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RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: FORWARDS "PRESERVICE INSP PROGRAM PLAN,VOLS 1 & 2."
(see reports - Vol. 1+2)

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Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. Box 968 3000 Geo. Washington Way Richland, Washington 99352 Phone (509) 375-5000

March 28, 1979
G02-79-54

Director, Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. S. A. Varga, Chief
Branch No. 4
Division of Project Management

Subject: WPPSS NUCLEAR PROJECT NO. 2
PRESERVICE INSPECTION PROGRAM PLAN

Dear Mr. Varga:

The Washington Public Power Supply System (WPPSS) herewith submits five (5) copies of the Preservice Inspection Program Plan, which is transmitted to you in accordance with Section XI of the ASME Boiler and Pressure Vessel Code, Paragraph IWA-1400(c). This Program Plan governs the preservice non-destructive examinations of the Nuclear Steam Supply System and supporting piping systems which are within the scope of Section XI, and pertinent augmented examination requirements of applicable NRC Regulatory Guides, including Regulatory Guide 1.70, Rev. 2. The WNP-2 FSAR will be revised to reference this Program Plan from FSAR Sections 5.2.4 and 6.6.

Exceptions to ASME Code examination requirements are identified and justified within the Program Plan, as is the tentative schedules for the conduct of the examinations and filing the Preservice Inspection Final Report.

The WNP-2 Inservice Inspection Program Plan, which will govern the first 10 year inspection interval, will be submitted to you following our submittal of the Preservice Inspection Final Report, but no later than 6 months following the start of commercial operation.

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PM

The Program for preservice testing of pumps and valves, also required by ASME Section XI, will be the subject of a separate transmittal.

Very truly yours,

D L Renberger

D. L. RENBERGER
Assistant Director, Technology

DLR:DWP:md

Attachments: As Stated

cc: JJ Verderber, B&R
JJ Byrnes, B&R
RC Root, B&R (site)
HR Canter, B&R
D Roe, BPA
J Ellwanger, B&R
FA MacLean, GE (San Jose)
E Chang, GE (San Jose)
NS Reynolds, Debevoise & Liverman

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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WPPSS
NUCLEAR PROJECT
NO. 2

PRESERVICE INSPECTION PROGRAM PLAN

VOLUME 2

PROCEDURES

COPY NO. 13

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

10.0--PROCEDURES

This section contains a listing of the procedures which were used to govern the preservice examination activities described in this Program Plan. The actual procedures are found in Volumes 2 and 3. The revision of each procedure, field changes, and effective dates are given in the listing. Also described in this section are the exceptions to the reference code (see Section 4.0) which are reflected in the procedures.

10.1 PROCEDURE LIST

The procedure list at the end of this section identifies each of the procedures, revision, and field changes applicable to the WNP-2 Preservice Inspection activities. The tab number for each procedure location in Volumes 2 and 3 is also given for convenience.

10.2 CODE EXCEPTIONS

The procedures comply to the reference code. However, there are some exceptions to that code which are stated below, along with the justification for each exception:

1. Use of Appendix III From the Winter 1975 Addenda

The ultrasonic examination procedure governing the examination of piping welds, UTP-10, reflects the guidelines of ASME Section XI, Appendix III, entitled "Ultrasonic Examination Method for Class 1 and 2 Piping Systems Made From Ferritic Steels", which was introduced with the Winter 1975 Addenda to 1974 Edition. This Appendix is assumed to be acceptable to the NRC based on the revision to 10CFR50 published by the NRc in October of 1979, which accepts the addenda to Section XI through the Summer 1978 Addenda to the 1977 Edition. The use of this Appendix has also been approved at a number of other

nuclear power plants. The Winter 1975 version of Appendix III has been referenced in the procedures. But the requirements of that addenda have been augmented such that all of the requirements of the Summer 1978 addenda of Appendix III are being met.

The use of Appendix III for piping welds is considered by the Supply System to be more appropriate than the use of Appendix I to the ASME Section XI Code, which is applicable per the 1974 Edition of Section XI through the Summer 1975 addenda, as Appendix III is written to be specifically applicable to piping welds, whereas Appendix I is intended for use with thick-walled components such as pressure vessels, and was not intended for use with piping welds. Furthermore, Appendix III will apparently be applicable for subsequent inservice examinations, so its use during the preservice examinations will provide for a better data comparison in the future.

2. Use of the Evaluation Criteria From Subarticle IWB-3000 of the Winter 1975 Addenda for Evaluation of Indications in Class 1 and Class 2 Piping

The Winter 1975 addenda to the 1974 edition of ASME Section XI introduced evaluation criteria for the examination of austenitic and ferritic piping welds, examination categories B-F and B-J, which were not previously included in Section XI. It is anticipated that it is these evaluation criteria that will be subsequently imposed inservice. The acceptance criteria in Winter 1975 addenda is identical or more strict than the NRC approved Summer 1978 addenda. Class 2 examinations will also be evaluated to IWB-3000.

Date 1/18/85
Revision 2

PROCEDURE LIST

Notes to following table

Note 1: Effective date - The date the revision or field change is approved for use. The revision or field change remains in effect until a new revision is approved. At that time all previous revisions and field changes are void.

Note 2: Field changes - When more than one (1) field change is listed for a revision, all previous field changes remain in effect until a new revision to the procedure is issued. Field changes are minor modifications to the procedure.

PROCEDURE TITLE	NUMBER	REVISION	FIELD CHANGE	EFFECTIVE DATE	TAB
Magnetic Particle Examination	MTP-1	0		12/7/79	1
		1		3/2/79	1
		1	1	1/29/81	1
		1	2	11/2/81	1
Liquid Penetrant Examination	PTP-1	0		2/7/79	2
		1		3/2/79	2
		1	1	11/8/79	2
		1	2	1/29/81	2
Automatic Data Recording	UTP-6	0		2/7/79	3
Ultrasonic Examination of Nuclear Coolant System Piping	UTP-10	1		3/2/79	4
		1	1	12/31/80	4
		1	2	12/31/80	4
		1	3	6/5/79	4
		1	4	6/13/79	4
		1	5	1/28/81	4
		1	6	11-7-80	4
		1	7	1/29/81	4

PROCEDURE TITLE	NUMBER	REVISION	FIELD CHANGE	EFFECTIVE DATE	TAB
Ultrasonic Examination of Nuclear Coolant System Piping (Contd.)	UTP-10	1	8	9/18/81	4
		1	9	10/7/81	4
		1	10	11/2/81	4
		1	11	7/31/82	4
Ultrasonic Examination of Nozzle Forging Inner Radius	QCI 6-4	0		[illegible]	5
Ultrasonic Examination of RPV Flange Weld	UTP-25	2		8/21/82	6
		2	1	10/8/82	6
UT of Hanger Lug Attachment Weld	UTP-26	5		1/20/81	7
		5	1	1/29/81	7
		5	2	2/27/81	7
		5	3	11/19/81	7
		5	4	12/1/81	7
		7		7/31/82	7
		7	1	8/11/82	7
Liquid Penetrant Examination	QCI 3-3	0		8/22/83	8
Ultrasonic Examination of Flange Ligaments	UTP-28	2		10/11/82	9

PROCEDURE TITLE	NUMBER	REVISION	FIELD CHANGE	EFFECTIVE DATE	TAB
Beam Spread Measurement	UTP-14	1		1/20/81	10
		1	1	6/16/81	10
Ultrasonic Examination of RPV Butt Welds and Adjacent Base Metal	UTP-30	1		1/20/81	11
		1	1	1/29/81	11
		2		2/27/81	11
		2	1	1/27/81	11
		2	2	9/14/81	11
		2	3	9/18/81	11
Magnetic Particle Examination	QCI 4-3	0		8/22/83	12
Ultrasonic Examination of RPV Studs	UTP-32	1		12/9/81	13
		1	1	12/11/81	13
Ultrasonic Examination of Component Studs and Bolts	UTP-34	2		10/20/81	14
		2	1	10/20/81	14
Ultrasonic Examination of Piping Welds	QCI 6-13	1		8/22/83	15
Ultrasonic Examination of Main Steam Flued Head	UTP-33	2	1	6/26/80	16
		5	1	4/8/81	16
		5	3	4/30/81	16

Date 1/18/85
Revision 0

PROCEDURE TITLE	NUMBER	REVISION	FIELD CHANGE	EFFECTIVE DATE	TAB
Manual UT of RHR Heat Exchanger Butt Welds	UTP-17	1		1/23/80	17
UT of Piping Attachment Welds	QCI 6-15	0		8/10/83	18
Manual UT of RPV Flange Ligaments from RPV Flange O.D.	UTP-15	1		10/11/82	19
Weld Marking Procedure	MEP-2	0		3/6/79	22
		0	1	3/22/79	22
		0	2	1/17/80	22
		0	3	1/29/81	22
		1		3/31/81	22
		1	1	4/30/81	22
Visual Examinations of Nuclear Power Components	QCS and I-002	0		1/2/79	23
(Title Change)	QCI 7-1	0		1/2/79	23
Document Control for the WNP-2 Preservice Inspection (Volumetric and Surface Examinations)	QA-28	0		2/16/79	24
		2		5/10/81	24
Preservice Inspection	INP 3-3	1		8/24/79	25
Examination Data	INP 3-10	0		3/15/79	26
Data Evaluation	INP 3-11	0		7/23/79	27
	QCI 12-8	0		7/17/81	27

PROCEDURE TITLE	NUMBER	REVISION	FIELD CHANGE	EFFECTIVE DATE	TAB
Control of Inservice Inspection Activities	EDP-9.0	0		2/28/79	28
Preparation of PSI Plan	EDP-9.2	0		10/31/78	29
Conduct of Preservice Examinations	EDP-9.3	0		10/31/78	30
		1		2/28/79	30
WNP-2 PSI Notification of Reportable Indication	QA-31	0		3/2/79	31
		1		5/11/81	31
Layout of Welds	QCI 12-10	0		8/3/83	32
Blank					33
Blank					34
Remote UT of RV Circ. and Long. Butt Welds	UTP-40	0		5/11/81	35
		0	1	5/13/81	35
		0	2	Not approved	
		0	3	8/12/81	35
		0	4	10/5/81	35
Remote UT of RV Nozzle-to-Vessel Welds	UTP-41	1		5/21/81	36
		1	1	5/27/81	36
		1	2	Not approved	
		1	3	6/29/81	36

PROCEDURE TITLE	NUMBER	REVISION	FIELD CHANGE	EFFECTIVE DATE	TAB
Remote UT of RV Nozzle-to-Vessel Welds (Contd.)		1	4	8/12/81	36
Remote System Data Recording	UTP-42	0		3/16/81	37
		0	1	4/20/81	37
Nozzle-to-Shell Device Assy. and Operating Procedures	UTP-44	1		5/5/81	38
		1	1	5/15/81	38
Blank					39
Visual Examination of Component Supports	SLT-5 303.0	Later			40
Piping System Expansion and Vibration Tests	PPM 8.2.17	Later			40
	PPM 8.2.33	Later			40
Pole Guided Examination Device Assembly and Operating Procedure	UTP-47	0		3/9/81	41
		0	1	3/30/81	41

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. MTP-1 Revision No. 1

Procedure Title Magnetic Particle Examination

LMT, Inc. QA Review and Approval [signature] Level III 2-20-79
(Quality Assurance Officer)

Client Approval [signature] ISI Engineer 3/1/79
Approved for Yoke/dry powder method only

Authorized Nuclear Inpsector ~~Approval~~ Reviewed [signature] 3/2/79

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

2	ISI ENGINEER THOMAS F. HOYLE	DATE 2/28/79
CONTRACT NO. C-14402	TITLE PSI SERVICES FOR NSSS AND Associated Nuclear Piping	
CONTRACTOR LMT, INC		

DOCUMENT TITLE		REV.
Magnetic Particle Examination	MTP-1	1

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) 1/25/79

PREVIOUSLY APPROVED ☒ YES ☐ NO (DATE IF YES) 2/7/79

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

Rev 0 was approved with comments, these comments have been incorportated into Rev 1 with the exception of comment 3 which states "Approved for Yoke / dry powder method only As noted on "client Approval" on Cover sheet

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
2/1/79 L Blank 3-1-79 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER		X		
NA PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA			
Ken J. Hannah 3-1-79 SUPERVISOR, ISI/NDE, GENERATION SERVICES		X		
3/1/79 M. L. Oricker 3/1/79 MANAGER, QUALITY SERVICES		X		

NOTES/COMMENTS:

1. Approved for Yoke / dry powder method only

WP-702

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PROC. NO. MTP-1
PAGE 1
FOLLOWING PAGE 2
REVISION 1
DATE: 2/16/79

TITLE:

MAGNETIC PARTICLE EXAMINATION

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of the ASME Boiler and Pressure Vessel Code, Sections V and XI, for magnetic particle examination of materials and components.

B. Scope

This procedure is applicable to examinations performed on materials and components using fluorescent or color contrast materials.

II. REFERENCES

A. This procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;

QUALIFICATION:

Approved for use [signature] 2/20/79

[signature] DB MacGill Level III 2-20-79

II. A. 1. a) Section V, "Nondestructive Testing", Article 7, "Magnetic Particle Examination":, 1974 edition, addenda through Summer 1975.

b) Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components: 1974 edition, addenda through Summer 1975, and Table IWB-3514.2 of the Winter 1975 addenda.

2. American Society for Nondestructive Testing;

a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification in Nondestructive Testing."

3. a) LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

b) LMT Operating and Quality Assurance Manual, Addendum to Revision 10, approved for the WNP-2 Preservice Inspection by WPPSS.

III. DEFINITIONS

None

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, Inc., or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

This procedure shall be qualified for specific examinations, personnel, and equipment by successfully locating known indications on a test specimen and documenting the results.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. Personnel shall be qualified and certified according to the requirements of ASME Section XI, SNT-TC-1A, and LMT, Inc., Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Prods

1. Prods shall contain a remote current control switch allowing current to be turned on after the prods have been properly positioned.
2. Prod tips shall be clean and dressed to allow proper contact with a minimum of electrical arcing.
3. Maximum prod spacing shall not exceed eight inches.

B. Yokes

1. Yokes shall be electromagnetic AC, DC, or AC/DC selectable, fixed or articulated leg, meeting the following requirements:

   a) DC yokes shall be capable of lifting at least 40 pounds at the maximum pole spacing to be used.

   b) AC yokes shall be capable of lifting at least a 10 pound weight at the maximum pole spacing to be used.

C. Magnetic Particles (oxides)

1. Magnetic particles used for examinations governed by this procedure shall be either wet or dry colored

VII. C. 1. oxide, or wet fluorescent oxide.

2. The oxide color used shall provide adequate contrast with the examination surface.

D. <u>Lighting</u>

1. The examination shall be conducted under white light of sufficient intensity to detect a 1/32 inch wide black line on an 18% (reflectance) neutral gray card.

2. When fluorescent oxides are used, the examination shall be conducted under filtered "black-light" illumination.

a) The black light intensity at the work surface shall be determined at least once every eight hours and whenever the work location is changed.

b) The black light intensity shall be checked with a meter sensitive to light in the ultraviolet spectrum, centered on 365nm (3650A). Two readings shall be taken; the first without the filter, and the second with the ultraviolet filter (365nm) over the sensing element of the meter. The second reading is deducted from the first and the difference shall be at least 800μW/cm^2.

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VII. E. Magnetizing Unit

The unit used to produce the magnetic field shall be capable of producing magnetic fields of sufficient intensity to meet the requirements of VII.A or B, or XI B.3, as applicable.

F. Equipment and Material Certifications

1. The magnetizing unit including voltage and amperage meters shall have been calibrated in accordance with the manufacturer's recommendations within 90 days prior to use.

2. Light meters shall be calibrated within 90 days prior to use.

3. Calibration documentation shall be available for audit.

VIII. PREPARATIONS

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before beginning any examination program:

VIII. A. 1. a) Procedure and Qualification

b) Inspection Reports

c) Material and Equipment Certifications

d) Personnel Certifications

e) NRC Form 4 (Operating Nuclear Plants Only)

f) NRC Form 5 (Operating Nuclear Plants Only)

g) Status Indicators (Hold Tags)

h) Radiation Work Permit (when applicable)

B. Physical Preparation

1. The following physical preparation requirements shall be reviewed by the examiner with client before specific examinations are performed:

a) Insulation removal

b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

c) Cleanup requirements

d) Safety precautions (other work in area, etc.)

C. Surface Preparation

1. Responsibility

It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

VIII. C. 2. Area

The area of interest plus adjacent surfaces extending at least one inch shall be clean, dry, and free from any dirt, grease, lint, scale, welding flux, weld spatter, or other matter which would in any way impair effective examination.

a) Any deviation from the above requirements shall be noted on the examination report.

b) Materials used in surface preparation shall have no adverse effect on the component examined.

IX. LIMITATIONS

A. Dry Method

1. For dry method magnetic particle examinations, this procedure is limited to part and material temperatures less than 600°F.

B. Wet Method

1. For wet method magnetic particle examinations, this procedure is limited to part and material temperatures less than 135°F and above the freezing point of this particle carrier.

X. CALIBRATION

This section is not applicable to magnetic particle examination.

XI. PERFORMANCE

A. Field Direction

To ensure the most effective detection of surface discontinuities, each area shall be examined twice, with the field in the first examination oriented at approximately right angles to the field in the second examination.

B. Prod Method

1. Magnetizing Technique

Magnetization shall be accomplished by portable prod type electrical contacts pressed against the surface of the area to be examined. To avoid arcing, a remote control switch, which may be built into the prod handles, shall be provided to permit the current to be turned on after the prods have been properly positioned and to be turned off before they are removed.

XI. B. 2. Prod Spacing

Prod spacing shall be a maximum of eight inches. Shorter spacing may be used to meet the limitations of geometry or dimensions of the area being examined, or to increase the sensitivity, but prod spacing less than three inches usually is not feasible due to banding of the particles around the prods. The prod tips shall be kept clean and dressed and the contact areas of the test surface free from dirt, scale, oil, etc., to avoid electrical arcing. If a source of magnetizing current with an open circuit voltage of over 25 volts is used, lead, steel or aluminum, rather than copper tipped prods, are recommended to avoid copper penetration.

3. Magnetizing Current

Direct or rectified magnetizing current shall be used at a minimum of 100 and a maximum of 125 amps per inch of prod spacing for sections 3/4 inch thick or greater. For sections less than 3/4 inch thick, amperage shall be 90-110 amps per inch of prod spacing.

4. Direction of Magnetization

At least two separate examinations shall be carried

XI. B. 4. out on each area, with prods placed so the lines of flux in one examination are approximately perpendicular to the lines of flux in the other.

5. Examination Coverage

Examinations shall be conducted with sufficient overlap to assure 100% coverage at the established test sensitivity.

C. Yoke Method

1. To ensure the most effective detection of surface discontinuities, each area shall be examined twice, with the field in the first examination oriented at approximately right angles to the field in the second examination.

2. The magnetizing field shall be produced by AC (alternating current), or DC (direct current).

3. The magnetizing field strength shall meet the requirements of VII.B.

D. Coil Method

1. Magnetizing Technique

Magnetization is accomplished by passing current

XI. D. 1. through a multiturn coil looped through or around the part, or section of the part, to be examined. This produces a magnetic field parallel to the axis of the coil.

2. Magnetizing Current

For encircling coils, direct or rectified current at 35,000 ampere-turns, divided by the sum of two plus the length-over-diameter ratio of the test part shall be used for magnetization. For example, a part ten inches long by two inches in diameter has an L/D ratio of five. Therefore, 35,000/(2 + 5) = 5,000 ampere-turns; if a five-turn coil is used, the amperage required is 5,000/5 or 1,000.

a) This formula provides adequate field strength for parts with an L/D ratio greater than or equal to four. For ratios down to two and for smaller parts magnetized in a larger, fixed-size coil, the formula shall be 45,000 ampere-turns divided by the length-over-diameter ratio. For L/D ratios less than two, alternate magnetizing methods shall be used. When the magnetizing coil is made of cable wound around the test part, the coil's turns shall be closely spaced. The effec-

XI. D. 2. a) tive field extends for about six inches on either side of the coil; longer parts shall be magnetized in sections.

b) At least two separate examinations shall be carried out on each area. The second examination shall be with the lines of magnetic flux perpendicular to those used for the first examination in that area. A different means of magnetizing may be used for the second examination.

E. Examination Sequence

1. Perform the examination in the following sequence:

a) Induce magnetizing field
b) Apply oxide
c) Shut off field
d) Examine surface
e) Repeat steps a), b), c), and d) with field oriented approximately 90° to a).

2. Precautions

a) Because excessive amounts of oxide may mask indications, apply dry oxide by lightly dusting the examination surface. In the event excessive amounts remain on the surface, remove them with

XI. E. 2. a) a gentle air stream.

b) When performing examinations with wet oxide, including fluorescent, ensure particle suspension by thoroughly agitating or shaking the container immediately prior to oxide application.

c) To maximize the examination sensitivity, apply oxide only while the field is being induced in the item under examination.

F. <u>Demagnetization</u>

Due to the low intensity of remnant field produced by yoke methods, demagnetization methods shall not be performed, unless specifically requested by the client.

XII. <u>EVALUATION</u>

A. <u>Methods</u>

1. Dry Powder

In order to recognize the broad, fuzzy, lightly held powder patterns it is essential to carefully observe the formation of indications both while the powder is being applied and while the excess is being removed.

XII. A. 1. Sufficient time for indication examination should be allowed between successive magnetization cycles.

2. Wet Particle

Care must be taken to prevent high velocity flow over critical surfaces, particularly highly finished areas, to prevent washing away fine or weakly held indications. Bath application must be cut off prior to removing the magnetic field.

B. Evaluation Criteria

1. Evaluation and recording shall be to the criteria of ASME Section XI, 1974 edition, addenda through Winter 1975, Table IWB 3514.2, with relevant indications interpreted according to the following criteria:

a) Indications with length greater than three times their width are defined as linear and are reportable.

b) Indications which are circular or elliptical with a length less than three times their width are defined as rounded indications. Rounded indications with any dimension greater than 3/16 inch are reportable.

XII. B. 1. c) Four (4) or more rounded indications in line and separated by 1/16 inch or less, edge-to-edge, are reportable.

2. Report all relevant indications only as rounded or linear, recording the length or major diameter.

C. Reference System for Reporting Indications

1. For piping, the reference system of Figure 1 shall be used to locate indications.

a) Indications shall be located in inches from an appropriate reference mark.

2. For vessel or other components (not pipe), the reference system shall be shown on a sketch of the item showing relative location of the indications.

D. Acceptance

Revelant indications shall be recorded and evaluated per Table 1 which contains the criteria of ASME, Section XI, 1974 edition, with addenda through Winter 1975.

XIII. RECORDS

A. Examination Report

XIII. A. 1. A Report of Surface Examination (Figure 2) shall be completed identifying the component(s) examined, the materials used, examiners, procedure, and detailing the examination results.

XIV. REVIEW

A. Examination reports shall be subject to review by an assigned LMT Level III Examiner for conformity to the requirements of this procedure.

B. Following the final LMT review the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the ANI.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

A. Original examination documentation shall become the property of WPPSS upon sign-off of the ISI Field Coordinator. Additional reports which may include examination documentation as reference materials shall be generated from copies.

B. Field Storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.

Material: Ferritic steels that meet the requirements of NB-2300 and a specified minimum yield strength of 50 ksi or less
Thickness Range: t, 0.1 to 6.0 in.

Nominal Wall Thickness t, in.[2]	Allowable Length Surface Examination Method: Length ℓ, on Outer Surface, in.	Allowable Depth by Volumetric for pipe sizes <4"	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4": Surface Indications a/t, %	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4": Subsurface Indications a/t, %[3]
Preservice Examinations				
0.1 to 0.312	1/16	(10% of Nominal Wall)	. . .	. . .
Over 0.312 to 2.0	3/16		10.4 minus 0.9t	10.4 minus 0.9t
Over 2.0 to 6.0	1/4		10.4 minus 0.9t	10.4 minus 0.9t
Inservice Examinations				
0.1 to 0.312	1/8[4]	(10% of Nominal Wall)	. . .	. . .
Over 0.312 to 2.0	9/32[5]		15.3 minus 1.3t	15.3 minus 1.3t
Over 2.0 to 6.0	5/16[5]		15.3 minus 1.3t	15.3 minus 1.3t

NOTES:

(1) The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

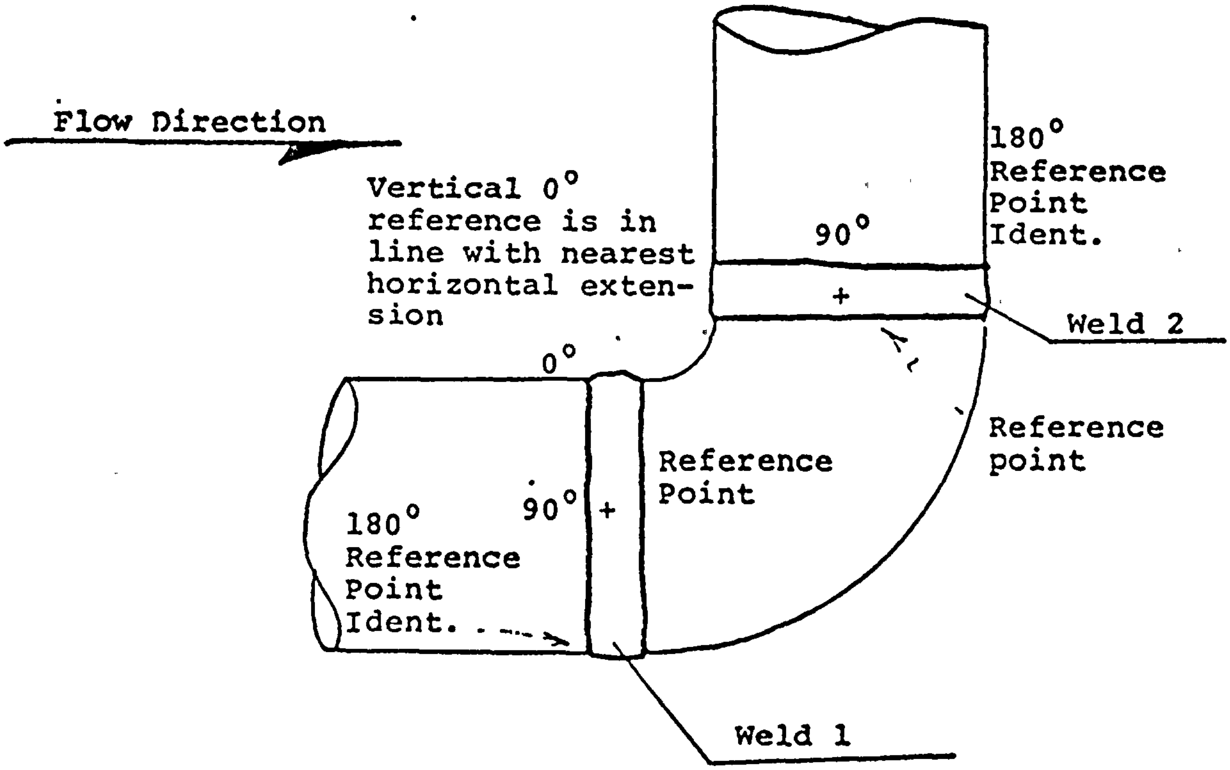
(2) t is the nominal pipe wall thickness, or the actual wall thickness as determined by UT examination

(3) The total depth of an allowable subsurface indication is twice the listed value.

(4) Refer to IWB-3514.2(b)(1) for optional standards where limits are exceeded.

(5) Refer to IWB-3514.2(b)(2) for alternative standards where limits are exceeded.

Table 1
Evaluation Criteria for Magnetic Particle
Indication Evaluation (From ASME XI Winter 1975)



1. Reference arrow is always in the direction of flow.
2. Zero Reference is at Top Dead Center on a horizontal run.
3. For vertical runs, Zero Reference is on a line with 0 Reference on the nearest horizontal run or extension.

