


PROCEDURE COVER SHEET

PENNSYLVANIA POWER & LIGHT CO. SUSQUEHANNA STEAM ELECTRIC STATION	TP-ISI-309 Revision 0 Page 1 of 19
MANUAL ULTRASONIC EXAMINATION OF AUSTENITIC THIN WALL PIPING WELDS	
Effective Date <u>11-1-84</u> Expiration Date <u>11-1-86</u> Revised Expiration Date _____	
PROCEDURE TYPE: PORC _____, NON-PORC _____, Alternate Review _____ PORC MTG. NO. _____ (If applicable)	

Prepared by <u>E. L. Carroll</u>	Date <u>10/17/84</u>
Reviewed by <u>Marianne Frank</u>	Date <u>10/18/84</u>
Recommended: <u>R. A. Berlin</u> Section Head/Manager	Date <u>10/25/84</u>
<u>W. Keiser</u> Superintendent of Plant	Date <u>10-24-84</u>

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 PDR ADDCK 05000387
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PROCEDURE DEVIATION

		SITE		PSI <input type="checkbox"/>	PROCEDURE/REVISION NO.
		Susquehanna, Unit 2		ISI <input checked="" type="checkbox"/>	800-36/30
SA	DEVIATION NO.	DEVIATION PAGE NO.:	DATE REQUESTED:	EXAMINATION PERIOD:	
	2	1 OF: 2	18 October 1984	1984	
DATE	SECTION(S) AFFECTED:		PROCEDURE PAGE(S):		OF: 16
	2, 3, 5 and 8		2, 5 and 15		
DUTY/INVENT DIRECTION	EXAMINATION AREA(S) AFFECTED:				
	Manual ultrasonic examination of sustenitic thin wall piping welds				
DATE	THIS DEVIATION SUPERCEDES DEVIATION 1				
	DEVIATION: It is requested that the paragraph(s) shown below in the above procedure/revision be deviated from as follows (use exact wording proposed. Additional sheets may be used if necessary): Change Section 2 to read as follows: <u>SCOPE AND APPLICATION</u> Angle-beam shear-wave and straight-beam longitudinal-wave, manual, contact, pulse-echo ultrasonic techniques shall be employed for thin wall piping weld examinations. Thin wall piping circumferential, longitudinal, and branch connection butt welds including the adjacent base material in a 0.1- to 0.4-inch nominal thickness range and with a nominal diameter of 4.0 inches or greater shall be examined as specified in the applicable SwRI Examination Plan. Change (1) and the first paragraph of (2) of Section 3 to read as follows: (1) ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition, with Addenda through Winter 1981, "Rules for Inservice Inspection of Nuclear Power Plant Components" (2) ASME Boiler and Pressure Vessel Code, Section V, 1980 Edition, with Addenda through Winter 1981, "Nondestructive Examination," with the exception of the following: JUSTIFICATION: Reason change is necessary and what it is intended to accomplish (use additional sheets if necessary): Changes made at the request of Pennsylvania Power & Light Company				
QA MANAGER	DATE	TECHNICAL REVIEW	APPROVED		
19 Oct 1984	19 Oct 1984	19 Oct 1984	Date: 10/25/84		
19 Oct 1984	19 Oct 1984	19 Oct 1984	Title: SUP-NUCLEAR HEAT SUPPORT		
19 Oct 1984	19 Oct 1984	19 Oct 1984	Signature: R. A. Breslin		
19 Oct 1984	19 Oct 1984	19 Oct 1984			

Change 5.6 to read as follows:

Couplant

- (1) USP-grade glycerine or deionized water (with or without wetting agent) shall be used when performing ultrasonic calibrations and examinations in accordance with this procedure.
- (2) USP-grade glycerine shall be certified for sulfur content and total halogens in accordance with ASTM SD-129 and ASTM SD-808 of Article 24, Section V. Only ultrasonic couplants meeting PP&L requirements shall be used.

