERVICE ORDER NO. _____
REMARKS ☐ NONE _____
OUT OF TOLERANCE ☐ NO _____

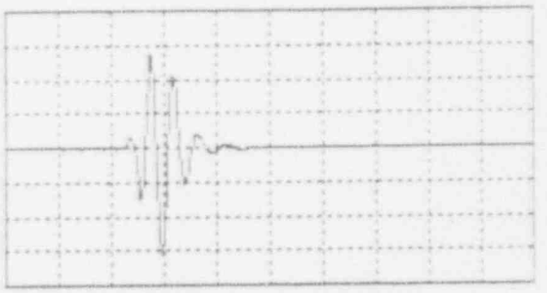
CERTIFIED BY _____

STAVELEY INSTRUMENTS INC
421 NORTH QUAY STREET / KENNEWICK, WA 99336 TELEPHONE 509-735-7550 / TELEX 152-858 / FAX 509-735-4672
Building a world of quality through NDT

Aerotech

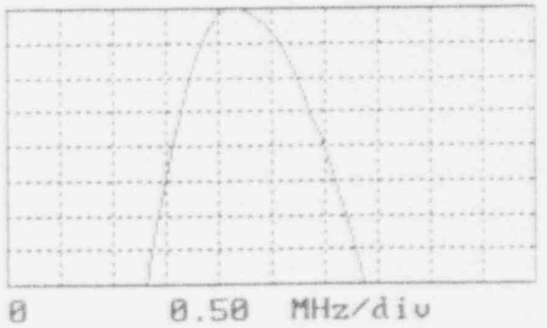
Transducer Certification

DATE: 02-18-1992
MODEL 113-242-580
SERIES: GAMMA STYLE: MSWS
SERIAL #B18207
ELE. SIZE: .50 CONNECTOR: MD
NOMINAL FREQUENCY: 2.25 MHz



TEST SETUP--
TEST BLOCK THICKNESS: 1.000 MATERIAL: PLEX
ENERGY SETTING: 2
IMPEDANCE SETTING: 50 OHMS

TEST DATA--
PEAK FREQUENCY: 2.15 MHz
RELATIVE SENSITIVITY: 37 dB
INSPECTOR: S.DIVEN



EQUIPMENT USED:
UTA-4 (S/N 103 CAL THRU 10-92)
TEK 2430 SCOPE (S/N B012909 CAL THRU 11-92)
TEK PEP301 CONTROLLER
PROCEDURE: WAVEFORM SHOWN IS THE FIRST
RETURN ECHO FROM THE INDICATED TARGET

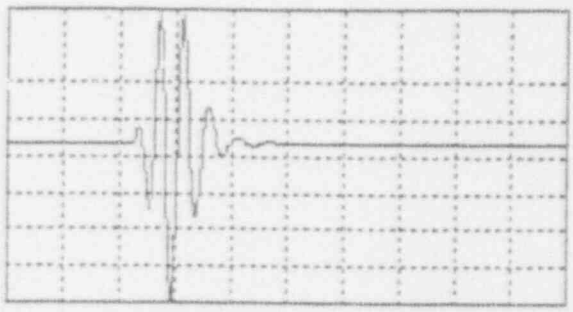
THE ACCURACY OF THE INSTRUMENT DESCRIBED ABOVE HAS BEEN CONFIRMED BY FACTORY STANDARD TEST EQUIPMENT AND LABORATORY REFERENCE STANDARDS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.

Krautkramer Branson
P.O. Box 350, Lewistown, PA 17044
(717) 242-0327 Fax: 717-242-2606

Aerotech

Transducer Certification

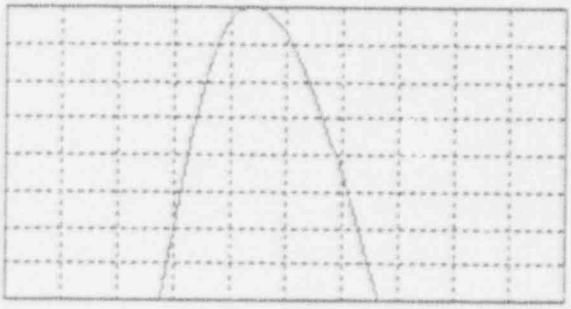
DATE: 10-03-1988
MODEL 113-232-590
SERIES: GAMMA STYLE: MSWQC
SERIAL #32328
DIAMETER: .375 in. CONNECTOR: MD
NOMINAL FREQUENCY: 2.25 MHz



TEST SETUP--
TEST BLOCK THICKNESS: 1.0 MATERIAL: PLEX
ENERGY SETTING: 2
IMPEDANCE SETTING: 50 OHMS

TEST DATA--
PEAK FREQUENCY: 2.20 MHz
RELATIVE SENSITIVITY: 34 dB
INSPECTOR: s.diven

EQUIPMENT USED: UTA-4, TEK 2430 SCOPE,
TEK PEP301 CONTROLLER
PROCEDURE: WAVEFORM SHOWN IS THE FIRST
RETURN ECHO FROM THE INDICATED
TARGET

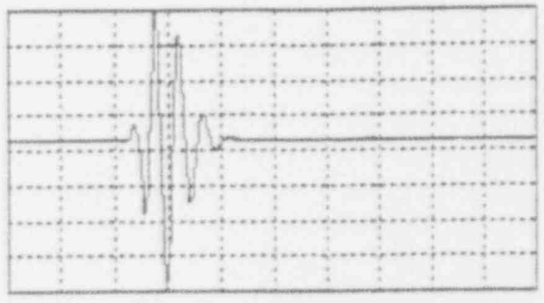


Krautkramer Branson
P.O. Box 350, Lewistown, PA 17044
(717) 242-0327 Fax: 717-242-2606

Aerotech

Transducer Certification

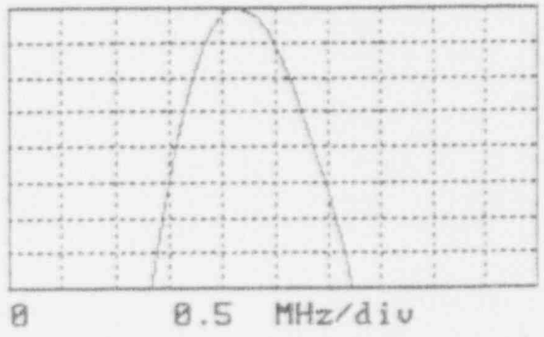
DATE: 10-03-1988
MODEL 113-232-590
SERIES: GAMMA STYLE: MSWQC
SERIAL #32348
DIAMETER: .375 in. CONNECTOR: MD
NOMINAL FREQUENCY: 2.25 MHz



TEST SETUP—
TEST BLOCK THICKNESS: 1.0 MATERIAL: PLEX
ENERGY SETTING: 2
IMPEDANCE SETTING: 50 OHMS

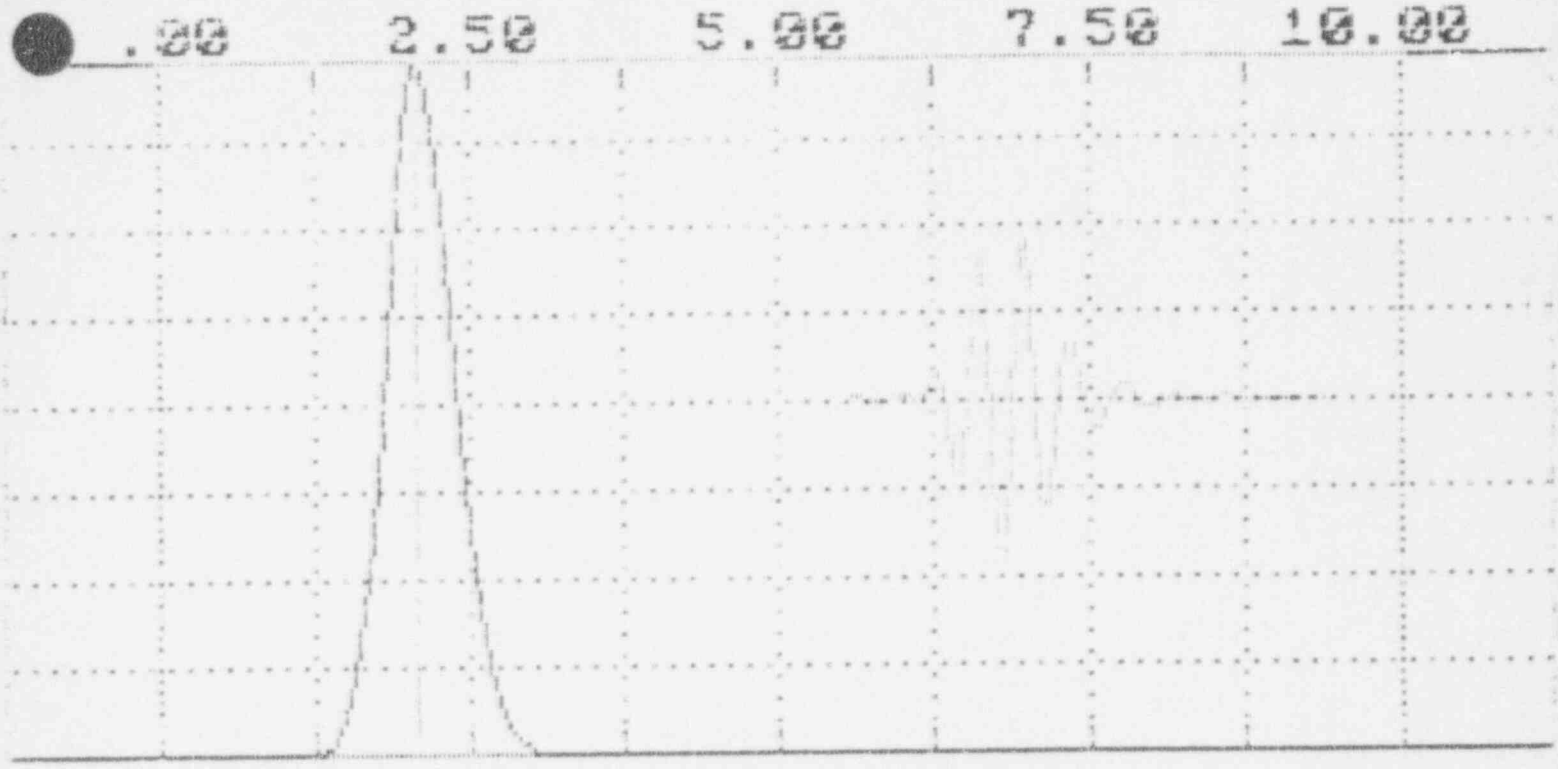
TEST DATA—
PEAK FREQUENCY: 2.15 MHz
RELATIVE SENSITIVITY: 33 dB
INSPECTOR: S.DIVEN

EQUIPMENT USED: UTA-4, TEK 2430 SCOPE,
TEK PEP301 CONTROLLER
PROCEDURE: WAVEFORM SHOWN IS THE FIRST RETURN ECHO FROM THE INDICATED TARGET



Krautkramer Branson
P.O. Box 350, Lewistown, PA 17044
(717) 242-0327 Fax: 717-242-2606

PC-TES TRANSDUCER EVALUATION REPORT



--- power spectrum (Mhz)

WAVE FORM ANAL

Test Date: SEP 1, 1992 (11: 1:22) Report Date: SEP 1, 1992 (11: 2: 0)

PULSER/RECEIVER PARAMETERS

Model : PCTR-100/160	Energy : 40	Damping : 1
Serial # : 41946 025	Gain (dB) : 8.	HP Filt.: 2.3
	Atten.(dB): 20	BP Filt.: 24

TRANSDUCER PARAMETERS

Model : KBA	Diameter : .375 DIA	Shoe Type : N/A
Serial # : 32443	Center Freq. : 2.25 MHZ	Couplant : ULTRAGEL 2

DATA COLLECTION PARAMETERS

Samp. Rate (Mhz) : 20.000 Gate Length (usec) : 5.000

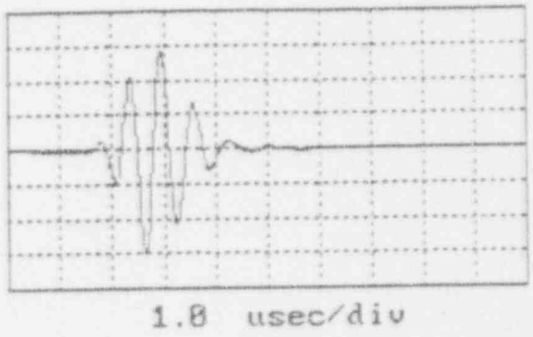
FEATURES

Power Spectrum		Time Waveform		Analytic Envelope	
Low 3dB (Mhz):	1.797	Abs peak amp :	61.000	Rise-10(uSec):	.900
High 3dB(Mhz):	2.461	Sens (dB):	65.562	Wid-10 (uSec):	2.150
Fq cen (Mhz):	2.129	Impg 1/3 (dB):	2.565	Wid-25 (uSec):	1.600
Bandwidth (%):	31.193	Impg 2/4 (dB):	1.605	Wid-60 (uSec):	1.000
Peak (Mhz):	2.070			Fall-10(uSec):	1.250
W :	.700				

Aerotech

Transducer Certification

DATE: 04-12-1989
MODEL 113-231-590
SERIES: GAMMA STYLE: MSWQC
SERIAL #17279
DIAMETER: .375 in. CONNECTOR: MD
NOMINAL FREQUENCY: 1.5 MHz



TEST SETUP--
TEST BLOCK THICKNESS: 1.000 MATERIAL: PLEX
ENERGY SETTING: 2
IMPEDANCE SETTING: 250 OHMS

DATA--
FREQUENCY: 1.56 MHz
RELATIVE SENSITIVITY: 44 dB
INSPECTOR: S.DIVEN

EQUIPMENT USED:
UTA-4 (S/N 103 CAL THRU 10-89)
TEK 2430 SCOPE (S/N B012989 CAL THRU 10-89)
TEK PEP301 CONTROLLER
PROCEDURE: WAVEFORM SHOWN IS THE FIRST RETURN ECHO FROM THE INDICATED TARGET

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.

Krautkramer Branson
P.O. Box 350, Lewistown, PA 17044
(717) 242-0327 Fax: 717-242-2606

TRANSDUCER CERTIFICATION

KBA# 15230

Transducer Description

Series GAMMA S/N 15230

Frequency 1.5 MHz Size .375

Style MSWQC Connector MD

☑ Contact ☐ Immersion ☐ Nonfocused

Water Path N/A ☐ Spherical

Target 1" Plex ☐ Cylindrical

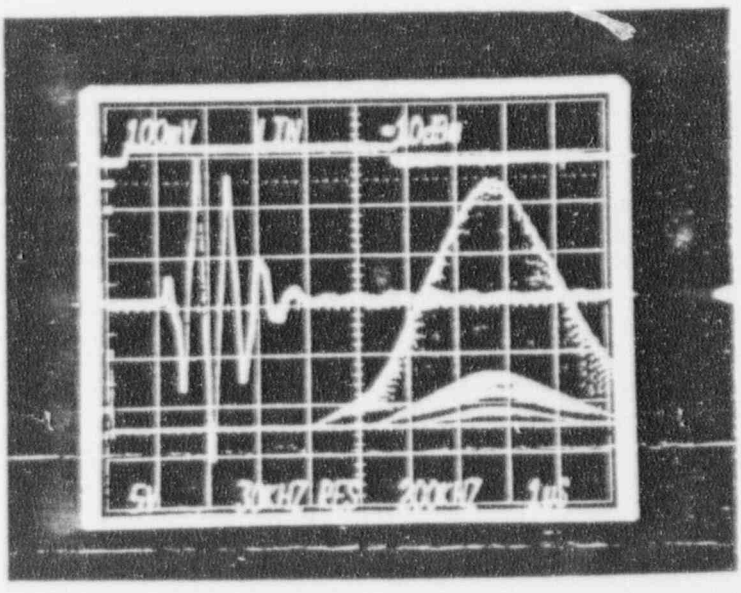
Relative Sensitivity 26 dB

Energy Setting 2 Impedance 50

☑ Peak or ☐ Center Frequency 1.54 MHz

Inspector JCD Date 12-4-85

A B



TRACE I

TRACE II

TRACE III

C D E F

Testing Procedure

The real time waveform shown in the photo above is the first return echo from a reflector selected with respect to transducer type. All contact (wearplate) transducers are tested on a flat steel (4340) plate while epoxy-faced shear wave transducers are tested on a flat polymer block. Dual contact transducers are tested on a flat polymer block unless otherwise specified. Delay fingertip removable (Style DFR) transducers are tested off of the tip of the delay line. Nonfocused immersion transducers are tested in water over a flat steel plate using a water path as specified above. Focused immersion transducers are tested the same as nonfocused transducers except that the water path used is equal to the actual focal length.

Using an AEROTECH Ultrasonic Transducer Analyzer, Model UTA-4, and a Tektronix 7L12 frequency spectrum analyzer in a 7704A Mainframe, the real time waveform, UTA-4 gate signal, and the frequency spectrum of the gated signal are simultaneously displayed and photographed. Using the linear attenuator in the UTA-4 receiver, the amplitude of the real time waveform is adjusted to a six centimeter amplitude (± 1 dB) on the CRT. With the vertical calibration of Trace II fixed at 100 millivolts per division, the amount of attenuation used provides a relative sensitivity rating for all transducers certified by Krautkramer Branson.

Real Time Waveform - Trace II

Screen writing figures A and F provide the vertical and horizontal screen calibration respectively for Trace II.

Gate Marker - Trace I

Screen writing figure C provides the vertical amplitude of the gate marker and is an inconsequential figure. The horizontal calibration for Trace I is the same as that for Trace II. The portion of Trace II that falls within the gate time period is the signal fed to the frequency spectrum analyzer.

Frequency Spectrum - Trace III

Screen writing figure E provides the horizontal calibration for Trace III. Figures B and D the spectrum analyzer's attenuator and resolution settings respectively.

KRAUTKRAMER BRANSON
P. O. Box 350
Lewistown, PA 17044

TRANSDUCER CERTIFICATION KBA** F-15776

Transducer Description

Series GAMMA S/N F-15776

Frequency 1.5 MHz Size .25

Style SNGL Connector MIN

☒ Contact ☐ Immersion ☐ Nonfocused

Water Path 1.0 ☐ Spherical

Target 10" DIA ☐ Cylindrical

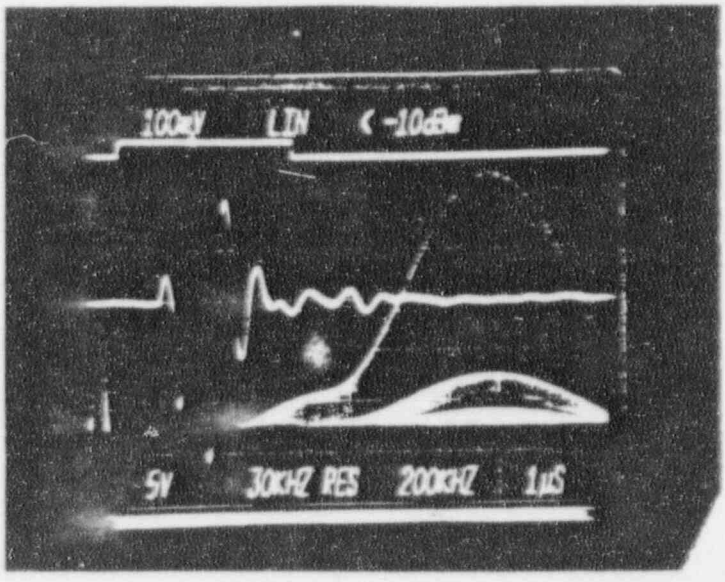
Relative Sensitivity 34 dB

Energy Setting 2 Impedance 250

☒ Peak or ☐ Center Frequency 1.52 MHz

Inspector JDC Date 4-12-92

A B



TRACE I

TRACE II

TRACE III

C D E F

Testing Procedure

The real time waveform shown in the photo above is the first return echo from a reflector selected with respect to transducer type. All contact (wearplate) transducers are tested on a flat steel (4340) plate while epoxy-faced shear wave transducers are tested on a flat polymer block. Dual contact transducers are tested on a flat polymer block unless otherwise specified. Delay fingertip removable (Style DFR) transducers are tested off of the tip of the delay line. Nonfocused immersion transducers are tested in water over a flat steel plate using a water path as specified above. Focused immersion transducers are tested the same as nonfocused transducers except that the water path used is equal to the actual focal length.

Using an AEROTECH Ultrasonic Transducer Analyzer, Model UTA-4, and a Tektronix 7L12 frequency spectrum analyzer in a 7704A Mainframe, the real time waveform, UTA-4 gate signal, and the frequency spectrum of the gated signal are simultaneously displayed and photographed. Using the linear attenuator in the UTA-4 receiver, the amplitude of the real time waveform is adjusted to a six centimeter amplitude (± 1 dB) on the CRT. With the vertical calibration of Trace II fixed at 100 millivolts per division, the amount of attenuation used provides a relative sensitivity rating for all transducers certified by Krautkramer Branson.

Real Time Waveform - Trace II

Screen writing figures A and F provide the vertical and horizontal screen calibration respectively for Trace II.

Gate Marker - Trace I

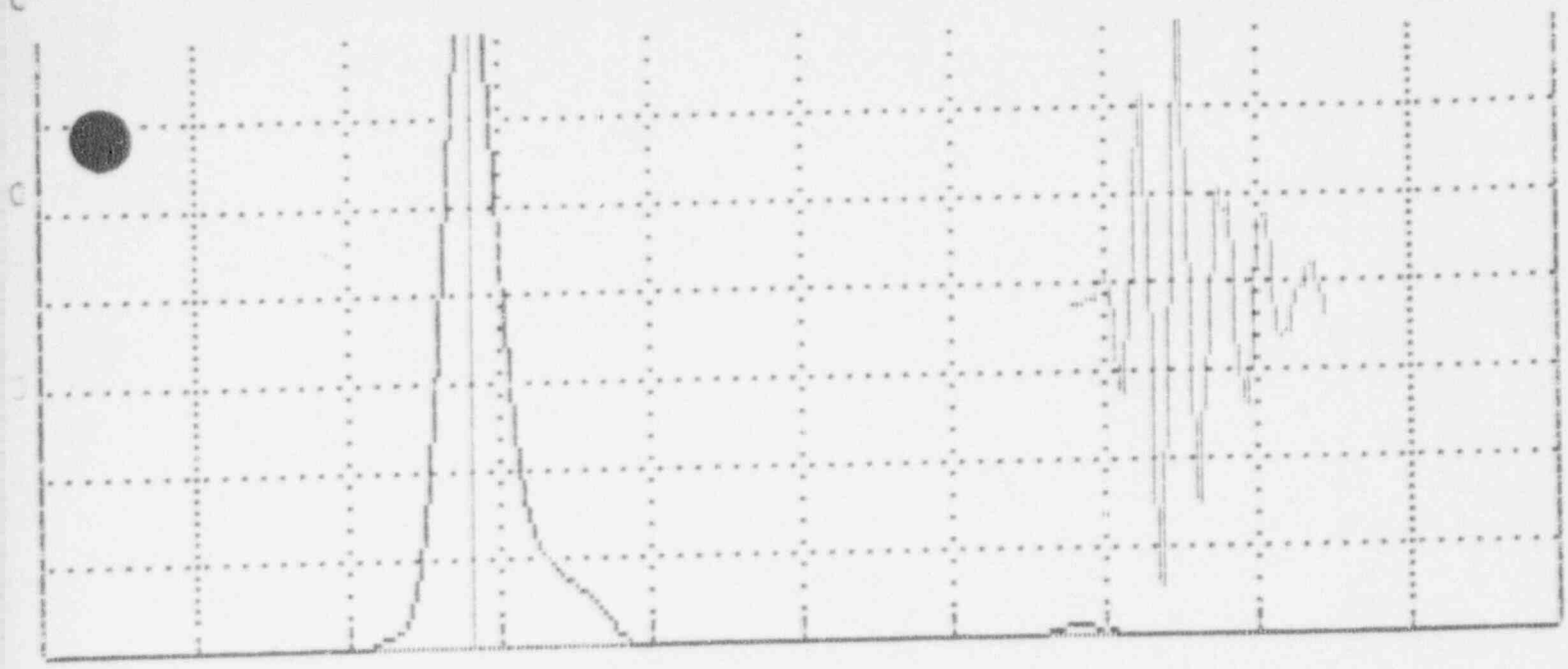
Screen writing figure C provides the vertical amplitude of the gate marker and is an inconsequential figure. The horizontal calibration for Trace I is the same as that for Trace II. The portion of Trace II that falls within the gate time period is the signal fed to the frequency spectrum analyzer.