REFERENCE POINT DETERMINATION AND MARKING

Figure 1

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ISO No. ________
Report ________
Job No. ________
Date ________
Page ____ of ____

REPORT OF SURFACE EXAMINATION

ITEM

ISI No. ________ Size ________ Material ________ S/N ________
Description ________
Location ________ Preparation ________

SIGN

Exam./Level ________ Exam./Level ________ Review/Level ________
Auth. Inspector ________ Customer ________

EQUIP

Mag. Particle: Machine ________ S/N ________ Cable Length ________
Method ________ Particles ________
Penetrant: Cleaner ________ Pen. ________ Developer ________
Lighting: Visible ________ Fluorescent ________

PROC

Mag. Particle: Cleaning ________ Examination ________
Penetrant: Cleaning ________ Examination ________
Visual: Cleaning ________ Examination ________

EXAMINATION

Part No.	Description		Part No.	Description	

Figure 2

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. PTP-1 Revision No. 1

Procedure Title Liquid Penetrant Examination

LMT, Inc. QA Review and Approval [signature] 2-20-79
(Quality Assurance Officer)

Client Approval Thomas J. Hogle ISI Engineer 3/1/79

Authorized Nuclear Inpsector ~~Approval~~ REVIEWED [signature] 3-2-79

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

2	ISI ENGINEER Thomas F. Hoyle	DATE 2/28/79
CONTRACT NO. C-14402	TITLE PSI Services for NSSS and Associated Nuclear Piping	
CONTRACTOR LMT, INC		

DOCUMENT TITLE		REV.
Liquid Penetrant Examination	PTP-1	1

PREVIOUSLY REVIEWED [X] YES [ ] NO (DATE IF YES) 1/25/79

PREVIOUSLY APPROVED [X] YES [ ] NO (DATE IF YES) 2/7/79

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

Rev 0 was approved with comments, these comments have been incorporated into Rev 1

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
Ack 3/1/79 L Blanton 3-1-79 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
NA PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA			
Ken J. Hannah 3-1-79 SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
3/1/79 M. L. Drelier 3-1-79 MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

WP-702 EDP 5.0

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TITLE:

LIQUID PENETRANT EXAMINATION

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of ASME Boiler and Pressure Vessel Code, Sections V and XI, for the liquid penetrant examination of materials and components.

B. Scope

This procedure is applicable to examinations performed using fluorescent or color contrast materials.

II. REFERENCES

A. This procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;

   a) Section V, "Nondestructive Testing:, Article 6 "Liquid Penetrant Examination", 1974 Edition, addenda through Summer 1975;

QUALIFICATION:

Approved for use [signature] Level III 2/20/79
[signature] Level III 2-20-79

II. A. 1. b) Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components":, 1974 edition, addenda through Summer 1975, and Tables IWB 3514.2 and 3514.3 of the Winter 1975 addenda.

2. American Society for Nondestructive Testing;

a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification in Nondestructive Testing."

3. a) LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

b) LMT Operating and Quality Assurance Manual Addendum to Revision 10 approved for the WNP-2 PSI by WPPSS.

III. DEFINITIONS

The procedure, as qualified for specific penetrant materials and plant components, is designated as the specific procedure.

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so

IV. A. indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by successful application to a comparator crack panel.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. Personnel shall be qualified and certified according to the requirements of ASME Section XI, SNT-TC-1A, and LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Filters (Magnaflux or equivalent)

VII. A. Black light filters shall be certified as within the 3300-3900A range at the time of purchase.

B. <u>Light Intensity Meters (Weston 703 or equivalent)</u>

Six month calibration intervals and data shall be certified and certification indicated by a sticker on the instrument.

C. <u>Surface Thermometers (PTC or equivalent)</u>

Original calibration shall be certified and certification documentation shall be available at the jobsite for client audit.

1. Thermometers shall be replaced after six months use.

a) Each thermometer shall have a sticker affixed showing date of purchase.

D. <u>Pentrant Materials</u>

1. Materials for use on stainless steel or titanium:

a) These materials shall be analyzed for total halogens by evaporating a 100 gm sample for three hours at 100°C or the boiling point of the sample, whichever is lower, and any residue

VII. D. 1. a) exceeding .005 gms analyzed for halogens in accordance with ASTM D-808-63.

b) Materials are acceptable if the residue does not exceed 0.005 gm, or if the total halogen content of the residue does not exceed 1% by weight.

2. Materials for use on nickel base alloys:

a) Materials for use on these alloys shall be analyzed for sulfur content by evaporating a 100 gm sample for three hours at a temperature of 90° to 100°C or the boiling point of the material, whichever is lower, and any residue exceeding .005 gms analyzed for sulfur in accordance with ASTM D-129-64.

b) Materials are acceptable if the residue does not exceed 0.005 gm or if the total sulfur content of the residue does not exceed 1% by weight.

3. Certification Requirements

Certification shall be on a batch basis. Where analysis is not required, the manufacturer shall certify the total amount of residue.

VII. D. 4. Approved Materials (Table 1)

The listed materials, when properly certified, are approved for use according to the procedure qualifications.

E. Liquid Penetrant Comparator

Liquid penetrant comparators shall be of SB 211, Type 2024 aluminum 3/8 inch thick, and machined as per Figure 1, less the groove. The ungrooved comparator shall be torch heated in the center of each face to between 950°F and 975°F, then quenched in cold water to produce a network of cracks on each face, and dried at 300°F. Finally, the groove shall be machined and marked as per Figure 1.

VIII. PREPARATION

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the client before beginning any examination program.

a) Procedure and Qualification

b) Inspection Reports

VIII. A. 1. c) Material and Equipment Certifications

d) Personnel Certifications

e) NRC Form 4 (Operating Nuclear Plants Only)

f) NRC Form 5 (Operating Nuclear Plants Only)

g) Status Indicators (Hold Tags)

h) Radiation Work Permit (when applicable)

B. Physical Preparation

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

a) Insulation removal

b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

c) Cleanup requirements

d) Safety precautions (other work in area, etc.)

C. Surface Preparation

1. Responsibility

It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

VIII. C. 2. Area

The area of interest plus adjacent surfaces extending at least one inch shall be clean, dry, and free from any dirt, grease, lint, scale, welding flux, weld spatter, oil, or other extraneous matter that would in any way impair effective examination.

a) Any deviation from the above requirements shall be noted on the examination report.

b) Materials used in surface preparation shall have no adverse effect on the component examined. Specifically, the requirements of VII.D. shall be met.

IX. LIMITATIONS

A. This procedure is limited to general use on materials at temperatures between 60°F and 125°F and ambient conditions above 60°F, unless a specific qualification procedure for extended temperature range use is performed.

B. Specific Qualification for Extended Temperature Ranges

1. Temperatures less than 60°F

IX. B. 1. a) A comparator panel and the penetrant materials shall be cooled to the examination temperature, and the specific procedure applied to Side B. The block shall be allowed to warm to between 60°F and 125°F, and the specific procedure applied to Side A.

b) The specific procedure shall be considered qualified for the proposed temperature if the indications appearing on both sides are essentially of equal intensity.

2. Temperatures above 125°F

a) A comparator panel shall be heated to the proposed examination temperature, and the procedure applied to Side B. The block shall be allowed to cool to between 60°F and 125°F, and the specific procedure applied to Side A.

b) The specific procedure shall be considered qualified for the proposed temperature if the indications appearing on both sides of the crack panel are essentially of equal intensity.

3. Procedure qualification shall be recorded on a specific Procedure Qualification form as shown in Figure 2.

X. CALIBRATION

This section is not applicable to penetrant examinations.

XI. PERFORMANCE

A. Temperature Measurement

The temperature of the material shall be verified to fall within the range qualified in the specific procedure, using a mechanical surface Temperature Gauge such as a PTC Type 313F certified upon purchase, and no more than six months old.

B. Pre-cleaning

As a part of the penetrant examination, before application of the penetrant, material to be examined shall be cleaned with an approved cleaner, as per Table 1, and wiped with clean, white, lint-free cotton rags. A drying period as per Table 1 shall be allowed after all pre-cleaner has been removed from the material before penetrant is applied.

C. Penetrant Application and Dwell Time

1. Penetrant shall be applied by dipping, brushing,

XI. C. 1. or spraying. Compressed air used for spraying shall be clean and dry.

2. Dwell time shall be per manufacturer's recommendations, as shown in Table 1, and qualified in this procedure.

3. Penetrant shall not be allowed to dry or gel.

D. Penetrant Removal

1. At the end of the dwell time interval, excess penetrant shall be removed from the material.

2. Removal materials shall be as per the manufacturer's recommendations as shown in Table 1.

3. Water shall not be used at a pressure greater than 50 psi or a temperature greater than 110°F. (Note: Tapwater is usually at a pressure above 50 psi).

4. Emulsification time shall be as shown in Table 1.

5. Solvent removable penetrants shall be first wiped away with dry paper or white cloth wipers, then with solvent-moistened wipers. In no case may solvent be directly applied to the material prior to developing.

XI. E. Drying Before Developing

1. Surfaces to be examined with water-washable or post emulsification methods shall be completely dry before developer is applied. Blotting with clean materials or circulating warm air may be used as drying aids; however, the surface temperature shall not exceed 125°F.

2. Surfaces to be examined with solvent-removable penetrant methods shall be allowed to dry by normal evaporation for at least five minutes.

3. Drying time shall be as specified in Table 1 and not exceeded.

F. Developing

1. Fluorescent examinations may use dry developer dusted evenly over the material surface or wet developer. Acceptable materials are listed in Table 1.

2. Color contrast examinations are required to use wet developer. Acceptable developers are listed in Table 1.

XI. F. 3. Wet developer shall be agitated before application by dipping or spraying to ensure adequate dispersion of developer particles. Developer coating should be even and pure white. Avoid using excess developer.

4. Warm air may be used to decrease the drying time of water-suspension developers, provided the material surface temperature does not exceed 125^{o}F.

5. Penetrant bleed-out time shall be a minimum of seven minutes, and may not exceed thirty minutes without qualification.

G. Post Examination Cleaning

1. Penetrant material removal shall be as per the manufacturer's recommendations, as shown in Table 1. Solvent materials may be used to flush the penetrant from the part. Excess solvent shall be wiped away with clean rags.

2. Solvent materials shall meet the requirement of VII.D. for halogen and sulfur content.

XII. EVALUATION

A. Methods

1. Preliminary

The material surface shall be observed during the application of the developer to determine the nature of indications with profuse bleed-out.

2. Final

Final evaluation shall take place between seven and thirty minutes following developer application.

3. Illumination for Final Analysis

a) Color Contrast Penetrants
Adequate illumination shall be provided for evaluation of color contrast indications without loss of sensitivity.

b) Fluorescent Penetrants
The examinations shall be evaluated in a darkened area. The material shall be examined under a minimum black light intensity of 90 footcandles, measured by a Weston 703 or equivalent light meter without filter, using 10X multiplier. The

XII. A. 3. b) black light shall be within the range of 3300-3900 Angstrom units.

B. Evaluation Criteria

1. Evaluation and recording shall be to the criteria of ASME Section XI, 1974 edition, addenda through Winter 1975, Tables IWB 3514.2 and 3514.3, with relevant indications interpreted according to the following criteria:

   a) Indications with length greater than three times their width are defined as linear and are reportable.

   b) Indications which are circular or elliptical, with a length less than three times their width are defined as rounded indications. Rounded indications with any dimension greater than 3/16 inch are reportable.

   c) Four (4) or more rounded indications in line separated by 1/16 inch or less, edge-to-edge, are reportable.

2. Report all relevant indications only as rounded or linear, recording their length or major dimension.

C. Reference System for Reporting Indications

XII. C. 1. For piping, the reference system of Figure 3 shall be used to locate indications.

a) Indications shall be located in inches from an appropriate reference marker.

D. Acceptance

Relevant indications shall be recorded and evaluated per Tables 2, (A) and (B), which contain the criteria of ASME XI, 1974 edition, with addenda through Winter 1975.

XIII. RECORDS

A. Qualification Report

1. A specific qualification report (Figure 2) form shall be prepared for examinations performed outside the temperature range of 60° to 125°F.

B. Examination Report

A Report of Surface Examination (Figure 4) shall be completed identifying the component(s) examined, the materials used, the examiners, the procedure, and detailing the examination results.

XIV. REVIEW

A. Examination reports shall be subject to review by an assigned LMT Level III Examiner for conformity to the requirements of this procedure.

B. Following the final LMT review the reports will be transmitted to the WPPSS Field Coordinator for review by WPPSS and the ANI.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

A. Original examination documentation shall become the property of WPPSS upon sign-off of the ISI Field Coordinator. Additional reports which may include examination documentation as reference materials shall be generated from copies.

B. Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor and his designated representative, WPPSS'S representative(s) and the Authorized Nuclear Inspector.

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ACCEPTABLE MATERIALS RECORD

CLEANERS

Mfg.	Type	No.	Drying Time
Magnaflux	Solvent	SKC-S	5 Min.
Met-L-Chek	Solvent	E-59	5 Min.
Magnaflux	Solvent	SKC-NF	5 Min.
URESCO	Tracer-Tec	K410C	5 Min.

PENETRANTS

Mfg.	Type	No.	Dwell Time
Magnaflux	Solvent-Rem.	SKL-HF/SKL-S	10-30 Min.
Met-L-Chek	Solvent-Rem.	VP-31	10-30 Min.
URESCO	Tracer-Tec	P-300A	10-30 Min.

DEVELOPERS

Mfg.	Type	No.	Drying Time
Magnaflux	Solvent-Rem.	SKD-S	5-15 Min.
Met-L-Chek	Solvent-Rem.	D-70	5-15 Min.
Magnaflux	Solvent-Rem.	SKD-NF	5-15 Min.
URESCO	Tracer-Tec	D-495C	5-15 Min.

Table 1

Material: Ferritic steels that meet the requirements of NB-2300 and a specified minimum yield strength of 50 ksi or less
Thickness Range: t, 0.1 to 6.0 in.

	Allowable Indication by Surface Examination Method	Allowable Depth by Volumetric for Pipe Sizes <4"	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4"	
Nominal Wall Thickness[2] t, in.	Length ℓ, on Outer Surface, in.		Surface Indications a/t, %	Subsurface Indications a/t, %[3]
Preservice Examinations				
0.1 to 0.312	1/16		. . .	. . .
Over 0.312 to 2.0	3/16	10%	10.4 minus 0.9t	10.4 minus 0.9t
Over 2.0 to 6.0	1/4		10.4 minus 0.9t	10.4 minus 0.9t
Inservice Examinations				
0.1 to 0.312	1/8[4]		. . .	. . .
Over 0.312 to 2.0	9/32[5]	10%	15.3 minus 1.3t	15.3 minus 1.3t
Over 2.0 to 6.0	5/16[5]		15.3 minus 1.3t	15.3 minus 1.3t

NOTES:

(1) The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

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

(3) The total depth of an allowable subsurface indication is twice the listed value.

(4) Refer to IWB-3514.2(b)(1) for optional standards where limits are exceeded.

(5) Refer to IWB-3514.2(b)(2) for alternative standards where limits are exceeded.

ALLOWABLE INDICATIONS

Table 2 (A)

Material: Austenitic steels with specified minimum yield strength of 35 ksi or less
Thickness Range: t, 0.1 to 3.0 in.

Nominal Wall Thickness[2] t, in.	Allowable Indication by Surface Examination Method	Allowable Depth by Volumetric for Pipe Sizes <4"	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4"	
	Length ℓ, on Outer Surface, in.		Surface Indications a/t, %	Subsurface Indications a/t, %[3]
Preservice Examinations				
0.1 to 0.312	1/16	10%	. . .	. . .
Over 0.312 to 2.0	3/16		10.1 minus 0.7t	10.1 minus 0.7t
Over 2.0 to 3.0	7/32		10.1 minus 0.7t	10.1 minus 0.7t
Inservice Examinations				
0.1 to 0.312	1/8[4]	10%	. . .	. . .
Over 0.312 to 2.0	1/4[5]		12.7 minus 0.9t	12.7 minus 0.9t
Over 2.0 to 3.0	9/32[5]		12.7 minus 0.9t	12.7 minus 0.9t

NOTES:

(1) The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

(2) t is the nominal pipe wall thickness, or the actual wall thickness as determined by UT examination

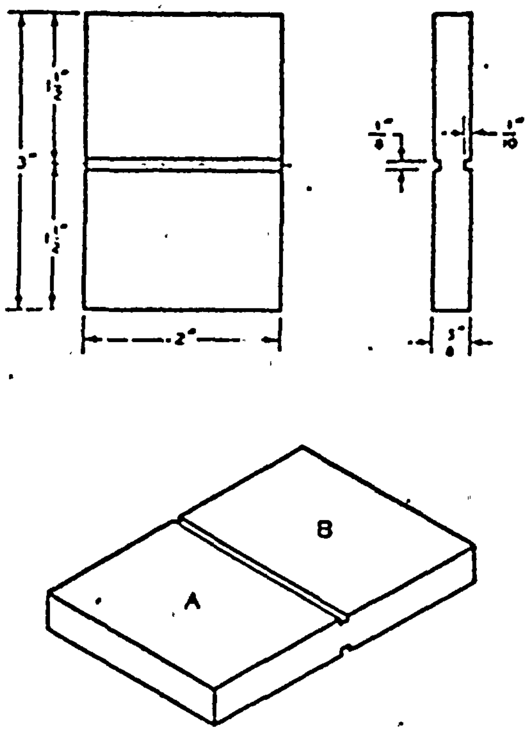
(3) The total depth of an allowable subsurface indication is twice the listed value.

(4) Refer to IWB-3514.3(b)(1) for optional standards where limits are exceeded.

(5) Refer to IWB-3514.3(b)(2) for alternative standards where limits are exceeded.

ALLOWABLE INDICATIONS

Table 2 (B)



(Note: Dimensions given are for guidance only and are not critical.)

LIQUID PENETRANT COMPARATOR

(Comparator Crack Panel)

Figure 1

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PROC. NO. PTP-1
PAGE 22
FOLLOWING PAGE 23
REVISION 1
DATE 2/16/79

LIQUID PENETRANT PROCEDURE QUALIFICATION RECORD (SPECIFIC)

A liquid penetrant procedure shall be qualified and certified prior to the starting of the project. The procedure shall establish how the work will be performed, the essential variables and what the procedure may be used on.

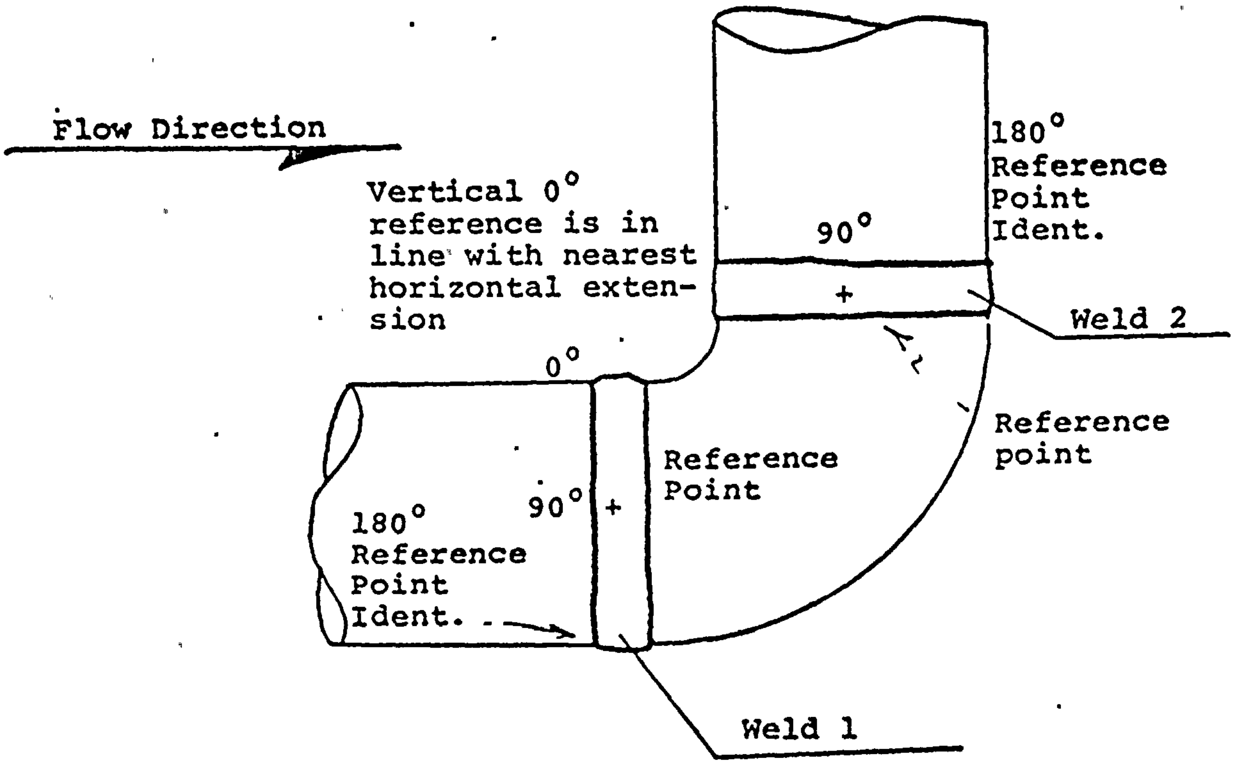
Name__________ Level______ Date__________ Proc. No.__________

Reference Code__________ Addenda__________

Other Reference Incorporated__________

1. Brand name and specific type - Manufacturer's name__________
   A. Penetrant letter designation__________ Batch Cert No.__________
   B. Remover letter designation__________ Batch Cert No.__________
   C. Developer letter of designation__________ Batch Cert No.__________
   D. Emulsifier letter designation__________ Batch Cert No.__________
   E. Type used: (I)Fluorescent__________ (II)Visible Dye__________
   F. Method used:
      a. Water-wash___ b. Post Emulsification___ c. Solvent Removable___
2. Details of the method of post-examination cleaning and drying, including cleaning materials used and time allowed for drying__________
3. Details of the method of penetrant application: (A) The length of time that the penetrant remains on the surface and (B) The temperature of the surface and penetrant during the examination if not within the 60 and 125°F range. (A)__________ (B)__________
4. Details of the methods of removing excess penetrant from the surface and of drying the surface before applying the developer__________
5. Details of the method of applying the developer, and length of developing time before examination. A. Spray___ B. Dip___ C. Brush___ D. Other___ Length of Developing time__________ Other details__________
6. Method of Post-examination cleaning__________
7. Name of Item__________ Type of material__________
8. Cast(   ) Weld(   ) Forging(   ) Other(   )__________
9. Welding Process__________ Casting Process__________
10. Defect classification__________
11. Footcandle power black light__________ White light footcandles__________
12. Warm-up time on black light__________
13. Signature and Level of person qualifying procedure__________
14. Signature and Level of person certifying procedure__________

Figure 2



1. Reference arrow is always in the direction of flow.
2. Zero Reference is at Top Dead Center on a horizontal run.
3. For vertical runs, Zero Reference is on a line with 0 Reference on the nearest horizontal run or extension.

REFERENCE POINT DETERMINATION AND MARKING

Figure 3

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ISO No. ______
Report ______
Job No. ______
Date ______
Page ____ of ____

REPORT OF SURFACE EXAMINATION

ITEM

ISI No. ______ Size ______ Material ______ S/N ______
Description ______
Location ______ Preparation ______

SIGN

Exam./Level ______ Exam./Level ______ Review/Level ______
Auth. Inspector ______ Customer ______

EQUIP

Mag. Particle: Machine ______ S/N ______ Cable Length ______
Method ______ Particles ______
Penetrant: Cleaner ______ Pen. ______ Developer ______
Lighting: Visible ______ Fluorescent ______

PROC

Mag. Particle: Cleaning ______ Examination ______
Penetrant: Cleaning ______ Examination ______
Visual: Cleaning ______ Examination ______

EXAMINATION

Part No.	Description		Part No.	Description	

Figure 4

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-6 Revision No. 0

Procedure Title Automatic Ultrasonic Data Recording

LMT, Inc. QA Review and Approval [signature] 1-16-79
(Quality Assurance Officer)

Client Approval [signature] (ISI ENGINEER) 2/7/79

Authorized Nuclear Inpsector REVIEW ~~Approval~~ [signature] 2/7/79

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP	ISI ENGINEER	DATE
2	THOMAS F. HOYLE	1/25/79

CONTRACT NO. C-14402

TITLE PSI Services for NSSS and Associated Nuclear Piping

CONTRACTOR LMT, Inc.

DOCUMENT TITLE	REV.
Automatic Ultrasonic Data Recording UTP-6	0

PREVIOUSLY REVIEWED ☐ YES ☒ NO (DATE IF YES) ______

PREVIOUSLY APPROVED ☐ YES ☒ NO (DATE IF YES) ______

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
DCW 1/30/79 L. Bleden 1-30-79 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
NA PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA			
K. J. Hanneh 2-3-79 SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
Dale Krolek 2/7/79 for MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

WP-702 EDP 9.0

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Testing • Engineering • Service • Training

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San Jose, Ca. 95112
408-297-8766

TITLE:

AUTOMATIC ULTRASONIC DATA RECORDING

I. PURPOSE AND SCOPE

This procedure provides guidance for automatic recording of test data generated in ultrasonic examination performed under other LMT, Inc. procedures.

II. REFERENCES

A. Applicable Code Editions

Automatic data recording is not directly covered by any ASME Code.

B. Applicable Code Cases

None

C. Supplemental References

1. Manufacturer's Manual, Sonic Mark I with 220 Thickness Adapter.

2. Manufacturer's Manual, Nortec 131D

3. Applicable LMT Ultrasonic Test Procedures

QUALIFICATION:

Approved for use [signature] 1/9/79
[signature] 1-16-79

III. DEFINITIONS

None

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, shall qualify the procedure for a particular examination. When the Field Supervisor is not Level III in the discipline, both his signature and that of a qualified LMT Level III are required.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by successful application to standard reference materials, which shall be documented by an approved calibration and a cover-sheet sign-off.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification, as specified by the approved procedure qualification,

VI. A. and associated approved calibration records.

B. Personnel shall be qualified and certified according to the requirements of ASME Sections V and XI, SNT-TC-1A, and LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Sonic Mark I Flaw/Thickness Tester with 220 Digital Thickness Adapter, Nortec 131D, or equivalent instrumentation, modified to provide analog metal path and echo amplitude voltage outputs.

B. Optional Zetec/Teac 2300S Two-channel Tape Recorder with voice override.

C. Brush 220 Two-channel Strip Chart Recorder, or equivalent, using chart materials as recommended by the manufacturer.

D. Equipment shall meet the calibration requirements as stated in the examination procedure.

VIII. PREPARATION

A. Documentation

Documentation requirements shall be as stated in the examination procedure.

VIII. B. Physical

An uncontaminated area with work table and electrical power is required for the data recording station.

IX. LIMITATIONS

This procedure may be used with any LMT, Inc. ultrasonic examination procedure.

X. CALIBRATION

A. Calibration is performed on a complete system. A change in tester or recording instrumentation requires recalibration of the system.

B. The Ultrasonic Tester

Calibrate the digital readout section of the tester in accordance with the manufacturer's instructions to display vertical and horizontal signal indications in % of scale and inches, respectively.

C. The Magnetic Tape Recorder (operational)

1. Set the line adjust to 100%

2. The testers amplitude output shall be connected to the V recorder input.

X. C. 3. The metal path tester output shall be connected to the H recorder input.

4. The tape recorder shall generally be operated on low speed but it may be operated on high speed to improve S/N ratio.

D. The Strip Chart Recorder

1. The amplitude signal from the tester (V tape recorder output) shall be connected to Channel 1.

2. The metal path signal from the tester (H tape recorder output) shall be connected to Channel 2.

3. Amplitude Channel Adjustment

a) Obtain any test block indication and adjust the tester gain to display H at 100% amplitude. (FSH)

(1) Adjust the recorder Channel 1 attenuator and sensitivity controls for a 100% pen deflection.

b) Obtain any test block indication and adjust the tester gain to display it at 20% amplitude.

(1) Adjust the recorder Channel 1 position control for a 20% pen deflection.

X. D. 3. c) Repeat steps a) and b) until the recorder faithfully tracks the amplitude signal displayed on the tester scope.

4. Metal Path Channel Adjustment

a) Lock the range gate on a test block indication at 10 on the horizontal trace.

(1) Adjust the recorder gain to place the pen at 10 on the chart.

b) Lock the range gate on a test block indication at 2 on the horizontal trace.

(1) Adjust the position control to place the pen at 2 on the chart.

c) Repeat steps a) and b) until the recorder faithfully tracks the signal range selected by the lock on range gate, and digital readout.

E. <u>Calibration Verification</u>

The calibrated system shall record the amplitude of the largest indication on the scope and the range of the indication nearest the initial pulse.