The following metals shall not be known added constituents of the material: silver, zinc, cadmium, mercury, gallium, indium, lead, tin, arsenic, antimony, and bismuth. Deionized water, when used, shall be supplied by the customer.

- (3) Other compounds, which in the opinion of the Level II or III examiner provide adequate ultrasonic coupling, may be used upon concurrence of the Project Manager responsible for the examination.
- (4) Couplant materials used for examination shall be the same as used for the calibration.

Add the following as the fourth paragraph under Section 8:

The investigation of ultrasonic reflectors not readily attributable to geometry should be accomplished, but not limited to, taking profiles and additional thickness measurements at the location of the indication, plotting the indication on a scale drawing, reviewing previous baseline data including that of other NDE methods used or re-examination using different angles.



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Title

MANUAL ULTRASONIC EXAMINATION OF AUSTENITIC THIN WALL PIPING WELDS

EFFECTIVITY AND APPROVAL

Revision 30 of this procedure became effective on 8 June 1984. Other revisions of the base document may be effective concurrently.

SA

Approvals

Written By

W. J. Hein

Date

8 Jun 84

Technical Review

E. R. Muecher

Date

8 June 1984

Manager of Q.A.

R. E. Engelhardt for BEM

Date

6/8/84

Cognizant Director

W. J. Hein

Date

6/8/84

The following information may be used for convenience. Completion of this portion is not mandatory.

Deviation No.

Date Effective

Procedure Section(s)
Affected

Notes:

APPROVED

Nuclear Support

Date: *10/12/84*

Title: *Supp - NUCLEAR MAINT SUPPORT*

Signature: *R. A. Breslin*

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MANUAL ULTRASONIC EXAMINATION OF AUSTENITIC THIN WALL PIPING WELDSSwRI-NDT-800-361. PURPOSE

This procedure provides the technical information and detailed steps necessary to ensure a complete and accurate manual ultrasonic examination of welds and adjacent base material of austenitic thin wall piping in accordance with the applicable ASME Boiler and Pressure Vessel Codes.

2. SCOPE AND APPLICATION

Angle-beam shear-wave and straight-beam longitudinal-wave, manual, contact, pulse-echo ultrasonic techniques shall be employed for thin wall piping weld examinations. Thin wall piping circumferential, longitudinal, and branch connection butt welds including the adjacent base material in a 0.1- to 0.4-inch nominal thickness range shall be examined as specified in the applicable SwRI Examination Plan.

3. APPLICABLE DOCUMENTS

- (1) ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition, with Addenda through Winter 1980, "Rules for Inservice Inspection of Nuclear Power Plant Components"
- (2) ASME Boiler and Pressure Vessel Code, Section V, 1980 Edition, with Addenda through Winter 1980, "Nondestructive Examination," with the exception of the following:
 - (a) Figure T-546.1 of Article 5, Section V, requires the basic calibration block for the average weld thicknesses (t) up to and including 1 inch to be $3/4$ inch or t . Paragraph 5.3 of this procedure requires the basic calibration block to be either t , no more than 25% less than t , or closer in thickness to the production material than the $3/4$ -inch alternate thickness allowed by Article 5 for production material thicknesses up to and including 1 inch. This exception will assure a more accurate calibration than the Article 5 basic calibration block design allowed by Code.
- (3) SwRI Nuclear Quality Assurance Program Manual (NQAPM)

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3.1 Applicable Calibration and Examination RecordsSwRI NDTR Form No.Revision Date

17-89	8-19-80
17-90	8-19-80
17-25	7-10-80
17-19	12-1-83
17-18	7-31-75
17-37	2-18-80

4. RESPONSIBILITY

- (1) The Director of the Department of Engineering Services, Quality Assurance Systems and Engineering Division, shall be responsible for the preparation, review, approval, and control of this procedure.
- (2) The Project Manager shall be responsible for the implementation of this procedure in accordance with the NQAPM in effect on the date this procedure is approved.
- (3) The examiner shall be responsible for implementing the requirements of this procedure.
- (4) The Manager of the Support and Administration Section, Quality Assurance Systems and Engineering Division, shall be responsible for storage of records generated in accordance with this procedure.