Frequency Spectrum - Trace III

Screen writing figure E provides the horizontal calibration for Trace III. Figures B and D are the spectrum analyzer's attenuator and resolution settings respectively.

KRAUTKRAMER BRANSON
P. O. Box 350
Lewistown, PA 17044

PC-TES TRANSDUCER EVALUATION REPORT



has been found

F

--- power spectrum (Mhz)

--- time waveform

RF WAVEFORM

Test Date: SEP 27, 1988 (14:47:59) Report Date: SEP 27, 1988 (14:50:19)

PULSER/RECEIVER PARAMETERS

Model : 100/180
Serial # : 41946 025

Energy :
Gain (dB) : 23.
Atten.(dB):

Damping : NA
HP Filt.: NA
BP Filt.: NA

TRANSDUCER PARAMETERS

Model : GAMMA
Serial # : K17921

Diameter : .25
Center Freq. : 2.25

Shoe Type : NA
Couplant : ULTRAGELII

DATA COLLECTION PARAMETERS

Samp. Rate (Mhz) : 20.000

Gate length (usec) : 2.800

FEATURES

Power Spectrum

Low 3dB (Mhz):	1.992
High 3dB(Mhz):	2.578
Fo cen (Mhz):	2.285
Bandwidth (%):	25.641
Fo peak (Mhz):	2.266
F skew :	.875

Time Waveform

Abs peak amp :	109.000
Sens (dB):	35.604
Dmpg 1/3 (dB):	2.800
Dmpg 2/4 (dB):	1.380

Analytic Envelope

Rise-10(uSec):	.750
Wid-10 (uSec):	2.400
Wid-25 (uSec):	1.850
Wid-60 (uSec):	.950
Fall-10(uSec):	1.650

TRANSDUCER EVALUATION REPORT

	2.50	5.00	7.50	10.00

--- POWER SPECTRUM (MHz)

WAVE FORM ANAL

Robert Lovell

ULTRASONIC TRANSDUCER ANALYSIS

REFLECTOR

☒ 1.0" Thick Flat Steel Plate.

☐ _____ Dia. Steel Ball.

☐ _____ FBH.

at _____ Inch Water Path.

TRANSDUCER

SERIAL NO: C1001

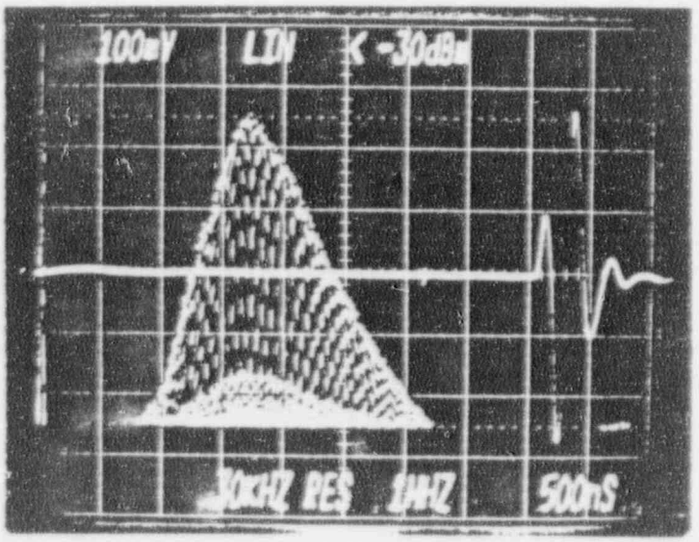
SERIES: CHM

FREQUENCY: 3.5 MHz

SIZE: .375" Dia.

FOCUS: _____ Inch

1 4 5



6 3 2

WAVE FORM & FREQUENCY SPECTRUM

FREQUENCY: 3.4 MHz

BANDWIDTH: 2.3 MHz

OSCILLOSCOPE SETTINGS:

1. Vertical Sensitivity/Div.
2. Horizontal Sensitivity/Div.

SPECTRUM ANALYZER SETTINGS:

3. Scan Width/Div.
4. Scale Format
5. Input Attenuation
6. Resolution

The above data has been obtained with Megasonics Ultrasonic Transducer Analyzer, MUTA, Tektronix 7704A Main Frame with 7L12 Spectrum Analyzer, 7B92A Dual Time Base, 7A18 Dual Trace Amplifier.

DATE: 10-5-92

BY: _____

MEGASONICS
ULTRASONIC TRANSDUCERS

205 Benedict Hill Rd.
New Canaan, CT 06840
(203) 966-3401

ULTRASONIC TRANSDUCER ANALYSIS

REFLECTOR

☒ 1.0" Thick Flat Steel Plate.

☐ _____ Dia. Steel Ball.

☐ _____ FBH.

at _____ Inch Water Path.

TRANSDUCER

SERIAL NO: C1008

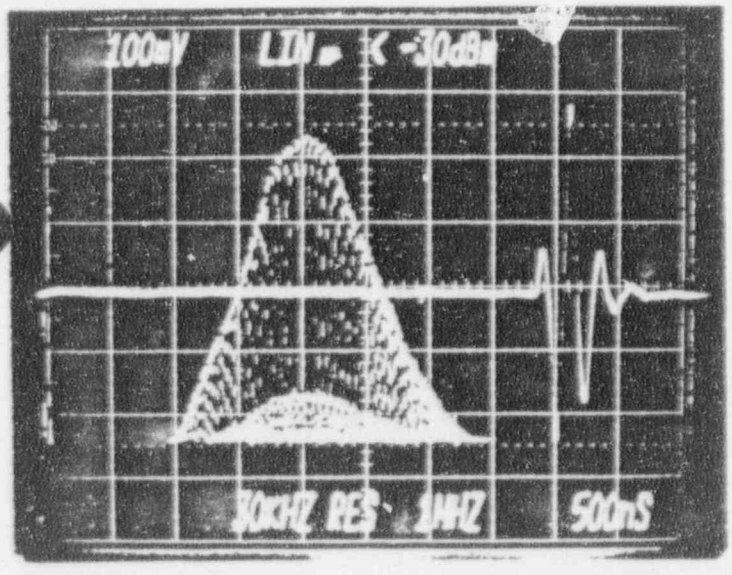
SERIES: CHM

FREQUENCY: 3.5 MHz

SIZE: .250" Dia.

FOCUS: _____ Inch

1 4 5



6 3 2

WAVE FORM & FREQUENCY SPECTRUM

FREQUENCY: 4.0 MHz

BANDWIDTH: 2.2 MHz

OSCILLOSCOPE SETTINGS:

1. Vertical Sensitivity/Div.
2. Horizontal Sensitivity/Div.

SPECTRUM ANALYZER SETTINGS:

3. Scan Width/Div.
4. Scale Format
5. Input Attenuation
6. Resolution

The above data has been obtained with Megasonics Ultrasonic Transducer Analyzer, MUTA, Tektronix 7704A Main Frame with 7L12 Spectrum Analyzer, 7B92A Dual Time Base, 7A18 Dual Trace Amplifier.

DATE: 10-5-92

BY: _____

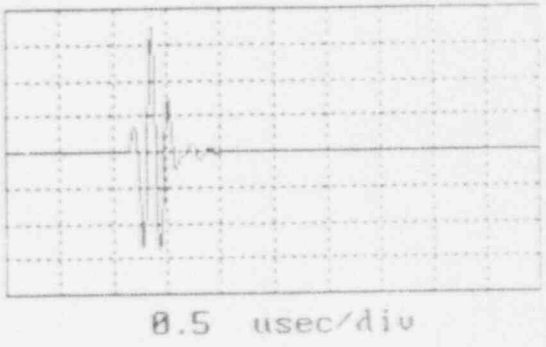
MEGASONICS
ULTRASONIC TRANSDUCERS

205 Benedict Hill Rd.
New Canaan, CT 06840
(203) 966-3404

Aerotech

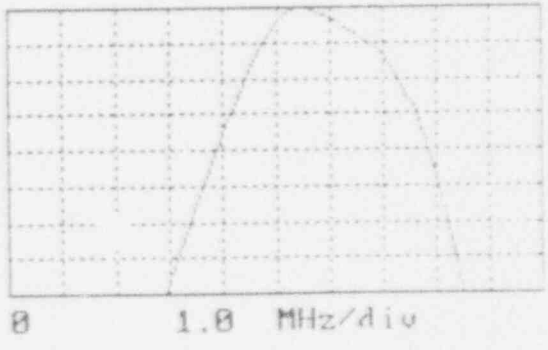
Transducer Certification

DATE: 11-01-1989
MODEL 113-124-660
SERIES: ALPHA STYLE: DFR
SERIAL #K30926
DIAMETER: .25 in. CONNECTOR: MD
NOMINAL FREQUENCY: 5 MHz



TEST SETUP--
TEST BLOCK THICKNESS: 0.375 MATERIAL: DELAY
ENERGY SETTING: 2
IMPEDANCE SETTING: 50 OHMS

DATA--
PEAK FREQUENCY: 5.47 MHz
RELATIVE SENSITIVITY: 47 dB
INSPECTOR: B.BENNETT



EQUIPMENT USED:
UTA-4 (S/N 103 CAL THRU 10-90)
TEK 2430 SCOPE (S/N B012909 CAL THRU 10-90)
TEK PEP301 CONTROLLER
PROCEDURE: WAVEFORM SHOWN IS THE FIRST RETURN ECHO FROM THE INDICATED TARGET

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.

Krautkramer Branson
P.O. Box 350, Lewistown, PA 17044
(717) 242-0327 Fax: 717-242-2606

Receiving Inspection Report

ORIGINAL COPY WHEN THIS IMPRINT IN RED.

FILE NO 10.1.34

Client DEVON TECHNICAL SERVICES CENTER

RIR No. 92-R034

Project VARIOUS

PART 1 - RECEIVING

Description SONATECH ULTRASONIC COUPLANT SOUNDSAFE BATCH NO.'S 92220B, 92220D, 20922S & 20922SB. HUMEX BATCH NO. 92265A

Purchase Order No. 1CLNJ122

Product Spec. No. N/A

PART 2 - CHARACTERISTICS	PART 3 - STATUS	
Description	Accept	Not Accept*
1. Quantity SEE BELOW ☑ P.O. Complete ☐ Partial	DDD	
2. Shipping Damage ☐ Yes ☑ No	DDD	
3. Lab Tests Required By Dedication Documentation ☐ Yes ☑ No	DDD	
4. LAB TEST REPORTS FOR BOTH SOUNDSAFE AND HUMEX UT COUPLANTS PLUS	DDD	
5. THE MATERIAL SAFETY DATA SHEETS (MSDS)	DDD	
6.		
7.		
8.		
9.		
10.		

* List Any Not Acceptable Characteristics By Number, Reason for Not Accepting.

Comments:

RECIVED 20 - 5 GALLON CONTAINERS OF SOUNDSAFE UT COUPLANT AND 20 - 5 GALLON CONTAINERS OF HUMEX UT COUPLANT

☐ Reference NCR No. N/A ☑ Item(s) Tagged ACCEPT

PART 4 - VERIFICATION

	Yes	No	N/A
Recorded Markings and Characteristics Meet ~~Product Specification~~ Purchase Order Requirements	☑	☐	☐
Material Certifications and Test Reports Meet ~~Product Specification~~ Purchase Order Requirements	☑	☐	☐
Heat/Lot Numbers Correspond With Material Certifications and Test Reports	☑	☐	☐
Data Reports Acceptable (Code -Samped Items Only)	☐	☐	☑
Serial Numbers Match Data Reports (Code-Stamped Items Only)	☐	☐	☑
Material Certifications and Test Reports Acceptable for Owner Purchased Items Only	☐	☐	☑

Inspected By:	Accepted By:	Reviewed By: (as required)
Date	Date	Date

☑ Supplemental Data Attached

GE Nuclear Energy

PURCHASE ORDER NUMBER	AMENDMENT NO	DATE	PAGE
[illegible]42 [illegible]80201		08-26-92	- OF -

NOTICE

1. ACKNOWLEDGEMENT COPY ATTACHED TO BE FILLED OUT AND RETURNED TO INVOICE ADDRESS OR AS INDICATED IN PURCHASE ORDER
2. ISSUE IN TRIPLICATE SEPARATE INVOICES FOR EACH PURCHASE ORDER OR PARTIAL SHIPMENT. REFERENCE P.O. NO. AND CONTROL/PART NO. ORIGINAL PAID FREIGHT BILL MUST BE SUBMITTED WHEN BILLING FOR PREPAID FREIGHT.
3. MARK ALL SHIPPING MEMORANDA, PACKAGES, INVOICES, CORRESPONDENCE, TRANSPORTATION BILLS, ETC., WITH OUR PURCHASE ORDER NUMBER AND APPLICABLE LINE ITEM.
4. INVOICE TO "SHIP TO" ADDRESS UNLESS OTHERWISE INDICATED BELOW.

SELLER

SONOTECH
P.O. BOX 2189
BELLINGHAM
WA
38227
CONFIRMING ORDER TO: MARC [illegible] 206-671-9101

BILL TO

GENERAL ELECTRIC
999 WEST VALLEY ROAD
WAYNE
SUITE 107
PA
19087

TAX INFORMATION
TAXABLE

SHIP VIA	SHIP TO ARRIVE
YELLOW FREIGHT	09-09-92

PAYMENT TERMS	SHIPPING TERMS	TRANSPORTATION RESPONSIBILITY	TITLE PASSAGE
NET 30 DAYS	PREPAY & BILL	FOB SHIP POINT	UPON RECEIPT

ITEM NO	QUANTITY ORDERED	UNIT	RECEIVED	DESCRIPTION	UNIT PRICE	TOTAL PRICE
1	20			SOUND SAFE ULTRASONIC COUPLANT $126.00 < 30% DISCOUNT	88.20	1764.00
2	20			HUMEX ULTRASONIC COUPLANT $58.00 < 25% DISCOUNT	43.50	870.00

CONFIRMING PURCHASE ORDER

MATERIALS SHALL BE IN CONFORMANCE WITH
ASTM SPEC. D-129 CERTIFICATE OF
COMPLIANCE SHALL ACCOMPANY SHIPMENT

QUALITY ASSURANCE APPROVAL

[signature] 28 Aug 92
GENERAL ELECTRIC DATE

DISCOUNT	0.00
SALES TAX	158.04
TOTAL	2792.04

RECEIVING COPY

[signature]

FORM GE/SS 165P (12/87)

Professional Service Industries, Inc.
Pittsburgh Testing Laboratory Division

TESTED FOR: Sonotech, Inc.
P. O. Box 2189
Bellingham, WA 98227-2189

PROJECT: 831-23324-1

Attention: Margaret Larson

REPORT DATE: July 14, 1992

PA CERTIFIED ID NO. 02-349

REMARKS: Client Ref. P.O. # 2347

LABORATORY NO: IN021227

Sample Description : One (1) Jar Jelly-Like Substance

Submitted By : Client

Method(s) Of Test : ASTM D-1246, ASTM D-512
Standard Method 413B, 426C

Sample Identification

CHEMICAL BATCH #C-9224
covering the following ultrasound couplant batches:
SOUNDSAFE, Batch 92220
SOUNDCLEAR, Batch 92231
HUMEX, Batch 92265
UT-30, Batch 92250

Determination	Result
Total Sulfur, mg/Kg	4
Total Halogens:	
Chlorine, mg/Kg	< 4
Fluorine, mg/Kg	< 0.4
Bromide, mg/Kg	< 3

Respectfully Submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.
PITTSBURGH TESTING LABORATORY DIVISION
ANALYTICAL SERVICES

Chris Kanabar/ Lab Supervisor/ for
Joyce A. Waters, Department Manager

1-Client
cac

BRANCH OFFICES:
Chicago, Illinois
Philadelphia, Pennsylvania

International Testing Laboratories, Inc.

Fax - 201 - 589 - 8486

Material Testing and Consulting Engineers
Weighers, Samplers and Assayers
578-582 MARKET STREET
NEWARK, N. J. 07105
Phone: (201) 589-4772-3-4

REPORT OF TEST

NO. 566512

DATE Oct. 17, 1991

From Sonotech, Inc.
P.O. Box 2198
Bellingham, Washington 98227-2189

P.O. No. 2312

Sample : Batch No. C9292 Covering the following UT couplant batches:

SoundSafe Batch 20922
Sound Clear Batch 31923
UT-30 Batch 50925
Hunex Batch 65165

Purpose : Quantitative determinations for total halogens and sulfur.

Methods : A. Trace Halogens as Chlorine:

1. The sample is oxidized by combustion in a combustion tube under oxygen to convert Halogens to Halides.

2. The Halides are determined colorimetrically in accordance with ASTM-D-512, Method C.

B. Sulfur:

1. The sample is subjected to a potassium fusion, followed by distillation of sulfide.

To

INTERNATIONAL TESTING LABORATORIES, INC.

ITL 10M 8-91

BRANCH OFFICES:
Chicago, Illinois
Philadelphia, Pennsylvania

International Testing Laboratories, Inc.
Material Testing and Consulting Engineers
Weighers, Samplers and Assayers
578-582 Market Street
Newark, N. J. 07105
Phones (201) 589-4772-4-6

Fax - 201 - 589 - 8486

REPORT OF TEST

NO. 566512

DATE Oct. 17, 1991

From Sonotech, Inc.
P.O. Box 2198
Bellingham, Washington

P.O.#2312

Methods (continued) : B. Sulfur:

2. The analysis for sulfur is determined colorimetrically by the reaction which takes place between paraaminodimethylaniline, ferric chloride and sulfide ion, resulting in the formation of methylene blue.

Results :

Parameter	Results (as is) wt/wt
1. Total Halogens	6 ppm
2. Total Sulfur	less than 2 ppm

To Sonotech, Inc.
Bellingham, Washington

INTERNATIONAL TESTING LABORATORIES, INC.

Dr. [signature]

MATERIAL SAFETY DATA SHEET

N/A = not applicable or not available (To comply with 29 CFR 1910.1200) Effective Date: 7/92

SECTION 1 -- PRODUCT IDENTIFICATION

roduct Name: HUMEX®
Generic Name: Ultrasound Couplant
Manufacturer: Sonotech, Inc.
P.O. Box 2189, Bellingham, WA 98227-2189
206-671-9121

NFPA Hazardous Materials
Identification System
Health 0
Flammability 0
Reactivity 0

SECTION 2 -- HAZARDOUS INGREDIENTS

none

SECTION 3 -- PHYSICAL DATA

Boiling Point: >212°F pH: 7.35 -- 7.9
Vapor Pressure: N/A Vapor Density: N/A
Evaporation Rate: N/A Specific Gravity: >1.00
Solubility in Water: complete
Appearance and Odor: water white, opaque gel; bland odor

SECTION 4 -- FIRE AND EXPLOSION HAZARD DATA

Flash Point: none
Upper Exposure Limit: none
Lower Exposure Limit: none
Special Fire Fighting Procedures: N/A
Extinguishing media: N/A
Unusual Fire and Explosion Hazards: none

SECTION 5 -- REACTIVITY DATA

Stability: Stable
Conditions to Avoid: none
Incompatability (*Materials to Avoid*): none known
Hazardous Polymerization: will not occur
Hazardous Decomposition or By-products: none known

SECTION 6 -- HEALTH HAZARD AND FIRST AID DATA

Routes of Entry:
Skin: yes Ingestion: not normally
Eyes: not normally Inhalation: no
Effects of Overexposure: *Acute*: May cause temporary eye irritation
Chronic: none expected

First Aid Procedures:
Skin: Wash affected area with water.
Eyes: Flush with water for 15 minutes.
Ingestion: For large quantities, induce vomiting and call a physician.
Inhalation: N/A

SECTION 7 -- STORAGE AND HANDLING INFORMATION

Precaution to be taken in handling and storage: Store at room temperature. Spills are slippery and should be cleaned up immediately.
Steps to be taken in case material is released or spilled: Pick up excess for disposal. Clean with water.
Waste disposal method: Dispose of in accordance with federal, state, and local regulations.

SECTION 8 -- CONTROL MEASURES

Respiratory Protection: not required
Ventilation: not required
Protective Gloves: on individuals demonstrating sensitivity to HUMEX®
Eye Protection: as required by working conditions
Other Protective Equipment: not required

HUMEX® contains only food grade and cosmetic grade ingredients.
HUMEX® is biodegradable.

SONOTECH, INC.

P.O. Box 2189, Bellingham, WA 98227-2189
Toll Free: 1-800-458-425 Telephone: 206-671-9121 Fax: 206-671-9024

MATERIAL SAFETY DATA SHEET

N/A = not applicable or not available (To comply with 29 CFR 1910.1200) Effective Date: 7/92

SECTION 1 -- PRODUCT IDENTIFICATION

Product Name: SOUNDSAFE®
Generic Name: Ultrasound Couplant
Manufacturer: Sonotech, Inc.
P.O. Box 2189, Bellingham, WA 98227-2189
206-671-9121

NFPA Hazardous Materials
Identification System
Health 0
Flammability 0
Reactivity 0

SECTION 2 -- HAZARDOUS INGREDIENTS

none

SECTION 3 -- PHYSICAL DATA

Boiling Point: >250°F pH: 7.35 -- 7.9
Vapor Pressure: N/A Vapor Density: N/A
Evaporation Rate: N/A Specific Gravity: >1.02
Solubility in Water: complete
Appearance and Odor: water white, opaque gel; bland odor

SECTION 4 -- FIRE AND EXPLOSION HAZARD DATA

Flash Point: none
Upper Exposure Limit: none
Lower Exposure Limit: none
Special Fire Fighting Procedures: N/A
Extinguishing media: N/A
Unusual Fire and Explosion Hazards: none

SECTION 5 -- REACTIVITY DATA

Stability: Stable
Conditions to Avoid: none
Incompatability (*Materials to Avoid*): none known
Hazardous Polymerization: will not occur
Hazardous Decomposition or Byproducts: none known

SECTION 6 -- HEALTH HAZARD AND FIRST AID DATA

Routes of Entry:
Skin: yes Ingestion: not normally
Eyes: not normally Inhalation: no
Effects of Overexposure: *Acute*: May cause temporary eye irritation
Chronic: none expected

First Aid Procedures:
Skin: Wash affected area with water.
Eyes: Flush with water for 15 minutes.
Ingestion: For large quantities, induce vomiting and call a physician.
Inhalation: N/A

SECTION 7 -- STORAGE AND HANDLING INFORMATION

Precaution to be taken in handling and storage: Store at room temperature. Spills are slippery and should be cleaned up immediately.
Steps to be taken in case material is released or spilled: Pick up excess for disposal. Clean with water.
Waste disposal method: Dispose of in accordance with federal, state, and local regulations.