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XI. PERFORMANCE

A. Chart records shall contain written notes fully identifying the record as directed in the examination procedure.

B. Calibration checks shall be recorded on each chart as directed by the examination procedure.

XII. EVALUATION

Chart records shall be evaluated according to the examination procedure.

XIII. RECORDS

Chart records shall be reviewed by an assigned LMT Level III Examiner for conformity to the requirements of the procedure.

XV. STORAGE AND DISTRIBUTION

Storage and distribution shall be governed by the examination procedure which this procedure supplements.

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-10 Revision No. 1

Procedure Title Ultrasonic Examination of Nuclear Coolant System Piping

LMT, Inc. QA Review and Approval [illegible signature] Level III 3/22/79
(Quality Assurance Officer)

Client Approval Thomas J. [illegible] ISI Engineer 3/1/79

Authorized Nuclear Inpsector ~~Approval~~ REVIEWED [illegible signature] 3/2/79

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

2	ISI ENGINEER THOMAS F. HOYLE	DATE 2/28/78
CONTRACT NO. C-14402	TITLE PSI SERVICES for NSSS AND Associated Nuclear Piping	
CONTRACTOR LMT, INC		

DOCUMENT TITLE	REV.
ULTRASONIC EXAMINATION of Nuclear Coolant System	
PIPING UTP-10	1

PREVIOUSLY REVIEWED [X] YES [ ] NO (DATE IF YES) 1/25/79

PREVIOUSLY APPROVED [ ] YES [X] NO (DATE IF YES)

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
[initials] 3/1/79 L B [signature] 3-1-79 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
NA PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA			
Ken J. Hannah 3-1-79 SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
[initials] 3/1/79 M. L. Dreher 3/1/79 MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

WP-702 EDP 5.0

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408-297-8766

TITLE:
ULTRASONIC EXAMINATION OF NUCLEAR COOLANT SYSTEM PIPING

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, for the straight beam and angle beam contact ultrasonic examination of full penetration piping welds and adjacent base metal.

B. Scope

1. The procedure is applicable to 45° angle beam examinations performed on ferritic steel in ASME Class 1 and Class 2 systems. The procedure may also be applied to austenitic steels and dissimilar metal welds where successful qualification is achieved.

   This procedure is further limited to piping systems having nominal wall thickness of 0.20 inches to 6 inches. The examinations may be performed from either inside or outside surfaces.

QUALIFICATION:

Approved for use [signature] Level III 2/22/79

[signature] Level II 2-22-79

I. B. 2. Volumetric examinations shall be performed using ultrasonic angle and straight beam techniques.

a) All welds shall receive a 45° angle beam examination.

b) Additionally plate (welded) pipe shall receive a 0° longitudinal beam examination.

c) Other angles may be used where wall thickness or geometric configuration (or metallurgical characteristics for austenitic welds) impedes effective use of 45° angle beam examination.

II. REFERENCES

A. This procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;

a) Appendix III and the Acceptance Criteria (IWB-3500) of Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1974 edition, Winter 1975 addenda.

2. American Society for Nondestructive Testing;

II. A. 2. a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification in Nondestructive Testing."

3. a) LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

b) LMT Operating and Quality Assurance Manual, Addendum to Revision 10, approved for the WNP-2 Preservice Inspection by WPPSS.

III. <u>DEFINITIONS</u>

None

IV. <u>RESPONSIBILITY</u>

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a successful calibration.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. As a minimum, examination teams shall consist of one Level II examiner and one Level I examiner or one Level II examiner and one NDT Trainee as defined in QA-6.

C. Personnel shall be qualified and certified according to the requirements of ASME XI, SNT-TC-1A, and LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Ultrasonic testers shall be of the pulse echo type. Instruments shall have an amplitude display linear within 5% of calibrated screen height over 80% of that height; and an attenuator, stepped in increments of 2 dB

VII. A. or less, which is accurate over the range of the test to ±20% of nominal value. Instruments shall have had their internal alignment and calibration verified within 90 days of any implementation of this procedure.

1. A record of calibration shall be available at the jobsite for client audit.

B. Connecting cables shall be coaxial, and their length limited to less than that at which significant signal degradation (2 dB) occurs, but shall not exceed 200 feet.

C. Electronic recording equipment, when used, shall be electronically aligned within 180 days of use.

1. A record of calibration shall be available at the jobsite for client audit.

D. Search units shall be certified by the manufacturer as to essential properties, including bandwidth, damping, center frequency within 10% of nominal, and relative gain.

1. A record of search unit properties shall be available at the jobsite for client review.

2. The angle beam search unit wedges shall be nominally 45° and shall be checked prior to each day's use to determine actual beam angle in metal when checked on

VII. D. 2. a standard reference block, such as an IIW or DSC. The actual beam angle shall be recorded and shall be $45^\circ \pm 2^\circ$ to be acceptable for initial or further use. Other beam angles may be used for evaluation and these angles shall be within $\pm 3^\circ$ of their nominal value.

3. The results of examinations performed with angle beam search units which meet the above requirements are acceptable provided the search unit beam angle on subsequent checking is within $\pm 3^\circ$ of 45°. Should this tolerance not be met on subsequent checking, determination of the need for re-examination shall be made and the basis for the decision documented.

4. Search units shall be selected according to Table 1. Additional search units may be used for evaluation or in unusual circumstances; however, such use shall be documented by an approved Field Change to this procedure as per LMT, Inc. Quality Assurance Procedure QA-5.

VII. D. 4.

Material Thickness	L-wave Angle and Straight Beam Exam Size (inch)	Freq.	Shear Wave Angle Beam Exam Size (inch)	Freq.
¼" or less	¼"	5-10 MHz	¼"x¼"	5 MHz
¼" to 1"	¼"-½"	2¼-5 MHz	¼"x¼" to ½"x½"	2¼-5 MHz or 1-2¼ MHz P/C
1" and above	1"x1"	1-2¼ MHz	½"x½" to ½"x1"	2¼ MHz or 1-2¼ MHz P/C

Table 1

Search unit contact angle beam wedges shall meet the criterion of Table 2 for coverage of the weld root as shown in Figure 1, when the examination is limited to half-node (half-vee path). NOTE: These values may not apply to austenitic materials.

Beam Angle	Required Index to Weld ℄ Distance A
45° Required	.93T
60° Supplemental	1.6 T
70° Supplemental	2.47T

Table 2

VII. E. Couplant materials shall be as low as practicable in sulfur and halogen content. Certification shall be provided on a generic basis for each brand of couplant. Analysis for halogens and sulfur shall be made according to ASTM D-129-64 and ASTM D-808-63.

1. Residual halogens and sulfur shall not exceed 1% by weight.

F. Calibration blocks shall be of the form of Figures 2 and 3 with calibration notches as shown. Calibration blocks shall be of the same nominal size, thickness, material, and surface finish as the pipe to be examined.

1. Calibration notches shall be one inch long, not more than one-quarter inch wide, and a depth selected according to Table 3:

Pipe Wall (T)	Ferritic Weld Notch Depth (d)	Austenitic Weld Notch Depth (d)
Less than 0.312"	10%T +.005" -.010"	10%(T) +.005" -.010"
.312" to 6.0	[10.4-.9T] %(T) +.1(d) -.2(d)	10%(T) +.005" -.010"

Table 3

VII. F. 2. Calibration holes for use in half-node examinations only shall be drilled perpendicular to the ends of the block to the centerline of the pipe, one and one-half inches deep. Holes are to be drilled both parallel and perpendicular to the pipe axis perpendicular to the edges of the block. The hole diameters and location shall conform to Table 4.

Pipe Wall (T)	Hole Ø	Hole Location
<2"	Empirically determined	¼T and 3/4T
>2"	Empirically determined	¼T, ½T, and 3/4T

Table 4

3. Other reflectors may be included in block designs for informational purposes.

VIII. PREPARATION

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the client before beginning any examination program:

a) Procedure and Qualification

VIII. A. 1. b) Calibration Sheets

c) Inspection Reports

d) Material and Equipment Certifications

e) Personnel Certifications

f) NRC Form 4 (Operating Nuclear Plants Only)

g) NRC Form 5 (Operating Nuclear Plants Only)

h) Status Indicators (Hold Tags)

i) Radiation Work Permits (when applicable)

B. <u>Physical</u>

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

a) Insulation removal

b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

c) Cleanup requirements

d) Safety precautions (other work in area, etc.)

C. <u>Surface Preparation</u>

1. Responsibility

VIII. C. 1. It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

2. Surfaces shall be sufficiently smooth and clean so that a meaningful examination may be performed.

3. Welds shall be identified and all required marking procedures completed before performing any examinations.

IX. <u>LIMITATIONS</u>

A. This procedure is based on ASME Nuclear Requirements; it may not be applicable to military, API, or AWS requirements without modification.

B. The procedure is limited to ferritic steels unless specifically qualified for other materials.

X. <u>CALIBRATION</u>

A. Test calibration is performed on a complete system. Any change in the ultrasonic instrument, transducer cable, or transducer requires test recalibration. A change in qualified personnel, recording instrumentation, or recorder connection cable requires a calibration check;

X. A. however, instrument alignment verification need not be made with the transducer used for testing.

B. Instrument alignment verification for screen height and amplitude control linearity shall be performed before the initial examination in any given series and repeated at intervals not exceeding 90 days.

1. Instrument Linearity Verification

a) Position the search unit on a calibration block to obtain two echoes with a 2:1 amplitude ratio.

b) Set the larger echo to 80% of calibrated screen height.

c) Vary the amplitude of the larger echo from 100% to 20% of calibrated screen height in 10% increments.

d) Note that at each increment the smaller echo remains 1/2 the larger within a tolerance band of ±5% of full screen height.

e) Record successful performance of the verification on a Calibration Record form (Figure 4).

2. Attenuator Linearity Verification

a) Position the search unit to obtain an 80% of full scale echo on the calibrated screen.

X. B. 2. b) Adjust the sensitivity control to decrease the system gain by 6 dB and 12 dB. Compare the response with Table 5 and determine its acceptability. Estimate system response to ±1% of calibrated full scale.

c) Position the search unit to obtain a 40% of full scale echo on the calibrated screen.

d) Adjust the sensitivity control to increase the system gain by 6 dB. Compare the response with Table 5 to determine its acceptability. Estimate system response to ±1% of calibrated full screen.

e) Position the search unit to obtain a 20% of full scale echo on the calibrated screen.

f) Adjust the sensitivity control to increase the system gain by 12 dB. Compare the response with Table 5 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

g) Record successful performance of the verification on a Calibration Record form (Figure 4).

Indication Set	Gain Change	Indication Tolerance Limits
80%	-6 dB	32% to 48%
80%	-12 dB	16% to 24%
40%	+6 dB	64% to 96%
20%	+12 dB	64% to 96%

Table 5

X. C. Examination Calibration

1. Straight beam examination scans shall be calibrated at the time of examination on a representative sample of the material examined by placing the first back reflection at 80% amplitude and 4 sweep divisions.

2. Angle Beam Examination

Calibration is performed on a complete system on an appropriate basic calibration block at the beginning of each day's testing of that material.

a) Calibration shall be performed on a calibration block whose temperature is within ±25°F of the material to be examined.

b) Set the sweep range on the calibrated tester screen according to Table 6.

Pipe Thickness (T)	Metal Path	I.D./O.D. Points
Up to ½"	2½ nodes	2,4,6,8,10 Div.
>½" - 1"	2 nodes	2.5,5,7.5,10 Div.
>1" - 2"	1½ nodes	3,6,9 Div.
>2"	1 node	5,10 Div.
Cast Stainless	½ node	8 Div.

Table 6

X. C. 2. c) For examinations utilizing metal paths greater than one-half node, test sensitivity at any range is established by setting the amplitude of the nearest notch echo to 80% of full calibrated scale. The responses from the remaining notch echoes in the test region shall then be obtained at this sensitivity, joined together in a smooth DAC curve on the tester face, and similarly recorded on the Calibration Record form (Figure 4). The DAC curve so generated is the Primary Reference Level.

d) For examinations utilizing a half-node metal path, a DAC curve shall be generated using the side drilled holes in a basis calibration block so that the maximum hole response is set to 80% calibrated screen height. This response shall be obtained with the transducer centerline aligned with the hole half length and the beam perpendicular to the SDH, to prevent possible erroneous corner responses. The DAC shall be clearly marked on the tester face and smoothly extrapolated to cover the full examination range, 0 to T inches. The DAC shall also be recorded on the

X. C. 2. d) Calibration Record form (Figure 4). The DAC curve is the Primary Reference Level.

e) After the Primary Reference Level has been established on the basic block, a calibration reference response may be established on a Rompas or other standard reference block. The response should include both sweep and amplitude calibration points and should be recorded as a calibration check response on the Calibration Record form. This response may be used for calibration check when an appropriate basic block is not available.

XI. PERFORMANCE

A. Straight Beam Lamination Scan of Rolled Plate Piping

1. The material through which angle beam sound will travel during the weld examinations shall be examined with longitudinal beams for laminations which would interfere with the angle beam examinations.

B. Coverage of Butt Welds in Piping

1. The entire examination volume comprising the weld and adjacent base metal, as shown in Figure 5, shall

XI. B. 1. be examined with the beam normal to the weld for at least a full V path on either side of the weld according to Table 7.

a) When examining piping fabricated from rolled plate this examination volume shall be scanned with a 0° longitudinal wave beam to detect laminar reflectors which may interfere with the angle beam examination. The examiner shall record those areas within the volume examined when the indication from a lamination equals or exceeds the remaining back reflection.

2. The entire examination volume comprising the weld and adjacent base metal, as shown in Figure 5, shall be examined with the beam parallel to the weld for a full V path on either side of the weld in two directions according to Table 7.

Beam	Required Perpendicular Scan Coverage Measured from the Weld ℄ for Full V with Weld Width T	Required Parallel Scan Coverage Measured from the Weld ℄
45°	The lesser of 3T or 2.5T+1"	T
60°	The lesser of 4.5T or 4T+1"	T
70°	The lesser of 6.5T or 6T+1"	T

Table 7

XI. B. 3. Overlap between parallel scans shall be nominally 15% and in no case less than 10%.

C. Coverage for Branch Welds in Piping

Piping branch welds shall be examined in both perpendicular and parallel directions to fulfill the coverage requirement of Table 7. Examination volumes are shown in Figures 6, 7, and 8, and shall be examined for laminar flaws per Paragraph XI.B.1.a).

D. Calibration Check

1. A calibration check is required before and after each examination, with any change in test personnel, and at least once every four hours.

2. The calibration check shall as a minimum consist of verification of the DAC curve by a single point amplitude and range check using the basic calibration block or a portable block such as the Rompas whose response has been related to that of the basic block.

   a) The amplitude response of the reference reflector during the calibration check shall be within ±2 dB, and its sweep location within ±10% of the calibration reference response value recorded on

XI. D. 2. a) the calibration sheet to be acceptable.

b) An unacceptable calibration check shall be cause for full examination of the test system to determine the reason for the calibration change. Typical causes for calibration change are ambient temperature effects on transducers and electronics, control settings inadvertently changed, and loss of couplant between the transducer and wedge. If, in the judgment of the examiner, the cause of the calibration change has been corrected or may be compensated for by a change in control settings, calibration may be restored using the calibration check response.

c) Any examination that has been performed in a non-calibrated condition shall be repeated.

E. <u>Sensitivity</u>

Scanning sensitivity shall be at least 2 times (2 x) the primary reference sensitivity.

F. <u>Scanning Speed</u>

Scanning speed shall not exceed 6 inches per second.

XI. G. Limitations

Physical or other limitations that prevent full compliance with the requirements of this procedure shall be recorded on the Examination Report form, Figure 11.

H. Automatic Alarms

Automatic alarms or recording may be used as an aid to the examiner.

XII. EVALUATION

A. Methods

1. For each indication that exceeds 50% of the reference level, the following information must be recorded:

   a) Peak amplitude (% DAC) with corresponding range to indication (inches), search unit position, search unit direction;

   b) Range and transducer position at DAC amplitude points;

   c) Length of reflector.

XII. B. Evaluation Criteria

1. Any indication exceeding 100% of the primary reference distance amplitude curve shall be evaluated by the examiner to determine the extent, size, location and shape of the reflector. These parameters shall be included on the Notification of Reportable Indication form (QA-31).

C. Reference System for Recording Indications

1. The reference system of Figure 12 shall be used to locate indications.

a) Indications shall be located in inches from appropriate reference marker.

D. Acceptance Criteria

1. Acceptance criteria contained in Paragraph IWB 3514 of ASME Section XI, 1974 edition, addenda through Winter 1975, are summarized in the tables drawn in Figures 9 and 10.

XIII. RECORDS

A. A Report of Visual and Ultrasonic Examination (Figure 11)

XIII. A. shall be prepared for each item examined, and shall be related to a Report of Ultrasonic Calibration (Figure 4).

B. Oscillograph chart records shall be made of all angle beam examinations.

1. Chart records used in indication analysis shall utilize two channels, one corresponding to vertical deflection of the tester signal and the other to horizontal.

   a) These channels shall be calibrated to match the oscilloscope display. That is, an indication 90% of vertical amplitude appearing at five divisions on the tester screen should have a nine division deflection on one chart channel and a five division deflection on the other.

2. Chart records shall include pre and post test calibration checks made at the same scanning speed as the test.

3. Location and other pertinent information shall be manually noted on each chart.

XIII. B. 3. a) Pertinent information includes, but is not limited to, date, time, item, equipment, examiners, scans, gain, recorder settings and speed, and date.

C. Recording Conventions

Ultrasonic scans and the location of indications shall be recorded according to Figure 13.

D. Other types of recording, such as event or alarm monitoring, may be used as an aid to the examiner where feasible.

XIV. REVIEW

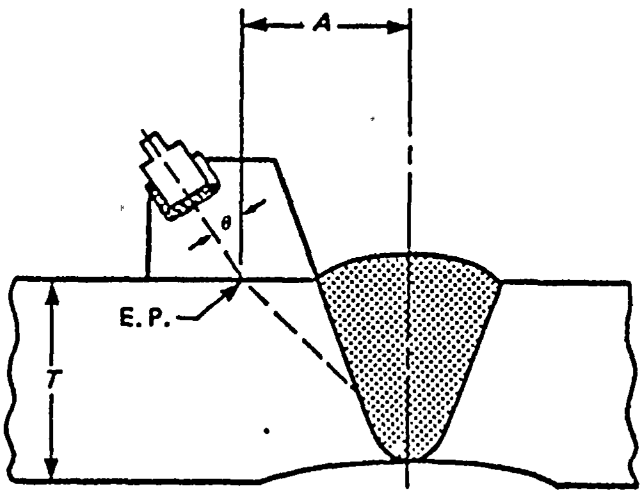
A. Examination Reports shall be subject to review by an assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the final LMT review, the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the ANI.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Coordinator. Additional reports which may include examination documentation as reference material shall be generated from copies.

B. Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.



WELD COVERAGE

Figure 1

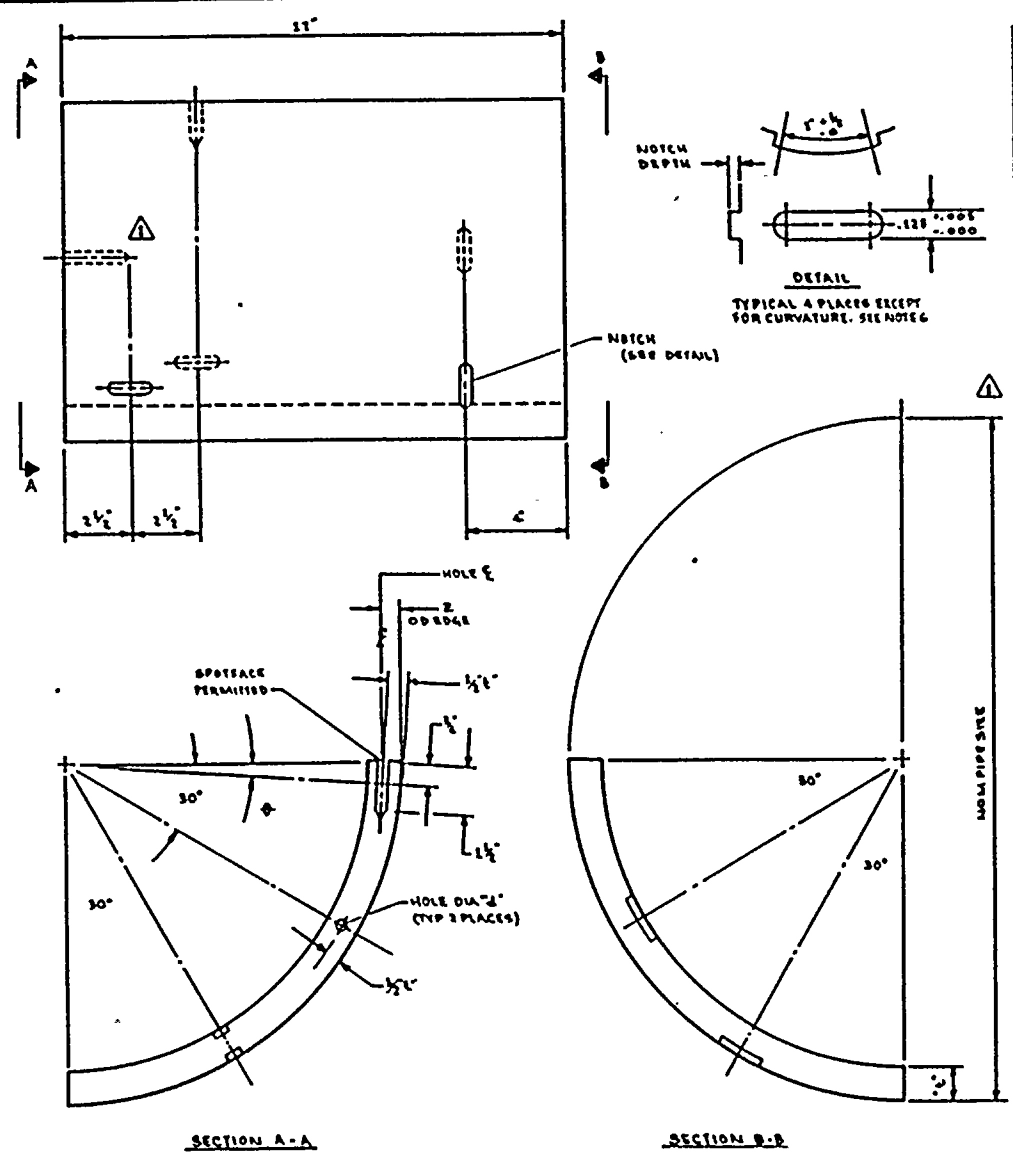


Figure 2

CAL BLOCK NO	NOM PIPE SIZE	NOM WALL THK "t"	MATERIAL SPECIFICATION	NOTCH DEPTH	HOLE DIA "d"	θ	Z
UT-1	30	1.250	SA 155 KCF-70	.116 +.012 −.023	1/8"	3°	.605
UT-2	28	1.420	SA 155 KCF-70	.129 +.013 −.026	1/8"	3½°	.619
UT-3	26	1.125	SA 155 KCF-70	.106 +.011 −.021	1/8"	3½°	.519
UT-4	SEE UTCB-224						
UT-5	24	1.812	SA 106 GRB	.159 +.016 −.032	1/8"	3¼°	.882
UT-6	24	1.218	SA 106 GRB	.113 +.011 −.023	1/8"	3¼°	.584
UT-7	24	1.140	SA 358 GR 304	.114 +.011 −.022	1/8"	3¼°	.545
UT-8	NOT USED						
UT-9	20	1.031	SA 358 GR 304	.103 +.010 −.020	1/8"	4½°	.486
UT-10	20	1.031	SA 106 GRB	.098 +.010 −.020	1/8"	4½°	.486
UT-11	18	1.375	SA 106 GRB	.126 +.013 −.025	1/8"	5¼°	.654
UT-12	18	0.938	SA 106 GRB	.090 +.009 −.018	3/32"	5°	.436
UT-13	16	0.758	SA 358 GR 304	.076 +.008 −.015	3/32"	5½°	.344
UT-33	24	2.343	SA 106 GRB	.196 +.019 −.039	3/16"	4°	1.165

NOTES:

1. STAMP BLOCKS WITH 1/8" HIGH STEEL STAMP ON ENDS WITH NOM PIPE SIZE, SCH OR WALL THK, MATL SPEC, HEAT NO & CAL BLOCK NO.
2. TOLERANCE FOR θ IS ± ¼°.
3. TOLERANCE FOR Z IS ±.005.
4. STANDARD MACHINING TOLERANCES ARE APPLICABLE UNLESS OTHERWISE NOTED.
5. ALL DIMENSIONS ARE IN INCHES.
6. NOTCH BOTTOM CURVATURE SHOULD CONFORM TO PIPE WALL CURVATURE.

DANIEL W PORTER

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

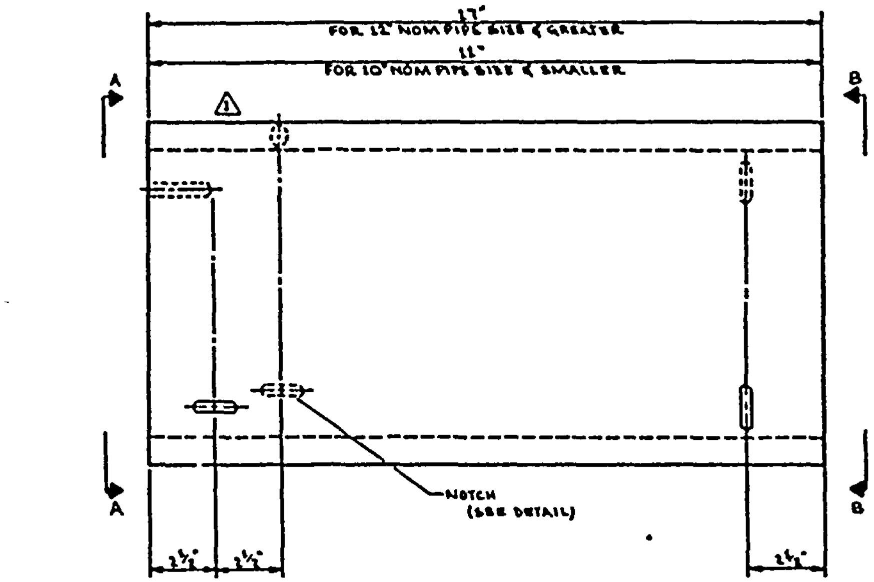
WASHINGTON PUBLIC POWER SUPPLY SYSTEM

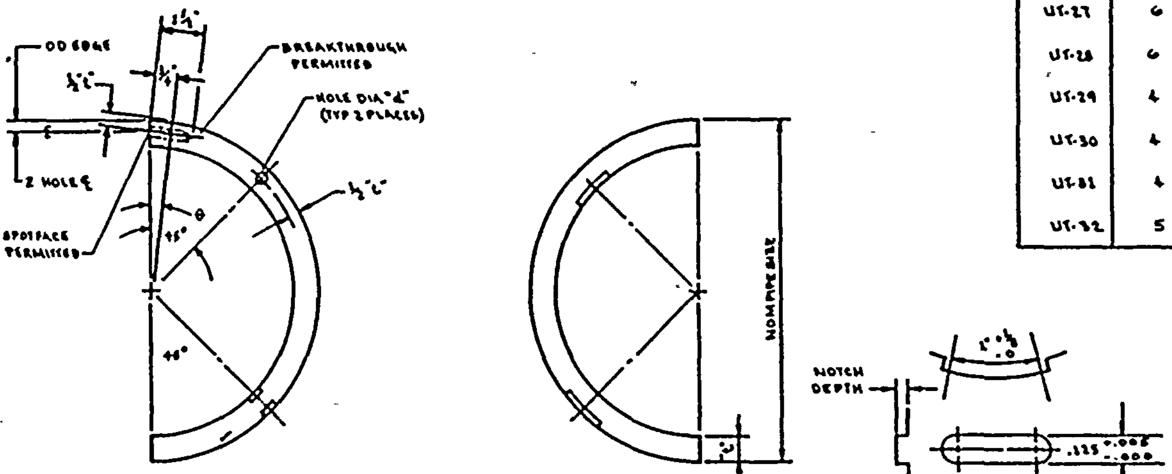
WNP 2

UT CALIBRATION BLOCKS

NO	DATE	REVISION	BY	CHKD	APPVD
2	2-2-79	CORRECTED Z DIMENSIONS, DELETED UT-4			
1	12-77	TABLE REVISED, HOLE DEPTH CHANGED			
0	7-18-78	ISSUED FOR CONSTRUCTION			

ENGINEER NC HALLAS
DRAWN K. McANDREW
DATE 7-18-78
DWG NO UTCB-220
REV 2





SECTION A-A

SECTION B-B

DETAIL

TYPICAL 4 PLACES EXCEPT FOR CURVATURE. SEE NOTE 6

CAL BLOCK NO	NOM PIPE SIZE	NOM WALL THK "t"	MATERIAL SPECIFICATION	NOTCH DEPTH	HOLE DIA "d"	θ	Z
UT-14	16	.150	SA 106 GR B	.075 +.007 -.015	3/32"	6 1/2°	.333
UT-15	12	1.000	SA 106 GR B	.095 +.009 -.019	3/32"	7 1/4°	.432
UT-16	12	.844	SA 106 GR B	.081 +.008 -.016	3/32"	7 1/2°	.375
UT-17	12	.688	SA 106 GR B	.067 +.007 -.013	3/32"	7°	.298
UT-18	NOT USED						
UT-19	12	.688	SA 358 GR 304	.069 +.007 -.014	3/32"	7°	.298
UT-20	NOT USED						
UT-21	10	.719	SA 106 GR B	.070 +.007 -.014	3/32"	8 1/2°	.304
UT-22	10	.594	SA 106 GR B	.059 +.006 -.012	3/32"	8 1/2°	.242
UT-23	10	.844	SA 106 GR B	.083 +.008 -.016	3/32"	8 1/2°	.366
UT-24	8	.906	SA 106 GR B	.087 +.009 -.017	3/32"	11°	.381
UT-25	8	.594	SA 106 GR B	.059 +.006 -.012	3/32"	10 1/2°	.228
UT-26	8	.500	SA 376 TP 304	.050 +.005 -.010	3/32"	10 1/2°	.181
UT-27	6	.562	SA 106 GR B	.056 +.006 -.011	3/32"	14°	.190
UT-28	6	.432	SA 106 GR B	.043 +.004 -.009	3/32"	13 1/2°	.126
UT-29	4	.337	SA 312 TP 304	.034 +.003 -.007	3/32"	19 1/4°	.038
UT-30	4	.337	SA 106 GR B	.034 +.003 -.007	3/32"	19 1/4°	.038
UT-31	4	.237	SA 376 TP 304	.024 +.005 -.010	3/32"	19 1/2°	-.011
UT-32	5	.500	SA 106 GR B	.050 +.005 -.010	3/32"	16 1/2°	.141

NOTES:

1. STAMP BLOCKS WITH 1/8" HIGH STEEL STAMP ON ENDS WITH NOM PIPE SIZE, SCH OR WALL THK, MATL SPEC, HEAT NO & CAL BLOCK NO.
2. TOLERENCE FOR θ IS ± 1/2°.
3. TOLERENCE FOR Z IS ± .005.
4. STANDARD MACHINING TOLERANCES ARE APPLICABLE UNLESS OTHERWISE NOTED.
5. ALL DIMENSIONS ARE IN INCHES.
6. NOTCH BOTTOM CURVATURE SHOULD CONFORM TO PIPE WALL CURVATURE.