5. PERSONNEL AND EQUIPMENT5.1 Personnel Certification

Personnel performing examinations in accordance with this procedure shall be certified in accordance with SwRI NQAP 11-1, "Special Process Control."

5.2 Reference Block

Reference blocks used for screen distance calibration and verification shall be of the same basic material as the production material, stainless steel, and shall be one of the following (1) SwRI Half-Round, or (2) AWS Type DC.

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5.3 Basic Calibration Block

Notches shall be placed in a block manufactured from material of the same specification, product form and heat treatment as one of the materials being joined.

Calibration reflectors shall be notches machined on the outside and inside surfaces of the basic calibration block. The notches shall be in accordance with approved drawings of the basic calibration block contained in applicable SwRI Examination Plan.

The basic calibration block thickness shall be determined by the thickness of the production piping material to which the search unit is applied and Article 5, Section V. When a basic calibration block of the same thickness as the production piping material is not available, the basic calibration block thickness shall be closer to the production material thickness than the 3/4-inch thick alternate basic calibration block allowed by Article 5.

Flat basic calibration blocks or blocks of essentially the same curvature as the part to be examined may be used when contact surface curvatures are greater than 20 inches in diameter.

A curved basic calibration block shall be used to establish distance amplitude correction (DAC) curves for examinations on contact surfaces in the range of curvature from 0.9 to 1.5 times the basic calibration block diameter, when contact surface curvature is 20 inches in diameter or less.

The curvature of the main run pipe shall be used to establish the requirements for the basic calibration block curvature for the examination of branch pipe connection welds.

5.4 Search Units

(1) Search units shall be selected according to the following:

(a) Straight-Beam Longitudinal-Wave Nominal Search Unit Size

1/4" x 1/4" Aerotech (Diamond) Gamma MSWS,
1/4" Round Dual Element

(b) Angle-Beam Shear-Wave

Nominal Production
Material Thickness

Nominal Search Unit Size

0.1" to 0.4"

1/4" x 1/4", 1/4" Round

0.2" to 0.4"

3/8" x 3/8", 3/8" Round

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- (2) The exit point of the sound beam and the actual refracted beam angle of shear-wave search units shall be determined on an IIW reference block. The exit point shall be marked on the search unit wedge.

- (3) The nominal shear-wave search unit frequency shall be as follows:

<u>Nominal Frequency</u>	<u>Search Unit Size</u>
2.25 MHz	1/4" Round, 1/4" x 1/4"
1.5 MHz	3/8" Round, 3/8" x 3/8"

- (4) Search unit wedges shall be fabricated as required to produce a $45^\circ \pm 2^\circ$ refracted shear-wave. Other angles may be used to supplement the examination.
- (5) A 1/4" round longitudinal-wave dual element search unit shall be used at a frequency of 2.25 MHz or 5.0 MHz. An Aerotech (Diamond) 1/4" x 1/4" Gamma MSWS search unit shall be used only at a frequency of 5.0 MHz.

5.5 Ultrasonic Instrument

The examiner shall use a Sonic FTS Mark I ultrasonic instrument. Each instrument shall be aligned and shall display a valid alignment calibration tag as required by NQAP 10-1.

5.6 Couplant

- (1) USP-grade glycerine or deionized water (with or without wetting agent) shall be used when performing ultrasonic calibrations and examinations in accordance with this procedure.
- (2) USP-grade glycerine shall be certified for sulfur content and total halogens in accordance with SD-129 and SD-808 of Article 24, Section V. The residual amount of total sulfur or halogens shall not exceed 1% by weight. Deionized water, when used, shall be supplied by the customer.
- (3) Couplant materials used for examination shall be the same as used for the calibration.

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5.7 Thermometer

The thermometer to be used for measuring the calibration block and component temperatures shall be calibrated and certified and shall display a valid calibration tag as required by NQAP 10-1.