SECTION 8 -- CONTROL MEASURES

Respiratory Protection: not required
Ventilation: not required
Protective Gloves: on individuals demonstrating sensitivity to SOUNDSAFE®
Eye Protection: as required by working conditions
Other Protective Equipment: not required

SOUNDSAFE® contains only food grade and cosmetic grade ingredients.
SOUNDSAFE® is biodegradable.

SONOTECH, INC.

P.O. Box 2189, Bellingham, WA 98227-2189
Toll Free: 1-800-458-425 Telephone: 206-671-9121 Fax: 206-671-9024

PILGRIM NUCLEAR POWER STATION

PRESERVICE EXAMINATION

NINTH REFUELING AND INSPECTION OUTAGE

NDE PROCEDURES

SECTION VII

QUALITY ASSURANCE DEPARTMENT

QUALITY CONTROL INSTRUCTION

NO. 50.10

LIQUID PENETRANT EXAMINATION

Prepared By: _____

Reviewed By: _____
NDE Level III

Reviewed By: _____
ANII

Approved By: _____
NDE Level III

Rev. 5

Date: 3/9/90

REV. 5 reviewed at ORC meeting no. 90-26

A. Surface irregularities such as rough weld ripples that interfere with the (PT) examination
B. Dirt
C. Rust
D. Mill scale
E. Grease
F. Lint
G. Salts
H. Weld spatter
I. Welding flux
J. Coatings
K. Adhering or embedded sand
L. Other extraneous material that would interfere with processing the part.

6.1.5 Illumination - Examinations shall be conducted with sufficient illumination to ensure that no loss of test sensitivity will occur. This shall be determined by the Level II conducting the examination.

6.1.6 Standard Temperature - The temperature of the penetrant materials and test surfaces shall be within the range of 60°F to 125°F during the examination of this temperature range shall be considered nonstandard and will require qualification (validation) in accordance with Attachment A and will be documented on Attachment B of this procedure.

6.1.7 ALARA Requirements - When performing penetrant examinations in high radiation areas caution should be taken to conserve the amount of exposure received by examination personnel. This can be achieved by leaving the high radiation area during the examination for the following steps:

- precleaning
- dwell time
- excess penetrant removal period

Once the above steps are completed and the drying or dwell periods are in progress, leave the high radiation area and wait in a radiation area that will result in lowering total exposure received. Each PT examiner should consult with the HP technician controlling the applicable RWP & work area to meet this requirement (ALARA).

5

6.2 Specific Requirements

6.2.1 Extent of Surface Cleaning - Prior to the application of pentrant, the surface to be examined must be cleaned for at least 1 (one) inch on either side of the region to be examined. Small parts shall be cleaned in their entirety. Solvent cleaner from the penetrant test kit shall be used for the precleaning agent. Various methods can be utilized for applying the solvent (i.e., spraying, soaking of test part in solvent, wiping with a cloth, soaked in solvent, etc). Whichever method is used, excess cleaner shall be removed with a clean, dry, and absorbent lint free wiper.

The surface shall be in the normal temperature range and be permitted to dry for a minimum of 5 (five) minutes prior to the application of penetrant.

6.2.2 Penetrant Application - Penetrant shall only be applied to a clean, dry surface which is at normal temperature. It can be applied by the following manner:

- Spraying
- Brushing
- Dipping

NOTE

A constant supply of penetrant shall remain on test surfaces during the penetrant dwell period. If at any time during the dwell period the surface penetrant dries, the test part shall require recleaning of the surface and re-examination.

6.2.3 Dwell - The penetrant must dwell on the examination surface for a minimum time period as identified in Attachment C of this procedure.

6.2.4 Excess Penetrant Removal - As soon as the dwell time has lapsed the examination surface shall be processed as follows:

A. With a lint free, absorbent dry cloth, wipe the examination surface removing the majority of excess surface pentrant. This should be done by wiping in one direction. This practice will avoid the smearing of shallow indications.

B. Next, with a solvent dampened wiper, wipe the examination surface until it is apparent that the surface is free of excess surface penetrant that would create interpretation difficulties. The surface again should be wiped in one direction during this step.

6.2.5 Pre-Development Drying - After the excess surface penetrant has been removed, the surface shall be allowed to dry for a minimum of 5 minutes. This is accomplished through normal evaporation of the solvent. Solvent drying time shall not exceed 8 minutes.

6.2.6 Developer Application - The developer shall be applied as soon as possible after the pre-development drying is accomplished. The developer should be agitated during application to ensure that when sprayed on the examination surface no clogging or separating of developer and solvent occurs. Suspensions shall be applied by spraying, except where a health hazard exists. Under such conditions, developers may be applied by other means approved and documented by the responsible Level III individual.

A thin, uniform coating of sufficient thickness shall be applied that eliminates the sheen of the materials surface. Heavy developer accumulation that would cause indications to become masked or produce an irregular bleed-out pattern are prohibited.

6.2.7 Observation and Evaluation - Using proper illumination, the test surface shall be observed closely for the initial formation of indications as the coating dries. Such early observation will disclose the true size and shape of any discontinuities which tend to bleed out profusely.

After allowing a minimum bleed-out time of 7 minutes, all of the area under test must be reviewed as a final evaluation of discontinuity indications. The final evaluation must be completed within 30 minutes after developer application in order to control excessive dye seepage, drying of penetrant, or fading of indications. Any indications which exceed applicable acceptance criteria shall be recorded on the Record of Liquid Penetrant Examination form Attachment B.

Any indication believed to be nonrelevant shall be regarded as a defect until the indication is either eliminated by surface conditioning or is demonstrated to be nonrelevant. Nonrelevant indications which could mask defect indications are unacceptable. Relevant indications are those which result from mechanical discontinuities. Linear indications are those indications in which the length-to-width ratio exceeds a prescribed value, in the applicable code or specifications. Rounded indications are indications which are circular or elliptical with length-to-width ratio less than that prescribed for the linear condition.

A. Unless caused by porosity, broad areas of pigmentation shall be considered as evidence of improper cleaning. All such areas shall be recleaned and retested.

B. The area in which any questionable indications appear shall be retested.

6.2.8 Post-Examination Cleaning - After examination, all dye and developer shall be cleaned from the part or area. Acetone, alcohol, or the penetrant cleaner/remover may be used provided the selected cleaner meets the requirements of paragraph 6.1.1. The cleaned surfaces shall be examined thoroughly to ensure that all traces of penetrant materials have been removed.

6.3 Acceptance Criteria

Detailed acceptance criteria excluding ASME Section XI are delineated in the applicable code section, addendum, or specification. Criteria usually include limits on size, quantity, proximity, and/or orientation of linear and of rounded indications.

6.3.1 For ASME Section XI Categories B-A, B-F, B-G-1, B-H, B-J, B-K-1, B-L-1, B-M-1, B-O, C-B, C-C, C-E, C-F, and C-G indications which meet or exceed the following criteria shall be recorded.

A. Any cracks and linear indications.

B. Rounded indications with dimensions greater than 1/16".

C. Four or more rounded indications in a line separated by 1/16" or less edge to edge.

D. Ten or more rounded indications in any 6 square inches of surface with major dimension of this area not to exceed 6" with the area taken in the most unfavorable location relative to the indications being evaluated.

6.3.2 For ASME Section XI Categories B-A, B-F, B-G-1, B-H, B-J, B-K-1, B-L-1, B-M-1, B-O, C-B, C-C, C-E, C-F, and C-G, the following indications shall be reported.

A. Any cracks.

B. Linear or rounded indications greater than 1/8".

C. Four or more rounded indications in a line separated by 1/16" or less to edge.

6.3.3 All relevant ASME Section XI indications shall be evaluated by QQC NDE Level III in accordance with the acceptance standards of the applicable attachment as follows:

CATEGORY	ATTACHMENT
B-A	M
B-F	D or E (as applicable)
B-G-1	F
B-H	G or H (as applicable)
B-J	D or E (as applicable)
B-K-1	G or H (as applicable)
B-L-1	I or J (as applicable)
B-M-1	I or J (as applicable)
B-O	K
C-B	L
C-C	G or H (as applicable)
C-F	D or E (as applicable)
C-G	I or J (as applicable)

NOTE

At times it may be necessary to employ other nondestructive means to determine the status of an indication. Tests employed for this purpose shall first have the approval of the responsible Level III. It is the duty of the Level II or Level III person interpreting examination results to request such approval to perform, or to have performed, specific additional examinations as needed for an accurate determination of an indication's status.

6.3.4 ASME Section XI Class 1, 2 & 3 piping welds shall meet the requirements of ASME Section XI 1980 W 80 Addenda paragraphs IWB 3514.2 and IWB 3514.3 for further evaluation when reportable indications are found. 5

All indications determined rejectable by Boston Edison QC shall be recorded on a Nonconformance Report (NCR). The NCR shall be completed in accordance with Reference 3.7. QQC must be notified within one hour of the discovery of a rejectable component so that timely reportability reviews can be performed. The NCR number shall be annotated on the PT data sheet.

7.0 RECORDS

7.1 The results of the examination and all pertinent information for conducting the examination shall be recorded on Record of Liquid Penetrant Examination, Attachment B or equivalent. Attachment B and all pertinent information related to an ASME Section XI examination shall be documented per Reference 3.9. The originals shall be sent to QQC for review in accordance with References 3.8 and 3.9. All installation reports shall be documented per Reference 3.10. All surveillance reports shall be documented per Reference 3.6.

7.2 The adequacy of this procedure shall be demonstrated to the satisfaction of the Authorized Nuclear Inspector and documented in QQC's NDE records.

8.0 ATTACHMENTS

A. Qualification of Procedures for Nonstandard Temperatures.

B. Record of Liquid Penetrant Examination.

C. Table 1 Minimum Penetrant Dwell Times

D. Table 2 Allowable Planar Indications.

E. Table 3 Allowable Planar Indications.

F. Table 4 Standard for Examination Category B-G-1, Pressure Retaining Bolting 2 in. and Larger in Diameter.

G. Table 5 Allowable Planar Indications

H. Table 6 Allowable Planar Indications

I. Table 7 Allowable Planar Indications

J. Table 8 Allowable Planar Indications

K. Table 9 Allowable Indication Standards for Surface Examination Category B-O Welds.

L. Table 10

M. Table 11

N. Table 12 Figures 1 through 17

O. Liquid Penetrant Examination - Procedure Technique

QUALIFICATION OF PROCEDURES FOR NONSTANDARD TEMPERATURES

A. GENERAL REQUIREMENTS

When it is impractical to conduct a PT within the temperature range of 60°F to 125°F and the procedure has been qualified to the requirements of an operational Procedure, examination at the proposed temperature must be further qualified. This is accomplished by producing quench cracks in an aluminum block, which for this purpose is designated as a liquid penetrant comparator, and then examining one section of the block at the proposed temperature and the other section of the block at a temperature in the range of 60°F to 125°F.

B. LIQUID PENETRANT COMPARATOR

The liquid penetrant comparator shall be made of aluminum SB.211, Type 2024, as rolled, 3/8 inch thick and shall have face dimensions of 2 inches x 3 inches. At the center of each face, an area approximately 1 inch in diameter shall be marked with a 950°F temperature indicating crayon or paint. The marked area shall be heated by a blowtorch, a Bunsen burner, or a similar device to a temperature of 950°F to 975°F. The specimen is then quenched in cold water to produce a network of fine cracks on each of the faces. The block shall then be dried by heating to 300°F, after which a groove shall be machined across the center of each face 1/16 inch deep and 3/64 inch wide. One half of the specimen shall be designated as "A" and the other as "B" for identification in subsequent procedures. Figure 1 shows the comparator after the grooves have been cut.

C. COMPARATOR APPLICATION

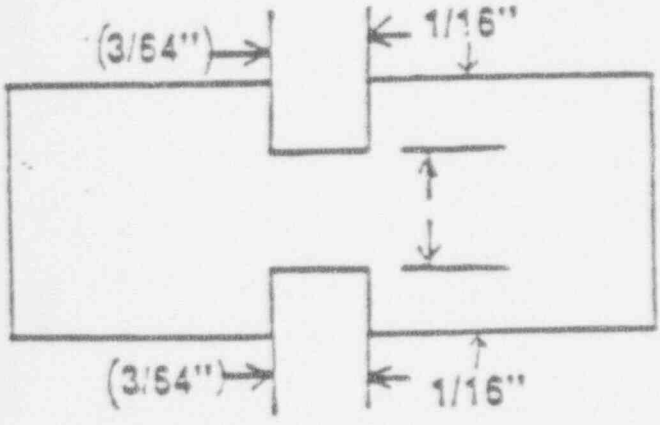
1. If it is desired to qualify a PT procedure at a temperature less than 60°F, the proposed procedure shall be applied to area "B" after the block and all materials have been cooled to the proposed examination temperature. The block then shall be allowed to warm to a temperature of 60°F to 125°F and area "A" examined in a manner which has been demonstrated to be suitable for use in this temperature range. The indications of cracks shall be compared for areas "A" and "B". If the indications obtained under the proposed conditions are essentially the same as those obtained under the examination at 60°F to 125°F, the proposed procedure may be considered qualified for use.

2. If the proposed temperature for the examination is above 125°F, then only the block need be held at this temperature throughout the examination of the "B" section. The block shall then be allowed to cool to a temperature between 60°F and 125°F and area "A" examined and compared.

Figure 1

TOP VIEW

END VIEW



Rev. 5
Attachment B
Page 1 of 1

BOSTON EDISON
RECORD OF LIQUID PENETRANT EXAMINATION

ITEM ID/PIECE *	SYSTEM LOCATION _____	MR#	ISO/DWG NUMBER
MATERIAL	TYPE		
GEOMETRY	PIPE ____ PLATE ____ ROD ____ OTHER _____		
FABRICATION PROCESS	CAST ____ WORKED ____ WELDED ____ OTHER ____	INSPECTION HOLD POINT	
B. PROCEDURE	TEMPERATURE (IF NOT BETWEEN 60-125 F) ----F	PROCEDURE # _____	PT VALIDATION # _____

SURFACE IS SUITABLE FOR SCHEDULED -- PT -- UT EXAMINATION YES/NO

INSPECTION MATERIALS	BRAND	DESIGNATION	BATCH #
1. PRE-CLEANER			
2. PENETRANT			
3. REMOVER			
4. DEVELOPER			
5. POST EXAM CLEANER			

SKETCH OR OTHER DETAILS. (ATTACH ADDITIONAL SHEETS AS NECESSARY)

C. EVALUATION — REPORT BELOW THOSE INDICATIONS OBSERVED AND THE PERTINENT INFORMATION REQUIRED. USE ADDITIONAL SHEETS AS NECESSARY.

LOCATION	SIZE (INCHES)	DESCRIPTION	ACTION. ACCEPT/REJECT AND COMMENT AS NECESSARY
1.			
2.			
3.			
4.			

D. CRITERIA

E. ATTEST

COMPONENTS MEET/DO NOT MEET ASME SECTION XI CRITERIA.
FURTHER EVALUATION REQUIRED YES/NO

_____/_____ ---/--- --/--/---
RESPONSIBLE CERTIFIED PERSONNEL LEVEL DATE

_____/ --/-- | _____/ --/---
BECO LEVEL III DATE | ANII DATE

TABLE 1

MINIMUM PENETRANT DWELL TIMES

MATERIAL	FORM	TYPE OF DISCONTINUITY	SOLVENT-REMOVABLE
Aluminum	Castings	Porosity & cold shuts	10
	Extrusion/forgings	Laps	10
	Welds	Lack of fusion and porosity	10
	All forms	Cracks	10
Magnesium	Castings	Porosity & cold shuts	10
	Extrusion/forgings	Laps	10
	Welds	Lack of fusion and porosity	10
	All forms	Cracks	10
Steel	Castings	Porosity & cold shuts	10
	Extrusion/forgings	Laps	10
	Welds	Lack of fusion and porosity	20
	All forms	Cracks	20
Brass & Bronze	Castings	Porosity & cold shuts	10
	Extrusion/forgings	Laps	30
	Brazed Parts	Lack of fusion and porosity	10
	All forms	Cracks	10
Plastic	All forms	Cracks	10
Glass	All forms	Cracks	10
Carbide-tipped Tools	All forms	Lack of fusion and porosity	10
	All forms	Cracks	20
Titanium & High Temp. Alloys	All forms	Cracks	20-30
Ceramic	All forms	Cracks & porosity	10

TABLE 2

ALLOWABLE PLANAR INDICATIONS

MATERIALS: Ferritic steels that meet the requirements of NB-2300 and specified minimum yield strength of 50 ksi or less at 100°F.

SURFACE EXAMINATION METHOD

NOMINAL WALL THICKNESS, t, in. 1, 2	INDICATION LENGTH, ℓ, in.
PRESERVICE EXAMINATION	
0.312 or less	1/8
1.0	3/16
2.0	1/4
3.0	1/4
4.0	1/4
INSERVICE EXAMINATION	
0.312 or less	0.2
1.0	0.3
2.0	0.6
3.0	0.8
4.0 and over	0.8

NOTES:

(1) For intermediate flaw aspect ratios a/ℓ, and thickness t, linear interpolation is permissable.

(2) t is nominal wall thickness or actual wall thickness as determined by UT examination.

TABLE 3

ALLOWABLE PLANAR INDICATIONS

MATERIALS: Austenitic steels that meet the requirements of minimum yield strength of 35 ksi or less at 100°F.

NOMINAL WALL THICKNESS, t, in. 1, 2	SURFACE EXAMINATION METHOD INDICATION LENGTH, ℓ, in.
PRESERVICE EXAMINATION	
0.312 or less	1/8
1.0	3/16
2.0	1/4
3.0 and over	1/4
INSERVICE EXAMINATION	
0.312 or less	0.2
1.0	0.25
2.0	0.45
3.0	0.65

NOTES:

Same as (1) and (2) Table 2. Attachment D

TABLE 4

STANDARD FOR EXAMINATION CATEGORY
B-G-1, PRESSURE RETAINING BOLTING
2 IN. AND LARGER IN DIAMETER

ALLOWABLE INDICATIONS FOR SURFACE EXAMINATIONS

Allow surface indications in vessel closure studs and pressure retaining bolting shall not exceed the following limits:

(a) nonaxial indications, 1/4 in. (6.4 mm) in length.

(b) axial indications, 1 in. (25 mm) in length.

TABLE 5

ALLOWABLE PLANAR INDICATIONS

MATERIALS: Ferritic steels meet the requirements of NB-2300 and specified yield strength of 50 ksi or less at 100°F. Thickness Range: 0.625 in. and greater.

NOMINAL SECTION THICKNESS, 1, 2 t, in.	SURFACE EXAMINATION INDICATION LENGTH, ℓ, in.
PRESERVICE EXAMINATION	
0.625 to 2.0	3/16
2.0	1/4
3.0	1/4
4.0	1/4
5.0	1/4
6.0 and over	1/4
INSERVICE EXAMINATION	
0.625 to 1.5	0.25
2.0	0.3
3.0	0.45
4.0	0.6
5.0	0.75
6.0 and over	0.9

NOTES:

(1) For intermediate flaw aspect ratios a/ℓ, and thickness t, linear interpolation is permissable.

(2) Where support section thickness varies, the average thickness over the length of the indication is the section thickness.

TABLE 7

ALLOWABLE PLANAR INDICATIONS

MATERIALS: Ferritic steels that meet the requirements of NB-2300 and specified minimum yield strength of 50 ksi or less at 100°F.

THICKNESS RANGE:

2 in. or greater

SURFACE METHOD

NOMINAL WALL THICKNESS, t, in. 1,2	SURFACE INDICATIONS, LENGTH ℓ, IN.
PRESERVICE EXAMINATION	
2.0	1/4
3.0	1/4
4.0	1/4
5.0	1/4
6.0 and over	1/4
INSERVICE EXAMINATION	
2.0	0.3
3.0	0.45
4.0	0.6
5.0	0.75
6.0 and over	0.9

NOTES:

(1) For intermediate flaw aspect ratios a/ℓ, and thickness t, linear interpolation is permissable.

(2) Component thickness t is measured normal to the pressure retaining surface of the component. Where section thickness varies, the average thickness over the length of the indication is the component thickness.

TABLE B

ALLOWABLE PLANAR INDICATIONS

MATERIALS: Austenitic stainless steels with specific minimum yield strength of 35 ksi or less at 100°F.

THICKNESS RANGE:

2 in. and greater

VOLUMETRIC (RT) AND SURFACE METHOD

NOMINAL WALL THICKNESS, t, in. (1)	SURFACE INDICATION LENGTH, ℓ, in.
PRESERVICE EXAMINATION	
2.0	1/4
3.0 and over	1/4
INSERVICE EXAMINATION	
2.0	0.3
3.0 and over	0.45

NOTES:

(1) t is the nominal wall thickness at the section where the indication is detected, or the actual wall thickness as determined by a UT examination. For intermediate wall thickness, linear interpolation is acceptable.

TABLE 9

ALLOWABLE INDICATION STANDARDS FOR SURFACE EXAMINATION CATEGORY B-O WELDS

(a) The size of allowable indications shall not exceed 3/16 in. (4.8mm) for the preservice examination, and 1/4 in. (6.4mm) for the inservice examination.

(b) Where an indication on the outer surface of the housing exceeds the allowable standards, the indication may be examined using the volumetric method, and the acceptance standards of IWB-3523.3 shall apply.

TABLE 10

(a) The size of allowable surface indications, as detected by surface examination of the area shown in Figures 12 and 13, shall not exceed 1/4 in. (6.4mm) in length at a preservice examination, and 5/16 in. (8mm) in length during an inservice examination.

TABLE 11

(a) The size of allowable surface indications, as detected by surface examination of the area shown in Figures 1, shall not exceed 1/4 in. (6.4mm) in length at a preservice examination, and 5/16 in. (8mm) in length during an inservice examination.

(b) Surface indications within cladding are acceptable.