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

WNP 2

UT CALIBRATION BLOCKS

NO	DATE	REVISION	BY	CHKD	APPVD
2	2-2-79	CORRECTED Z DIMENSION FOR UT-31.	K McA		
1	1-2-79	TABLE REVISED, HOLE DEPTH CHANGED	K McA		
0	11-13-78	ISSUED FOR CONSTRUCTION	K McA		

ENGINEER N.C. HALLAS
DRAWN K McANDREW
DATE 7-11-78
DWG NO UTCB-222
REV 2

Figure 3

WPS-UTC1 2/79

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ISO No. ____________
Cal. No. ______ Time ______
Job No. ____________
Date ____________
Page ______ of ______

REPORT OF ULTRASONIC CALIBRATION

SIGN

Examiner/Level ____________ Examiner/Level ____________ Review/Level ____________
Authorized Inspector ____________ Customer ____________

EQUIPMENT

Instrument ____________ S/N ______ Recorder ____________ S/N ______
Recorder ____________ S/N ______ Cable ____________

Vertical Linearity Check Check Completed ____________

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2										

Signal 2 shall equal 50% of Signal 1 ±5% of full scale

Attenuator Linearity Check Check Completed ____________

Tester Gain	Set	-6	-12	Set	+12	Set	+6
Signal Amp.	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
Actual Value							

Signal amplitude must fall within listed values

Transducers

S/N ______ Mfg. ______ Type ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Freq. ______ Index ______ Angle ______

PROC

Procedure ____________ Rev. ______ Date ____________

CALIBRATION

Cal. Block Type ____________ S/N ______ Ref. Refl. ______ Temp. ______
Verification/Ref. Blk. ____________ S/N ______ Ref. Refl. ______ Temp. ______

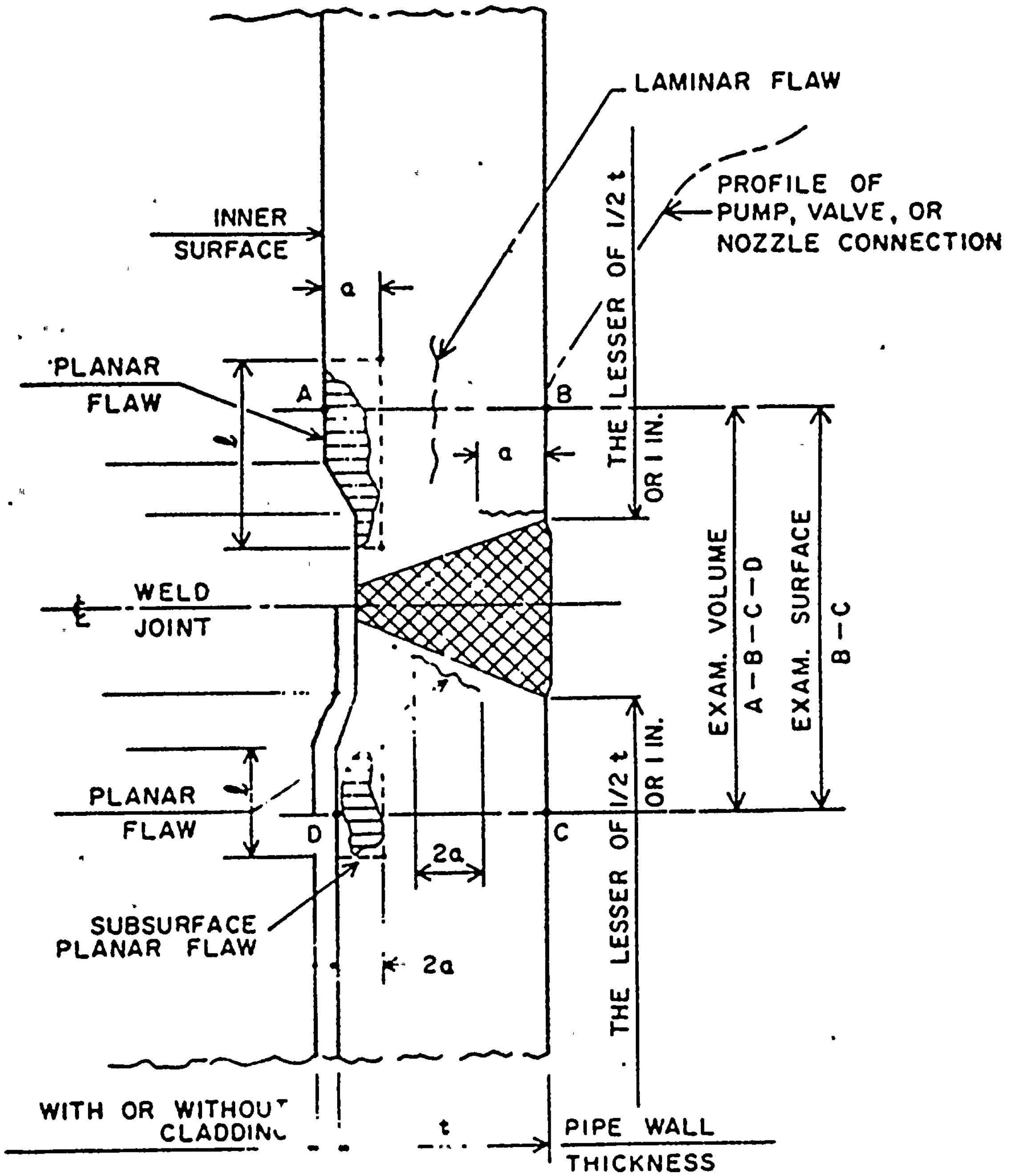
Instrument Settings			
	L	∠	
Gain			
Sweep			
Delay			
Reject			
Damp.			

DAC

10
8
6
4
2
0
2 4 6 8 10

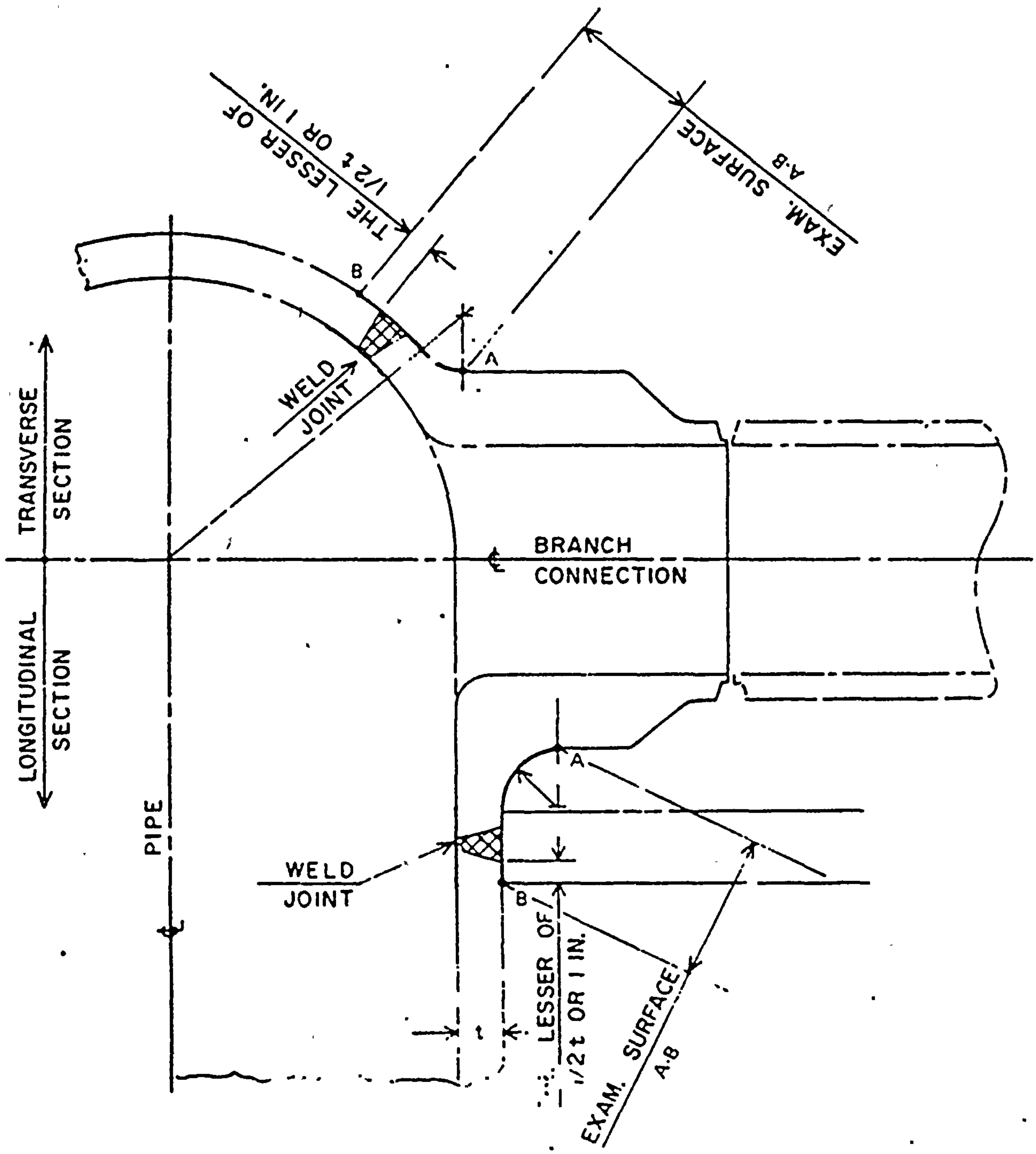
Cal. Check Time

Figure 4



PIPE WELD EXAMINATION VOLUME

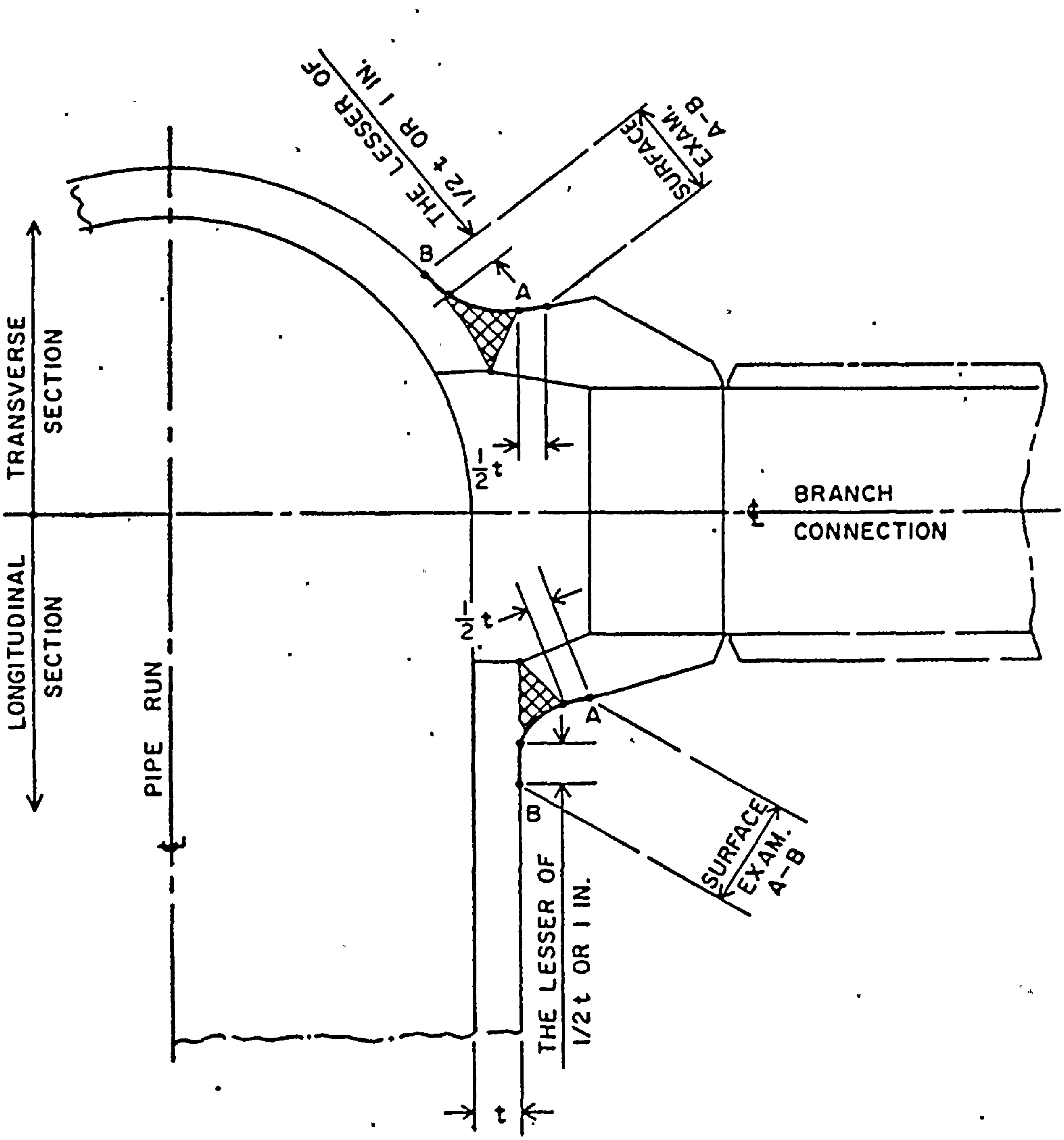
Figure 5



TYPE 1 BRANCH WELD

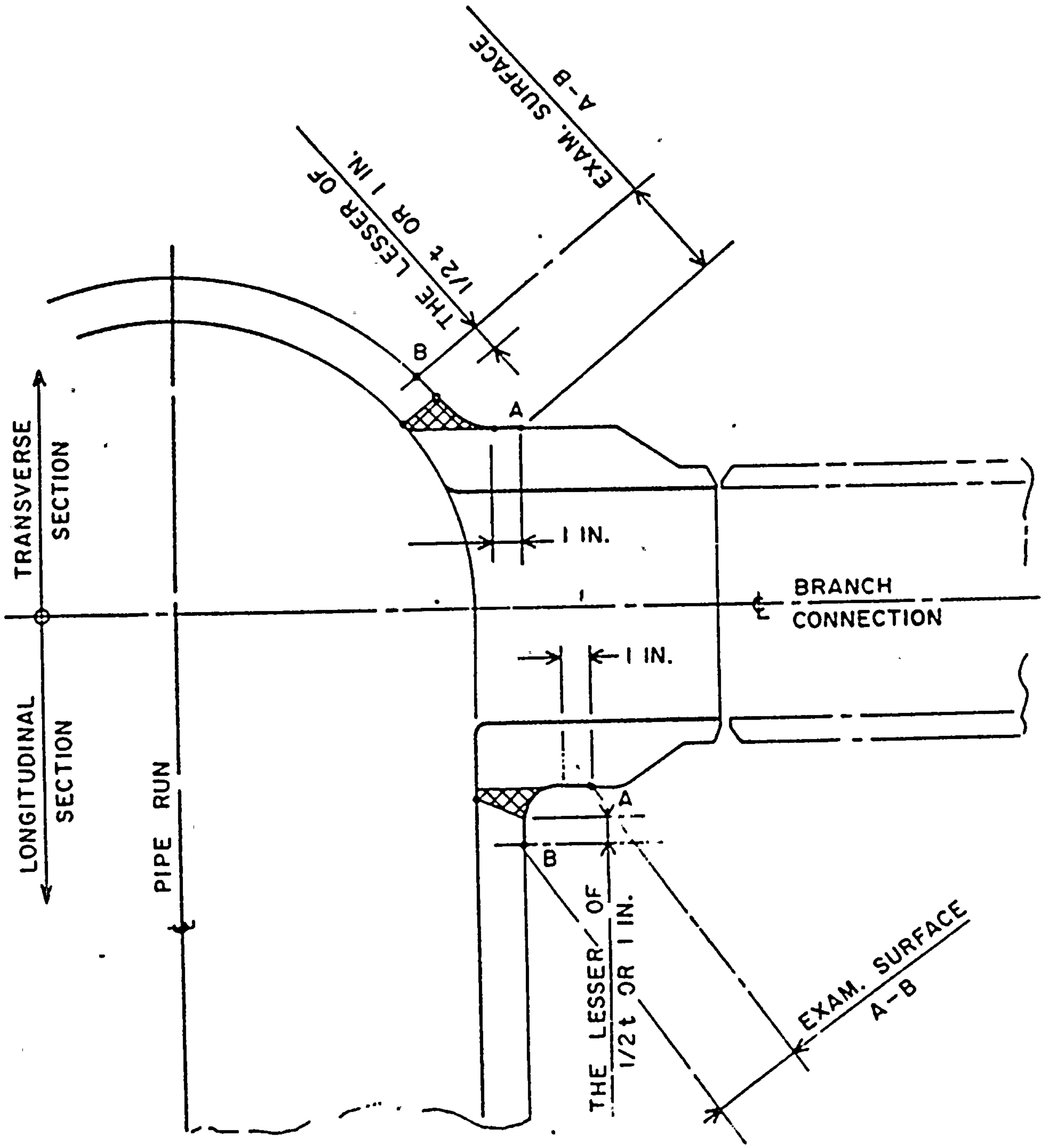
EXAMINATION VOLUME

Figure 6



TYPE 2 BRANCH WELD
EXAMINATION VOLUME

Figure 7



TYPE 3 BRANCH WELD
EXAMINATION VOLUME
Figure 8

Material: Ferritic steels that meet the requirements of NB-2300 and a specified minimum yield strength of 50 ksi or less
Thickness Range: t, 0.1 to 6.0 in.

Nominal Wall Thickness t, in.[2]	Allowable Depth by Volumetric for Pipe Sizes <4"	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4"	
		Surface Indications a/t, %	Subsurface Indications a/t, %[3]
Preservice Examinations			
0.1 to 0.312		. . .	. . .
Over 0.312 to 2.0		10.4 minus 0.9t	10.4 minus 0.9t
Over 2.0 to 6.0	10%	10.4 minus 0.9t	10.4 minus 0.9t
Inservice Examinations			
0.1 to 0.312		. . .	. . .
Over 0.312 to 2.0		15.3 minus 1.3t	15.3 minus 1.3t
Over 2.0 to 6.0		15.3 minus 1.3t	15.3 minus 1.3t

NOTES:

[1]The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

[2]t is the nominal pipe wall thickness, or the actual wall thickness as determined by UT examination.

[3]The total depth of an allowable subsurface indication is twice the listed value.

ALLOWABLE INDICATIONS

Figure 9

Material: Austenitic steels with specified minimum yield strength of 35 ksi or less
Thickness Range: t, 0.1 to 3.0 in.

Nominal Wall Thickness t, in.[2]	Allowable Depth by Volumetric for Pipe Sizes <4"	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4"	
		Surface Indications a/t, %	Subsurface Indications a/t, %[3]
Preservice Examinations			
0.1 to 0.312		. . .	. . .
Over 0.312 to 2.0		10.1 minus 0.7t	10.1 minus 0.7t
Over 2.0 to 3.0	10%	10.1 minus 0.7t	10.1 minus 0.7t
Inservice Examinations			
0.1 to 0.312		. . .	. . .
Over 0.312 to 2.0		12.7 minus 0.9t	12.7 minus 0.9t
Over 2.0 to 3.0		12.7 minus 0.9t	12.7 minus 0.9t

NOTES:

[1] The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.
[2] t is the nominal pipe wall thickness, or the actual wall thickness as determined by UT examination.
[3] The total depth of an allowable subsurface indication is twice the listed value.

ALLOWABLE INDICATIONS

Figure 10

WPS-UTX2 2/79

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ISO No. ______
Report No. ______
Cal.No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF VISUAL AND ULTRASONIC EXAMINATION

ITEM

ISI No. ______ Size ______ Material ______ S/N(s) ______
Description ______
Location ______ Preparation ______ Temp. ______

SIGN

Examiner/Level ______ Examiner/Level ______ Review/Level ______
Authorized Inspector ______ Customer ______

EQUIPMENT

Tester 1 ______ S/N ______ 2 ______ S/N ______
Recorder 1 ______ S/N ______ 2 ______ S/N ______
Transducer 1 ______ 2 ______
3 ______ 4 ______
Couplant ______ Cable ______ Marker ______ Photo ______

PROC

Calibration Procedure ______ Rev. ______
Examination Procedure ______ Rev. ______
Record Procedure ______ Rev. ______

CALIB

Calib. Blk. ______ Temp. ______ Ref. ______ Amp. ______ Swp. ______
Ref. Gain ______ Damp ______ Reject ______ Gate ______
Alarm ______ Mag. Tape Count ______ Chart ______ Cal. Check Time ______

EXAMINATION

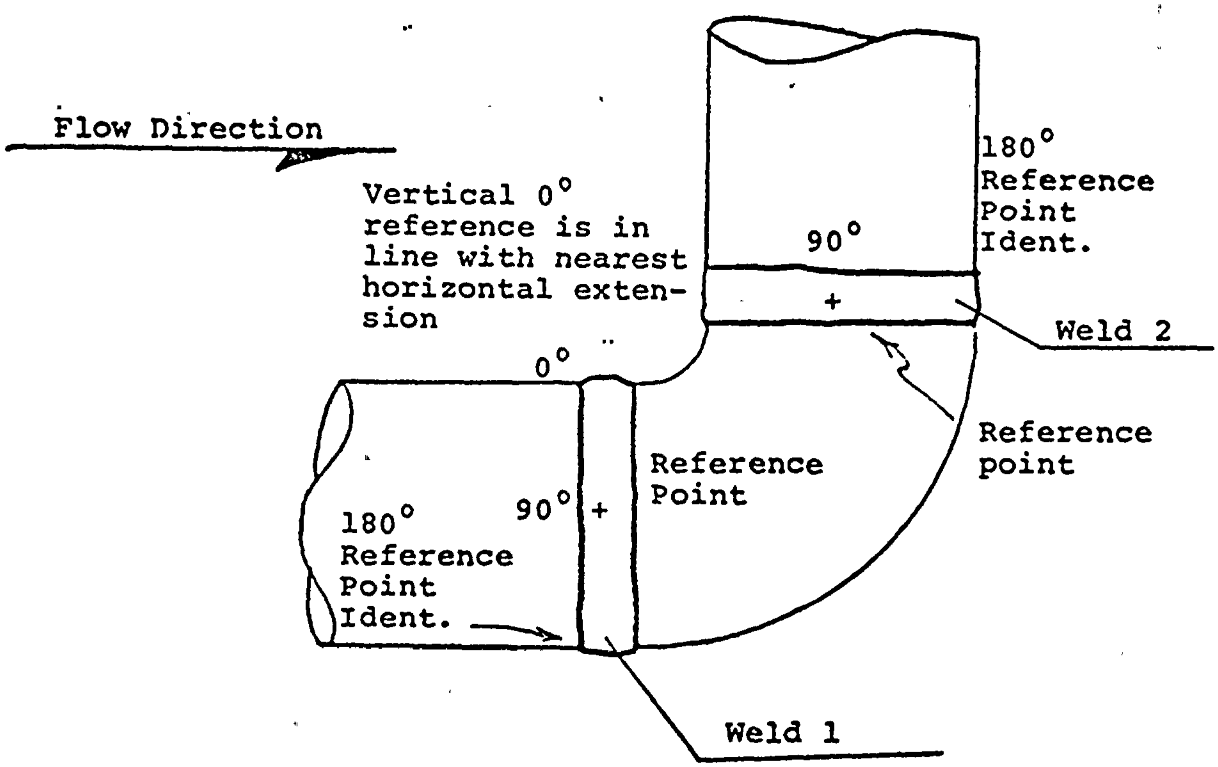
Cal. Ref. Blk. ______ Ref. Rfl. ______ Amp. ______ Sweep Position ______
Scan Gain ______ Ref. Dwg. ______ Reject Level ______ Report Level ______

NAD = No apparent disc. L = Linear G = Geometry S = Spot M = Multiples

Scan	Type	Disp.	Scan	Type	Disp.	Scan	Type	Disp.
0	PT							
1	Visual		7			13		
2	Base Metal		8			14		
3			9			15		
4			10			16		
5			11			17		
6			12			18		