6. CALIBRATION METHOD6.1 Instrument Linearity

Ultrasonic instrument linearity shall be verified onsite as a minimum within one day before and one day after examining all welds to be examined with an instrument during an outage or every three months, whichever is less, in accordance with Paragraphs 6.1.1 and 6.1.2. Additionally, if a calibration verification does not meet the requirements of 6.3.2 of this procedure, an instrument linearity check must be performed prior to continuing examinations. Data required shall be recorded on the SwRI Instrument Linearity Verification Record and the sheet number shall be referenced on each applicable SwRI Sonic Instrument Calibration Record.

NOTE

The setting of the damping control shall be recorded on REMARKS on the SwRI Instrument Linearity Verification Record. The damping control shall be in the same position during linearity verification, calibrations, and examinations or a new linearity verification shall be performed.

6.1.1 Amplitude Linearity

- (1) Position a shear-wave search unit on a calibration block to obtain indications from the 1/2T and 3/4T holes (the calibration block for amplitude linearity verification may not be the basic calibration block specified for calibrating distance amplitude correction curves in accordance with this procedure).
- (2) Adjust the search unit position to give a 2:1 ratio between the two indications, with the larger indication (1/2T hole) set at 80% of full screen height (FSH) and the smaller indication (3/4T hole) set at 40% of FSH.
- (3) Without moving the search unit, adjust the instrument sensitivity (gain) to set the larger indication to 100% of FSH and record the amplitude of the smaller indication, estimated to the nearest 1% of FSH.

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- (4) Successively set the larger indication from 100% to 20% of FSH in 10% increments (or 2 dB steps if a fine control is not available); observe and record the smaller indication estimated to the nearest 1% of FSH at each setting. The reading must be 50% of the larger amplitude within 5% of FSH.

6.1.2 Amplitude Control Linearity

- (1) Position a shear-wave search unit on a calibration block to obtain maximum amplitude from the 1/2T hole.
- (2) Without moving the search unit, set the indication to the required percent of FSH and increase or decrease the dB as specified below. The estimated signal shall be recorded to the nearest 1% of FSH and shall fall within the limits of the following table:

<u>Indication</u> <u>Set at % of FSH</u>	<u>dB Control</u> <u>Change*</u>	<u>Indication</u> <u>Limits, % of FSH</u>
80%	- 6 dB	32 to 48%
80%	-12 dB	16 to 24%
40%	+ 6 dB	64 to 96%
20%	+12 dB	64 to 96%

*Minus denotes decrease in amplitude; plus denotes increase.

6.2 Calibration

The ultrasonic calibration shall be completed prior to the examination.

The REJECT control shall be maintained in the 0 position during calibration and examination.

The nominal piping production material thickness shall be used to determine the correct calibration block and search units for examinations with geometric restrictions such as piping or components which may be thicker than the nominal pipe size, examinations limited to one side of the weld or wide weld crowns. The Level II or III examiner shall ensure that complete coverage of the examination area is obtained. Additional calibration vee-path positions and larger screen sizes which may be required to assure this coverage shall be used for the examination from either side of the weld.

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The centerline of the search unit shall be at least 1-1/2 inches from the nearest side of the block. Rotating the beam into the corner formed by the hole and the side of the block may produce a higher amplitude at a longer beam path. This beam path shall not be used for calibration.

The FREQ MHz control shall be turned to 1 when a 1.5 MHz search unit is used, to 2 with a 2.25 MHz search unit, and to 5 with a 5.0 MHz search unit.

The type and length of the search unit cable shall be recorded on the SwRI Sonic Instrument Calibration Record.

All spaces on the SwRI Sonic Instrument Calibration Record shall be filled in.

6.2.1 Temperature

The temperature of the calibration block shall be within 25°F of the component temperature and shall be recorded on the SwRI Sonic Instrument Calibration Record for the initial calibration and each verification.

The surface temperature of the component to be examined shall be taken prior to performing an examination and shall be recorded on the applicable SwRI Examination Record.