FIGURE 1

HEAD-TO-FLANGE WELD JOINT - CLASS 1

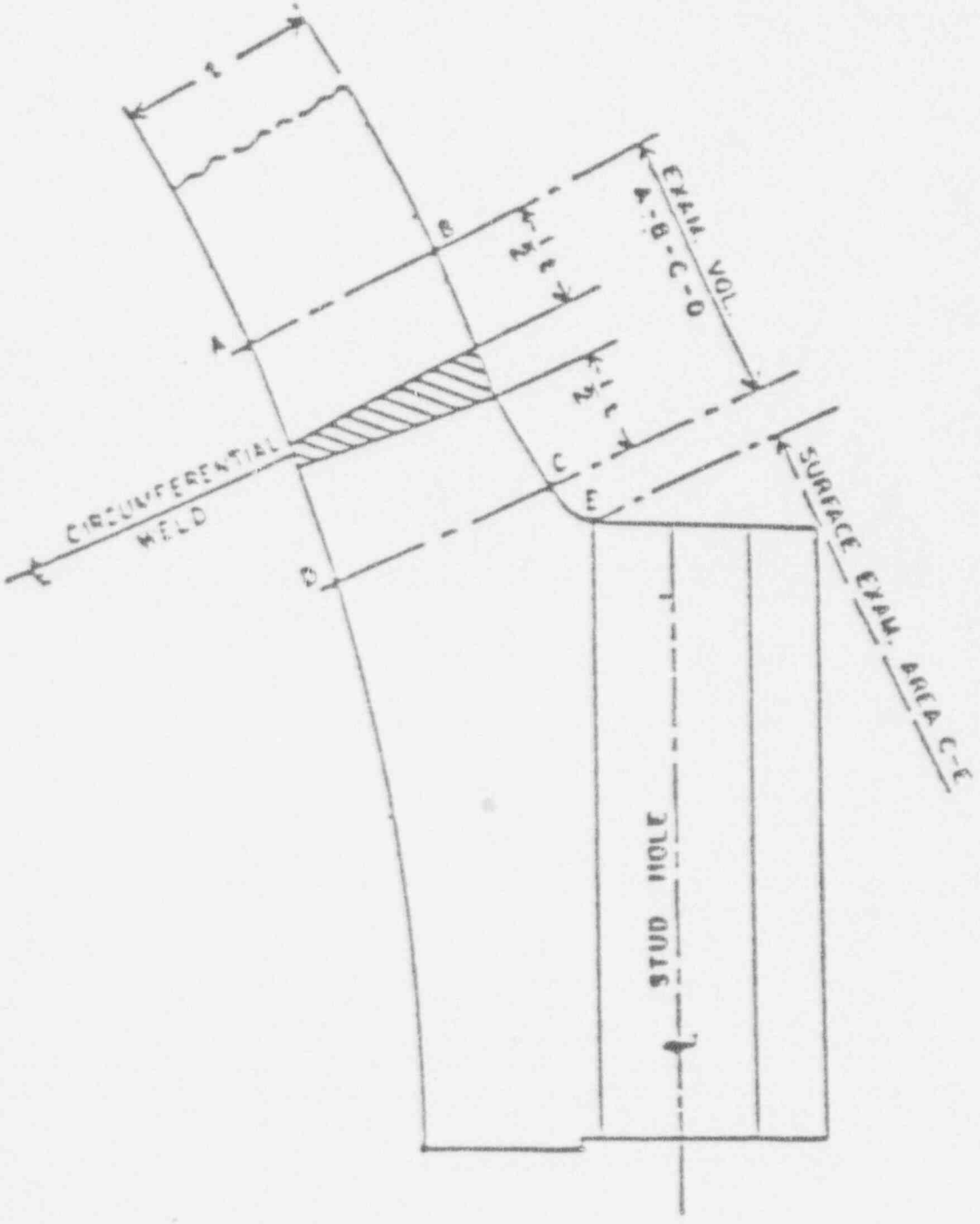
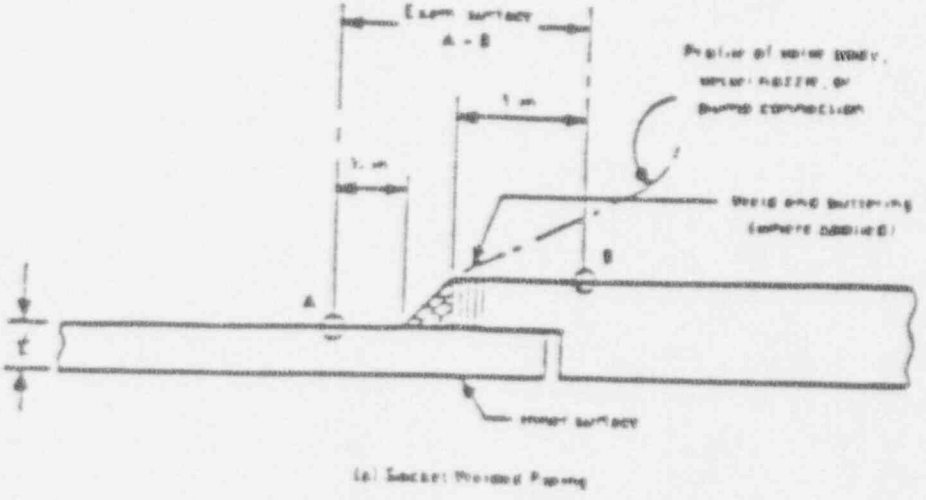
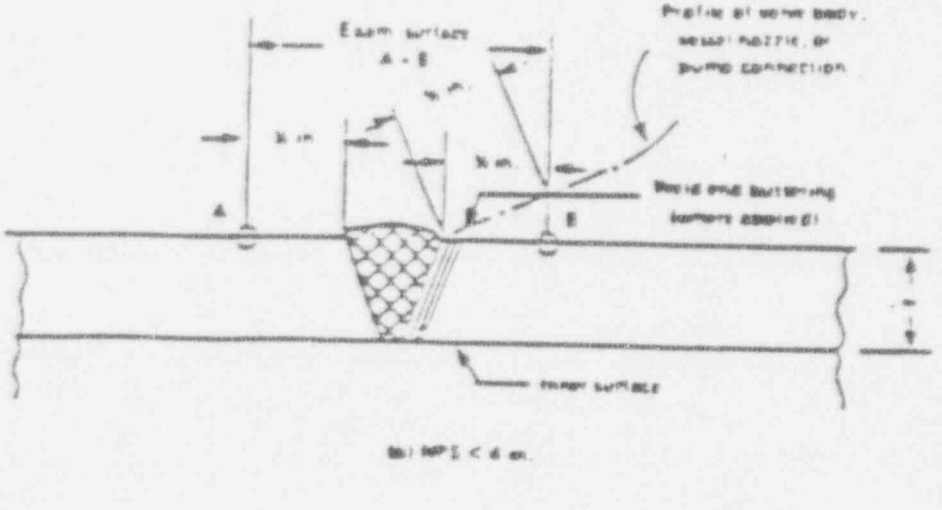


FIGURE 2

SIMILAR AND DISSIMILAR METAL WELDS IN PIPING - CLASS 1



(a) Similar Welded Piping



(b) $NPS < 4$ in.

FIGURE 2 (CONT)