Scan	Description of Indications

Figure 11



1. Reference arrow is always in the direction of flow.

2. Zero Reference is at Top Dead Center on a horizontal run.

3. For vertical runs, Zero Reference is on a line with 0 Reference on the nearest horizontal run or extension.

REFERENCE POINT DETERMINATION AND MARKING

Figure 12

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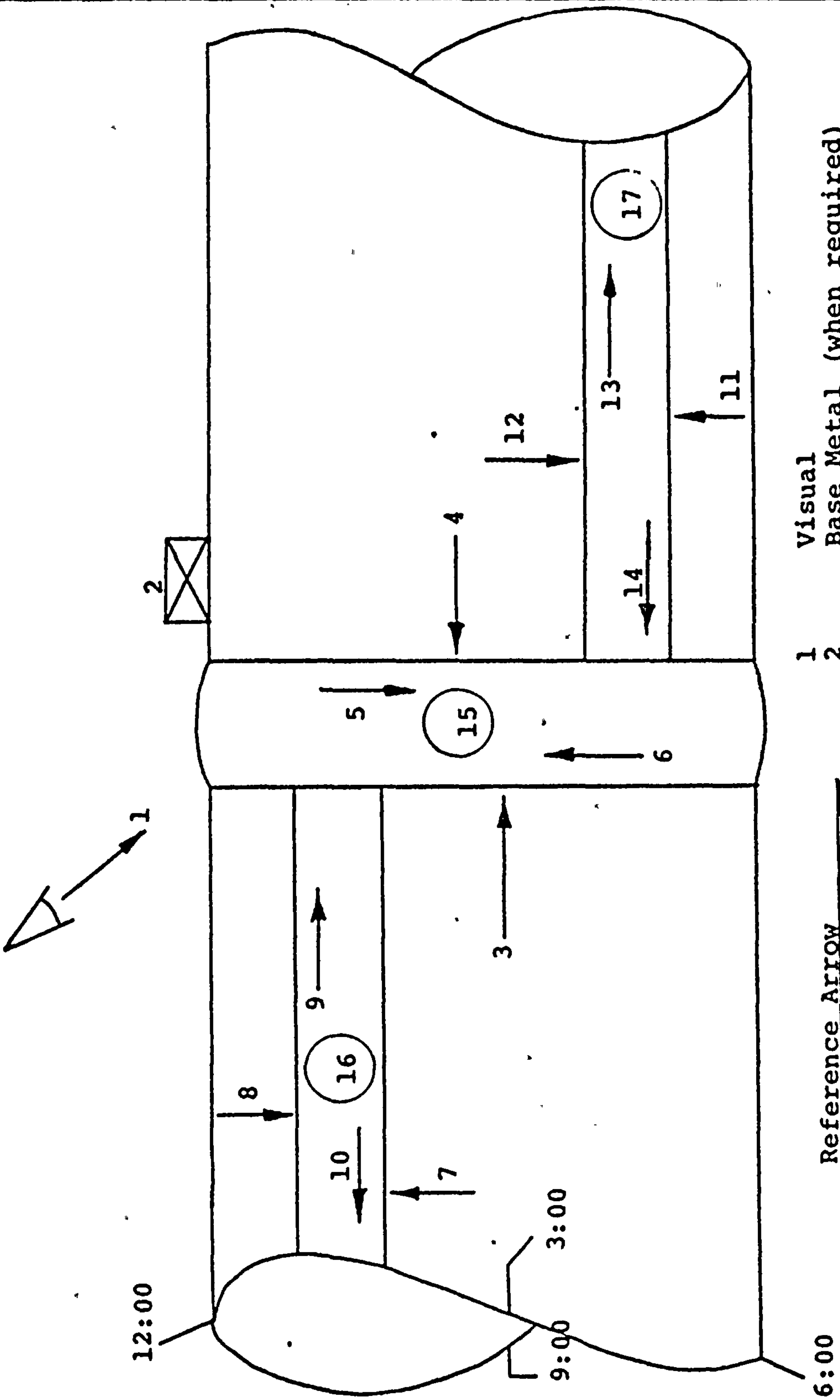
PROC. NO.	UTP-10
PAGE	F
REVISION	1
DATE	2/20/79



Reference Arrow
(Toward next highest weld number)

1 Visual
2 Base Metal (when required)
3-14 Angle Beam
15-17 0° Weld and HAZ (when required)

MANUAL SCAN DIRECTIONS
Figure 13

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely lèft blank)

Date 1/8/79

Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-26 Revision No. 5

Procedure Title MANUAL ULTRASONIC EXAMINATION OF HANGER LUG ATTACHMENT WELDS

LMT, Inc. QA Review and Approval D.B. MacGill Level III 12-16-80
(Quality Assurance Officer)

Client Approval D.P. Raney, ISI Engineer 1/20/81

Authorized Nuclear Inspector Approval S.M. Foster 1-20-81

Specific Qualification Record

LEVEL I & II EXAMINERS

Component	Examiners	Date
~~M. King~~ LUG WELD	M. KING/II D. RICHEY/II	1-23-81
"	R. FRADKIN/II G. STRAIT/II	1-23-81
"		

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP- 02	ISI ENGINEER D.P. Ramey	DATE 12-24-80
CONTRACT NO. C-14402	TITLE Preservice Inspection Services for NSSS & Associated Nuclear Piping	
CONTRACTOR LMT, Inc		

DOCUMENT TITLE	REV.
UTP-26 Manual Ultrasonic Examination of Hanger Lug Attachment Welds	5

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) 10/20/80

PREVIOUSLY APPROVED ☒ YES ☐ NO (DATE IF YES) 10/20/80

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
JFA D.W. Porter 12/24/80 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER		X		
Ken J. Hammel 12/29/80 DRR 1/6/81 PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR		X		
12/26/80 SUPERVISOR, ISI/NDE, GENERATION SERVICES				
12/29/80 MANAGER, QUALITY SERVICES		X		

NOTES/COMMENTS:

VII D.4. Move lines 3-6 left to under the rest of paragraph

I B.2.c) spelling - "obtain"

XI. A. line 4 spelling - "lug"

XI. B.1. line 4 spelling - "least"

VII C. "Reference" - spelling

Fig. 7 Change Austenitic to "Ferritic"

ANI(I) CONCURRENCE: H. W. Foster 1-6-81

WP-702 EDP 9.0

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TITLE: MANUAL ULTRASONIC EXAMINATION OF HANGER LUG ATTACHMENT WELDS

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, for the straight beam and angle beam contact ultrasonic examination of full penetration piping support lug welds and adjacent base metal.

B. Scope

1. The procedure is applicable to straight and angle beam examinations performed on ferritic steel in ASME Class 1 and Class 2 systems. The procedure may also be applied to austenitic steels and dissimilar metal welds where successful qualification is achieved.

   This procedure is further limited to piping systems having nominal wall thickness of 0.20 inches to six inches.

2. Volumetric examinations shall be performed in accordance with the following techniques:
   a) Pipe material shall receive a 0° scan covering an area extending at least 1/2" around the lug.

QUALIFICATION:

Approved for use. T. Lambert 12/16/80
DB MacGill Level III 12-16-80

I. B. 2. b) All lug welds shall receive a 45° angle beam examination performed from the pipe surface.

c) All lug welds shall receive a 0° longitudinal beam examination performed from the outer plane surface of the lug.

d) Other angles may be used where wall thickness or geometric configuration (or metallurgical characteristics for austenitic welds) impedes effective use of 45° angle beam examination.

II. REFERENCES

A. This procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code:

a) Appendix III and the Acceptance Criteria (IWB-3500) of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components", 1977 edition, Summer 1978 addenda.

2. American Society for Nondestructive Testing:

a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification in Nondestructive Testing."

II. A. 3. a) LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

b) LMT Operating and Quality Assurance Manual, Revision 12, approved for the WNP-2 Preservice Inspection by WPPSS.

III. DEFINITIONS

Hanger Lug: A metal pad or plate section welded to the outside surface of process piping to provide the contact or load bearing surface for pipe supports or restraints.

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a successful calibration and demonstration examination.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. As a minimum, examinations teams shall consist of one Level II examiner and one Level I examiner, or one Level II examiner and one NDE Trainee as defined in LMT Procedure QA-6.

C. Personnel shall be qualified and certified according to the requirements of ASME XI, SNT-TC-1A, and LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Ultrasonic testers shall be of the pulse echo type. Instruments shall have an amplitude display linear within 5% of full screen height over 80% of that height; and an attenuator, stepped in increments of 2 dB or less, which is accurate over the range of the test of ±20% of nominal value. Instruments shall have had their internal alignment and calibration verified within 90 days of any implementation of this procedure.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

VII. B. Connecting cables shall be coaxial, and their length limited to less than that at which significant signal degradation (2 dB) occurs, but shall not exceed 200 feet.

C. Electronic recording equipment, when used, shall be electronically aligned within 180 days of use.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

D. Search units shall be certified by the manufacturer as to essential properties, including bandwidth, damping, center frequency within 10% of nominal, and relative gain.

1. A record of search unit properties shall be available at the jobsite for WPPSS audit.

2. The angle beam search unit wedges shall be nominally 45° and shall be checked prior to each day's use to determine actual beam angle in metal when checked on a standard reference block, such as an IIW or DSC. The actual beam angle shall be recorded and shall be 45°, ±2° to be acceptable for initial or further use. Other beam angles may be used for evaluation and these angles shall be within ±3° of their nominal value.

VII. D. 3. The results of examinations performed with angle beam search units which meet the above requirements are acceptable provided the search unit beam angle on subsequent checking is within ±3°. Should this tolerance not be met on subsequent checking, determination of the need for re-examination shall be made and the basis for the decision documented.

4. Search units shall be selected according to Table 1. Additional search units ay be used for evaluation or in unusual circumstances; however, such use shall be documented by an approved Field Change to this procedure as per LMT, Inc. Quality Assurance Procedure QA-5.

Material Thickness	L-wave Angle and Straight Beam Size (inch)	Exam Freq.	Shear Wave Angle Beam Size (inch)	Exam Freq.
1/4" or less	1/4"	5-10 MHz	1/4"x1/4"	5 MHz
1/4" to 1"	1/4"-1/2"	2 1/4-5 MHz	1/4"x1/4" to 1/2"x1/2"	2 1/4-5 MHz or 1-2 1/4 MHz P/C
1" and above	1/2" to 1"	1-2 1/4 MHz	1/2"x1/2" to 1/2"x1"	2 1/4 MHz or 1-2 1/4 MHz P/C

Table 1

VII. E. Couplant materials shall be as low as practicable in sulfur and halogen content. Certification shall be provided on a batch basis for each brand of couplant. Analysis for halogens and sulfur shall be made according to ASTM D-129-64 and ASTM D-808-63.

1. Residual halogens and sulfur shall not exceed 1% by weight.
2. Certification, by batch number, for each batch of couplant shall be maintained on file at the jobsite.

F. Calibration blocks for angle beam examination shall be of the form of Figures 1 and 2 with calibration notches as shown. Calibration blocks shall be of the same nominal size, thickness, material, and surface finish as the pipe to be examined.

VIII. PREPARATION

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before beginning any examination program:
    a) Procedure and Qualification
    b) Calibration Sheets
    c) Inspection Reports

VIII. A. 1. d) Material and Equipment Certifications

e) Personnel Certifications

f) NRC Form 4 (Operating Nuclear Plants Only)

g) NRC Form 5 (Operating Nuclear Plants Only)

h) Status Indicators (Hold Tags)

i) Radiation Work Permits (when applicable)

B. Physical

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

a) Insulation removal

b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

c) Cleanup requirements

d) Safety precautions (other work in area, etc.)

C. Surface Preparation

1. Responsibility

a) It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

2. Surfaces shall be sufficiently smooth and clean so that a meaningful examination may be performed.

VIII. C. 3. Welds shall be identified and all required marking procedures completed before performing any examinations.

IX. LIMITATIONS

A. This procedure is based on ASME nuclear requirements; it may not be applicable to military, API, or AWS requirements without modification.

B. The procedure is limited to ferritic steels unless specifically qualified for other materials.

X. CALIBRATION

A. Test calibration is performed on a complete system. Any change in the ultrasonic instrument, transducer cable, or transducer requires test recalibration. A change in qualified personnel, recording instrumentation, or recorder connection cable requires a calibration check; however, instrument alignment verification need not be made with the transducer used for testing.

B. Instrument alignment verification for screen height and amplitude control linearity shall be performed daily before any examinations are performed.

X. B. 1. Instrument Linearity Verification

a) Position the search unit on a calibration block to obtain two echoes with a 2:1 amplitude ratio.

b) Set the larger echo to 80% of calibrated screen height.

c) Vary the amplitude of the larger echo from 100% to 20% of calibrated screen height in 10% increments.

d) Note that at each increment the smaller echo remains 1/2 the larger within a tolerance band of ±5% of full screen height.

e) Record successful performance of the verification on a Calibration Report form (Figure 3).

2. Attenuator Linearity Verification

a) Position the search unit to obtain an 80% of full scale echo on the calibrated screen.

b) Adjust the sensitivity control to decrease the system gain by 6 dB and 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

X. B. 2. c) Position the search unit to obtain a 40% of full scale echo on the calibrated screen.

d) Adjust the sensitivity control to increase the system gain by 6 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full screen.

e) Position the search unit to obtrain a 20% of full scale echo on the calibrated screen.

f) Adjust the sensitivity control to increase the system gain by 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

g) Record successful performance of the verification on a Calibration Report form (Figure 3).

Indication Set	Gain Change	Indication Tolerance Limits
80%	-6 dB	32% to 48%
80%	-12 dB	16% to 24%
40%	+6 dB	64% to 96%
20%	+12 dB	64% to 96%

Table 2

X. C. <u>Examination Calibration</u>

1. Straight Beam Calibration

Calibrations are performed at the time of examination by setting the pipe inside surface reflection at 80% amplitude and four sweep divisions, when the transducer is placed on the outer plane surface of the hanger lug and on the outer pipe surfaces. These are Primary Reference Responses.

2. Angle Beam Calibration

Calibration is performed on a complete system on an appropriate basic calibration block at the beginning of each day's testing of that material.

a) Calibration shall be performed on a calibration block whose temperature is within ±25°F of that material to be examined.

b) Set the sweep range on the calibrated tester to display 2 1/2 nodes with pipe I.D./O.D. points at 2, 4, 6, 8 and 10 divisions.

c) Test sensitivity at any range is established by setting the amplitude of the nearest notch echo to 80% of full calibrated scale. The responses shall then be obtained at this sen-

X. C. 2. c) sitivity, joined together in a smooth DAC curve on the tester face, and similarly recorded on the Calibration Report form (Figure 3). The DAC curve so generated is the Primary Reference Response.

d) After the Primary Reference Level has been established on the basic block, a calibration reference response may be established on a Rompas or other standard reference block. The response should include both sweep and amplitude calibration points and should be recorded as a calibration check response on the Calibration Report form. This response may be used for calibration check when an appropriate basic block is not available.

XI. PERFORMANCE

A. The weld and pipe material beneath the weld through which angle beam sound will travel during the weld examinations shall be examined with a longitudinal beam directed from the outer plane surface of the lub toward the inner surface of the pipe and with a longitudinal beam directed through the pipe over an area extending at least 1/2 inch around the lug weld.

XI. B. Angle Beam Scan of Attachment Welds and Adjacent Base Metal

1. The entire examination volume comprising the weld and adjacent base metal, as shown in Figure 4, shall be examined with the beam normal to the weld for at leave a full "V" path on either side of the weld covering the scan zone.
2. The entire examination volume comprising the weld and adjacent base metal, as shown in Figure 4, shall be examined with the beam parallel to the weld for a full "V" path on either side of the weld in two directions.
3. Overlap between parallel scans shall be nominally 15% and in no case less than 10%.

C. Angle Beam Calibration Check

1. A calibration check is required before and after each examination, with any change in test personnel, and at least once every four hours.
2. The calibration check shall, as a minimum, consist of verification of the DAC curve by a single point amplitude and range check using the basic calibration block or a portable block, such as the Rompas, whose response has been related to that of the basic block, as in X.C.2.d).

XI. C. 2. a) The amplitude response of the reference reflector during the calibration check shall be within ±2 dB, and its sweep location within ±10% of the calibration reference response value recorded on the calibration sheet to be acceptable.

b) An unacceptable calibration check shall be cause for full examination of the test system to determine the reason for the calibration change. Typical causes for calibration change are ambient temperature effects on transducers and electronics, control settings inadvertently changed, and loss of couplant between the transducer and wedge. If, in the judgment of the examiner, the cause of the calibration change has been corrected or may be compensated for by a change in control settings, calibration may be restored using the calibration check response.

d) Any examination that has been performed in a noncalibrated condition shall be repeated.

D. Sensitivity

Scanning sensitivity shall be at least two times (2x) the primary reference sensitivity.

XI. E. <u>Scanning Speed</u>

Scanning speed shall not exceed four inches per second.

F. <u>Limitations</u>

Physical or other limitations that prevent full compliance with the requirements of this procedure shall be recorded on the Examination Report form (Figure 5).

G. <u>Automatic Alarms</u>

Automatic alarms or recording may be used as an aid to the examiner.

XII. <u>EVALUATION</u>

A. <u>Methods</u>

1. For each straight beam indication that exceeds 20% of the Primary Reference Response, and for each angle beam indication that exceeds 50%, the following information must be recorded:

   a) Peak amplitude (%PRR) with corresponding range to indication (inches), search unit position, search unit direction;

   b) Range and transducer position at 20% and 50% PRR amplitude points for straight and angle beam indications respectively;

XII. A. 1. c) Length of reflector as measured between 20% and 50% PRR amplitude points for angle and straight beam indications respectively.

B. Evaluation Criteria

1. Any indication exceeding 100% of the Primary Reference Response shall be evaluated by the examiner to determine the extent, size, location and shape of the reflector. These parameters shall be included on the Notification of Reportable Indication form (Figure 6).

C. Refeence System for Recording Indications .

1. A reference system shall be used to locate hanger lugs, according to Procedure MEP-2, "Weld Marking Procedure."

a) Indications shall be located in inches from the appropriate reference marker.

D. Acceptance Criteria

1. Acceptance criteria contained in Paragraph IWB-3516 of ASME Section XI, 1977 edition addenda through Summer 1978, are summarized in the tables drawn in Figures 7 and 8.

XIII. RECORDS

A. A Report of Visual and Ultrasonic Examination (Figure 5) shall be prepared for each item examined, and shall be related to a report of Ultrasonic Calibration (Figure 3).

B. Oscillograph chart records shall be made of all examinations.

1. Chart records used in indication analysis shall utilize two channels, one corresponding to vertical deflection of the tester signal and the other to horizontal.

   a) These channels shall be calibrated to match the oscilloscope display. That is, an indication 90% of vertical amplitude appearing at five divisions on the tester screen should have a nine division deflection on one chart channel and a five division deflection on the other.

2. Chart records shall include pre and post test calibration checks made at the same scanning speed as the test.

3. Location and other pertinent information shall be manually noted on each chart.

XIII. B. 3. a) Pertinent information includes, but is not limited to, date, time, item, equipment, examiners, scans, gain, and recorder settings and speed.

C. Recording Conventions

Ultrasonic scans and the location of indications shall be recorded according to Figure 4.

D. Other types of recording, such as event or alarm monitoring, may be used as an aid to the examiner where feasible.

XIV. REVIEW

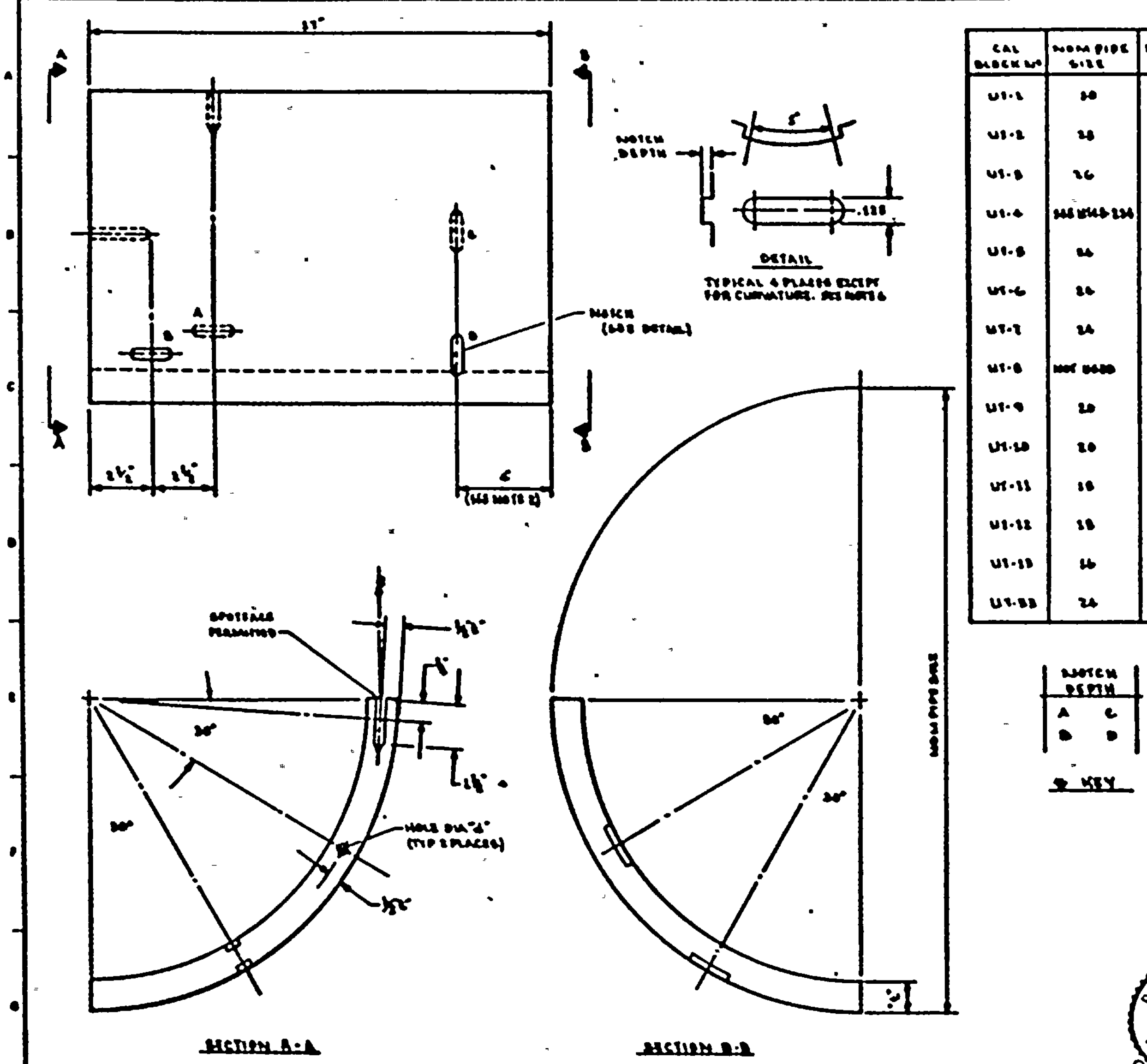
A. Examination reports shall be subject to review by an assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the final LMT review, the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the Authorized Nuclear Inspector.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Coordinator. Additional reports which may include examination documentation as refeence material shall be generated from copies.

XV. B. Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.



CAL BLOCK Nº	NOM PIPE SIZE	NOM WALL THK "t"	MATERIAL SPECIFICATION	NOTCH DEPTH	HOLE DIA "d"	HEAT Nº
UT-1	30	1.250	SA 155 KCF-70	.113 .112 / .116 .110	1/8"	W10834
UT-2	28	1.620	SA 155 KCF-70	.127 .125 / .130 .111	1/8"	14368
UT-3	26	1.125	SA 155 KCF-70	.109 .113 / .108 .109	1/8"	M01460
UT-4	[illegible]					
UT-5	24	1.812	SA 106 GRB	.152 .151 / .155 .154	1/8"	L2508
UT-6	24	1.218	SA 106 GRB	.118 .130 / .110 .115	1/8"	L88730
UT-7	24	1.140	SA 358 GR 304	.109 .109 / .110 .109	1/8"	19068
UT-8	NOT USED					
UT-9	20	1.031	SA 358 GR 304	.105 .106 / .109 .104	1/8"	25890
UT-10	20	1.031	SA 106 GRB	.105 .099 / .099 .106	1/8"	L86486
UT-11	18	1.375	SA 106 GRB	.126 .120 / .126 .125	1/8"	M10160
UT-12	18	0.938	SA 106 GRB	.093 .095 / .092 .092	3/32"	L00193
UT-13	16	0.750	SA 358 GR 304	.075 .075 / .077 .078	3/32"	37000
UT-33	24	2.343	SA 106 GRB	.186 .186 / .193 .182	3/16"	443549

NOTES:

1. BLOCKS STAMPED WITH 1/8" HIGH STEEL STAMP ON ENDS WITH NOM PIPE SIZE, SCH OR WALL THK, MATL SPEC, HEAT Nº & CAL BLOCK Nº.
2. DIMENSION 2 1/2" FOR UT-1.
3. DELETED
4. DELETED
5. ALL DIMENSIONS ARE IN INCHES.
6. NOTCH BOTTOM CURVATURE CONFORMS TO PIPE WALL CURVATURE.

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

Figure 1

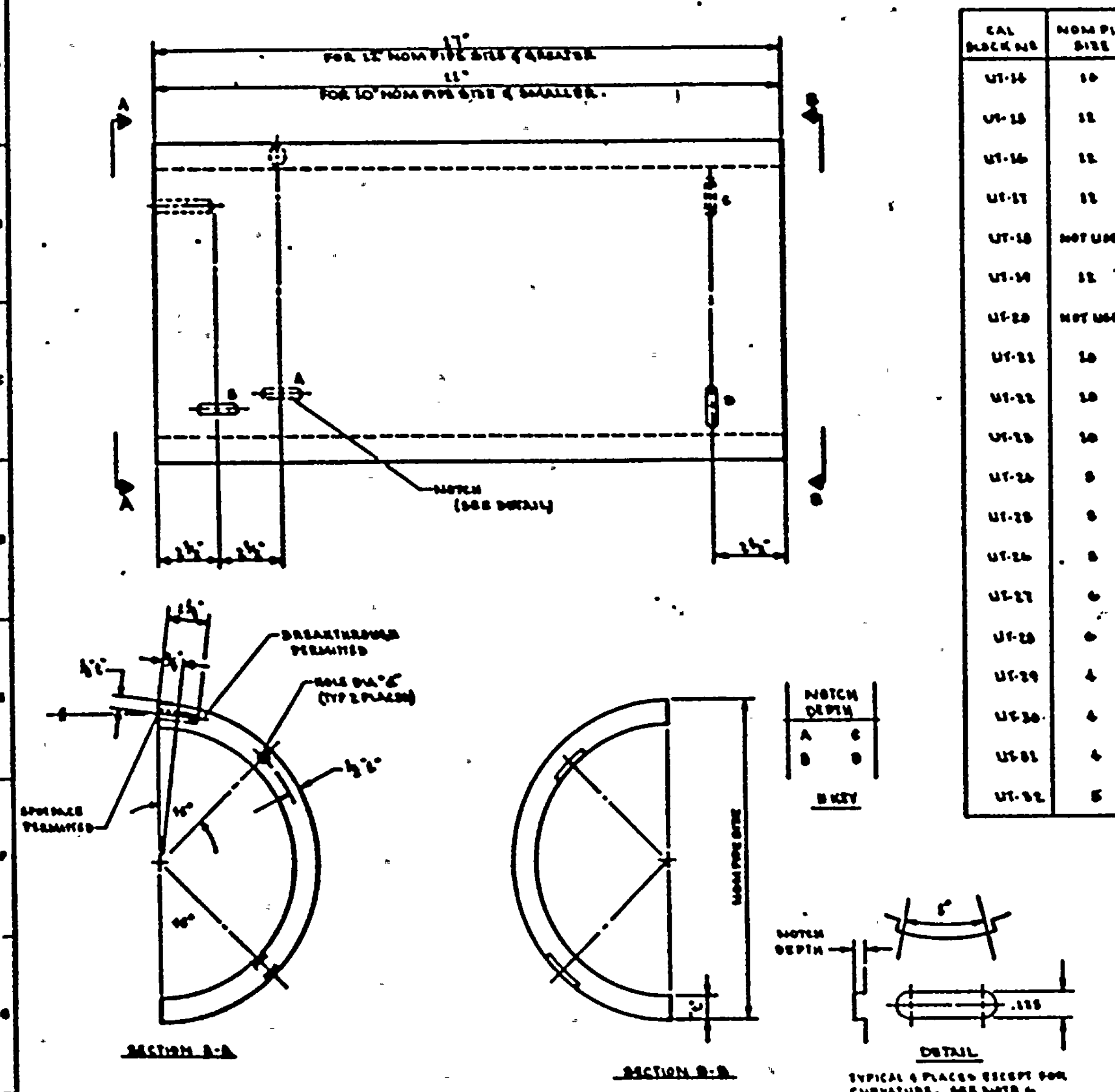
WASHINGTON PUBLIC POWER SUPPLY SYSTEM

UT CALIBRATION BLOCKS

NO	DATE	REVISION	BY	CHKD	APPVD
2	[illegible]	CORRECTED B DIMENSIONS, DELETED UT-4, TABLE REVISED, ADD DEPTH CHANGED			
1	[illegible]				
0	[illegible]	ISSUED FOR CONSTRUCTION			
4	[illegible]	AS BUILT, UT-2, 7, 9, 13 & 33			
3	[illegible]	AS BUILT, UT-1, 3, 5, 6, 10, 11 & 12			

ENGINEER MC HALLAS
DRAWN K MCANDREWS
DATE 3-18-78
DWG NO UTCB-330 REV 4

PROC. NO. UTP-26
PAGE 21
FOLLOWING PAGE 22



CAL BLOCK NO	NOM PIPE SIZE	NOM WALL THK "t"	MATERIAL SPECIFICATION	NOTCH DEPTH	HOLE DIA "d"	HEAT NO
UT-14	10	.150	SA 106 GR B	.075 .076 / .075 .076	3/32"	N10630
UT-15	12	1.000	SA 106 GR B	.091 .098 / .097 .097	3/32"	L45845
UT-16	12	.844	SA 106 GR B	.081 .088 / .082 .083	3/32"	64925
UT-17	12	.688	SA 106 GR B	.073 .067 / .069 .070	3/32"	105057
UT-18	NOT USED					
UT-19	12	.688	SA 358 GR 304	.068 .069 / .070 .071	3/32"	271134
UT-20	NOT USED					
UT-21	10	.719	SA 106 GR B	.073 .072 / .071 .073	3/32"	358277
UT-22	10	.594	SA 106 GR B	.058 .058 / .057 .057	3/32"	N98498
UT-23	10	.844	SA 106 GR B	.082 .081 / .081 .081	3/32"	N38498
UT-24	8	.906	SA 106 GR B	.090 .092 / .079 .086	3/32"	N34295
UT-25	8	.594	SA 106 GR B	.060 .061 / .060 .060	3/32"	48087
UT-26	8	.500	SA 376 TP 304	.047 .054 / .053 .061	3/32"	M1386
UT-27	6	.562	SA 106 GR B	.054 .061 / .056 .058	3/32"	N10068
UT-28	6	.432	SA 106 GR B	.046 .045 / .042 .044	3/32"	L84413
UT-29	4	.337	SA 312 TP 304	.036 .037 / .032 .032	3/32"	F50309
UT-30	4	.337	SA 106 GR B	.030 .036 / .035 .033	3/32"	N96836
UT-31	4	.237	SA 376 TP 304	.027 .026 / .020 .025	3/32"	Q1480
UT-32	5	.500	SA 106 GR B	.056 .055 / .050 .053	3/32"	L44716

NOTES:

1. BLOCKS STAMPED WITH 1/4" HIGH STEEL STAMP ON ENDS WITH NOM PIPE SIZE, SCH OR WALL THK, MATL SPEC, HEAT NO & CAL BLOCK NO.
2. DELETED
3. DELETED
4. DELETED
5. ALL DIMENSIONS ARE IN INCHES.
6. NOTCH BOTTOM CURVATURE CONFORMS TO PIPE WALL CURVATURE.