6.3 Straight-Beam Distance Calibration

- (1) The screen distance chosen shall be the shortest applicable size to include at least 1/4t beyond the thickest production material to which the search unit is applied.
- (2) Attach a delay line shoe if a 1/4" x 1/4" Aerotech (Diamond) Gamma MSWS search unit is used.
- (3) Position the straight-beam search unit on an appropriate reference block, observe the back reflections and set up the required linear sound path distance along the screen baseline.

6.4 Angle-Beam Distance Calibration

- (1) Select the shortest screen distance size that includes at least 1/8 vee-path beyond the anticipated examination range.
- (2) Position the shear-wave search unit on an appropriate reference block, observe the radius echoes and set up the required linear sound path distance along the screen baseline.

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6.5 Angle-Beam Distance Amplitude Correction

DAC curves shall be constructed from notches perpendicular to the axis of curved basic calibration blocks when examining circumferential welds. DAC curves shall be constructed from the axial notches of curved basic calibration blocks for examinations of longitudinal welds and branch pipe connections. The DAC curve shall be constructed as follows:

- (1) Position the angle-beam search unit on the basic calibration block to obtain maximum response from the vee-path position, selected from the following, which produces the highest amplitude:

Vee-Path Positions

4/8, 8/8, 12/8

- (2) Adjust instrument gain controls to obtain the primary reference response at 80% \pm 5% of full screen height (FSH) and mark this amplitude on the screen. The gain controls shall not be adjusted once the primary reference response has been established.
- (3) Position the search unit to obtain maximum response from the remaining vee-path positions; mark and join all amplitude points with a smooth curved line that shall not extend more than 1/8 vee-path beyond the last qualified calibration point.

6.6 Secondary DAC Calibration

Each point on the DAC curve shall appear at a minimum of 20% FSH or a secondary DAC curve shall be constructed as follows:

- (1) Secondary DAC curves shall contain at least 2 points.
- (2) The DAC point at the 8/8 vee-path position shall be brought to the primary reference level by manipulating the instrument gain controls. This point shall be marked on the instrument screen. The 12/8 vee-path position, previously at less than 20% of FSH, shall be marked on the screen and these points connected with a smooth curved line. The instrument gain settings for this secondary DAC curve shall be recorded on the appropriate SwRI Sonic Instrument Calibration Record.

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EXCEPTION

When the 8/8 vee-path position is set at the primary reference level, and the 12/8 vee-path position is below 20% of FSH, a secondary DAC curve is not required.

6.7 Calibration Verification6.7.1 Sweep Range and DAC Curve Verification

Sweep range calibration shall be verified on the appropriate reference block and DAC curve calibration, if applicable, shall be verified on the appropriate basic calibration block:

- (1) At the start of a series of examinations
- (2) Substitution of search unit cable
- (3) Substitution of power source
- (4) At least every 4 hours during the examination
- (5) At the finish of a series of examinations
- (6) Whenever the validity of the calibration is in doubt

6.7.2 Verification of Calibration Reflectors at Scanning Speed

The examiner shall verify the presence of the calibration reflector at scanning speed when required.

NOTE

It is not necessary to assure that this check confirms the signal amplitude at 100% of reference level, but merely to demonstrate that the signal from the calibration reflectors are readily observable at scanning speed.

The following statement shall be documented on the SwRI Sonic Instrument Calibration Record and initialed:

"Calibration reflectors have been verified at scanning speed."

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6.7.2 Calibration Changes

- (1) Perform the following if any point on the DAC curve has decreased more than 20% of FSH or 2 dB in amplitude, or if any point on the DAC curve has moved on the sweep line more than 5% of full screen width or 10% of the sweep division reading, whichever is greater:
 - (a) Void all examinations referring to the calibration in question and performed after the last valid calibration verification.
 - (b) Conduct a new calibration.
 - (c) Reexamine the areas for which examinations have been voided.
- (2) Perform the following if any point on the DAC curve has increased in amplitude more than 20% or 2 dB:
 - (a) Correct the calibration.
 - (b) Reexamine all indications recorded since the last valid calibration verification.
 - (c) Enter proper values on a new SwRI Examination Record.