SIMILAR AND DISSIMALAR METAL WELDS IN PIPING - CLASS 1

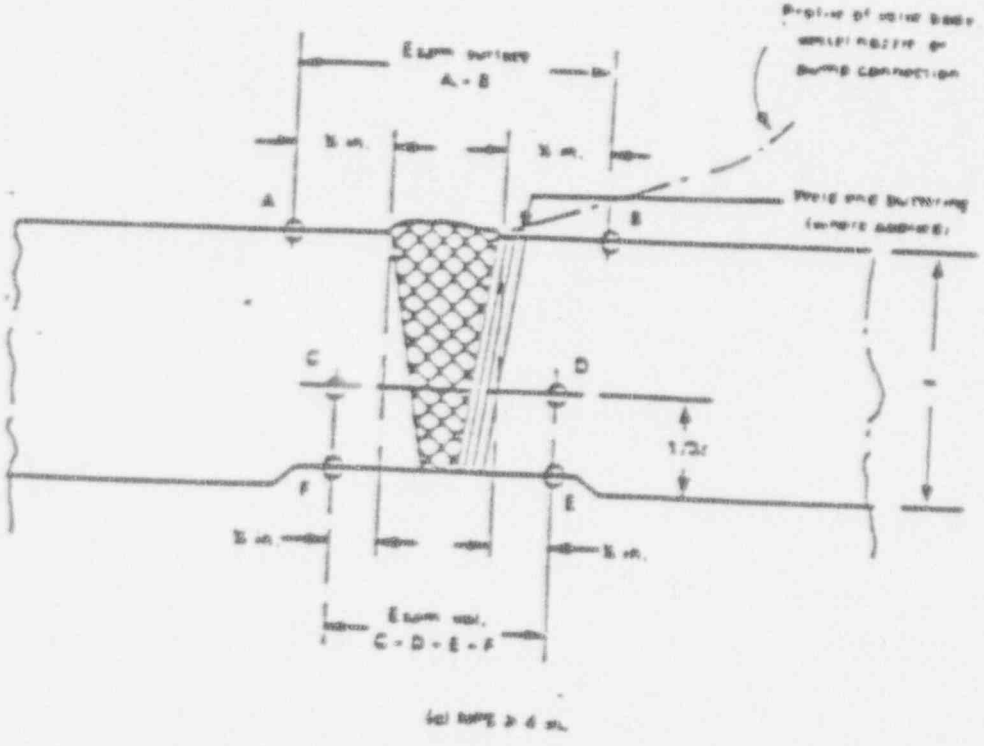


FIGURE 3

PIPE BRANCH CONNECTION - CLASS 1

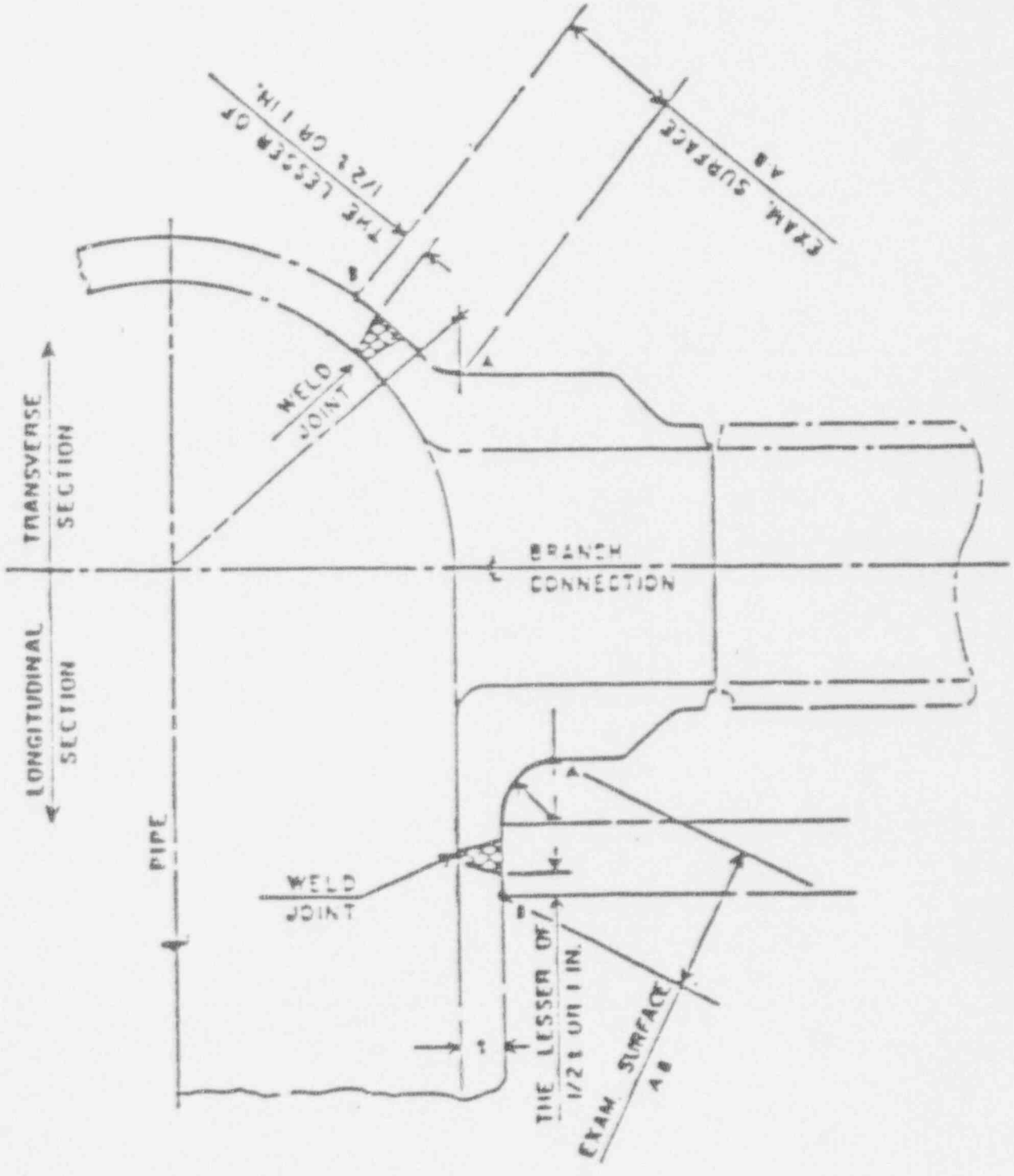


FIGURE 4

PIPE BRANCH CONNECTION - CLASS 1

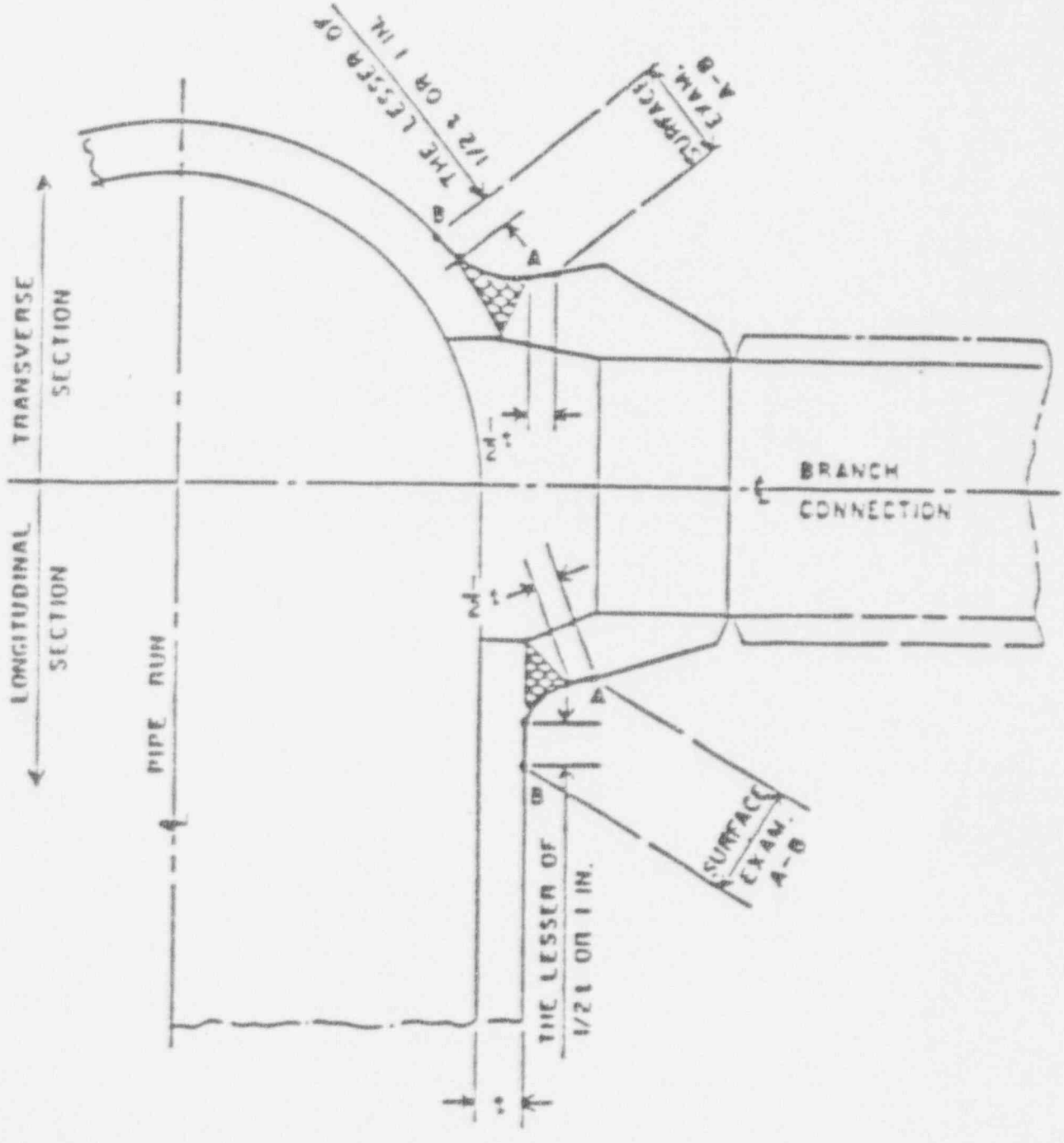


FIGURE 5

PIPE BRANCH CONNECTION - CLASS 1

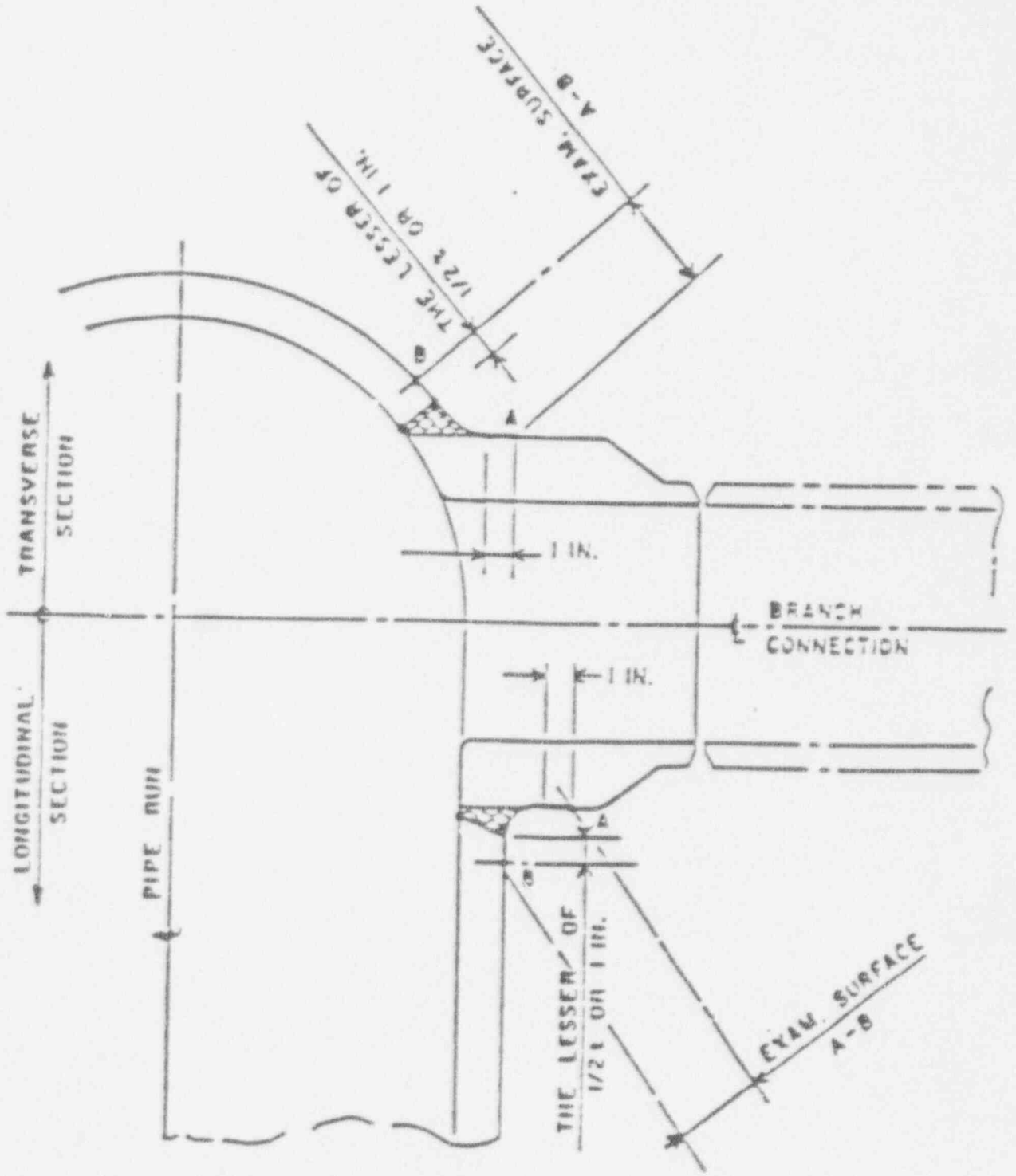


FIGURE 6

SUPPORT CIRCUMFERENTIAL WELD JOINT - CLASS 1

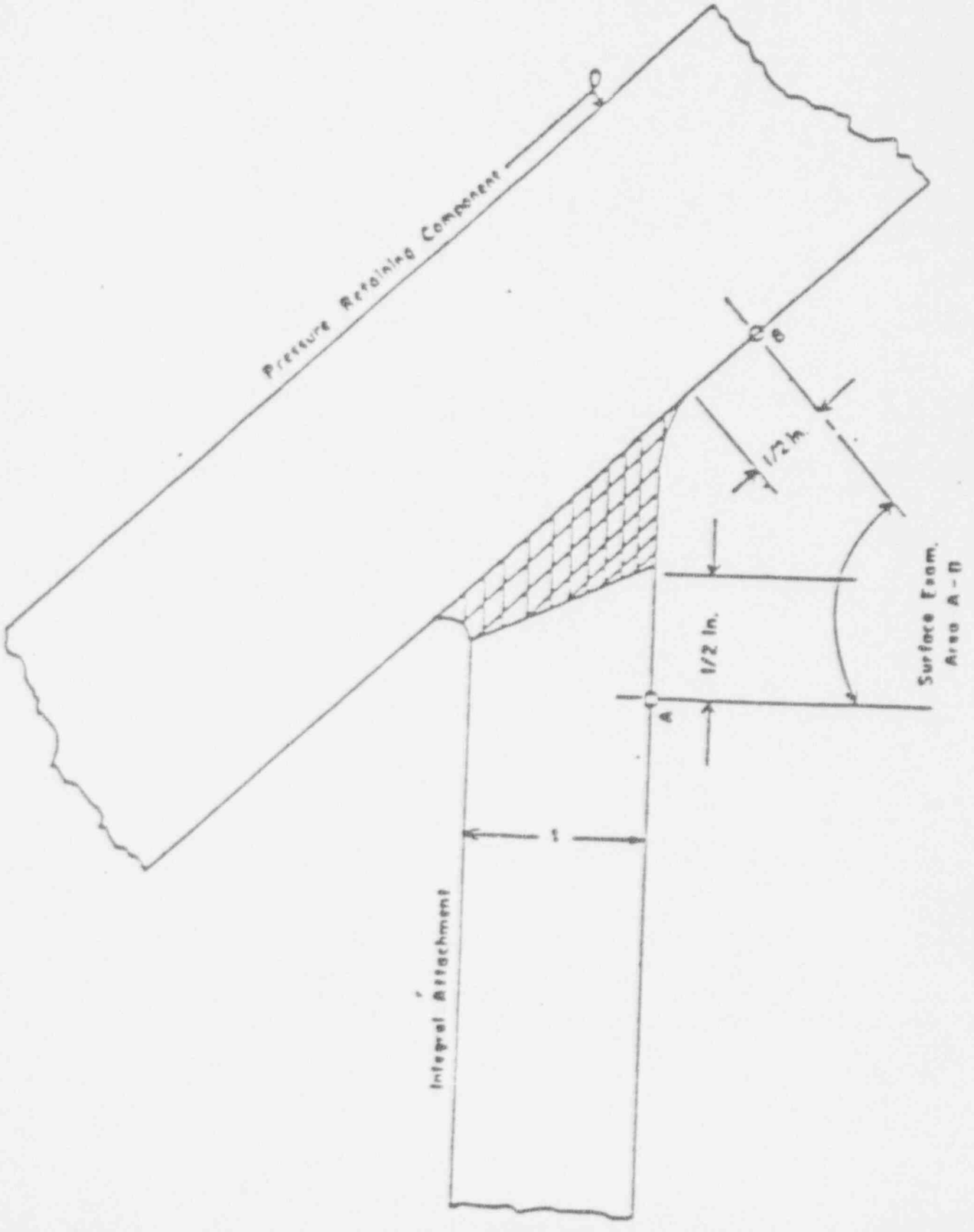
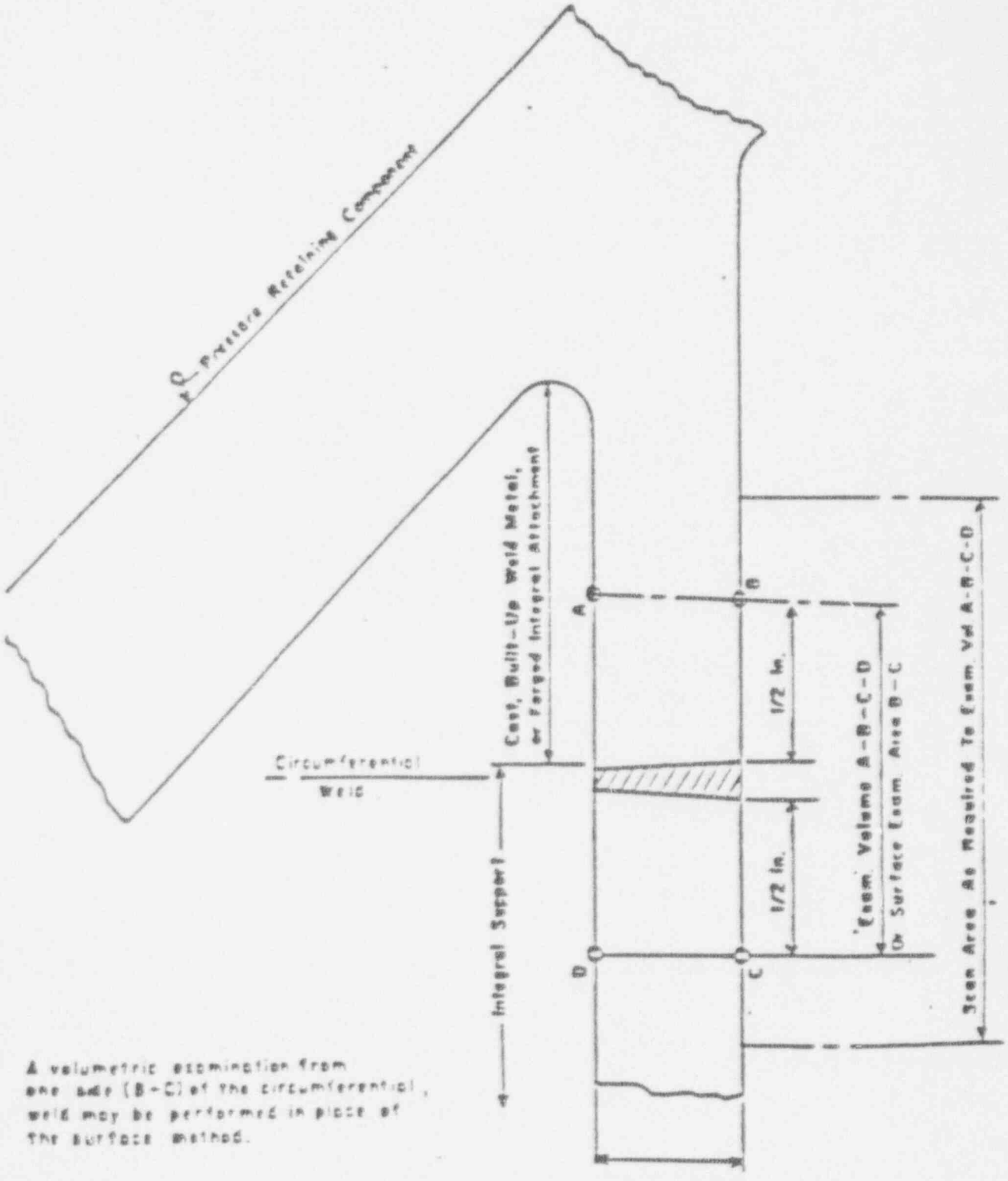


FIGURE 7

SUPPORT CIRCUMFERENTIAL WELD JOINT - CLASS 1



A volumetric examination from one side (B-C) of the circumferential weld may be performed in place of the surface method.