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

UT CALIBRATION BLOCKS

REV 4

NO	DATE	REVISION	BY	CHK	APPR
		AS BUILT, UT-32			
		AS BUILT, UT-14 thru 31			
1		CORRECTED DIMENSION FOR UT-31			
		TABLE REVISED ... DEPTH CHANGED			
C		ISSUED FOR CO[redacted]ION			

DATE 7-11-78

Figure 2

 WPS-UTC1 10/79

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San Jose, Ca. 95112
408-297-8766

ISO No.______
Cal. No.______ Time______
Job No.______
Date______
Page______ of ______

REPORT OF ULTRASONIC CALIBRATION

SIGN

Examiner/Level______ Examiner/Level______ Review/Level______

Authorized Inspector______ Customer______

EQUIPMENT

Instrument______ S/N______ ReCal Due______ Cable______

Recorder______ S/N______ ReCal Due______

Recorder______ S/N______ ReCal Due______

Vertical Linearity Check Check Completed______

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2										

Signal 2 shall equal 50% of Signal 1 ±5% of full scale

Attenuator Linearity Check Check Completed______

Tester Gain	Set	-6	-12	Set	+12	Set	+6
Signal Amp.	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
Actual Value							

Signal amplitude must fall within listed values

Transducers

S/N______ Mfg.______ Type______ Size______ Freq.______ Index______ Angle______

S/N______ Mfg.______ Type______ Size______ Freq.______ Index______ Angle______

S/N______ Mfg.______ Type______ Size______ Freq.______ Index______ Angle______

S/N______ Mfg.______ Type______ Size______ Freq.______ Index______ Angle______

PROC

Procedure______ Rev.______ Date______

CALIBRATION

Cal. Block Type______ S/N______ Ref. Refl.______ Temp.______

Verification/Ref. Blk.______ S/N______ Ref. Refl.______ Temp.______

Instrument Settings

	L	∠	
Gain			
Sweep			
Delay			
Reject			
Damp.			

DAC

10
8
6
4
2
0
2 4 6 8 10

Cal. Check Time

Figure 3

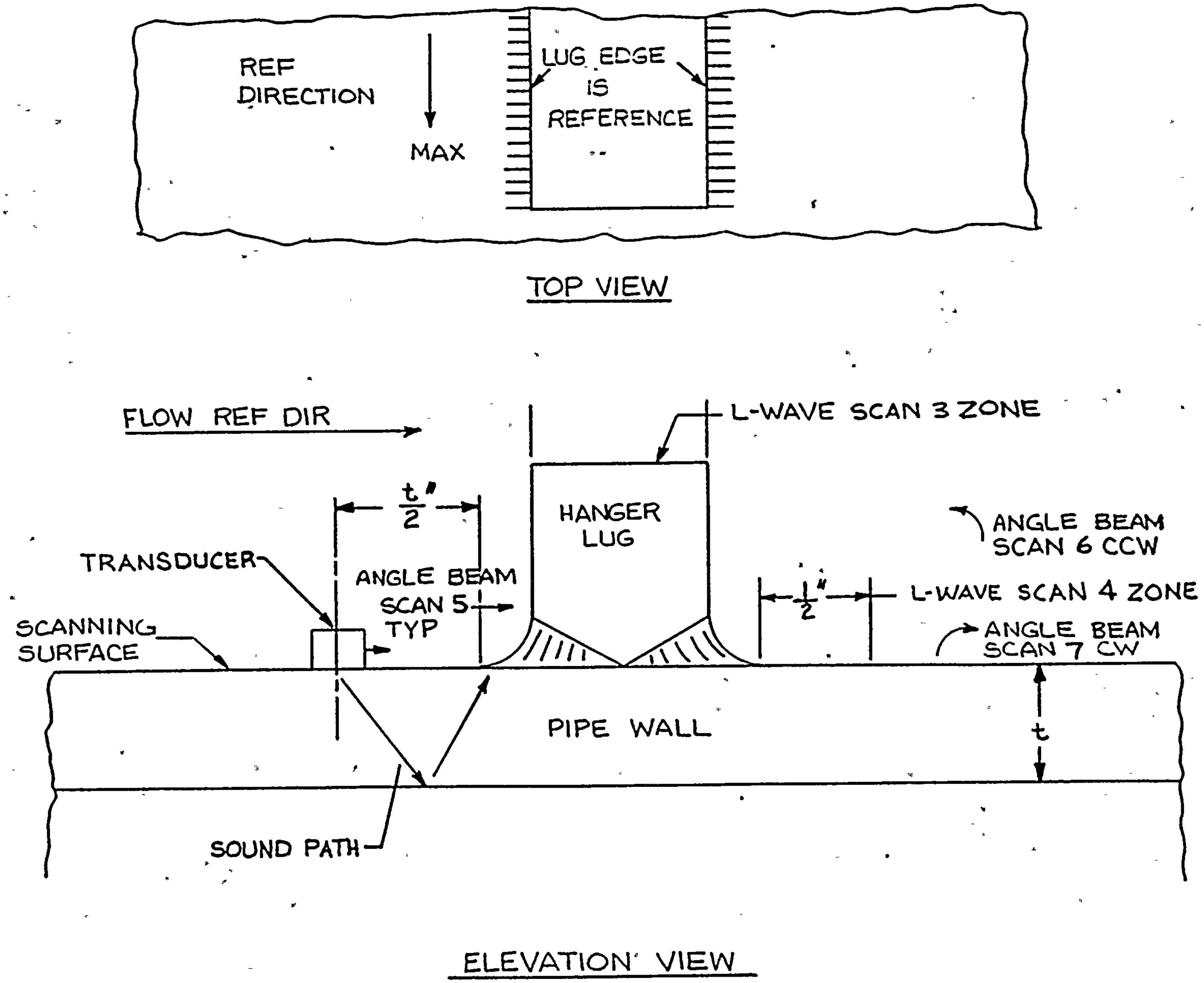

Figure 4

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 WPS-UTX2 2/79

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771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

ISO No. ______
Report No. ______
Cal. No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF VISUAL AND ULTRASONIC EXAMINATION

ITEM
ISI No. ______ Size ______ Material ______ S/N(s) ______
Description ______
Location ______ Preparation ______ Temp. ______

SIGN
Examiner/Level ______ Examiner/Level ______ Review/Level ______
Authorized Inspector ______ Customer ______

EQUIPMENT
Tester 1 ______ S/N ______ 2 ______ S/N ______
Recorder 1 ______ S/N ______ 2 ______ S/N ______
Transducer 1 ______ 2 ______
3 ______ 4 ______
Couplant ______ Cable ______ Marker ______ Photo ______

PROC
Calibration Procedure ______ Rev. ______
Examination Procedure ______ Rev. ______
Record Procedure ______ Rev. ______

CALIB
Calib. Blk. ______ Temp. ______ Ref. ______ Amp. ______ Swp. ______
Ref. Gain ______ Damp ______ Reject ______ Gate ______
Alarm ______ Mag. Tape Count ______ Chart ______ Cal. Check Time ______

EXAMINATION
Cal. Ref. Blk. ______ Ref. Rfl. ______ Amp. ______ Sweep Position ______
Scan Gain ______ Ref. Dwg. ______ Reject Level ______ Report Level ______

NAD = No apparent disc. L = Linear G = Geometry S = Spot M = Multiples

Scan	Type	Disp.	Scan	Type	Disp.	Scan	Type	Disp.
0	PT							
1	Visual		7			13		
2	Base Metal		8			14		
3			9			15		
4			10			16		
5			11			17		
6			12			18		

Scan	Description of Indications

Figure 5

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Saratoga, Ca. 95070
408-867-4109

Job Location ____________
____
Report No ____________
____
Exam Date ____________

NOTIFICATION OF REPORTABLE INDICATION

Part I - LMT Findings

LMT Job No. ____________ I.D.# ____________ ISO No. ____________

NDT Method: UT ______ PT ______ MT ______ ET ______ VT ______

Description of Indication: (Sketch/photograph attached Yes __ No __)

Examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Field Supervisor Date:

Notification Acknowledged by Client Representative: Date:

Part II - Re-examination

Findings: (Sketch/photograph attached Yes __ No __)

Re-examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Supervisor Date:

Closed Client Representative Date:

Figure 6

ALLOWABLE PLANAR INDICATIONS

Materials: Austenitic steels that 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[2]

Volumetric Examination			Surface Examination	
Aspect Ratio, a/ℓ[1]	Surface Indication, a/t, %	Subsurface Indication, a/t, %[3]	Nominal Section Thickness, t, in.	Indication Length, ℓ, in.
Preservice Examination			**Preservice Examination**	
0	2.9	3.7	0.625 to 2.0	3/16
0.05	3.2	3.8		
0.10	3.5	4.2	2.0	1/4
0.15	3.8	4.6		
0.20	4.3	5.2	3.0	1/4
0.25	4.9	5.8		
0.30	5.5	6.6	4.0	1/4
0.35	5.5	7.4		
0.40	5.5	8.3	5.0	1/4
0.45	5.5	9.3		
0.50	5.5	10.3	6.0 and over	1/4
Inservice Examination			**Inservice Examination**	
0	4.3	5.5	0.625 to 1.5	0.25
0.05	4.8	5.7		
0.10	5.2	6.3	2.0	0.3
0.15	5.7	6.9		
0.20	6.4	7.8	3.0	0.45
0.25	7.3	8.7		
0.30	8.2	9.9	4.0	0.6
0.35	8.2	11.1		
0.40	8.2	12.4	5.0	0.75
0.45	8.2	13.9		
0.50	8.2	15.4	6.0 and over	0.9

NOTES:
(1) For intermediate flaw aspect ratios a/ℓ, and thickness t, linear interpolation is permissible.
(2) Where support section thickness varies, the average thickness over the length of the indication is the section thickness.
(3) The total depth of the subsurface indication is $2a$.

Figure 7

ALLOWABLE PLANAR INDICATIONS

Materials: Austenitic steels that meet the requirement of minimum yield strength of 35 ksi or less at 100 F temperature.
Thickness Range: 0.625 in. and greater.[1]

Surface Examination	
Nominal Section Thickness, t, in.	Indication Length, ℓ, in.
Preservice Examination	
0.625 to 2.0	3/16
2.0 and over	1/4
Inservice Examination	
0.625 to 1.0	0.20
1.0 to 2.0	0.25
2.0 to 3.0	0.45
3.0 and over	0.65

NOTE:

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

Figure 8

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

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408-297-8766

WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-14 Revision No. 1

Procedure Title Beam Spread and Refracted Angle Determinations

LMT, Inc. QA Review and Approval D.B. MacGill Level III 12-8-80
(Quality Assurance Officer)

Client Approval D.P. Ramey, ISI Engineer 1/20/81

Authorized Nuclear Inspector Approval J. M. Foster 1-20-81

Specific Qualification Record

LEVEL I & II EXAMINERS

Component	Examiners	Date
RPV HEAD BLOCK	R. FRADKIN/II	1-27-81
RPV HEAD BLOCK	M. KING/II	1-27-81
RPV HEAD BLOCK	T. KIMBALL/TR.	1-27-81
RPV HEAD BLOCK	R. HILYARD/I	1-27-81
RPV HEAD BLOCK	G. STEAIT/II D. RICHEY/II	1-30-81

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP- 02	ISI ENGINEER D.P. Ramey	DATE 12-24-80
CONTRACT NO. C-14402	TITLE PSI Services for NSSS & Associated Nuclear Piping	
CONTRACTOR LMT, Inc.		

DOCUMENT TITLE	REV.
UTP-14 Beam Spread and Refracted Angle Determinations	1

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) 10/20/80

PREVIOUSLY APPROVED ☒ YES ☐ NO (DATE IF YES) 10/20/80

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
TFD D.W. Porter 12/24/80 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
K. J. Hammond 12/24/80 DPR PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR DPR 1/6/81	X			
SUPERVISOR, ISI/NDE, GENERATION SERVICES				
12/29/80 [signature] 12/29/80 MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

ANI(I) CONCURRANCE: M. M. [signature] 1-6-81

WP-702 EDP 9.0

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771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

TITLE:

BEAM SPREAD AND REFRACTED ANGLE DETERMINATIONS

I. PURPOSE AND SCOPE

A. Purpose

1. This procedure provides instructions for determining ultrasonic beam spread in accordance with the requirements of Section XI, ASME Boiler and Pressure Vessel Code, 1974 Edition, Summer 1975 Addenda.

2. Additionally, this procedure provides instructions for determining the refracted angle of the ultrasonic beam within the basic calibration block.

B. Scope

1. The procedure applies to angle beam search units used in performing ultrasonic examinations according to the requirements of Appendix I, Section XI, ASME Boiler and Pressure Vessel Code, 1974 Edition, Summer 1975 Addenda.

QUALIFICATION:

Approved for use [signature] Level III 12/8/86

[signature] Level II 12-8-80

II. REFERENCES

A. Applicable Code Editions

1. This procedure complies with the applicable requirements of Appendix I, Section XI, ASME Boiler and Pressure Vessel Code, 1974 Edition, Summer 1975 Addenda.

B. Supplemental References

1. SNT-TC-1A, 1975 Edition, "Recommended Practice for the Establishment of Personnel Qualification and Certification Programs."

2. LMT, Inc., Procedure QA-6, "Qualification and Certification of NDE Personnel."

3. LMT, Inc., Operating and Quality Assurance Manual, Rev. 12, approved for the WNP-2 Pre-Service Inspection by WPPSS.

III. DEFINITIONS

None.

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a beam spread and refracted angle determination.

VI.. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualifications as per the Referencing Procedure Qualification.

VI. B. Personnel shall be qualified and certified according to the requirements of ASME XI, SNT-TC-1A, and LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Equipment and materials shall conform to the requirements of the Referencing Procedure.

VIII. PREPARATION

A. Documentation, Physical, and Surface preparations shall be as specified by the applicable requirements of the Referencing Procedure.

IX. LIMITATIONS

A. This procedure is based on ASME Nuclear Requirements; it may not be applicable to military, API, or AWS requirements without modification.

IX. B. This procedure is limited to ferritic steels unless the Referencing Procedure has been specifically qualified for other materials.

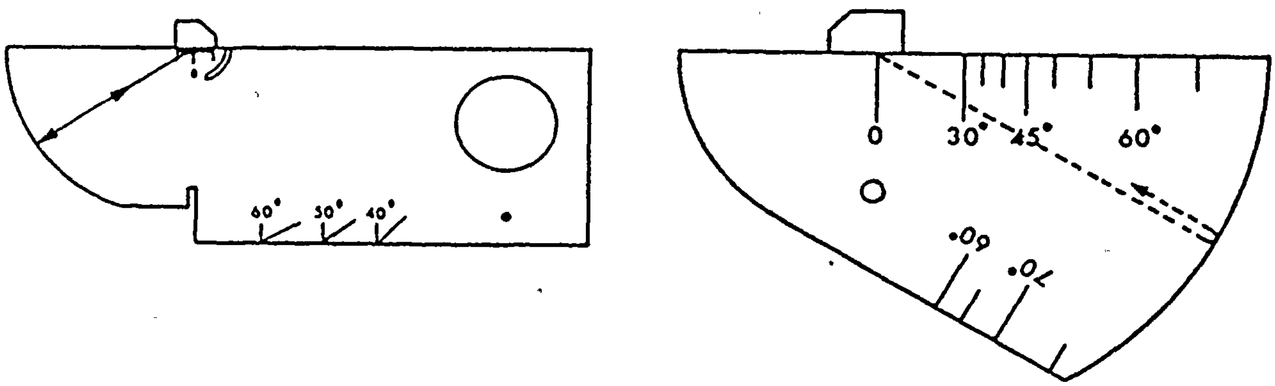
X. CALIBRATION

This section is not applicable to this procedure.

XI. PERFORMANCE

A. Search Unit Incident Point Determination

1. Position the angle beam search unit on an IIW or Rompas Block, as shown below; obtain maximum response amplitude.



XI. A. 2. Mark the angle beam wedge or search unit housing as appropriate, coincident with the "0" mark on the reference block. This represents the exit or incident point for that particular search unit/wedge combination.

B. <u>Beam Spread Determination</u>

1. Upon completion of calibrating for examination, determine beam spread as follows:

a) Position the search unit for the maximum response (DAC) from the T/4 beam spread determination hole in the appropriate basic calibration block. Refer to the appropriate UT calibration block drawing for identification of beam spread determination holes.

b) Measure the distance, along the block surface, from the calibration hole centerline to the search unit incident point.

XI. B. 1. c) Record the sweep location of the calibration hole signal and the measured distance (step 6) on the "Report of Ultrasonic Beam Spread and Refracted Angle Determination," (Figure 1).

d) Increase instrument sensitivity by 2χ.

e) Move the search unit away from the calibration hole until the signal amplitude returns to DAC.

f) Measure the distance, along the block surface, from the centerline of calibration hole to the search unit incident point.

g) Record the distance and sweep location of the hole signal on the "Report of Ultrasonic Beam Spread Determination."

h) Move the search unit toward the calibration hole, until the hole signal amplitude peaks and returns to DAC.

XI. B. 1. i) Measure the distance from the search unit incident point to the calibration hole centerline, along the block surface.

j) Record sweep location and measured distance on the "Report of Ultrasonic Beam Spread and Refracted Angle Determination." (Figure 1).

k) Repeat steps a through j from the T/2 and 3T/4 holes.

2. The following sets forth an alternate method for determining ultrasonic beam spread using the Nortec 131D Ultrascope.

a) Calibrate the 131D as follows:

(1) Position the search unit on the appropriate calibration block to obtain maximum response amplitude from the T/4 beam spread determination holes.

(2) Set the 131 digital controls.

(a) Adjust the OFFSET Control to

XI. B. 2. (2) (a) set the "step" in the baseline to the "0" sweep location.

(b) Press 1st, beam angle, depth, and 20 pushbuttons.

(c) Adjust D-1 Control as required to lock the range gate onto the T/4 signal.

(d) Adjust ZERO Control to set the digital panel meter reading to the hole depth. (Block surface to hole centerline.)

(3) Position the search unit for maximum response amplitude from the 3T/4 hole.

(a) Adjust the D-1 Control as required to lock the range gate onto the 3T/4 signal.

(b) Adjust the CAL Control to set the digital panel meter reading to the hole depth. (Block surface to hole centerline.)

XI. B. 2. a) (4) Repeat the applicable portions of the above steps as required until the digital panel meter indicates the proper depth for the T/4 and 3T/4 (or 5T/4, if applicable.)

b) Perform beam spread determination as follows:

(1) Position the search unit for the maximum response amplitude from the T/4 hole (amplitude equal to DAC).

(2) Depress the D pushbutton.

(3) Record the panel meter reading and sweep position (maximum).

(4) Increase the 131D sensitivity by 2x.

(5) Reposition the search unit such that the T/4 hole is not detected.

(6) Move the search unit toward the T/4 hole until the response amplitude comes to the DAC line.

(7) Record the panel meter reading and sweep position (leading).

XI. B. 2. b) (8) Continue moving the search unit over the T/4 hole until the response amplitude has exceeded and returned to the DAC line.

(9) Record the digital panel meter reading and sweep position (trailing).

(10) Repeat the above steps for the 2T/4 and 3T/4 holes (and 5T/4 hole, if applicable).

(11) Record all required data on the "Report of Ultrasonic Beam Spread and Refracted Angle Determination." (Figure 1)

C. Refracted Angle Determination

1. To determine the refracted beam angle in the calibration block, proceed as follows:

a) Measure the distance from the UNCLAD block surface to the 3T/4 hole centerline (d).

NOTE: This dimension is shown on the appropriate WPPSS as-built UT Calibration Block drawing.

XI. C. 1. b) Position the angle beam search unit for maximum response amplitude from the 3T/4 SDH.

c) Measure the distance, along the block surface(s), from the 3T/4 SDH to the search unit incident (index) point.

d) Calculate the refracted angle as follows:

(1) $\theta = \arctan \left(\frac{s}{d}\right)$

2. The following alternate method may be used to calculate the refracted angle:

a) Measure the distance from the UNCLAD block surface to the 3T/4 SDH centerline(d).

NOTE: <u>This dimension is shown on the appropriate WPPSS as-built UT Calibration Block drawing</u>.

b) On the 131D, depress the appropriate beam angle pushbutton and SOUNDPATH.

XI. C. 2. c) Position the search unit for maximum amplitude response from the 3T/4 SDH.

d) Read the metal path on the 131D digital panel meter (m).

e) Calculate the refracted beam angle as follows:

$$\theta = \arccos\left(\frac{d}{m}\right)$$

XII. EVALUATION

Not applicable to this procedure.

XIII. RECORDS

A. Beam Spread

1. Complete all appropriate data relating to Beam Spread, on the "Report of Ultrasonic Beam Spread and Refracted Angle Determination," (Figure 1).

XIII. B. Refracted Angle

1. Complete all appropriate data, relating to the refracted angle determination on the "Report of Ultrasonic Beam Spread and Refracted Angle Determination" form (Figure 1).

XIV. REVIEW

A. Beam Spread Determination reports shall be subject to review by an assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the LMT Level III review, the reports shall be appended to the appropriate Report of Ultrasonic Calibration and transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the ANI.

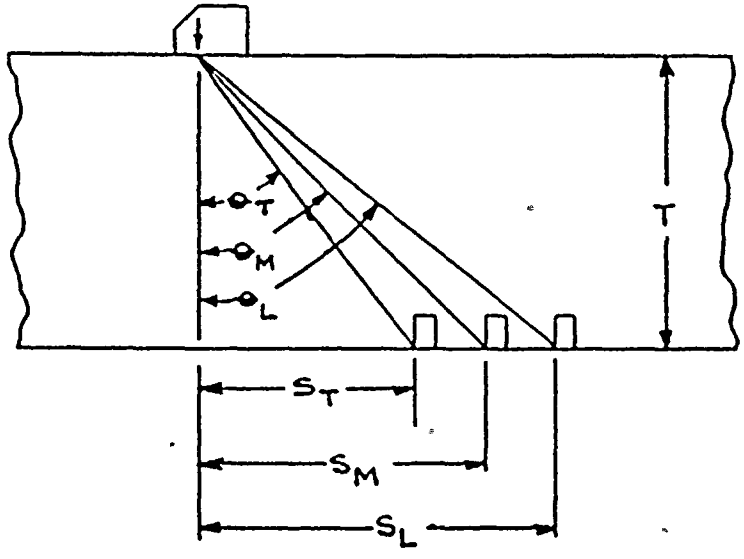
XV. DOCUMENTATION STORAGE AND DISTRIBUTION

A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Coordinator. Additional reports which may include examination documentation as reference material shall be generated from copies.

B. Field Storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.

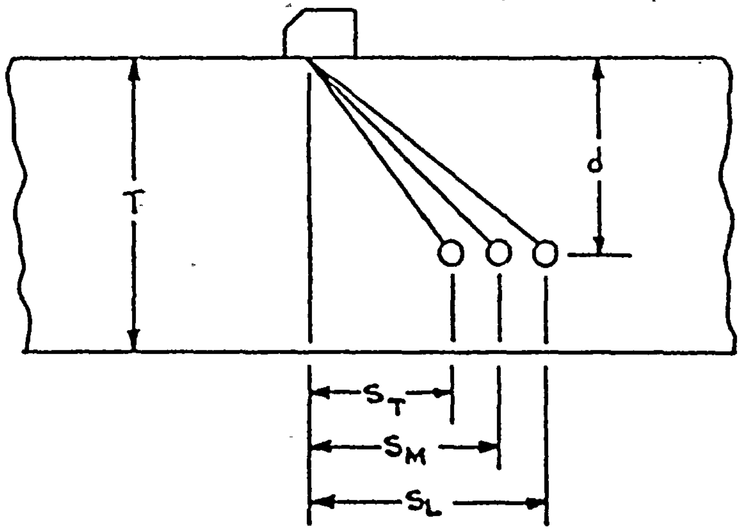
REPORT OF ULTRASONIC BEAM SPREAD & REFRACTED ANGLE DETERMINATION VERT. PLANE

BEAM ANGLE (θ)



θ = ARCTAN S/T

BEAM SPREAD & DIAMETER



B = ARCTAN S/D
$\varnothing = S_L - S_T$

REFL'R	MAX			LEADING			TRAILING			BEAM			
	S_M	SWP	MP	S_L	SWP	MP	S_T	SWP	MP	θ_M	θ_L	θ_T	Ø
___	___	___	___	___	___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___	___	___	___	___	___

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CAL. NO. ______
JOB NO. ______
DATE ______
PAGE ____ OF ____

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-30 Revision No. 2

Procedure Title MANUAL ULTRASONIC EXAMINATION OF REACTOR VESSEL AND HEAD BUTT WELDS

LMT, Inc. QA Review and Approval [signature] Level III 1-29-81
(Quality Assurance Officer)

Client Approval [signature] 2/25/81 ISI Engineer

Authorized Nuclear Inspector Approval [signature] 2/27/81

Specific Qualification Record

Component	Examiners	Date
RPV HEAD	R. FRADKIN / II	1-27-81
RPV HEAD	M. KING / II	1-27-81
RPV HEAD	T. KIMBALL / TR.	1-27-81
RPV HEAD	R. HILYARD / II R. HILYARD / I	9-19-81 1-27-81
RPV HEAD	M. WORBY / I G. STRAIT / II	1-30-81
RPV HEAD	J. MILLER / I D. RICHEY / II	1-30-81

[illegible]

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP 02	ISI ENGINEER D.P. Ramey	DATE 1-30-81
CONTRACT NO. C-14402	TITLE PSI Services for NSSS and Associated Nuclear Piping	
CONTRACTOR		

DOCUMENT TITLE	REV.
UTP-30 " Manual Ultrasonic Examination of Reactor Vessel and Head Circumferential Butt Welds	2

PREVIOUSLY REVIEWED [X] YES [ ] NO (DATE IF YES) Oct. 20, 1980 (WPLM-2-80-27)

PREVIOUSLY APPROVED [X] YES [ ] NO (DATE IF YES) 1/20/81

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

Section VI on Personnel Requirements was omitted from Rev. 1.