6.7.3 Recalibration

Substitution of any of the following shall be cause for recalibration:

- (1) Search unit transducer or wedge
- (2) Search unit cable type or length
- (3) Ultrasonic instrument
- (4) Examination personnel
- (5) Couplant
- (6) Change in type of power source; e.g., a change from alternating to direct current

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7. EXAMINATION7.1 Examination Areas7.1.1 Longitudinal and Circumferential Butt Welds in Piping

This procedure shall apply to ultrasonic examination from the outside surface of pressure piping longitudinal and circumferential welds and adjacent base material 0.1- to 0.4-inch nominal thickness.

Scanning of the weld and base material shall be adequate to ensure complete coverage for $1/3t$ from the inside surface of the pipe. The base material shall be examined for a distance of 1 inch as measured from the outside surface fusion line on each side of the weld.

Class 1 longitudinal welds shall be examined along the entire length of the weld during the preservice examination and for at least one pipe-diameter length or 12 inches, whichever is less, from the fusion line of the intersecting circumferential weld during inservice examinations.

Class 2 longitudinal welds shall be examined for at least $2-1/2t$ length from the fusion line of the intersecting circumferential weld during preservice and inservice examinations.

7.1.2 Branch Pipe Connection Butt Welds

"Set in" type branch pipe connection butt welds in pressure piping of 0.1- to 0.4-inch nominal thickness dimensions shall be examined ultrasonically as described herein.

Examination of "set in" type branch pipe connection butt welds shall be performed from the outside surface of the main run pipe.

Base material of the main run pipe shall be examined for a minimum distance of 1 inch from the weld fusion line.

7.2 Surface Condition

The contact surfaces shall be free from weld spatter, roughness, or other conditions which interfere with free movement of the search unit or impair the transmission of ultrasound.

7.3 Attenuation

No attempt shall be made to determine differences in the acoustic properties between the basic calibration block and the production material which would result in an instrument gain change.

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7.4 Indication Length Zero Reference (Lo) Location

Areas to be examined in accordance with this procedure shall have a Lo marked in accordance with the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-103.

7.5 Scanning

When practical, scanning shall be performed at a minimum gain setting five times the reference level sensitivity.

Instrument gain setting for scanning shall be determined on the basic calibration block as follows for each primary reference level utilized:

- (1) With the instrument at the primary reference level, manipulate the search unit on the basic calibration block to obtain a signal of 20% FSH from a calibration reflector (notch).
- (2) Add 14 dB of gain by utilizing the 14 dB switch (if present), the fine gain control, or a combination of the fine and coarse gain controls and choose any method which yields a signal response within ± 2 dB of 100% FSH.
- (3) This amplitude and method shall be recorded on the SwRI Sonic Instrument Calibration Record and shall be used during the valid calibration period for all scanning at five times the reference level sensitivity.

Scanning overlap shall be a minimum of 10% of the search unit piezoelectric element dimension perpendicular to the direction of scan.

The search unit movement rate for scanning shall not exceed six inches per second.

7.5.1 Base Material Lamination Scan

Before the angle-beam examination, a lamination scan using longitudinal-wave shall be performed. This scan shall cover as much as practical of the area through which the angle-beam is later to be passed. The lamination scan shall be conducted as follows:

- (1) Screen distance calibration for this examination shall be conducted in accordance with Paragraph 6.3.

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- (2) Scanning sensitivity shall be as required to maintain the first back reflection at an amplitude of between 50% and 90% of FSH.
- (3) To record an intermediate indication, a back reflection signal shall be obtained from an indication-free area and the instrument gain control adjusted until this signal is at 75% $\pm 5\%$ of FSH; record the intermediate indication when its amplitude is equal to the remaining back reflection. If total loss of back reflection accompanies the intermediate echo, the area of total loss of back reflection shall be recorded on the appropriate SwRI Examination Record.