FIGURE 8

SUPPORT LUG ATTACHMENT - CLASS 1

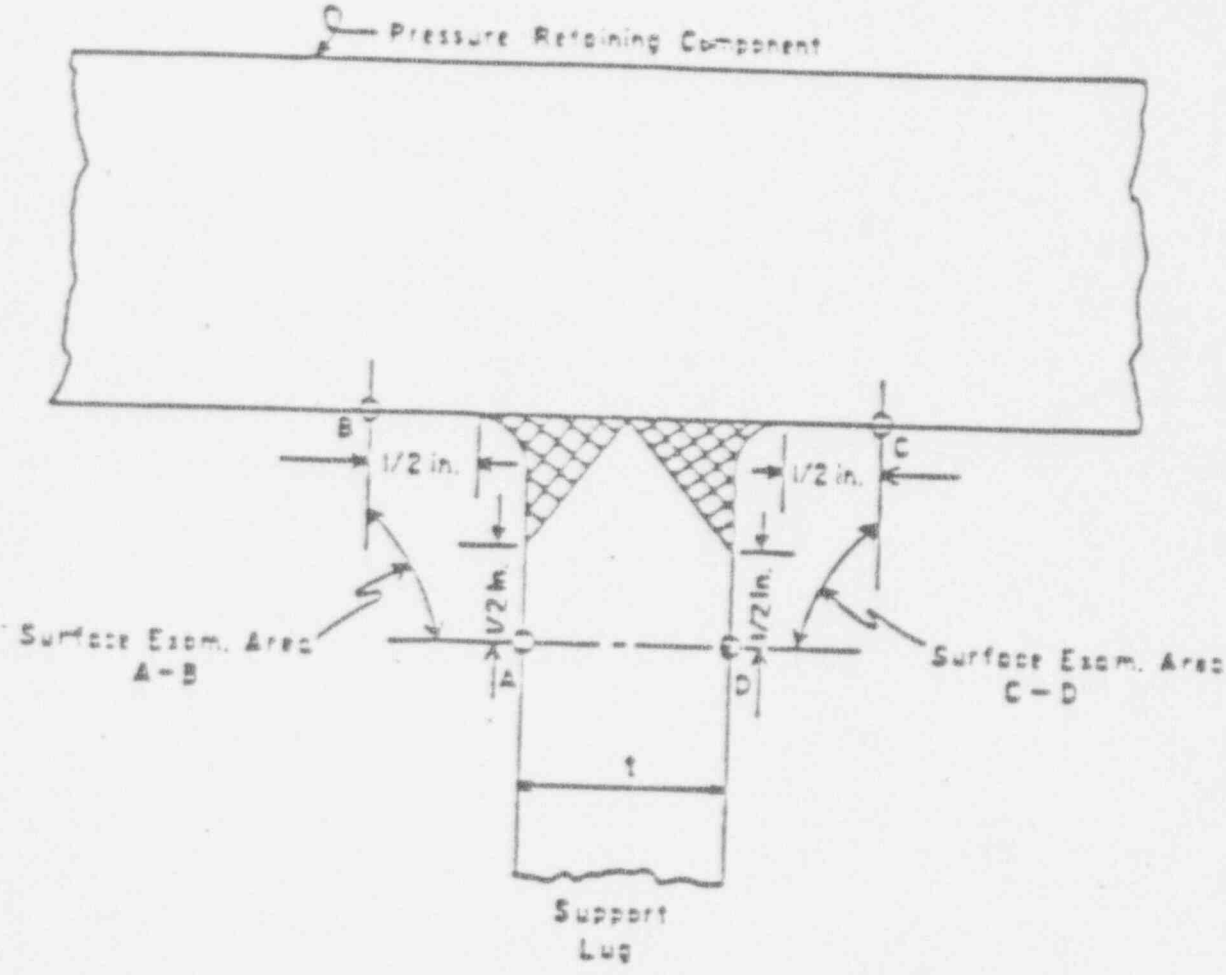


FIGURE 9

PUMP CASING WELD - CLASS 1

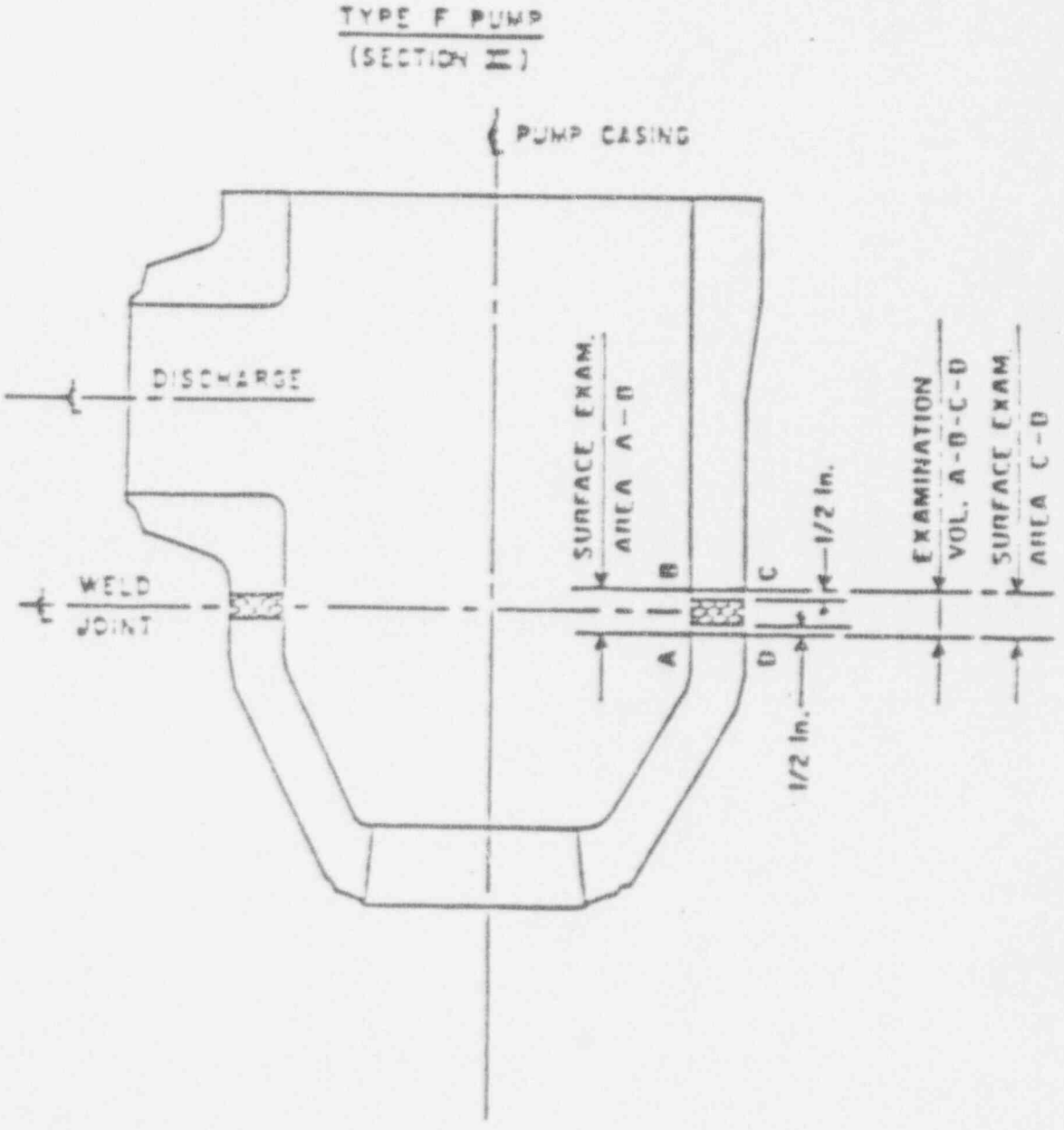


FIGURE 10

VALVE BODY WELDS - CLASS 1

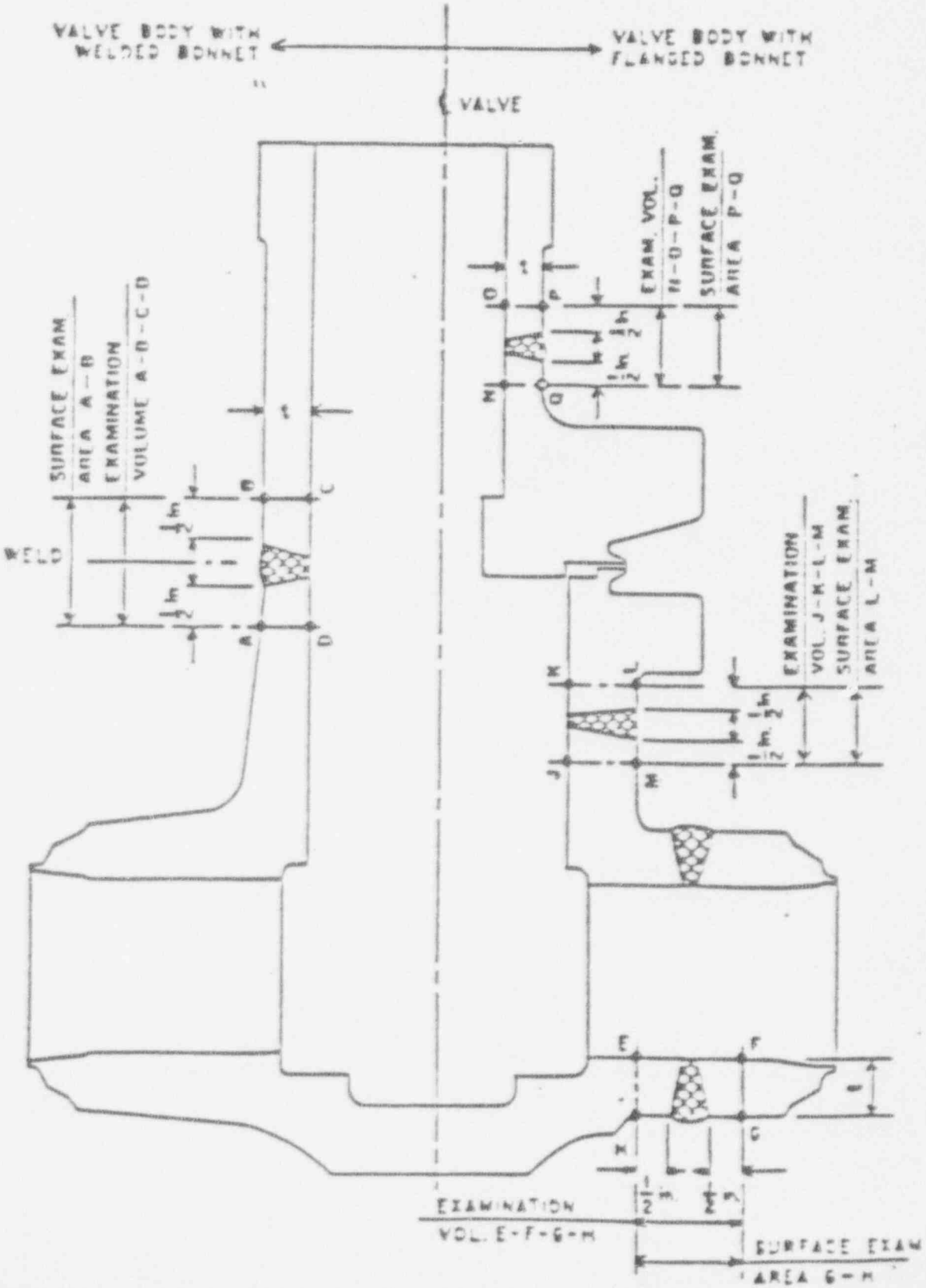


FIGURE 11

CONTROL ROD DRIVE HOUSING WELDS - CLASS 1

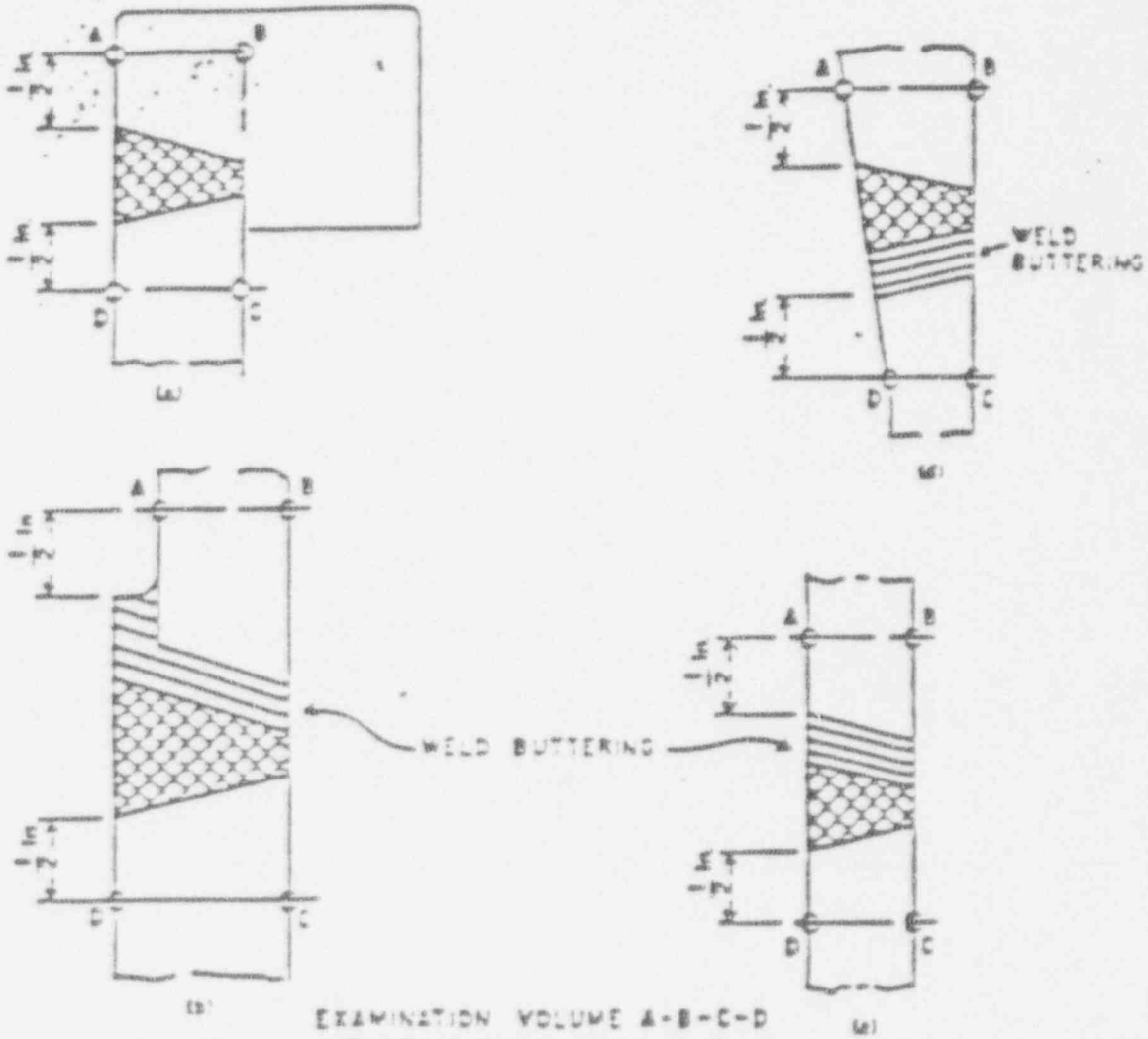


FIGURE 12

NOZZLE-TO-VESSEL WELDS - CLASS 2

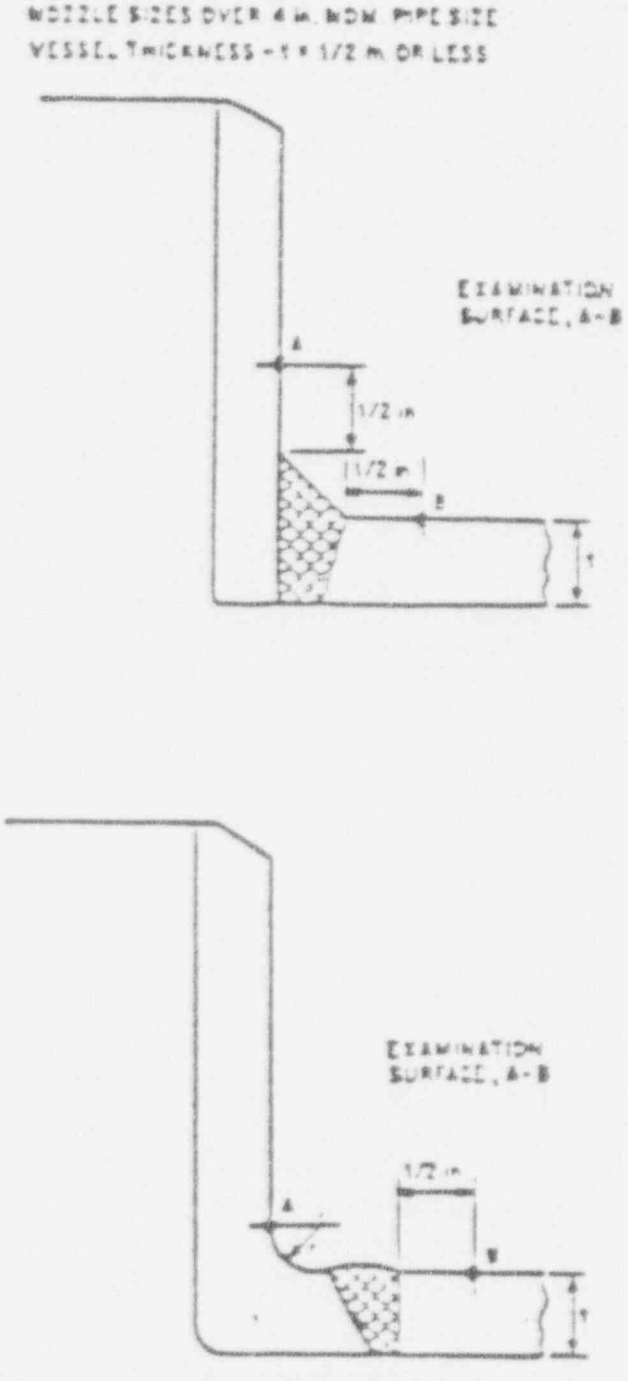


FIGURE 13

NOZZLE-TO-VESSEL WELDS - CLASS C

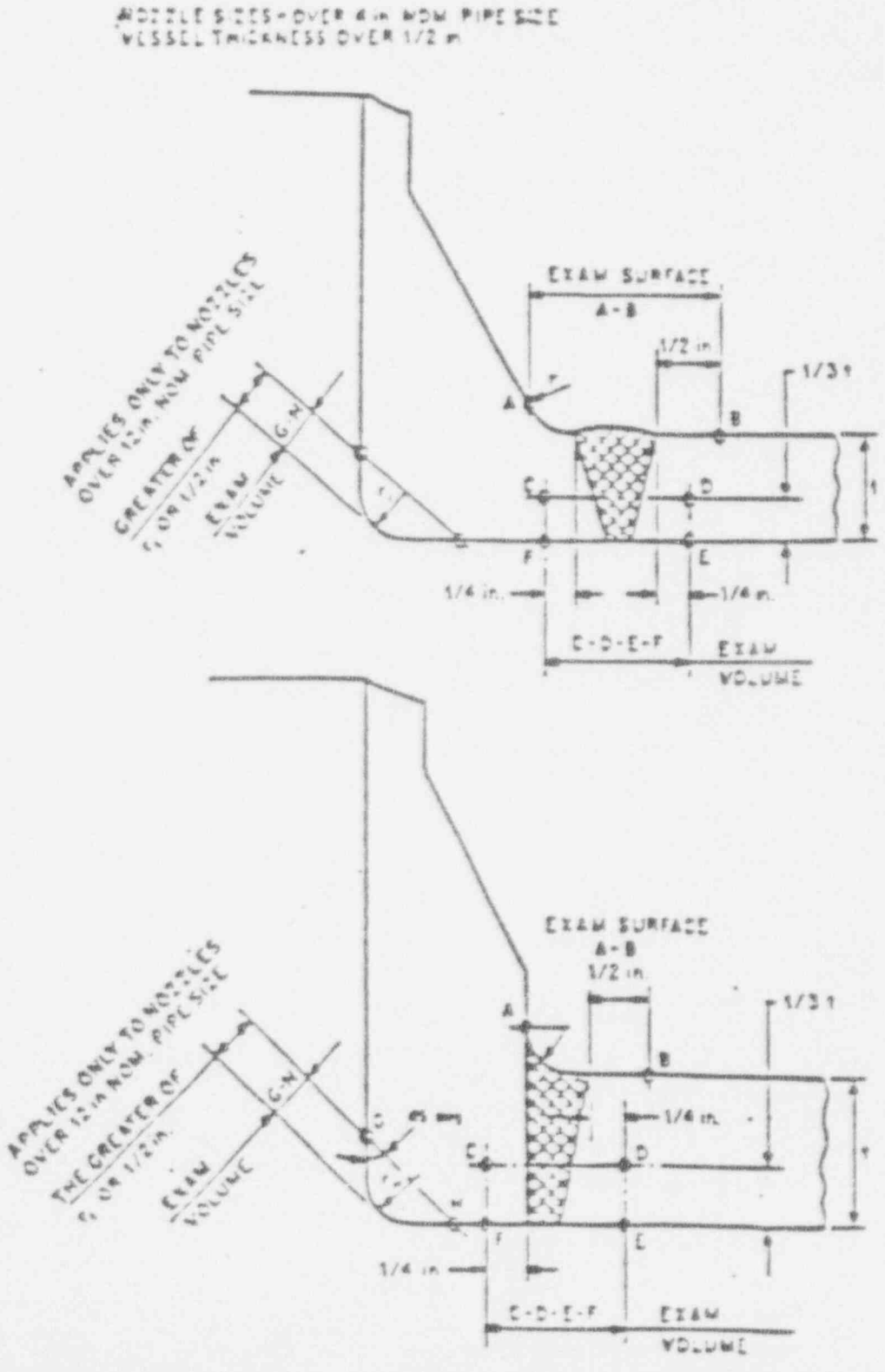
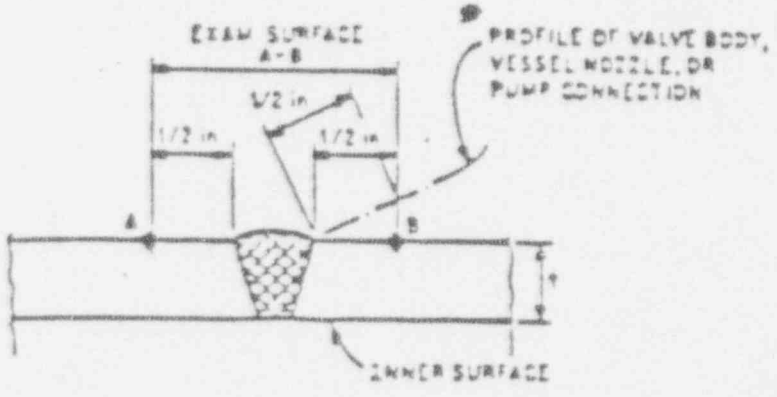
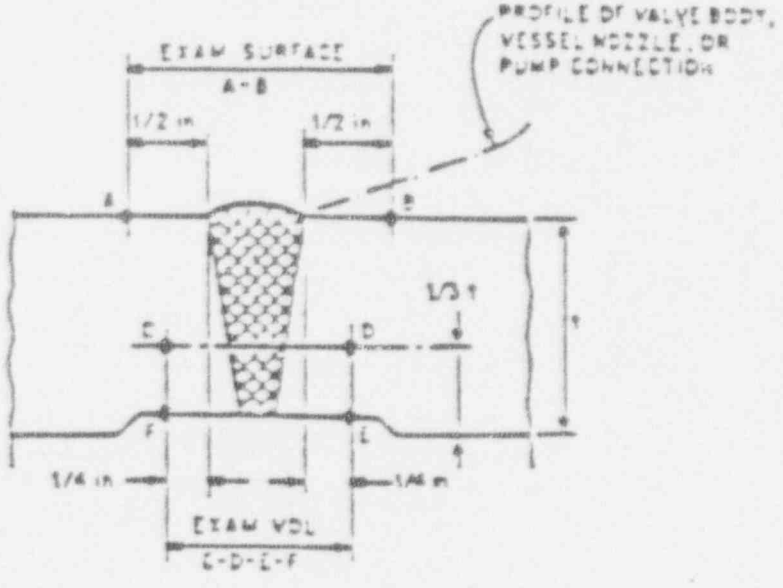


FIGURE 15

WELDS IN PIPING - CLASS 2



NOM PIPE WALL THICKNESS, t ≤ 1/2 in OR LESS



NOM PIPE WALL THICKNESS t OVER 1/2 in

FIGURE 16

WELDS IN PUMP CASING AND VALVE BODIES - CLASS 2

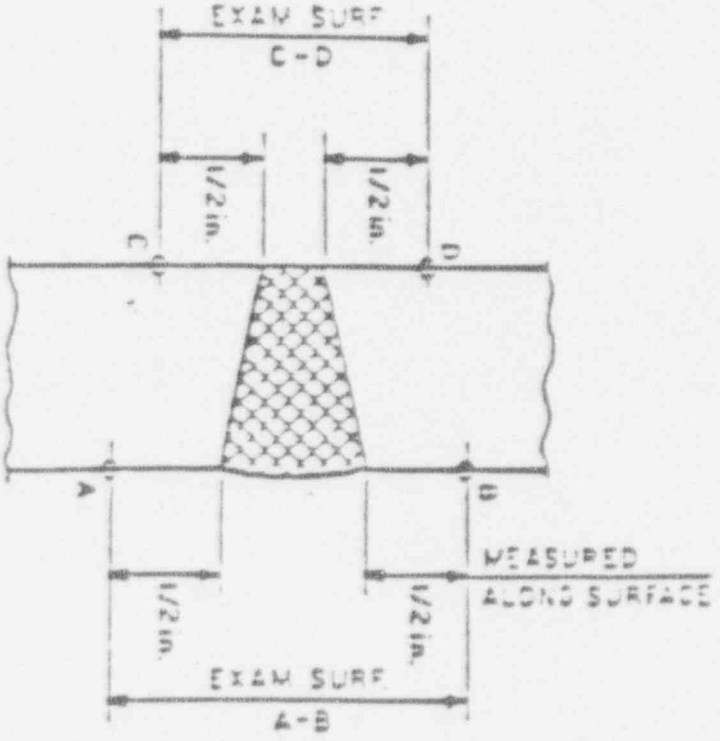
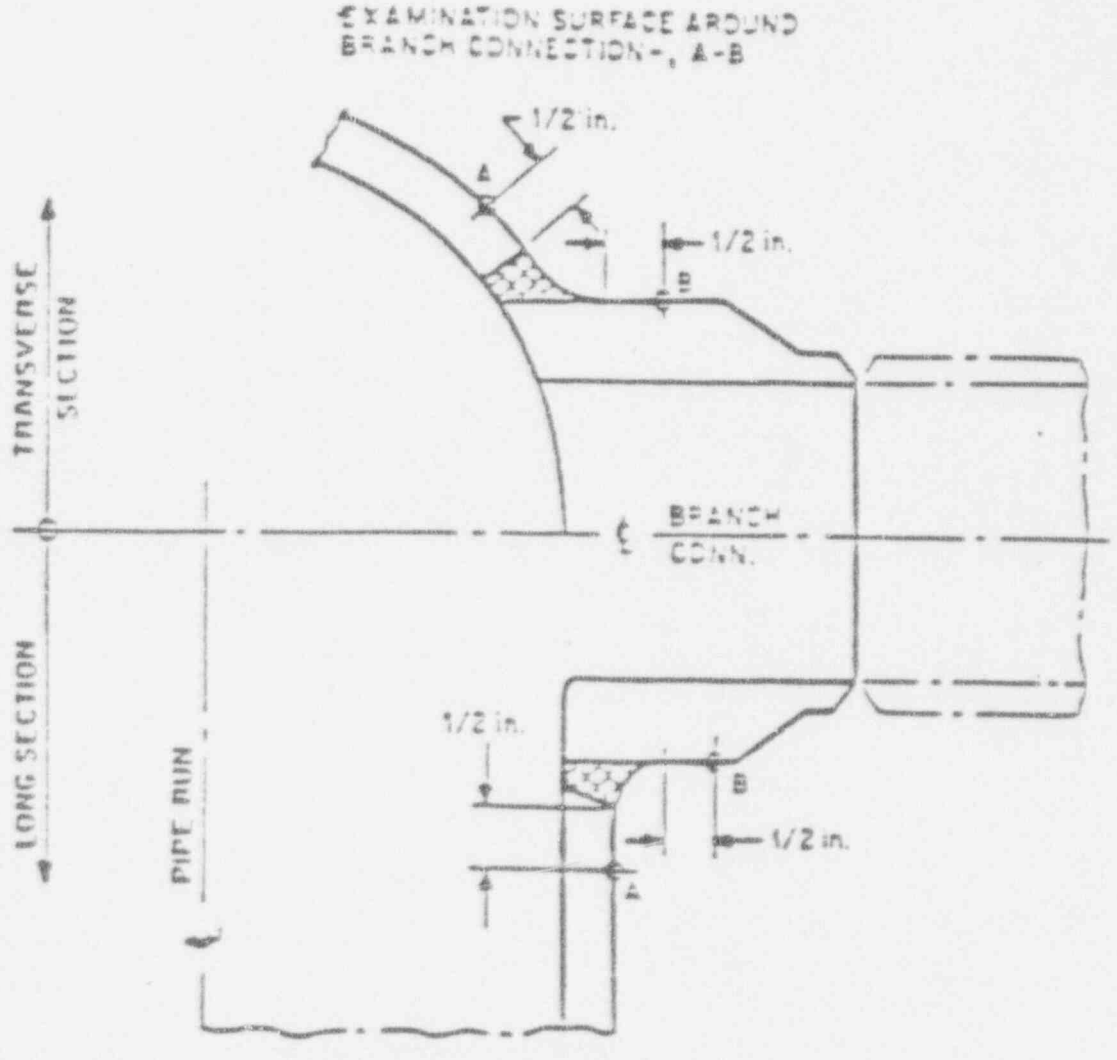


FIGURE 17

BRANCH CONNECTION WELDS - CLASS 2



BOSTON EDISON
LIQUID PENETRANT EXAMINATION PROCEDURE TECHNIQUE

TECHNIQUE NO._____

A. MATERIAL	TYPE:			
CROSS-SECTION THICKNESS -	MAX. ____ MIN. ____	GEOMETRY - >	___ PIPE ___ PLATE ___ ROD ___ OTHER *	
FABRICATION PROCESS	___ WORKED ___ WELDED ___ CAST ___ OTHER		FABRICATED STATUS	
SURFACE CONDITION	___ MACHINED ___ AS FABRICATED ___ GROUND ___ OTHER*		HEAT TREAT STATUS _____	
B. PROCEDURE	TEMPERATURE RANGE (F) ___ Min. _____ Max.		CLEANER _____ VENDOR	BATCH _____ TYPE _____
PENETRANT VENDOR: _____ BATCH No: _____ TYPE: _____			DEVELOPER VENDOR: _____ BATCH No: _____ TYPE: _____	
EMULSIFIER: VENDOR: _____ BATCH No. _____ TYPE: _____				
PRE-EXAM CLEANING	___ WIPE ___ WATER RINSE ___ SOLVENT RINSE		OTHER _____	DRY TIME _____
PENETRANT APPLICATION	___ DIP ___ SPRAY ___ BRUSH DWELL TIME _____		EMULSIFIER	___ DIP ___ SPRAY EMULS. TIME _____
PENETRANT REMOVAL	WIPE: ___ TOWEL ___ CLOTH	___ WATER RINSE	___ SOLVENT WIPE	OTHER _____
PREDEVELOPER DRYING	___ BLOT ___ ROOM AIR	___ WARM AIR ___ OVEN		DRYING TIME _____ Min.
DEVELOPER APPLICATION	___ DUST ___ DIP ___ BLOW ___ SPRAY			DEVELOPING TIME _____ Min.
POST-EXAM CLEANING	___ WIPE ___ WATER RINSE	___ SOLVENT FLUSH		OTHER _____

*SKETCH OR OTHER DETAIL

BOSTON EDISON
LIQUID PENETRANT EXAMINATION PROCEDURE TECHNIQUE

TECHNIQUE NO._____

METHOD	STATE BELOW ANY TEXT CHANGES REQUIRED TO QCI 50.10 FOR THIS TECHNIQUE.

BOSTON EDISON COMPANY
QUALITY ASSURANCE DEPARTMENT

QUALITY CONTROL INSTRUCTION MANUAL

VOLUME II

TABLE OF CONTENTS

BOSTON EDISON COMPANY
QUALITY ASSURANCE DEPARTMENT

QUALITY CONTROL INSTRUCTION MANUAL

VOLUME II

TABLE OF CONTENTS

GE Nuclear Energy

PROCEDURE: GE-ADM-1001

REVISION No.: 2

TITLE

PROCEDURE FOR PERFORMING LINEARITY CHECKS ON ULTRASONIC INSTRUMENTS

PREPARED BY: A. W. Clay DATE: 12/13/92	INSPECTION SERVICES TECHNICAL REVIEW BY: Wade F. Miller DATE: 12/16/92 LEVEL III
BWR TECHNOLOGY REVIEW BY: Steven C. Mortenson DATE: 12/22/92	APPROVED FOR USE BY: John W. Self DATE: 12/28/92

COMMENTS:

TABLE OF CONTENTS

1.0 SCOPE

1.1 This procedure defines the method, and requirements for Amplitude Control Linearity and Screen Height Linearity.

2.0 REFERENCES

2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section V and XI, The code year for Section V and XI is determined by the applicable examination procedure.

2.2 General Electric Personnel Qualification Procedure FQP-3, which meets the requirements of the American Society for NonDestructive Testing (ASNT) Recommended Practice, SNT- TC-1A, 1984 Edition.

2.3 General Electric Quality Assurance Manual, QAM-001 Rev. 2.

3.0 PERSONNEL

3.1 Personnel shall be certified in accordance with paragraph 2.2.

3.2 Personnel performing linearity checks shall be certified to at least Level I, and under the direct supervision of personnel certified to at least a Level II.

4.0 EQUIPMENT

4.1 The ultrasonic instrument shall be of the pulse echo type, and shall be equipped with a calibrated dB gain or attenuator control stepped in increments of 2 dB or less.

4.2 Search units shall produce a longitudinal wave or a shear wave and may be either single or dual element ceramic types. The size range shall not be less than 1/4" (Round or Square) and not more than 1" (Round or Square). The nominal frequency shall be between 1.0 MHz and 5.0 MHz. Other sizes and frequencies may be utilized if approved by the Cognizant Level III.

4.3 Coaxial cables of any convenient length and number of connectors may be used for linearity verification.

4.4 The ultrasonic couplant to be used shall be in sufficient quantities to maintain adequate acoustic contact between the search unit and the component and shall be certified in accordance with ASTM-0-129-64 and D-808-63 for total sulfur and halogen content. Total residual sulfur and halogen content shall not exceed 1% by weight.

4.5 Any basic calibration block which will provide the required signal correlations may be used.

5.0 LINEARITY VERIFICATION

5.1 This process shall demonstrate the checks for screen height linearity and amplitude control linearity as described below. These checks shall be performed at the beginning of each period of extended use, at least every three (3) months during use, and a final linearity check will also be performed at the completion of a period of examination (i.e., completion of an ISI).

5.2 These checks may be performed more frequently, (i.e., daily, weekly, etc.) when required by the Owner, or other controlling documents.

5.3 Screen Height Linearity

a) To verify the ability of the instrument to meet the linearity requirement, position an angle beam search unit so that echoes can be observed from any two reflectors in a calibration block.

b) Adjust the search unit position to give a 2 to 1 ratio of amplitudes between the two echoes, with the larger set at 80% of full screen height (FSH). Without moving the search unit, adjust sensitivity (gain) to successively set the larger echo from 100% to 20% FSH, in 10% increments (or 2 dB steps if a fine control is not available), and read the amplitude of the smaller signal at each setting. The readings must be estimated to the nearest 1% of FSH.

c) Alternatively, a straight beam search unit may be used on any calibration block that will provide the signal correlations.

5.4 Amplitude Control Linearity.

a) To verify the accuracy of the amplitude control in the ultrasonic instrument, position a search unit so that an echo from one reflector in a calibration block is peaked on the screen.

b) With the increases and decreases in gain shown below, the echo amplitude must fall within the specified limit. Convenient reflectors from any calibration block may be used with angle or straight beam search units. The readings must be estimated to the nearest 1% of FSH.

Indication set at % of Full Screen Height	dB Control change (1)	Indication Limits % of Full Screen
80 %	-6 dB	32 to 48 %
80 %	-12 dB	16 to 24 %
40 %	+6dB	64 to 96 %
20 %	+12 dB	64 to 96 %

(1) Minus indicates decrease in amplitude; plus denotes increase.

6.0 RECORDING

6.1 Screen Height Linearity readings must be 50% of the larger amplitude, within 5% of FSH. Amplitude Control Linearity must fall within the specified limits (see limits set in 5.4). Instruments that do not meet the requirements of 5.3 and/or 5.4 shall not be used until they are repaired.

6.2 If an instrument is found to be out of tolerance after examinations have been performed, all data taken since the last documented acceptable check shall be reviewed by the responsible Level III examiner to determine any corrective action necessary.

7.0 REPORTS

7.1 The format of the Linearity Data Sheet is subject to change as may be required. The technical content of the Linearity Data Sheet used shall include as a minimum, that listed in paragraph 7.1.1 see sample Linearity Data Sheet (Exhibit I).

7.1.1
a) Date Linearity performed
b) Examiner's signature and NDE level
c) Ultrasonic Instrument Model number
d) Ultrasonic Instrument Serial number
e) Transducer Frequency, Size, and Beam Angle
f) Transducer Serial Number and Manufacturer
g) Calibration Block identification

EXHIBIT I

GE Nuclear Energy

ULTRASONIC INSTRUMENT QUALIFICATION

Mfg: _____

Model: _____

Linearity Sheet No. _____

Instrument Serial No: _____

Procedure No.: _____ Rev. ___ FRR _____

SCREEN HEIGHT LINEARITY CHECK		
	% FSH SMALLER SIGNAL *	
% FSH LARGER SIGNAL	ACTUAL	LIMITS
100		45 – 55
90		40 – 50
80	40	35 – 45
70		30 – 40
60		25 – 35
50		20 – 30
40		15 – 25
30		10 – 20
20		5 – 15

* THE SMALLER SIGNAL MUST BE WITHIN 50% OF THE LARGER SIGNAL WITHIN 4% FSH

AMPLITUDE CONTROL LINEARITY			
INDICATION SET AT % OF FSH	dB CONTROL CHANGE	INDICATION AT FSH	
		ACTUAL	LIMITS
80%	–6 dB		32 – 48
80%	–12 dB		16 – 24
40%	+6 dB		64 – 96
20%	+12 dB		64 – 96

EQUIPMENT DATA FOR LINEARITY CHECKS

Block Identification: _____

Transducer Data: Manufactor: _____

Serial No: _____ Size: _____

Beam Angle: _____ Freq: _____

_____ Examiner _____ Level _____ Date

_____ Reviewed By _____ Level _____ Date

_____ Reviewed By _____ Title _____ Date

SCREEN HEIGHT LINEARITY CHECK		
	% FSH SMALLER SIGNAL *	
% FSH LARGER SIGNAL	ACTUAL	LIMITS
100		45 – 55
90		40 – 50
80	40	35 – 45
70		30 – 40
60		25 – 35
50		20 – 30
40		15 – 25
30		10 – 20
20		5 – 15

* THE SMALLER SIGNAL MUST BE WITHIN 50% OF THE LARGER SIGNAL WITHIN 4% FSH

AMPLITUDE CONTROL LINEARITY			
INDICATION SET AT % OF FSH	dB CONTROL CHANGE	INDICATION AT FSH	
		ACTUAL	LIMITS
80%	–6 dB		32 – 48
80%	–12 dB		16 – 24
40%	+6 dB		64 – 96
20%	+12 dB		64 – 96

EQUIPMENT DATA FOR LINEARITY CHECKS

Block Identification: _____

Transducer Data: Manufactor: _____

Serial No: _____ Size: _____

Beam Angle: _____ Freq: _____

_____ Examiner _____ Level _____ Date

_____ Reviewed By _____ Level _____ Date

_____ Reviewed By _____ Title _____ Date

(GNF-NIS 5-13-91)

GE Nuclear Energy

PROCEDURE: GE-ADM-1005 **TITLE** REVISION NO.: 2

PROCEDURE FOR ZERO REFERENCE AND DATA RECORDING
FOR NON-DESTRUCTIVE EXAMINATION

PREPARED BY:	REVIEWED BY:	APPROVED FOR USE BY:
John Enitac	George E Hatfield	Lisa A. Brinkman FOR J.W. SELF
DATE: SEP. 13, 1991	DATE: 9-13-1991 LEVEL: III	DATE: SEPT 13, 1991

COMMENTS:

TABLE OF CONTENTS

1.0 SCOPE

1.1 This procedure provides the information necessary to determine zero reference locations and to record data from manual and automated ultrasonic, direct visual, magnetic particle, and liquid penetrant examinations of piping welds, vessel welds, attachments, and components. Weld joints, attachments, and components shall be assigned zero reference locations for data recording of examinations in accordance with this procedure unless stated otherwise in the specific examination procedure.

2.0 REFERENCES

2.1 The applicable General Electric Examination Procedures for the type of examination being performed.

3.0 PERSONNEL

3.1 Personnel requirements shall be in accordance with the appropriate General Electric procedure.

4.0 EQUIPMENT

4.1 Equipment requirements shall be in accordance with the appropriate General Electric procedure.

5.0 EXAMINATION

5.1 Examinations shall be conducted in accordance with the appropriate General Electric Examination procedure.

6.0 RECORDING

6.1 Determination of L_0 Reference for Piping and Welded Components

6.1.1 The following rules shall apply in determining the zero reference location on piping welds and welded components. Vertical welds shall be defined as those welds having no horizontal component in the adjacent run of pipe. If more than one rule can be used, the lowest numbered rule shall apply. All reference points shall be noted on the Data Sheet.

1) If the piping is horizontal at the weld, use the top centerline of the weld to be examined.

2) If the piping is vertical at the weld and the weld contains one elbow, use the centerline of the outside radius of the elbow.