REVIEWER	APPROVED	APPROVED AS NOTED	DISPOSITION: DISAPPROVED	COMMENTS ATTACHED
2/3/81 — SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
N/A — PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR				
2/3/81 — SUPERVISOR, ~~ISI/~~NDE GENERATION SERVICES	X			
2/3/81 2-4-81 — MANAGER, ~~QUALITY SERVICES~~ operational QA & Services	X			

NOTES/COMMENTS:

ANI(I) Concurrence: 2-6-81

Field Change #1 to Rev 1 of UTP-30 is also applicable to Rev 2 and is attached.

WP-702 EDP 9.0

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FIELD CHANGE RECORD

Procedure No. UTP-30 Field Change No. 1

Procedure Title MANUAL ULTRASONIC EXAMINATION of REACTOR Vessel AND Head CIRCUMFERENTIAL AND Longitudinal BUTT WELDS

Revision No. 1 Date 10/15/80

LMT, Inc. Approval [signature] Date 1-29-81

Client Approval [signature], TSI Engineer Date 1-29-81

Procedure Change:

Add Figures 20A, 20B, 20C, 20D and 20E, 20F to procedures. these figures show top and bottom head weld coverage and should have been included in Rev 1.

Add XD3(b) For a full "Vee" examination position the response from the 1/4t and 3/4t side drilled calibration holes at 1.2 and 3.6 screen divisions of the tester hortizontal scale.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP 02	ISI ENGINEER D.P. Ramey	DATE 1-29-81
CONTRACT NO. C-14402	TITLE PSI Services for NSSS & Associated Nuclear Piping	
CONTRACTOR LMT, Inc.		

DOCUMENT TITLE	REV.
UTP-30 Field change 1	
"Manual ultrasonic Examination of	
Reactor Vessel and Head Circumferential	
and Longitudinal Butt Welds"	1

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) 12/24/80

PREVIOUSLY APPROVED ☒ YES ☐ NO (DATE IF YES) 1/20/81

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

These figures should have been in procedure to show weld coverage for the top and bottom heads. Added paragraph XD3 (b) to provide guidance on performing a full "Vee" calibration.

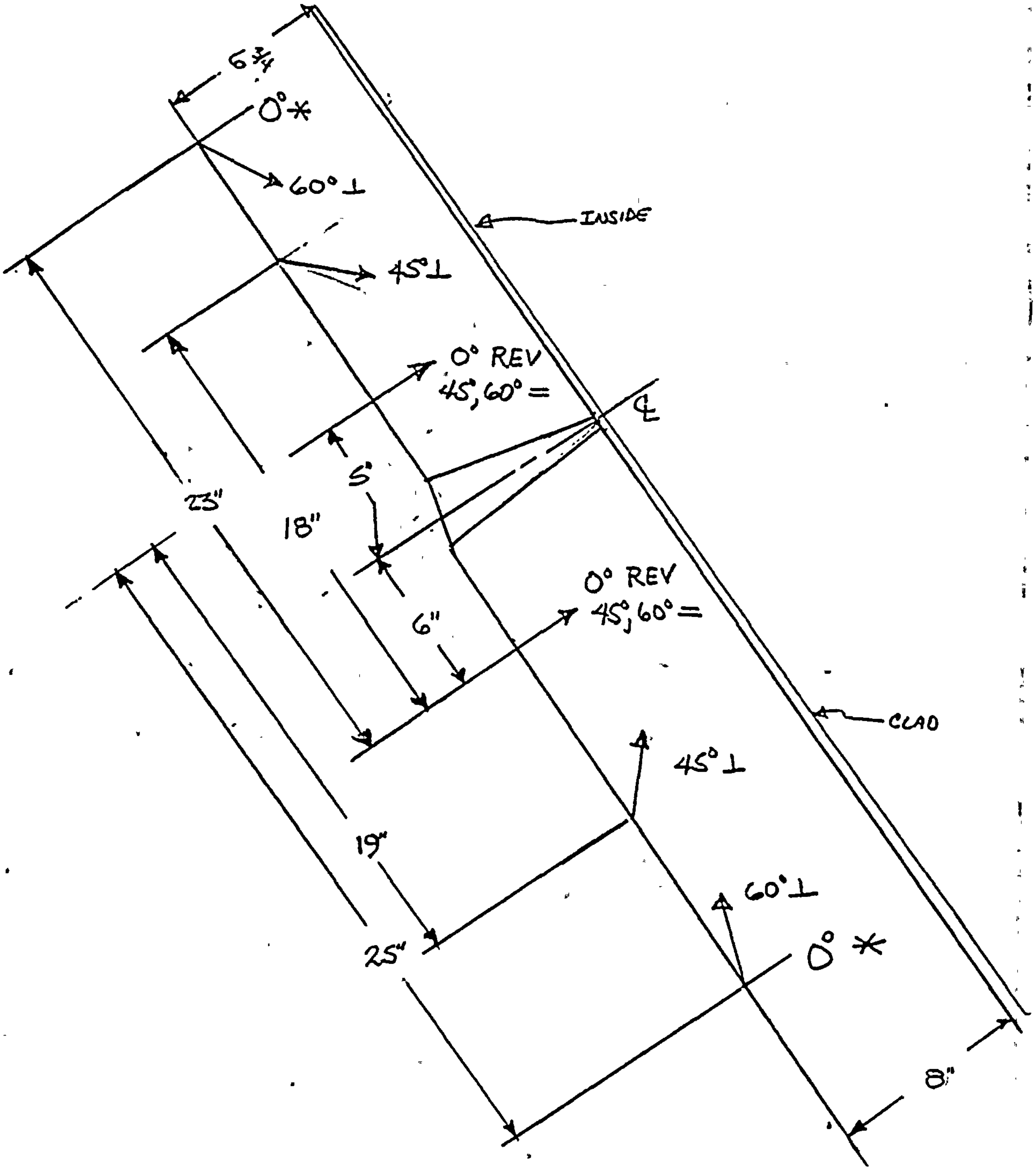
REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
FFB 1/29/81 D. W. Porter 1/29/81 — SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
N/A. — PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR				
Ken J. [illegible] 1/29/81 — SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
1/29/81 [signature] 1/29/81 — MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:
ANI(I) concurrence. S.M. [signature] 1-29-81

WP-702 EDP 9.0

REF. DWG. : CB&I 3133-17 DET 3

CAL BLOCK: UT-117 8"



ULTRASONIC EXAMINATION OF

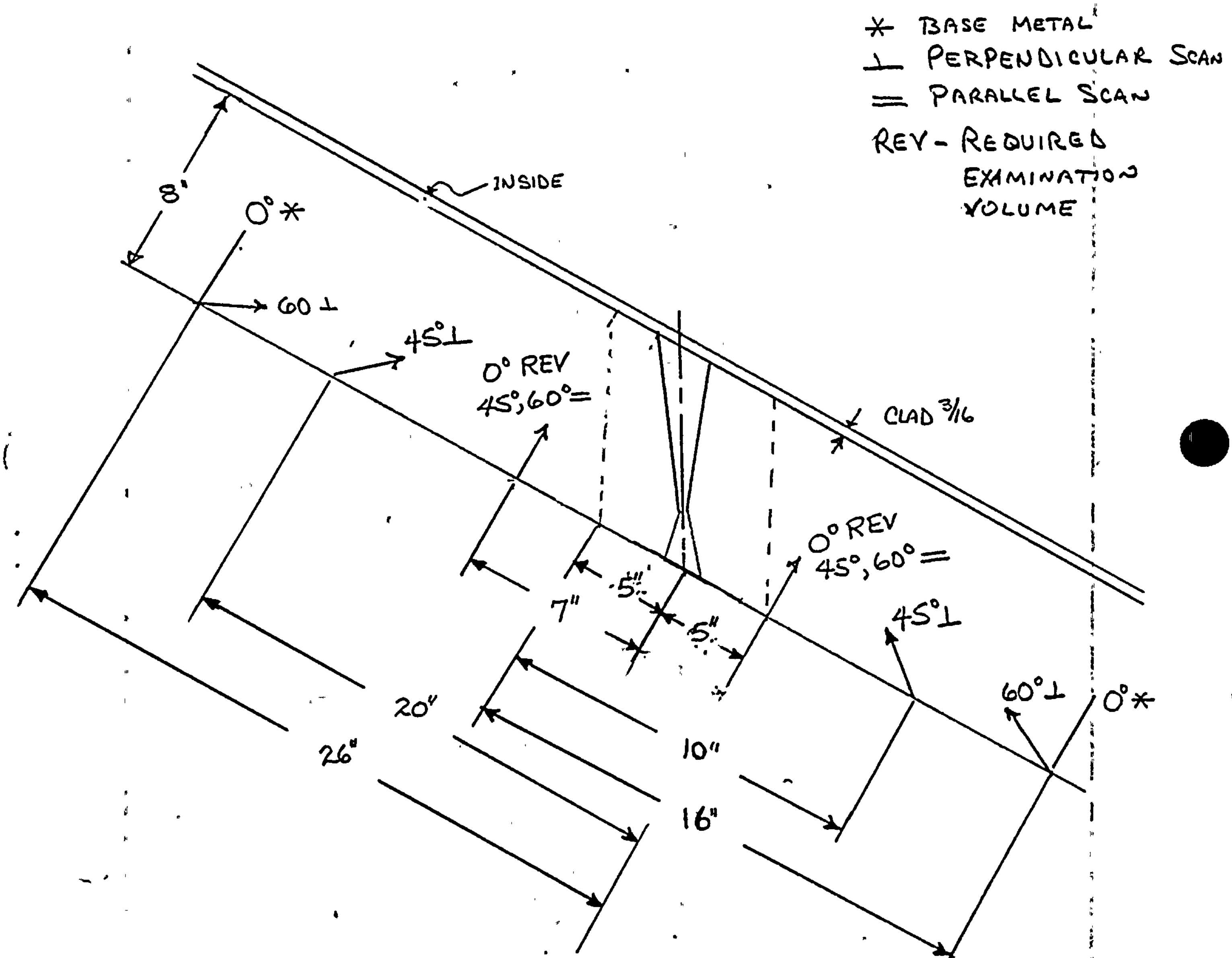
BOTTOM HEAD RADIAL PLs TO DOLLAR PLs

FIG 20 A

TFH
1/29/81

REF. DWG. CB&I #3153-17 DET. 1

CAL BLOCK UT-117 8"



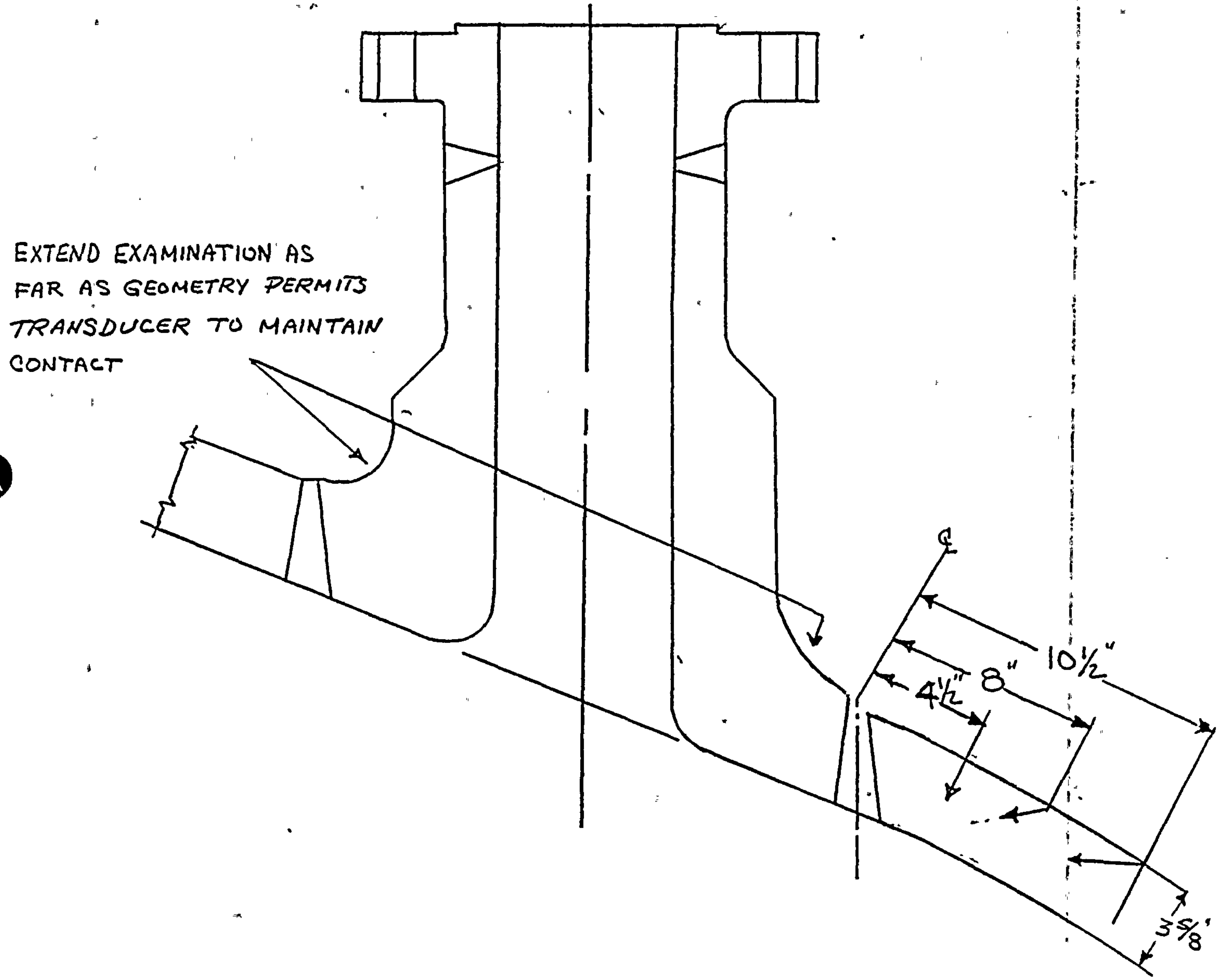
ULTRASONIC EXAMINATION OF
BOTTOM HEAD DOLLAR PLs TOGETHER

FIG 20B

TF
1/29/81

REF DWG: CB&I #3133-78 - N7
" -80 - N8
" -102 - N18

CAL. BLOCK UT-115 3 5/8"



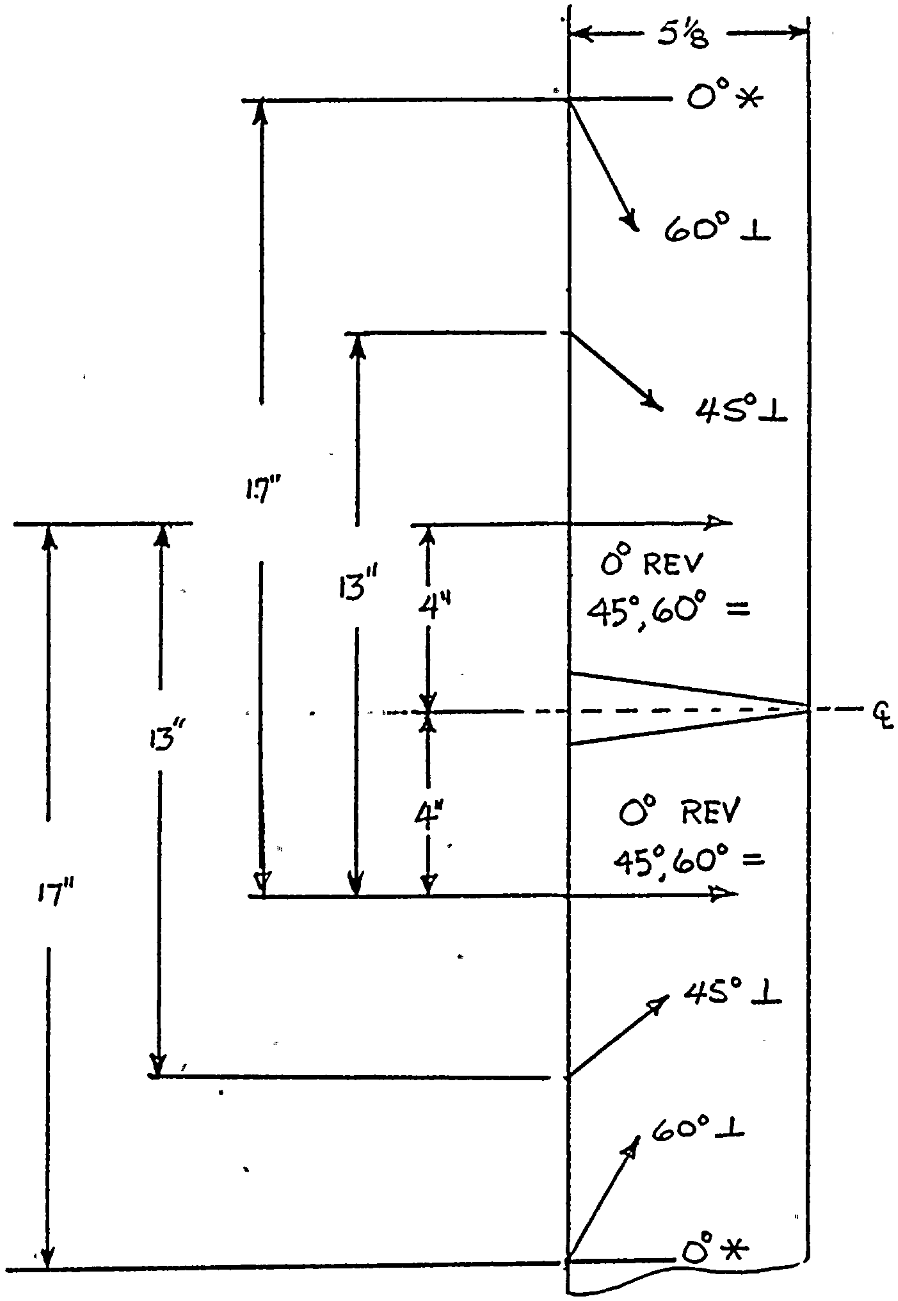
ULTRASONIC EXAMINATION OF
NOZZLE TO TOP HEAD WELDS N-7,8,18

FIG 20C

TFH
1/29/81

REF. DWG. # 3133-17 DET. 6

CAL BLOCK : UT-116 - 5⅛"



ULTRASONIC EXAMINATION OF
TOP HEAD RADIAL ℄s TOGETHER

FIG 20D

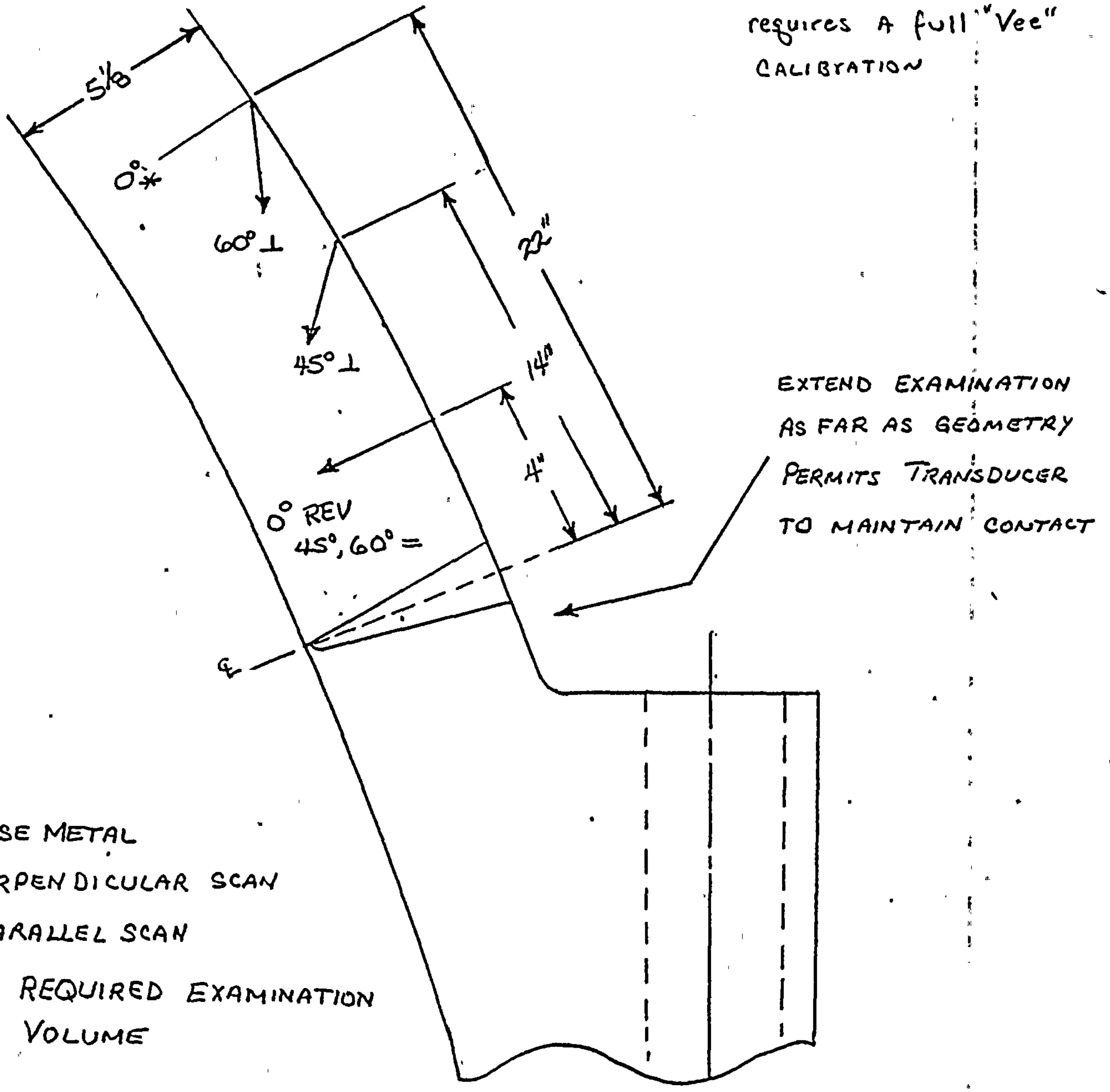
TFH
1/29/81

REF. DWG: CB&I #3313-17 DET. 5

CAL BLOCK: UT-116 - 5⅛"

IMPORTANT

NOTE: THIS SCANNING requires a full "Vee" CALIBRATION



* BASE METAL

⊥ PERPENDICULAR SCAN

= PARALLEL SCAN

REV - REQUIRED EXAMINATION VOLUME

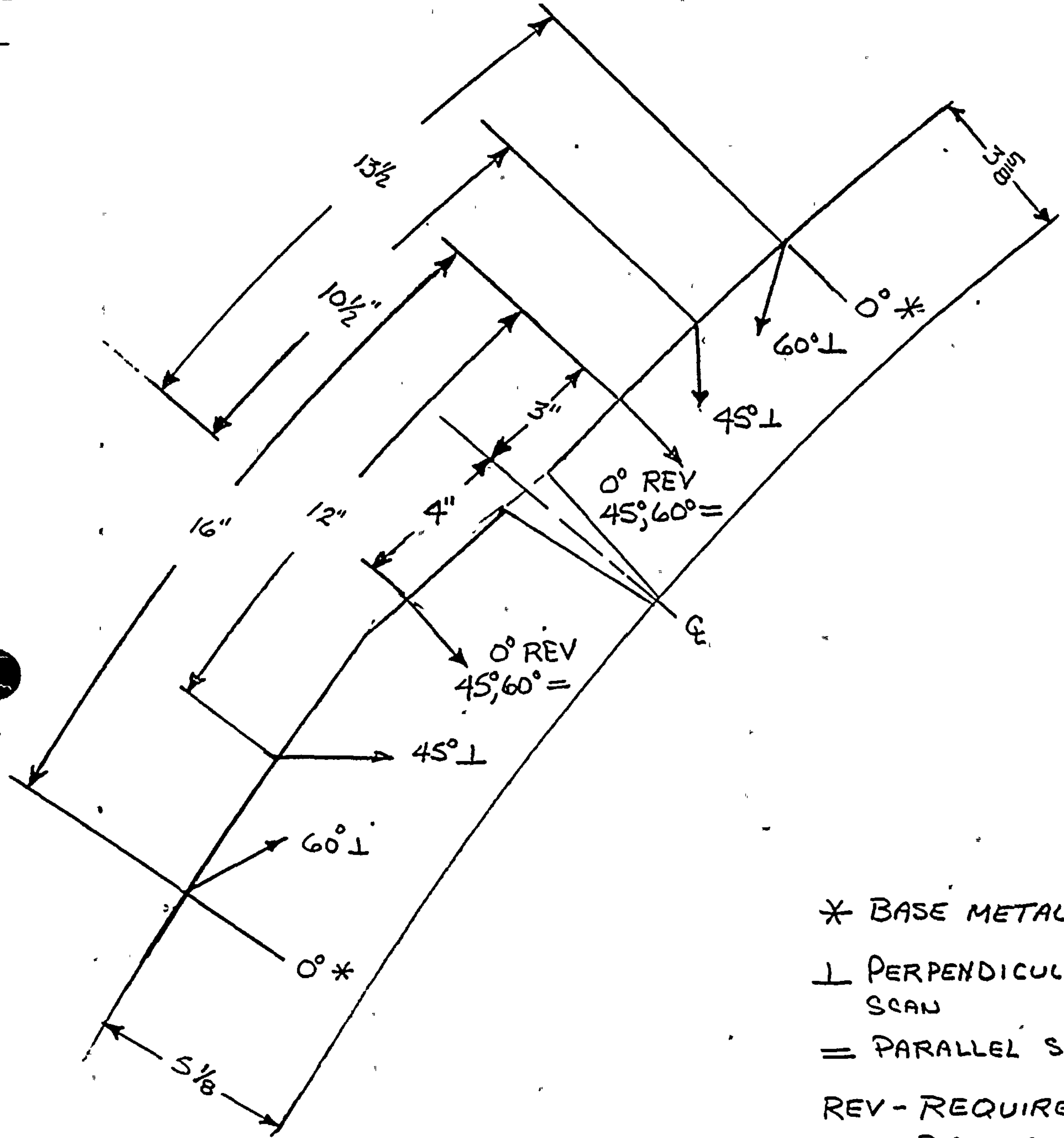
ULTRASONIC EXAMINATION OF HEAD TO FLANGE WELD

FIG. 20E

TFH
1/29/81

RÉF. DWG. #3133-17 DET. 7

CAL BLOCK UT-115 3 5/8"
UT-116 5 1/8"



* BASE METAL

⊥ PERPENDICULAR SCAN

= PARALLEL SCAN

REV - REQUIRED EXAMINATION VOLUME

ULTRASONIC EXAMINATION OF
TOP HEAD RADIAL ℄ TO DOLLAR ℄

FIG F

TFB
1/29/81

MANUAL ULTRASONIC EXAMINATION OF REACTOR VESSEL AND HEAD CURCUMFERENTIAL AND LONGITUDINAL BUTT WELDS

Procedure No. UTP-30

Revision No. 2

January 27, 1981

Lambert • MacGill • Thomas, Inc.
Testing • Engineering • Service • Training
771 East Brokaw Road
San Jose,Ca. 95112
408-297-8766

TITLE: MANUAL ULTRASONIC EXAMINATION OF REACTOR VESSEL AND HEAD BUTT WELDS

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, for manual straight beam and angle beam contact ultrasonic examination of full penetration and adjacent base metal.

B. Scope

1. The procedure is applicable to straight and angle beam examinations performed on reactor vessel shell and head circumferential and longitudinal welds. This procedure is limited to vessels having nominal wall thickness greater than 2.5 inches, and examinations performed from the outside surface.

2. Volumetric examinations shall be performed using ultrasonic angle and straight beam techniques, as follows:

a) Base metal through which sound will pass shall receive a 0° longitudinal beam examination to

QUALIFICATION:

Approved for use J R Lambert 1/27/81 Level III
DB MacGill Level III 1-29-81

I. B. 2. a) detect reflectors which may interfere with the angle beam examinations;

b) All welds and one-half t of the base metal beyond each edge of the weld shall receive a 45° and 60° angle beam examination, and a 0° straight beam examination;

c) Other angles may be used where wall thickness or geometric configuration impedes effective use of 45° and 60° angle beam examination.