EXCEPTION

A base material lamination scan need not be conducted on components which have received a lamination scan during a previous examination and laminar reflectors were not recorded.

7.5.2 Thickness Measurements

Thickness measurements for circumferential and longitudinal welds shall be taken at a minimum of three points (on the centerline of the weld and at one point in the base material on both sides of the weld). Thickness measurements for branch pipe connections shall be taken at a minimum of two points (one point in the base material on the main run pipe side of the weld and one point on the branch connection side of the weld). These measurements shall be recorded on the appropriate SwRI Examination Record. Screen distance calibration for this examination shall be conducted in accordance with Paragraph 6.3.

7.5.3 Angle-Beam Examination for Indications Parallel with the Weld

A shear-wave angle-beam examination shall be accomplished from both sides of the circumferential or longitudinal weld and from the main run pipe side of the weld for branch pipe connections. The sound beam shall be directed perpendicularly into the weld to detect indications parallel with the weld. The entire weld and base material for a distance of 1 inch from each side of the weld fusion line (1 inch of base material of the main run pipe for branch pipe connections) shall be examined. Calibration for these examinations shall be in accordance with Paragraphs 6.4 and 6.5. Other angles may be used as referenced in Paragraph 5.4.

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7.5.4 Angle-Beam Examination for Indications Perpendicular to the Weld

A shear-wave angle-beam examination shall be conducted on the weld and adjacent base material by placing the search unit on the weld and base material surface with the sound beam directed into the weld and base material in an axial orientation with respect to the weld to detect indications perpendicular or transverse to the weld. The entire length of the weld and base material for a distance of 1 inch from each side of the fusion line (1 inch of base material of the main run pipe for branch pipe connections) shall be scanned with the search unit directed in this manner. The search unit shall then be turned 180° and the scan repeated. Calibration for this examination shall be in accordance with Paragraphs 6.4 and 6.5.

7.6 Postexamination Cleaning

Arrangements shall be made with the customer for postexamination removal of couplant materials.

8. RECORDING CRITERIA

Indications shall be recorded in accordance with the techniques outlined in the applicable revision of SwRI Nuclear Projects Operating Procedure IX-FE-117, except for the recording levels which shall conform to the following paragraph of this section.

Indications producing a response 20% or greater of the reference level shall be recorded and investigated by a Level II or a Level III examiner to the extent necessary to determine the shape, identity, and location of the reflector.

All ultrasonic reflectors (regardless of signal amplitude) not attributable to geometry shall be recorded and investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector. Examples of nongeometric reflectors (which may occur at any amplitude) are those that are slightly removed from the weld root and/or chamfer, mask the root indications, are transverse to the weld, or have linear dimensions with side branches.

Indications 20% or greater of the reference level attributable to geometry shall be recorded only once, even if the amplitude of the indication fluctuates above and below the required recording amplitude along the weld. These indications shall be investigated by a Level II or a Level III examiner to determine the shape, identity, and location of the reflector. If indications that have been recorded as geometry have been investigated and found to be nongeometric reflectors, the entire weld shall be reexamined and all nongeometric reflectors and other reflectors not previously recorded shall be recorded.

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Indications investigated and found to be other than geometrical in nature, regardless of the amplitude, shall be reported to the customer for evaluation.

The end points of the indication as determined by 100% DAC shall be recorded.

Scanning limitations shall be recorded.

9. EVALUATION

Evaluation of reportable indications shall be the responsibility of the customer, or the customer's representative, and shall be conducted in accordance with ASME Boiler and Pressure Vessel Code, Section XI, Article IWA-3000. The applicable year and Addenda of the Code shall be as specified in Section 3 of this procedure.

10. RECORDS

The customer shall receive copies of documents generated in accordance with this procedure in the examination report.

Documents generated in accordance with this procedure shall be retained as a portion of the examination report. The examination report shall be stored by the Manager of the Support and Administration Section, Quality Assurance Systems and Engineering Division, in the Data Storage Facility for the period specified by the contractual agreement with the customer.