3) If the piping is vertical at the weld and the weld is elbow to elbow or does not contain an elbow, use an extension of the centerline of the outside radius of the elbow above.

4) If in Rule 3, there is no visible elbow above, use an extension of the centerline of outside radius of the elbow below the weld.

5) If the pipe is vertical at the weld and there is no visible elbow to use for reference, choose the most convenient location (e.g., 180° from reactor vessel or nearest wall).

6) For branch connectors, saddle welds, sweepolets, weldolets, welded lugs and supports, use the upstream intersection of the main run pipe and the weld to be examined.

7) For longitudinal welds use the junction of the longitudinal weld and the near edge of the intersecting circumferential weld.

6.2 Determination of L_o Reference for Pressure Vessels and Their Components

6.2.1 The following rules shall apply in determining the zero reference location on pressure vessels and their components, when practical. All reference points shall be numbered clockwise and noted on the Data Sheet.

1) L_o for circumferential welds on pressure vessels shall be vessel 0°.

2) L_o for longitudinal welds on pressure vessels shall be referenced to their junction (near edge or fusion line) with the applicable circumferential weld.

3) L_o for nozzle to shell welds shall be top dead center of the nozzle.

4) For nozzle to shell welds on nozzles having no horizontal component (e.g., on the closure head of an upright pressure vessel), L_o may be referenced to an azimuth of the vessel or other easily identified area.

6.3 Determination of W_o Reference

6.3.1 The following rules shall apply in determining W_o reference locations for circumferential and longitudinal welds, nozzle-to-shell welds, branch connections, saddle welds, sweepolets, weldolets, welded lugs and supports. The W_o datum point shall be noted on the Data Sheet.

1) For circumferential, longitudinal, and nozzle-to-shell welds, W_o shall be the centerline of the weld to be examined.

2) For branch connections, saddle welds, sweepolets, weldolets, welded lugs, supports, and nozzle with fillet type welds, W_o shall be the junction of the weld with the main run of piping, or junction of the weld and shell for vessels.

NOTES

A) For unusual circumstances such as flush machines welds or dissimilar metal welds an easily measured or discernible point may be used in establishing W_o (e.g., nozzle boss or carbon steel/stainless steel interface).

B) For ultrasonic indications oriented perpendicular to the axis of the weld (e.g., transverse examinations), the L_o and W_o reference positions shall be reversed.

6.4 Measurements of "L_o" and "W_o" for Volumetric Examinations:

6.4.1 For all circumferential welds, the L dimension is measured clockwise when looking in direction of flow.

6.4.2 "L" measurements shall be measured from L_o on a path parallel to the indication length to the axial center of the search unit to the nearest .10".

6.4.3 "L_1" measurement shall be the indication end point as determined by amplitude of the examination procedure that is numerically closest to "L_o" for long seam examinations, and the most counter-clockwise end point for all other examinations.

6.4.4 "L_2" measurement shall be the indication end point as determined by amplitude of the examination procedure that is numerically farthest from "L_o" for long seam examinations, and the most clockwise end point for all other examinations.

6.4.5 "L max" measurement shall be taken when an indication equals or exceeds the recording level at highest amplitude. "L max" measurement shall be located between "L_1" and "L_2".

6.4.6 "W" measurements shall be taken on a path perpendicular to the "L max" position to the nearest .10".

6.4.7 "W" measurements shall be measured from W_o to the axial center of the search unit for straight beam examinations.

6.4.8 "W" measurements shall be measured from W_o to the index point of the search unit for angle beam examinations.

6.4.9 "W_1" and "W_2" measurements, when taken, must equal recording level limits in amplitude. "W_1" measurements will be the shortest distance from W_o and must be accompanied by a minimum sweep reading (MP). "W_2" measurements will be the longest distance from W_o and must be accompanied by a maximum sweep reading (MP).

6.4.10 "W Max" measurement shall be taken when an indication equals or exceeds the recording level at the highest amplitude, and must be accompanied by a sweep reading.

6.5 Measurements from "L_o" and "W_o" for surface and visual examinations:

6.5.1 All measurements shall be taken to the nearest 1/16 of an inch.

6.5.2 "L" and "W" measurements of indications observed shall be measured to the geometric center of the indication.

6.5.3 Welded Components

1) "L" measurements on circumferential piping welds with a flow direction shall be measured clockwise from L_o looking in the direction of flow.

2) "L" measurements on long seams shall be measured from L_o along the length of the longitudinal weld being examined.

3) "L" measurements for branch connections, nozzle-to-shell welds, lugs, and supports shall be measured clockwise from L_o when viewing the component along the fusion line of the weld and main run pipe, or vessel shell.

4) "L" measurements on pressure vessels shall be measured clockwise from L_o as viewed from above on vertical vessels or from an identified end on horizontal vessels.

6.5.4 Non-Welded Components

1) L_o, W_o, L_1, L_2, W_1, and W_2 measurements shall be in accordance with the recording criteria specified in the applicable examination procedure(s).

6.6 INDICATION TYPES (Surface)

Indications recorded during direct visual, magnetic particle, and liquid penetrant examinations shall be classified as rounded or linear, and noted on the appropriate examination data.

6.7.1 Linear Indications

A linear indication is defined as one whose length is more than three times its width. A linear indication shall be measured along its length.

6.7.3 All indications shall be measured to the nearest 1/16".

7.0 REPORTS

7.1 Report requirements shall be in accordance with the appropriate General Electric procedure.

GE Nuclear Energy

PROCEDURE: GE-ADM-1002 REVISION No.: 2

TITLE

PROCEDURE FOR REVIEW PROCESS AND ANALYSIS OF RECORDED INDICATIONS

PREPARED BY: H. W. Clay DATE: 11/10/92	INSPECTION SERVICES TECHNICAL REVIEW BY: Wade F. Miller DATE: 11/16/92 LEVEL III
BWR TECHNOLOGY REVIEW BY: Wade F. Miller FOR STEVEN C. MORTENSON DATE: 11/16/92	APPROVED FOR USE BY: John W. Self DATE: Nov 17, 1992

COMMENTS:

TABLE OF CONTENTS

1.0 SCOPE

1.1 This procedure defines the detailed steps required in the review process as well as the process for analysis of recorded indications of ultrasonic examinations.

2.0 REFERENCES

2.1 The following are referenced in the development of this procedure and shall be applied as required.

2.1.1 The applicable edition of the ASME Boiler and Pressure Vessel Code, Sections V and XI as specified by the Ultrasonic Procedure.

2.1.2 General Electric Procedure FQP-03, "Procedure for Qualification and Certification of Nondestructive Examination Personnel".

2.1.3 Applicable Ultrasonic Examination Procedure.

2.1.4 General Electric Procedure GE-UT-104, "Procedure for Ultrasonic Planar Flaw Sizing".

2.1.5 USNRC Regulatory Guide 1.150, Revision 1 Alternate Method.

2.1.6 General Electric Quality Assurance Manual, QAM-001 Rev. 2.

3.0 PERSONNEL

3.1 All data reviewers shall be certified to Level II or III in accordance with 2.1.2.

3.2 All personnel analyzing indications in austenitic piping shall have successfully completed the Ultrasonic Testing Operator Training for IGSCC, Competency Area 910, developed by the EPRI NDE Center, and completed the practical examination and shall have current qualification status.

3.3 Personnel performing flaw sizing in accordance with 2.1.4 shall have successfully completed the UT Operator Training for Planar Flaw Sizing Course, Competency Area 911, developed by the EPRI NDE Center and shall have current qualification status.

3.4 Personnel analyzing indications in weld overlays shall have successfully completed the Ultrasonic Operator Training for Weld Overlay, Competency Area 912 developed by the EPRI NDE Center and shall have current qualifications status.

3.5 All personnel analyzing indications on RPV componants shall have received the training and experience as required by the appropriate operating procedure.

4.0 EQUIPMENT

4.1 Equipment which meets the requirements of 2.1.3 shall be available. In addition, any special equipment which will aid in the resolution of recorded indications may be used with the approval of the cognizant Level III.

5.0 CALIBRATION

5.1 Calibration shall be in accordance with 2.1.3 or 2.1.4.

5.2 Under the direction of the responsible Level III, other techniques or methods may be used to aid in resolution. These augmented examinations, when used, shall be documented with appropriate data and calibration sheets.

6.0 EXAMINATION

6.1 All data and calibration sheets shall receive a technical review fore completion and clarity. As a minimum, the reviewer shall verify the following:

6.1.1 All blanks are filled in or marked "NA".

6.1.2 Calibration times meet the requirements of 2.1.3.

6.1.3 All comments/remarks/limitations are clearly understandable.

6.1.4 All mark outs are initialed and dated.

6.1.5 All information required by the reports and record section of 2.1.3 are included on the sheet.

6.1.6 Search units meet the requirements of 2.1.3.

6.1.7 Calibration block meets the requirements of 2.1.3 for the examination area.

6.1.8 Calibration point(s) appear at the proper position in time.

6.1.9 Sweep range is adequate for the examination area.

6.1.10 Calibration block temperature and examination area temperature are within the requirements of 2.1.3.

6.1.11 All examinations required by 2.1.3 are completed or areas/examinations not completed are noted.

6.1.12 All attachments are properly referenced so there is no doubt that the report is complete.

6.1.13 Previous data shall be reviewed to assure knowledge of any significant changes in the examination results. If changes are noted, they shall be brought to the attention of the personnel responsible for the analysis of the examination data.

6.1.14 All data, calibration, resolution sheets and all other reports shall be written out in black ink.

6.2 When all of the requirements of 6.1 are met, the data reviewers shall sign and date the "Reviewed By" block, indicating this review is complete.

6.3 When no indications are recorded the "Evaluated By" block (when present) shall be marked "NA".

6.4 When indications are recorded, they will be analyzed in accordance with 7.0

7.0 RECORDING

7.1 All recorded indications shall have as a minimum the following:

7.1.1 A geometric plot which reveals the location of the indication with respect to the weld and/or configuration of the examination area, as applicable.

7.1.2 A review of previous recorded indications, preservice and inservice.

7.2 Additional analysis - When the requirements of 7.1 do not prove conclusively that the indication is the result of a geometric or metallurgical condition, the indication shall receive additional analysis. This analysis shall continue until the type of the indication is determined. This analysis may include but shall not be limited to the following:

7.2.1 Additional Examinations - These may be conducted with original calibration requirements, to confirm the indication data, and/or with augmented calibration and examination techniques (or methods, i.e. PT, MT, RT etc.) when in the opinion of the analyst such examinations would aid in the resolution of the indication(s). When augmented examinations are used, they shall be documented with applicable calibration and data sheets and shall become a part of the examination report.

7.2.2 Review of Radiographs - This may include both original construction radiographs and any subsequent radiographs. These may be used to confirm or deny the presence of geometric conditions, (such as counterbore, drop through, etc.) or fabrication flaws (such as inclusions, lack of fusion etc.).

7.2.3 Signal Characteristics - The behavior of the signal has proven to be an aid in the analysis of certain types of flaws, such as IGSCC, and may be useful in resolving other types of indications as well. Some characteristics to be considered are:

7.2.3.1 Indications which walk (travel on the CRT) from the ID toward OD.

7.2.3.2 When the search unit is angulated while the indication is peaked, a geometric indication will decrease in amplitude rapidly with a variation in the incident angle. An indication caused by certain types of flaws tend to decrease in amplitude slowly and become more broad based as the search unit is angulated.

7.2.3.3 At times, an indication will separate from a flaw indication, as the search unit is moved toward the indication , and walk towards the OD. This indication, when it appears, is indicative of a crack tip and is associated with indications such as IGSCC. These characteristics should be checked at or near the middle of the indication. If the indication is short, (less than 3 times the width of the search unit) it will be necessary to move the search unit to an end of the indication before angulation is performed.

7.3 Resolution - After the requirements of 7.1 and 7.2 (where required) are met, indications shall fall into one of two broad types.

7.3.1 Type 1 - Indications which require no further analysis. This would include the following:

a) Geometric reflectors - root, crown, counterbore, etc.

b) Metallurgical reflectors - bimetallic interface etc.

c) False reflectors - lift off, couplant, etc.

7.3.2 Type 2 - Indications from flaws. These indications will require further analysis in accordance with 7.4.

7.4 Codes/Standards - All type 2 (7.3.2) indications shall be compared to one of the following to determine acceptability in accordance with the applicable code or standard. This comparison shall be documented and shall become a part of the examination report.

7.4.1 IGSCC indications in austinitic material shall be sized in accordance with 2.1.3 and 2.1.4.

7.4.2 Indications in reactor pressure vessel welds shall be sized in accordance with 2.1.1, as modified by USNRC Regulatory Guide 1.150, Revision 1 Alternate Method.

7.4.3 All other indications shall be in accordance with 2.1.1

8.0 REPORTS

8.1 The format of records are subject to change as may be required. The technical contents of forms used shall contain as a minimum all of the items in paragraph 8.2 (see Exhibit I).

8.2 Indication Resolution Sheet - An indication resolution sheet shall be completed for each examination area. As a minimum, the information on the indication resolution sheet shall include:

a) Applicable calibration and data sheets(s))

b) Names and certification levels of examination personnel

c) Examination procedure identification and revision number

d) Identification of weld or volume scanned

e) Plant

f) Method of NDE (UT, MT, PT, etc.,)

g) Weld type

h) Resolution determination

a) When no indications are recorded, the resolution determination shall be "No Recordable Indications".

b) When type 1 indications are recorded, the resolution determination shall state that the indications are geometric, metallurgical, or false and from where the indication originates (root, counterbore, bimetallic interface, non-relevant etc.). If the beam has been redirected or mode conversion has taken place, this shall be noted.

c) When type 2 indications are recorded, the resolution determinations shall include an analysis in accordance with 7.0 and shall state which reference was used to analyze the indications. The process used to analyze the indication shall be described in this section, and should include a summary of steps taken to reach the resolution (i.e., augmented examinations, RT review, types of sizing utilized, etc.). These statements shall be supported by supplemental data.

8.3 Supplemental data shall be included and made a part of the examination report. As a minimum this shall include the following:

a) Geometric plots of recorded indications
b) Calibration and data sheets on all augmented examinations
c) Calibration and data sheets on all sizing
d) Calculations used for analysis

8.4 When the requirements of this procedure are completed, the analyst shall sign and date the "Reviewed By" on those data sheets with recorded indications.

8.5 When the requirements of 7.0 and 8.0 are met, the data analyst shall sign and date the Indication Resolution Sheet.

GE Nuclear Energy

RESOLUTION SHEET

REPORT NO.:

PROJECT:

PROCEDURE: _____ REV. ___ FRR NO. _____
_____ REV. ___ FRR NO. _____
_____ REV. ___ FRR NO. _____

ITEM: _____
WELD NO.: _____
CONFIGURATION: _____
EXAMINER: _____ LEVEL ___
EXAMINER: _____ LEVEL ___
EXAMINER: _____ LEVEL ___

NDE METHOD: ☐ MT ☐ PT ☐ UT ☐ VT

WELD TYPE: ☐ CIRCUMFERENTIAL ☐ LONGITUDINAL ☐ OTHER _____

CAL SHEET NO.(S) _____

REPORT NO.(S) _____

_____ LEVEL ___ DATE ___
RESOLUTION BY

_____ LEVEL ___ DATE ___
REVIEWED

_____ LEVEL ___ DATE ___
REVIEWED

PAGE ___ OF ___

FORM 139 12-8-84

EXHIBIT I

BOSTON EDISON RTYPE H6.12

PILGRIM NUCLEAR POWER STATION

Temporary Procedure No. TP93-087

PROCEDURE FOR MANUAL ULTRASONIC EXAMINATION OF SIMILAR AND DISSIMILAR PIPING WELDS FOR IGSCC

REQUIRED REVIEWS

QC REVIEW REQUIRED

SAFETY REVIEW ~~REQUIRED~~/ NOT REQUIRED

ORC REVIEW REQUIRED/ ~~NOT REQUIRED~~

REVIEWERS AND APPROVERS

Procedure Writer	Date 4/5/93
Technical Reviewer	Date 4/5/93
Validator	Date 4/5/93
Procedure Owner	Date 4/6/93
QAD Manager	Date
ORC Chairman	Date 4/7/93
~~Responsible Manager~~	Date 4/8/93

Effective Date : 4/10/93

Expiration Date: 10/8/93

GE Nuclear Energy

PROCEDURE: GE-UT-102 REVISION No.: 4

TITLE

PROCEDURE FOR MANUAL ULTRASONIC EXAMINATION
OF SIMILAR AND DISSIMILAR PIPING WELDS FOR IGSCC

PREPARED BY:	REVIEWED BY:	APPROVED FOR USE BY:
DATE: 3-17-93	DATE: 3-17-93 LEVEL III	DATE: 3-19-93

COMMENTS:

TABLE OF CONTENTS

1.0 SCOPE

1.1 This procedure defines the method and requirements for manual ultrasonic examination of similar, and dissimilar full penetration piping butt welds and adjacent base metal ranging in thickness from .20" to 2.75" nominal for Intergranular Stress Corrosion Cracking (IGSCC).

2.0 REFERENCES

2.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Sections V and XI, 1980 Edition, including Addenda through Winter 1981.

2.2 General Electric procedure FQP-03, "Qualification and Certification of Nondestructive Examination Personnel", which meets the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A, 1975 and 1980 Editions.

2.3 General Electric procedure GE-ADM-1005, Procedure for "Zero Reference Location and Data Recording for Nondestructive Examinations".

2.4 Coordination Plan for NRC/EPRI/BWROG Training and Qualification Activities of NDE Personnel.

2.5 General Electric procedure GE-UT-104, "Procedure for Planar Flaw Sizing".

2.6 General Electric procedure GE-ADM-1001, "Procedure for Performing Linearity Checks on Ultrasonic Instruments".

2.7 General Electric procedure GE-ADM-1002, "Procedure for Review and Process and Analysis of Recorded Indications".

3.0 PERSONNEL

3.1 Personnel performing, or evaluating the results of examinations to this procedure shall be certified to at least Level II in accordance with 2.2 and shall be qualified with current status for the Ultrasonic Testing Operator Training for Intergranular Stress Corrosion Cracking (IGSCC), competency Area 910, developed by the EPRI NDE Center.

3.2 When the "Master/Slave" system is used, the Level II monitoring the master ultrasonic instrument shall meet the requirements of paragraph 3.1. Personnel performing the ultrasonic scanning shall be certified to at least UT Level I as defined in paragraph 2.2 and shall be trained with a Level II on a known discontinuity, prior to weld examinations. The purpose of this training is to familiarize the scanner in following the scanning and dimensioning instructions directed by the Level II. This training shall be documented.

4.0 EQUIPMENT

4.1 The ultrasonic instrument shall be of the pulse echo type, and shall be equipped with a calibrated dB gain or attenuator control stepped in increments of 2 dB or less and shall meet the requirements of reference 2.6.

Note: NOTE: When the remote master/slave system is employed, the CRT slave unit used as an aid for the scanner may be of any type that will produce video display. It shall not contain any independent controls that could alter the performance parameters or calibration of the master instrument being monitored by the Level II Examiner.

4.2 Ceramic type transducers similar in size, frequency and mode of propagation as those that have been qualified in detection at the EPRI NDE Center shall be used for the examination. The maximum allowable active element size shall be .25" (round or square) for material thicknesses less than .50". For material thicknesses .50" and greater, the maximum allowable active element size shall be .50" (round or square). When selecting the search unit size, consideration shall be given to the diameter of the pipe. The search unit shall be small enough to allow adequate contact between the search unit and pipe. Search units may contain either single or dual transducer elements. For dual element search units, the maximum allowable element size applies to each of the two elements.

4.2.1 Search units with contoured contact wedges may be used to aid ultrasonic coupling. Calibration shall be accomplished with the same search units and wedges as used during the examination.

4.2.2 Angle beam wedges shall be used that will produce shear waves at a nominal angle of 45° ± 2° in the examination medium. The actual beam paths to be utilized for the weld examination shall be determined by obtaining a contour of the weld crown and the wall thickness, to assure complete coverage.

Note: NOTE: Transducers/Wedges of other sizes, angles, mode of propagation, or frequencies may be used where required by material characteristics, geometric configuration or for the evaluation of indications, with the approval of the Cognizant NDE Level III.

4.3 When dissimilar metal welds are being examined, the search units shall be RTD dual element, or equivalent. The nominal frequency shall be in the range of 1 to 4 MHz. The examination shall be performed using refracted longitudinal waves with nominal angles in the range of 30 to 70 degrees. Maximum piezoelectric element size (each individual element) shall be 1" x 1 1/2". Various roof angles and focal distances should be evaluated to choose the search unit with the maximum signal-to-noise (S/N) ratio. Refracted longitudinal waves of 31 - 45 degrees have been shown to be successful for detecting tips of deep notches and provide some capability of throughwall dimension determination. Search unit size shall be selected based upon the diameter and configuration of the material to be examined to allow maximum ultrasonic coupling.

4.3.1 The search units utilized for the examination should follow the guidelines of paragraph 4.3. At least two search units with different beam angles should be used for the examinations.

4.4 Coaxial cables of any convenient length may be used for examination. The length, type of cable and the number of connectors used shall be recorded on the Calibration Data Sheet.

4.5 The ultrasonic couplant to be used shall be in sufficient quantities to maintain adequate acoustic contact between the search unit and the component and shall be certified in accordance with ASTM-D-129-64 and D-808-63 for total sulfur and halogen content. The total residual sulfur and halogen content shall not exceed 1% by weight.

4.6 Basic Calibration Blocks

4.6.1 Basic calibration blocks shall be furnished or approved by the Owner.

4.6.2 The surface finish of the calibration block shall be representative of the surface finishes of the component to be examined.

4.6.3 An IIW type, DSC or Rompus block may by used as a simulator block for calibration checks. Other simulator blocks may also be used for the purpose of calibration checks provided they contain sufficient reflectors to establish the checks.

4.7 A thermometer calibrated and certified in accordance with the manufacturer's standards shall be used to measure the calibration block and examination component surface temperatures. Additionally, the serial number of the thermometer shall be recorded on the Calibration Data Sheet for reference.

4.8 Contour gauges may be used as required to obtain O.D. surface profiles to aid in plotting and evaluation (see Exhibit III).

5.0 CALIBRATION

5.1 System Calibration

5.1.1 Calibration shall be performed prior to the first use of the system on the thickness being examined. Calibration shall include the complete ultrasonic examination system. Any change in search units, wedges, couplants, cables, ultrasonic instruments, operators or any other parts of the examination system shall be cause for calibration check. The original calibration shall be performed on the basic calibration block. Calibration checks may be performed on either a basic calibration block simulator or the basic calibration block, but must include a check of the entire examination system.

5.1.2 The calibration standard temperature shall be within 25 degrees F of the temperature of the component to be examined. Examination surface shall not exceed 125 degrees F.

5.2 Determination of Beam Index - Position the angle beam search unit on an IIW type, DSC or Rompus block so that the beam is directed toward the appropriate radius surface. Move the transducer parallel to the sides of the block until a maximum echo is obtained from the reflecting radius. The beam index point is now above the centerline of the radius, as scribed on the applicable block. Place a mark on the side of the wedge to identify the index point, and note the measurement from the index point to the front edge of the wedge on the calibration data sheet for future reference.

5.3 Determination of Beam Angle - Place the search unit on an IIW type block and obtain a peak signal amplitude from the 2" diameter hole. Read the refracted beam angle from the side of the block using the angle which corresponds with the beam index point. If required, the beam angle shall be determined on the basic calibration block by locating a circumferential I.D. notch and using the surface distance, metal path and block thickness.

5.4 Sweep Calibration - Position the search unit on the IIW type, DSC or Rompus Block and maximize the responses from the radius reflectors. Using the sweep and delay controls, position these responses on the CRT to read the desired linear sound path in inches. Position the reflectors on the CRT to allow for a sound path of at least 3/4 vee to be observed when calibrating for a 1/2 vee examination, and 2 vee to be observed when calibrating for a 1-1/2 vee examination.

5.5 Straight Beam Calibration.(Pre-Service Examinations Only) The volume of base material through which the sound beam will travel in angle beam examination shall be examined by by a straight beam transducer in accordance with the following:

5.5.1 The straight beam transducer shall be coupled to the production material at a location free of indications. The sensitivity of the instrument shall be adjusted as required to maintain the first back reflection at an amplitude of 50 to 80 percent of FSH.

Note: Note: The examiner shall assure that adequate separation exists between initial pulse and back reflection.

5.5.2 Indications that have an amplitude equal to or greater than 50 percent of the initial back reflection and accompanied by a 50 percent loss of back reflection shall be recorded. If total loss of back reflection occurs, even if unaccompanied by an intermediate echo, the total area of back reflection loss shall be recorded. Locations and areas of such reflectors shall be recorded on examination data sheet (Exhibit II).

5.6 Angle Beam Calibration

5.6.1 Obtain the angle beam path required on the sweep display. Variables such as weld preparation, weld crown width, or physical interference may preclude obtaining coverage of the examination volume with 1/2 vee examination from two sides as shown in Figure II. If these variables are such that the dimension A of Figure I is greater than:

.93t for ø = 45°
1.19t for ø = 52°
1.60t for ø = 60°

the beam path shall be increased to at least 1-1/2 vee. Alternatively, the interference may be eliminated by one or more of the following:

1) reducing the dimension of the wedge edge to beam entry point
2) reducing search unit size
3) increasing the beam angle
4) reducing or eliminating the weld crown

5.6.2 The angle beam examination may be performed using a 1/2 vee path calibration when performing a circumferential scan and when the "A" dimension requirements of paragraph 5.5.1 cannot be met, the examination shall be performed using a 1-1/2 vee path calibration. The 1-1/2 vee path calibration may be used for axial and circumferential scans. When using the 1-1/2 vee path calibration for circumferential examinations, only the first half vee path shall be utilized.

5.7 1/2 Vee Path Calibration

5.7.1 The maximum calibration response shall be obtained with the sound beam oriented essentially perpendicular to the axis of the calibration reflector. The centerline of the search unit shall be at least 3/4" from the nearest side of the block. (Rotation of the beam into a corner formed by the reflector and the side of the block may produce a higher amplitude signal at a longer beam path. This beam path shall not be used for calibration.)

5.7.2 Position the search unit on the applicable calibration block utilizing the end drilled holes. Obtain the maximum amplitude response from the vee path position exhibiting the highest amplitude from the following positions, 3/8, 5/8 or 7/8 vee path, and set its amplitude to 80% FSH. Without changing the gain, maximize the responses from the remaining two vee path positions. When the calibration block contains only 1/2 t hole, calibrate using the 2/8 and 6/8 vee paths.

5.7.3 Connect these points with a smooth curve. Extend this curve horizontally from the 3/8 (or 2/8) vee path response to the initial pulse. Then, extrapolate the line from the 7/8 (or 6/8) vee path response to either the right hand side of the CRT or to the baseline, whichever comes first. This distance amplitude correction (DAC) curve represents the primary reference level.

5.7.4 Establish the primary reference sensitivity by setting the maximum response from the circumferential I.D. notch for an axial scan or the axial I.D. notch for a circumferential scan, equal to the DAC at that sweep location.

Note: NOTE: If the calibration block limitations preclude using the end drilled holes, the side drilled holes (holes drilled transverse to the axis of the block) may be used for DAC construction.

5.7.5 1/2 Vee path calibration for refracted longitudinal wave examination.

a) Position the search unit on the basic calibration block and maximize the response from the circumferential I.D. notch if available. Using the instrument gain control, adjust these responses to 80% FSH thereby establishing the primary reference level. Note the dB setting on the calibration data sheet for future reference.

5.8 1 - 1/2 Vee Path Calibration

5.8.1 Using the circumferential machined notches, construct a DAC from the 4/8, 8/8 and 12/8 nodal positions. Adjust the response from the 4/8 vee path I.D. notch at 80% FSH. Mark this point on the CRT. Maximize the response from the remaining notches and mark their response on the CRT, establishing a DAC. This calibration shall be used for axial examinations. To obtain primary reference sensitivity for circumferential examinations, maximize the response from the 4/8 vee path axial machined I.D. notch and adjust this response to the DAC at that sweep location. Record the gain levels for both reference sensitivities on the Calibration Data Sheet.

5.8.2 Record all instrument settings and DAC curve points on the Calibration Data Sheet (Exhibit I).

5.9 Calibration Confirmation

5.9.1 Calibration shall be verified at the start and finish of a series of examinations, and at intervals not to exceed four (4) hours. Calibration may be verified on the calibration block, or by means of a simulator such as the IIW block. Any type of block may be used as a simulator, provided that it contains sufficient reflectors so that at least two points on the sweep can be observed without changing the sweep range and delay controls from the calibration settings. If a simulator is used, the response must be recorded at the time of initial calibration for reference at the time of verification.

5.9.2 Acceptance standards for calibration verification checks are as follows:

a) Distance Amplitude Correction (DAC) - If any points on the DAC curve have decreased 20% or 2dB of its amplitude, all data sheets since the last calibration check shall be marked as void. A new calibration shall be made and recorded and the voided examination areas shall be re-examined. If any point on the DAC curve has increased by more than 20% or 2dB of its amplitude, recorded indications taken since the last valid calibration check shall be re-examined with the correct calibration and their values changed on the data sheets.

b) Sweep Range - If any point of the DAC curve has moved on the sweep line more than 10% of the sweep division reading, correct the sweep range calibration and note the correction in the examination record. If recordable reflectors are noted on the data sheets, those data sheets shall be voided, a new calibration shall be recorded and the voided examination areas shall be re-examined.

5.10 All calibration and calibration verification data shall be recorded on the Calibration Data Sheet (Exhibit I).

6.0 EXAMINATION

6.1 The examinations shall be performed from the outside surface of the applicable weld.

6.2 Examination Coverage - The required examination volume (Figure II) shall be scanned with a minimum overlap of 50% of the search units active element size. While scanning, the shear wave search unit should be oscillated approximately ± 15° degrees as shown in Figure III. When refracted longitudinal search units are used, oscillation shall be approximately 10 degrees.

6.3 For Pre-Service Examinations a 0° Lamination examination shall be performed in accordance with Paragraph 5.5 above.

Note: 0° lamination scan examinations are only required to be performed once, usually during the Pre-Service examination.

6.4 The examination surface should be free of irregularities, loose material, or coatings which interfere with ultrasonic wave transmission.

6.5 Rate of Search Unit Movement - The rate of search unit movement shall not exceed 3" per second.

6.6 The scanning level sensitivity shall be at least 14 dB above the primary reference sensitivity when practical.

6.6.1 The above scanning level sensitivity may not be adequate in some highly attenuative materials. In these situations the gain shall be adjusted so the average baseline noise is a minimum of 10% FSH. In no case shall the average baseline noise level exceed 30% FSH. When scanning is to be performed below reference level the approval of the Cognizant NDE Level III must be obtained.

6.7 Angle Beam Technique

6.7.1 The examination volume as described in Figure II shall be examined with the beam directed perpendicular to the weld axis from both sides of the weld, and with the beam directed parallel to the weld axis in both directions (i.e., clockwise and counter clockwise). To detect axial indications which are essentially transverse to the weld, the skew angle for various pipe wall thicknesses are as shown on Figure III. Additional skew angles may be used, if in the opinion of the Level II, more meaningful data can be obtained.

6.7.2 Inaccessible Welds

a) Welds that cannot be examined from at least one side (edge) using the angle beam technique shall be reported to the Owner for dispositioning.

7.0 RECORDING

7.1 Recording for Non-Geometric Indications

7.1.1 All indications 50% of DAC or greater shall be recorded and investigated by a Level II or Level III examiner to determine the shape, identity and location of the reflector.

7.1.2 Any indication regardless of amplitude in the HAZ or base metal or any known flaw, shall be recorded and investigated by a Level II or Level III examiner to determine the shape, identity and location of the reflector.

7.1.3 Each indication, regardless of amplitude, which is considered to be a defect, shall be recorded as follows:

a) Record the peak amplitude, the search unit position (W max), search unit location (L max), the sound beam direction (1 thru 6 on Exhibit II), the sweep reading to the reflector (SW max), at the peak amplitude point. End points (L1 - L2) shall be recorded at the points that the signal is discernible from the noise level.

7.2 Recording for Geometric and Metallurgical Indications

7.2.1 For each indication that equals or exceeds 50% of the primary reference level, and is not considered to be a defect, the following shall be recorded:

a) Record the peak amplitude, the transducer position (W max), transducer locations (L max), the sound beam direction (1 thru 5 on Exhibit II), the sweep reading (SW max) to the reflector, at the peak amplitude point only. Record the transducer positions and locations parallel to the reflector, at the end points (L1 - L2), at which the signal drops to 50% DAC.

7.3 Selection of L_o and W_o reference points shall be in accordance with the applicable revision of Procedure GE-ADM-1005.

7.4 Record all scanning limitations on the applicable data sheet.

8.0 EVALUATION

8.1 The recorded data shall be reviewed and analyzed in accordance with paragraph 2.7 by an individual meeting the requirements of paragraph 3.1 as a minimum.

8.2 Flaw indication sizing shall be accomplished per paragraph 2.5.

8.3 All flaw indications shall be reported to the Owner within 24 hours of final sizing determination, or as required by contract.

8.4 Final evaluation and disposition of flaw indications are the responsibility of the Owner.

9.0 REPORTS

9.1 The format of data sheet exhibits is subject to change as may be required. The technical content of data forms used shall contain as a minimum that listed in paragraphs 9.3 and 9.4.

9.2 The Calibration Data Sheet shall be completed before any examinations are performed.

9.3 Calibration Data Sheet - The system calibration information shall be recorded on the Calibration Data Sheet and shall include as a minimum, the following information (see Exhibit I):

a) Calibration Data Sheet number

b) Date of Calibration

c) Examiner's signature and NDE level

d) Ultrasonic instrument model number

e) Ultrasonic instrument serial number

f) Ultrasonic instrument setting

g) Transducer frequency, size, beam angle and mode of wave propagation in the material

h) Transducer serial number and manufacturer

i) Search unit cable type and length and number of connectors

j) Couplant (type and batch number)

k) Examination procedure number and revision

l) Calibration standard number

m) Times of initial calibration and subsequent calibration checks

n) Calibration reflector (hole or notch)

o) Orientation of search unit with respect to the pipe (longitudinal or circumferential)

p) Amplitudes and sweep readings obtained from the calibration reflectors

q) Special search units, wedges, shoe type or saddles identification if used

r) Index point to front of wedge measurement

s) Thermometer serial number

t) Temperature

9.4 Examination Data Sheet - All examinations shall be recorded on the Examination Data Sheet and shall include as a minimum the following information (see Exhibit II):

a) Examination Data Sheet number

b) Date and time period of examination

c) Examination procedure and revision

d) Applicable Calibration Data Sheet number

e) Examiner's signature and NDE Level

f) Identification and location of weld or volumed scanned (for example marked up drawings or sketches)

g) Record of indications or volume free of indications

h) Surface from which examination is conducted

i) The information detailed in paragraph 7.0 for recorded indications

j) Thermometer serial number

k) Temperature

GE Nuclear Energy

ULTRASONIC CALIBRATION DATA SHEET

(MANUAL EXAMINATION)

SITE:_____ UNIT:_____ CALIBRATION SHEET NO.:_____

PROJECT NO.:_____ LINEARITY SHEET NO.:_____

PROCEDURE NO.:_____ REVISION:_____ FRR:_____

Instrument _____ (Manufacturer) _____ (Model No.) _____ (Serial No.)

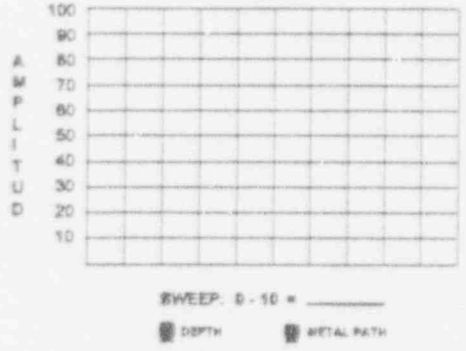
Search Unit _____ (Manufacturer) _____ (Serial No.) _____ (Size) _____ (Freq.) _____ MHz _____ (Angle/Path) _____ (Distance to Sound Exit)

Cable _____ (Type) _____ (Length) _____ (No. of Connectors)

Calibration Standard _____ (Serial No.) _____ (Material) _____ (Thickness) _____ (Temp.) °F

Couplant _____ (Type) _____ (Batch No.) Thermometer _____ (Serial No.)

DAC



SWEEP: 0 - 10 = _____

DEPTH METAL PATH

INSTRUMENT SETTINGS

DAC Construction		Sensitivity	
Gain - Axial Scan		Gain - Axial Scan	
Gain - Circ. Scan		Gain - Circ. Scan	
Pulse		Range	
Damping		Delay	
Rep Rate		Velocity	
Filter		Sweep	
Frequency		Resolution	
Reject		Jack	A T

Field Simulat._____ S/N:_____

REFLECTOR		
MAX AMPLITUDE		
SWEEP		
GAIN		

CALIBRATION VERIFICATION

INITIAL CALIBRATION TIME		VERIFICATION TIMES
FINAL VERIFICATION TIME		

WELDS EXAMINED	REPORT NO.	COMMENTS:

EXAMINER LEVEL DATE

UTILITY I&I ENGINEER REVIEW DATE

ANII REVIEW DATE

GE REVIEWED BY LEVEL DATE

UTILITY QA REVIEW DATE

PAGE ___ OF ___

EXHIBIT I

GE Nuclear Energy

ULTRASONIC EXAMINATION DATA SHEET
(MANUAL PIPING)

SITE:_____ UNIT:_____

PROJECT NO.:_____

REPORT NO.:_____

CALIBRATION SHEET NO.:_____

DATA SHEET NO.:_____

PROCEDURE NO.:_____ REVISION:_____ FRR:_____

SYSTEM:_____ EXAM SURFACE ____°F COUPLANT:_____ EXAM START:_____

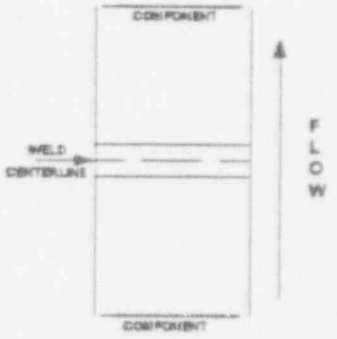
WELD ID:_____ THERMOMETER _____ BATCH NO.:_____ EXAM _____

SEARCH UNIT:_____ EXAMINATION ◉ ID ◉ OD MATERIAL TYPE: ◉ CS ◉ SS OTHER _____

Lo REFERENCE:_____ AXIAL SCAN SENSITIVITY (dB)_____

Wo REFERENCE:_____ CIRC SCAN SENSITIVITY (dB)_____

		PERFORMED		INDICATIONS	
		YES	NO	YES	NO
AXIAL:	1 WITH FLOW				
	2 AGAINST FLOW				
CIRC CW:	3 UPSTREAM				
	4 DOWNSTREAM				
CIRC CCW:	5 UPSTREAM				
	6 DOWNSTREAM				
	7 L-WAVE BASE METAL				
	8 OTHER_____				



INDICATION NO.	L (in) FROM REF			W (in) FROM REF			SWEEP READING			MAX AMP % DAC	EXAMINATION (1-8)
	L-1	L-MAX	L-2	W-1	W-MAX	W-2	SW-1	SW-MAX	SW-2		

REMARKS:

EXAMINER	LEVEL	DATE	UTILITY I&I ENGINEER REVIEW	DATE	AMII REVIEW / DATE
GE REVIEWED BY	LEVEL	DATE	UTILITY QA REVIEW	DATE	PAGE:___ OF:___

EXHIBIT II

GE Nuclear Energy

WALL THICKNESS PROFILE SHEET

SITE: _____ UNIT: _____

PROJECT: _____

REPORT NO.: _____

SYSTEM: _____

COMPONENT ID _____

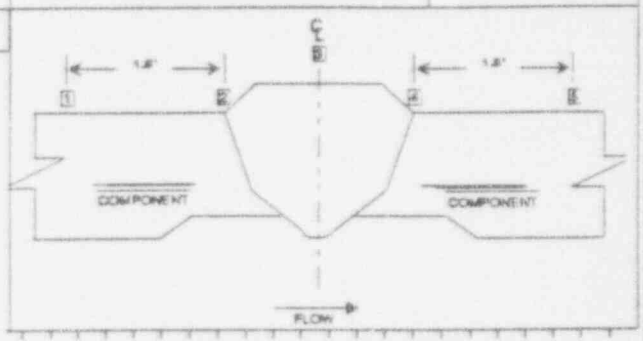
POSITION	0°	90°	180°	270°
1				
2				
3				
4				
5				

CROWN HEIGHT _____

CROWN WIDTH _____

NOM DIAMETER _____

WELD LENGTH _____

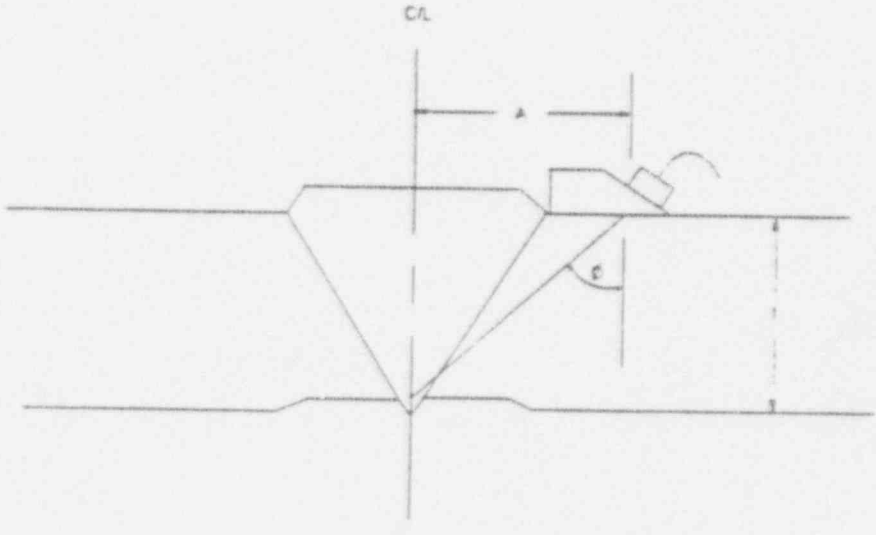


[redacted] DATE

GE REVIEWED BY [redacted] DATE

PAGE ____ OF ____

EXHIBIT III



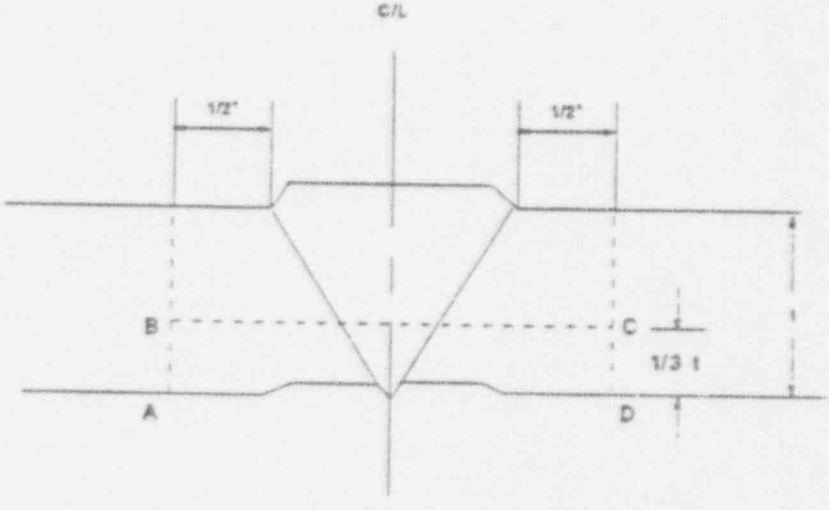
"A" DIMENSION REQUIREMENT

.93t for Ø with 45°

1.19t for Ø with 52°

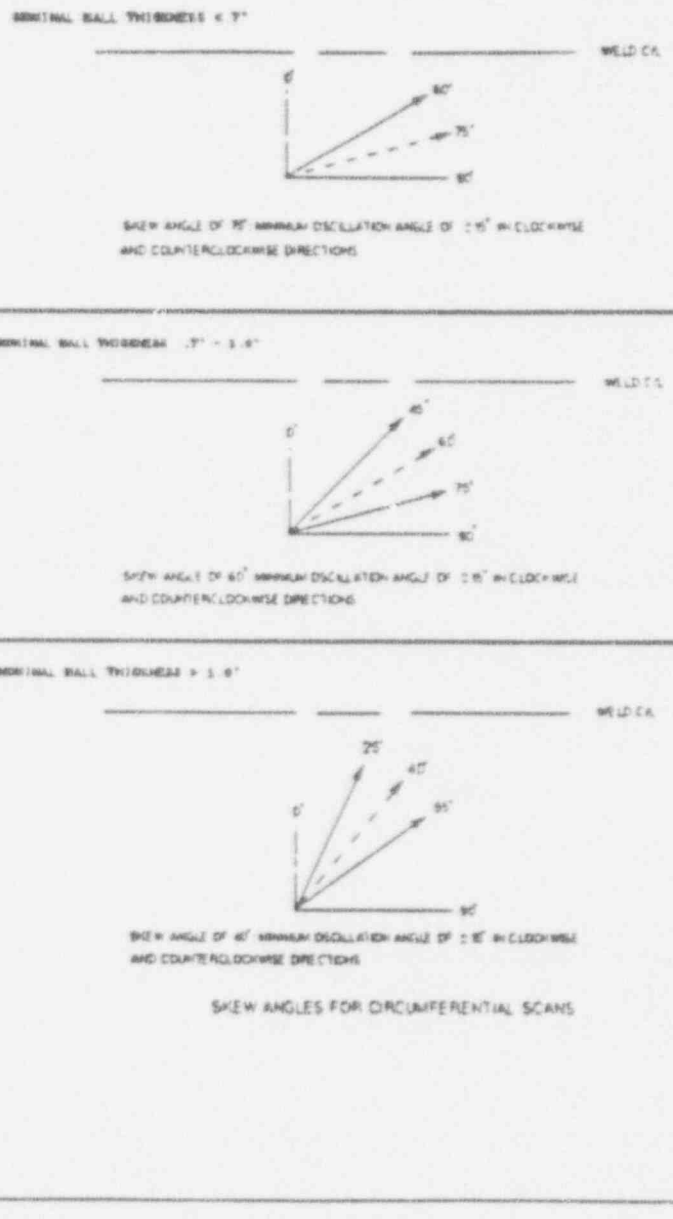
1.60t for Ø with 60°

FIGURE I



EXAMINATION VOLUME
A-B-C-D

FIGURE II



SKEW ANGLES FOR CIRCUMFERENTIAL SCANS

FIGURE III