II. <u>REFERENCES</u>

A. This procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 1974 edition, and all addenda through Summer 1975.

2. American Society for Nondestructive Testing;

a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification in Nondestructive Testing."

3. a) LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

b) LMT Operating and Quality Assurance Manual, Revision 12, approved for the WNP-2 Preservice Inspection by WPPSS.

III. DEFINITIONS

t = Weld thickness

T = Calibration block thickness

β = Sonic beam angle in metal

a = Discontinuity dimension normal to the surface

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc. is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a successful calibration.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. As a minimum, examination teams shall consist of one Level II examiner and One Level I examiner, or one

VI. B. Level II examiner and one NDE Trainee as defined in LMT Procedure QA-6.

C. Personnel shall be qualified and certified according to the requirements of ASME Section XI, SNT-TC-1A, and LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. <u>EQUIPMENT AND MATERIAL REQUIREMENTS</u>

A. Ultrasonic testers shall be of the pulse echo type. Instruments shall have an amplitude display linear within 5% of calibrated screen height over 80% of that height; and an attenuator, stepped in increments of 2 dB or less, which is accurate over the range of the test to ±20% of nominal value. Instruments shall have had their internal alignment and calibration verified within 90 days of any implementation of this procedure.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

B. Connecting cables shall be coaxial, and their length limited to less than that at which significant signal degradation (2 dB) occurs, but shall not exceed 200 feet.

C. Electronic recording equipment shall be electronically aligned within 180 days of use.

VII. C. 1. A record of calibration shall be available at the jobsite for WPPSS audit.

D. Search units shall be certified by the manufacturer as to essential properties, including bandwidth, damping, center frequency within 10% of nominal, and relative gain.

1. A record of search unit properties shall be available at the jobsite for WPPSS audit.

2. The angle beam search unit wedges shall be checked prior to each day's use to determine actual beam angle in metal when checked on a standard reference block, such as an IIW or DSC. The actual beam angle shall be recorded and shall be 45° ±2°, or 60° ±3° to be acceptable for initial or further use. Other beam angles shall be within ±3° of their nominal value.

3. The results of examinations performed with angle beam search units which meet the above requirements are acceptable provided the search unit beam angle on subsequent checking is within ±3° of the nominal angle. Should this tolerance not be met on subsequent checking, determination of the need for re-examination shall be made and the basis for the decision documented.

VII. D. 4. Search units shall be selected according to Table 1. Additional search units may be used for evaluation or in unusual circumstances; however, such use shall be documented by an approved Field Change to this procedure as per LMT, Inc. Quality Assurance Procedure QA-6, "Procedure Generation and Control."

Material	L-Wave Exam		Angle Beam Exam		
Thickness	Size	Frequency	Size	Frequency	Angle
Over 2.5"	.5" to 1"	2 to 2-1/4 MHz	.5"x1" to 1.5"x1.5"	1 MHz to 2-1/4 MHz	45° and 60°

Table 1

E. Couplant materials shall be as low as practicable in sulfur and halogen content. Certification shall be provided on a batch number basis for each brand name of couplant. Analysis for halogens and sulfur shall be made according to ASTM D-129-64 and ASTM D-808-63.

1. Residual halogens and sulfur shall not exceed 1% by weight.
2. Certification, by batch number, for each batch of couplant used, shall be maintained on file at the jobsite for WPPSS audit.

F. Calibration blocks shall be WPPSS Calibration Blocks UT-115, UT-116, UT-117, UT-118, UT-119, UT-120 and UT-121, as applicable. These blocks are shown in Figures 1 through 7.

VII. F. 1. The identity of the calibration block shall be recorded on each calibration and examination record.

VIII. PREPARATION

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before beginning any examination program:

   a) Procedure and Qualification
   b) Calibration Sheets
   c) Inspection Reports
   d) Material and Equipment Certifications
   e) Personnel Certifications
   f) NRC Form 4 (Operating Nuclear Plants Only)
   g) NRC Form 5 (Operating Nuclear Plants Only)
   h) Status Indicators (Hold Tags)
   i) Radiation Work Permits (when applicable)

B. Physical

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

   a) Insulation removal

VIII. B. 1. b) OSHA requirements (ladders, lighting, fresh air)

c) Cleanup requirements)

d) Safety precautions (other work in area, etc.)

C. Surface Preparation

1. Responsibility

It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

2. Surfaces shall be sufficiently smooth and clean so that a meaningful examination may be performed.

3. Welds shall be identified and all required marking procedures completed before performing any examinations.

IX. LIMITATIONS

A. This procedure is based on ASME nuclear requirements; it may not be applicable to military, API, or AWS requirements without modification.

B. The procedure is limited to ferritic steels greater than 2-1/4 inches in thickness.

X. CALIBRATION

A. Test calibration is performed on a complete system. Any change in the ultrasonic equipment, cable, or transducer requires test recalibration. A change in qualified per-

X. A. sonnel, recording istrumentation, or recorder connection cable requires a calibration check; however, instrument alignment verification need not be made with the transducer used for testing.

B. Instrument alignment verification for screen height and amplitude control linearity shall be performed daily before any examinations are performed.

1. Instrument Linearity Verification

a) Position the search unit on a calibration block to obtain two echoes with a 2:1 amplitude ratio.

b) Set the larger echo to 80% of calibrated screen height.

c) Vary the amplitude of the larger echo from 100% to 20% of calibrated screen height in 10% increments.

d) Note that at each increment the smaller echo remains one-half the larger within a tolerance band of ±5% of full screen height.

e) Record successful performance of the verification on a Calibration Report form (Figure 8).

2. Attenuator Linearity Verification

a) Position the search unit to obtain an 80% of full scale echo on the calibrated screen.

b) Adjust the sensitivity control to decrease the system gain by 6 dB and 12 dB. Compare the

X. B. 2. b) response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

c) Position the search unit to obtain a 40% of full scale echo on the calibrated screen.

d) Adjust the sensitivity control to increase the system gain by 6 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full screen.

e) Position the search unit to obtain a 20% of full scale echo on the calibrated screen.

f) Adjust the sensitivity control to increase the system gain by 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

g) Record successful performance of the verification on a Calibration Report form (Figure.8).

Indication Set	Gain Change	Indication Tolerance Limits
80%	-6 dB	32% to 48%
80%	-12 dB	16% to 24%
40%	+6 dB	64% to 96%
20%	+12 dB	64% to 96%

Table 2

X. C. Straight Beam Examination Calibration

1. Calibration shall be performed on the basic calibration block appropriate for the weld and thickness to be examined (see the WNP-2 Preservice Inspection Program Plan and also Figures 1 through 7) whose temperature is within 25°F of that of the component to be examined.

2. Sweep Range Calibration

   a) Position the responses from the 1/4t and 3/4t side drilled calibration holes at the second and sixth screen divisions of the tester horizontal scale.

   b) If calibration is performed using a block whose thickness is not the same as that of the material being examined the responses should be positioned so that at least 1-1/4t of the material under examination is displayed on the tester screen.

3. Distance Amplitude Correction

   a) Position the transducer to obtain the maximum response from the side drilled hole giving the highest amplitude signal.

X. C. 3. a) (1) Set this response to 80% of full screen height. Mark the response point on the tester screen.

(2) Without further adjusting the gain, obtain and mark on the screen the responses from the other two staggered side drilled calibration holes.

b) Connect the responses from the holes with a smooth curve which shall terminate when the signal-to-noise ratio is less than four. This is the Primary Reference Response.

c) Obtain, record, and mark on the tester screen the response of the 1/8-inch side drilled hole in an IIW-2 block or the combination of the amplitude response of the No. 5 hole in a Rompas block and the last two responses from the curved surface range reference reflectors; i.e., at least one inch and four inches, or two inches and five inches. This step is optional at the examiner's discretion.

D. <u>Angle Beam Test Calibration</u>

1. Vertical beam spread measurements for each transducer are required at the beginning of the Preservice and each Inservice Inspection. These

X. D. 1. measurements shall be performed in accordance with LMT Procedure UTP-14.

2. Calibration shall be performed on the basic calibration block appropriate for the weld and thickness to be examined (see the WNP-2 Preservice Inspection Program Plan and also Figures 1 through 7) whose temperature is within 25°F of that of the component to be examined.

3. Sweep Range Calibration

   a) Position the responses from the 1/4t and the 3/4t side drilled calibration holes at the second and sixth screen divisions of the tester horizontal scale.

4. Distance Amplitude Correction

   a) Position the transducer to obtain the maximum response from the side drilled calibration hole giving the highest amplitude signal.

      (1) Set this response to 80% of full screen height. Mark the response point on the tester screen.

      (2) Without further adjusting the gain, obtain and mark on the screen the response from the other two in-line side drilled calibration holes.

X. D. 4. b) Connect the responses from the holes with a smooth curve which shall terminate when the signal-to-noise ratio is less than four. This is the Primary Reference Response.

c) If calibration is performed using a block whose thickness is not the same as that of the material being examined, as in tapered areas, the responses should be positioned so that at least 1/2 "Vee" path of the thicker section is displayed on the tester screen.

d) Without further adjusting the gain, position the transducer for maximum response from the planar reflectors (notch) on the near and far surface. Mark these responses on the tester screen at 0 and 8 sweep divisions, respectively.

e) Without further adjusting the gain, obtain, record, and mark on the tester screen the response in both near and far positions of the 1/8-inch side drilled hole in an IIW-2 block or the combination of the amplitude response of the No. 5 hole in a Rompas block and the last two responses from the curved surface range

X. D. 4. e) reflectors; i.e., at least one inch and four inches, or two inches and five inches, if used.

XI. PERFORMANCE

A. Calibration

1. Calibration shall be verified before and after each examination, with any change in test personnel, and at intervals not to exceed four hours.
2. With any change in test personnel, and at the begining and ending of each day's examinations, verification shall be made using the basic block responses. Before and after each examination, and at intervals not to exceed four hours, verification shall be made using the basic block responses or the verification block response, as per Paragraph X.D.4.e).
3. A response within 2 dB and 5% of the original vertical and horizontal screen values respectively shall be considered proof of calibration.
4. Any examination that has been performed in a non-calibrated condition shall be repeated.
5. Record the time(s) at which verification is performed on the Calibration Report form (Figure 8).

XI. B. Sensitivity

1. Scanning sensitivity shall be twice (2x) that of the Primary Reference Response.
2. Penetration of straight beam energy shall be verified by a back surface echo, where geometry permits.

C. Coverage (Refer to Scan Plan Drawings, Figures 9 through 20, and Reactor Figures 21 through 24)

1. Where practical, the weld and a zone at least t/2 on either side of the weld, measured from the edge of the weld, shall be examined by an angle beam at 45° and 60°, in both perpendicular and parallel directions.
2. The weld and the t/2 zones on either side of the weld shall be examined with a calibrated straight beam.
3. The material through which angle beams pass shall be scanned with a straight beam, maintaining a 50% to 80% back reflection amplitude, where geometry permits.
4. Overlap between parallel scans shall be nominally 15% and in no case shall be less than 10%.

D. Directions

1. Each angle beam scan perpendicular to the weld shall cover at least $t/2 + t(\tan\beta)$ inches on each side of

XI. D. 1. the weld. For a beam angle of 45° this distance is 1.5t and for 60° this distance is 2.25t.

2. Each angle beam scan parallel to the weld shall cover at least t/2 inches each side of the weld.

E. Scanning Speed

Scanning speed shall not exceed four inches per second.

F. Limitations

Physical or other limitations that prevent full compliance with the requirements of this procedure shall be recorded on the Examination Report form, Figure 25.

G. Automatic Alarms

Automatic alarms or recording may be used as an aid to the examiner.

XII. EVALUATION

A. Recordable Indications

1. Any indication that exceeds 20% of the reference level shall be recorded.
2. Any planar indication exceeding the amplitude of the calibration planar notch shall be recorded.
3. Clad interface and back wall reflections shall not be recorded.
4. The extent and location of laminar reflectors found by straight beam scanning (XI.C.3) that might interfere with angle beam examination shall be recorded.

XII. A. 4. Record all areas giving indications equal to or greater than the remaining back reflection.

B. Methods

1. Indication recording is based on the scheme of reference points as shown in Figure 26. Refer to WPPSS drawings RPV 101 and RPV 102 (Figures 23 and 24) for weld numbers, elevations, and angular orientation.

a) Depth data shall be obtained from successive scans perpendicular to the indication with a minimum 10% effective transducer width overlap, and data taken between the 20% DAC points.

b) Length data shall be taken between 20% DAC points.

c) Record the following data for each scan perpendicular to the indication:

(1) Maximum amplitude (% DAC) with corresponding range to the indication (inches) and search unit position; search unit direction.

(2) Twenty percent of DAC points with associated range.

(3) Length of reflector.

XII. C. <u>Evaluation Criteria</u>

1. Any indication exceeding 50% of the primary reference distance amplitude curve shall be evaluated by the examiner (as in XII.B.1 except at 50% DAC) to determine the extent, size, location and shape of the reflector. These parameters shall be included on the Notification of Reportable Indication form (Figure 27), and on the Ultrasonic Indication Data Tabulation (Figure 28).

D. <u>Acceptance Criteria</u>

Acceptance criteria contained in Paragraph IWB-3510 and IWB-3511 of ASME Section XI, 1974 edition, addenda through Summer 1975, are summarized in the tables drawn in Figures 29 and 30.

XIII. <u>RECORDS</u>

A A Report of Visual and Ultrasonic Examination (Figure 25) shall be prepared for each item examined, and shall be related to a Report of Ultrasonic Calibration (Figure 8).

B. Oscillograph chart records shall be made of all angle and calibrated straight beam examinations.

1. Chart records used in indication analysis shall utilize two channels, one corresponding to vertical deflection of the tester signal and the other to horizontal.

XIII. B. 1. a) These channels shall be calibrated to match the oscilloscope display. That is, an indication 90% of vertical amplitude appearing at five divisions on the tester screen should have a nine division deflection on one chart channel and a five division deflection on the other.

2. Chart records shall include pre and post test calibration checks made at the same scanning speed as the test.

3. Location and other pertinent information shall be manually noted on each chart.

    a) Pertinent information includes, but is not limited to, date, time, item, equipment, examiners, scans, gain, and recorder settings and speed.

C. <u>Recording Conventions</u>

Ultrasonic scans and the location of indications shall be recorded according to the conventions established by General Electric Procedure WIP-1, "Weld Identification and Marking Procedure", Revision 0, dated 3/12/74.

1. Each single or double penetration plate-to-plate weld has been marked with low stress stamps on both sides of the weld at a distance of 6, 6-1/2, and 7 inches from the edge of the original weld preparation. These marks will occur at 12-inch intervals along the weld. Refer to Figures 31 and 32.

XIII. C. 2. Each nozzle-to-shell weld shall have a minimum of one set of reference marks on the shell at each of the nozzle cardinal points. The reference marks, stamped with low stress stamps, are located 6, 6-1/2 and 7 inches from the edge of the original weld preparation in the plate only and shall be at intervals as shown in Figure 33. The orientation of top head nozzles is shown in Figure 34.

3. Nozzle-to-safe end and weld neck flange welds have reference marks, made with low stress stamps, on the outside of the nozzle forging at a standard distance of 6, 6-1/2 and 7 inches from the edge of the original weld preparation. These distances are measured along the surface with a flexible rule marking intervals corresponding to those used for nozzle-to-vessel welds having equivalent cutout diameters.

4. Vessel longitudinal and girth seams are marked according to the conventions established in Figure 35.

D. Other types of recording, such as event or alarm monitoring, may be used as an aid to the examiner where feasible.

XIV. A. <u>REVIEW</u>

Examination reports shall be subject to review by an assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the final LMT review, the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the Authorized Nuclear Inspector.

XV. <u>DOCUMENTATION STORAGE AND DISTRIBUTION</u>

A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Coordinator. Additional reports which may include examination documentation as reference material shall be generated from copies.

B. Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.

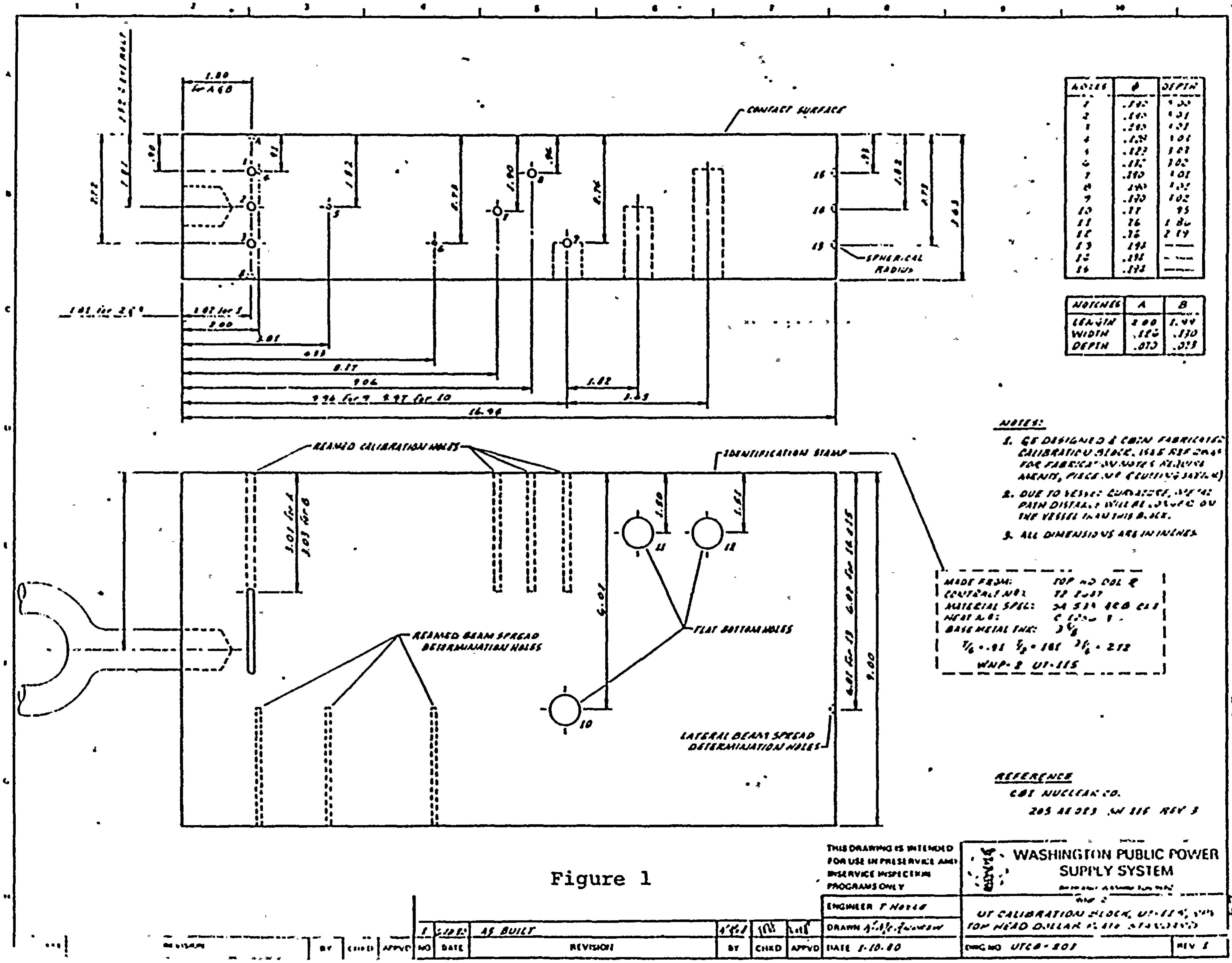

CONTACT SURFACE
SPHERICAL RADIUS
REAMED CALIBRATION HOLES
IDENTIFICATION STAMP
REAMED BEAM SPREAD DETERMINATION HOLES
FLAT BOTTOM HOLES
LATERAL BEAM SPREAD DETERMINATION HOLES
NOTCHES
LENGTH
WIDTH
DEPTH
NOTES:
3. ALL DIMENSIONS ARE IN INCHES
MADE FROM:
MATERIAL SPEC:
BASE METAL THK:
REFERENCE
THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
ENGINEER
DRAWN
DATE
AS BUILT
REVISION
BY
CHKD
APPVD
DWG NO
REV

Figure 1

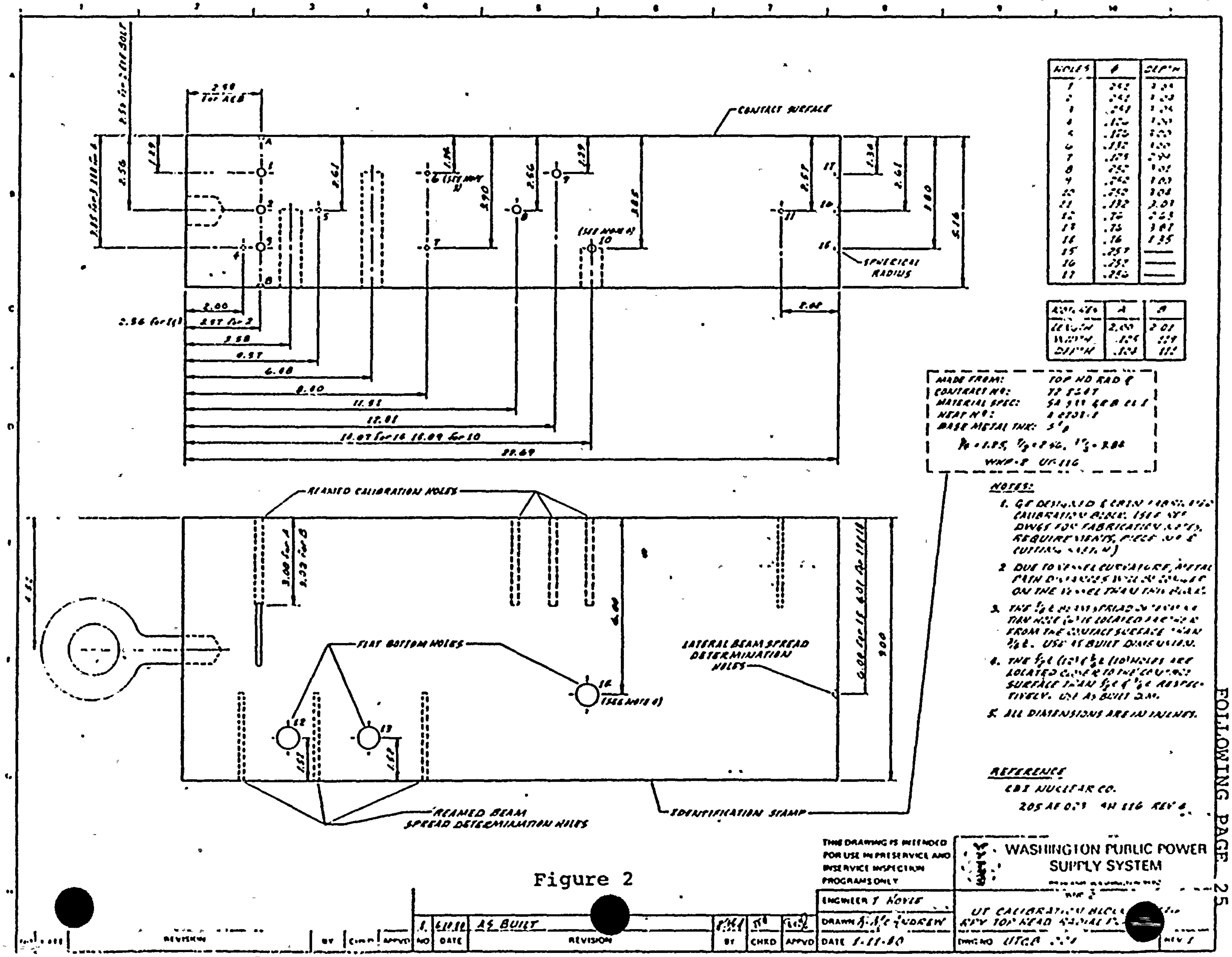

CONTACT SURFACE
SPHERICAL RADIUS
REAMED CALIBRATION HOLES
FLAT BOTTOM HOLES
LATERAL BEAM SPREAD DETERMINATION HOLES
REAMED BEAM SPREAD DETERMINATION HOLES
IDENTIFICATION STAMP
NOTES:
5. ALL DIMENSIONS ARE IN INCHES.
REFERENCE
THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
AS BUILT
REVISION
BY
CHKD
APPVD
DATE

Figure 2

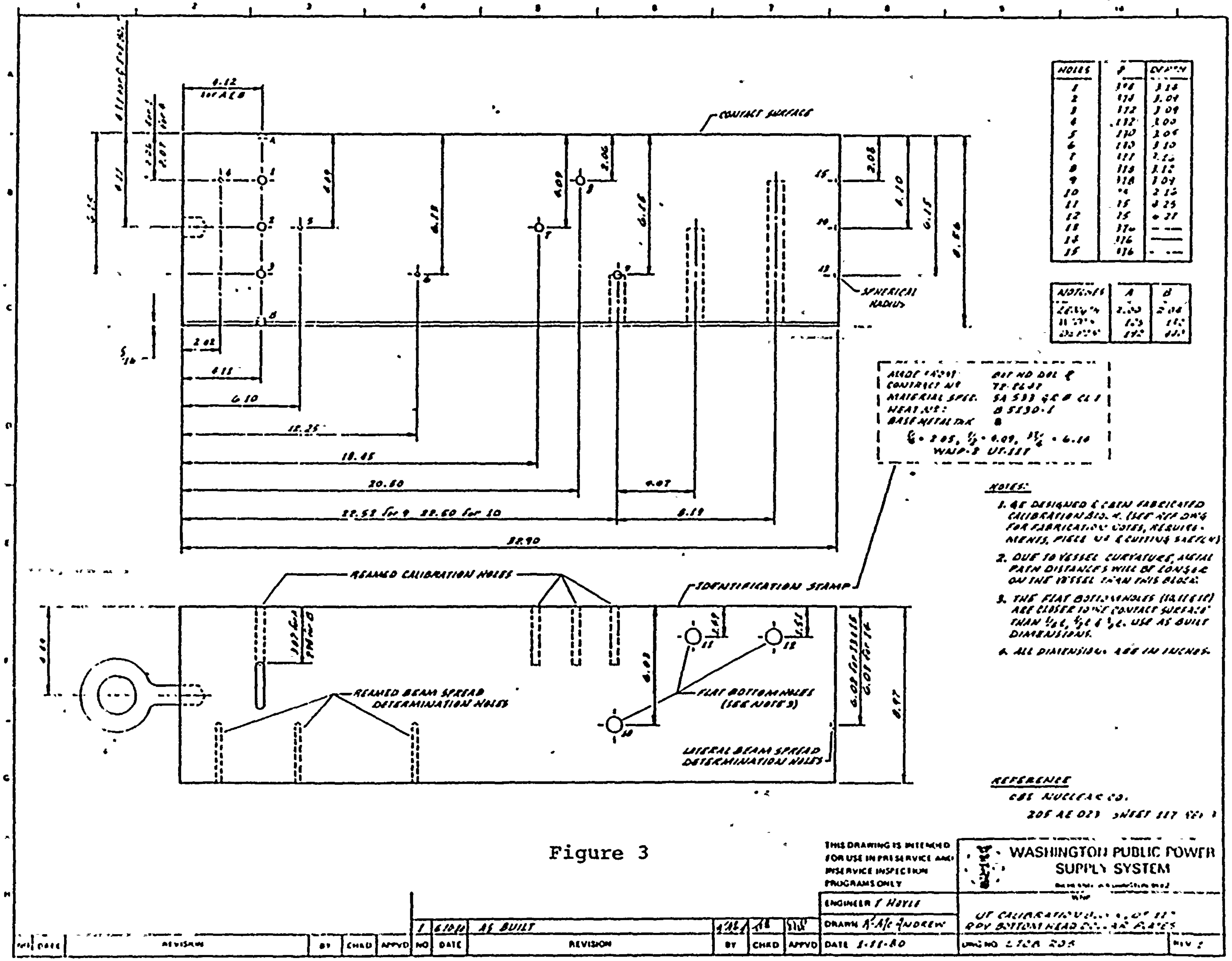
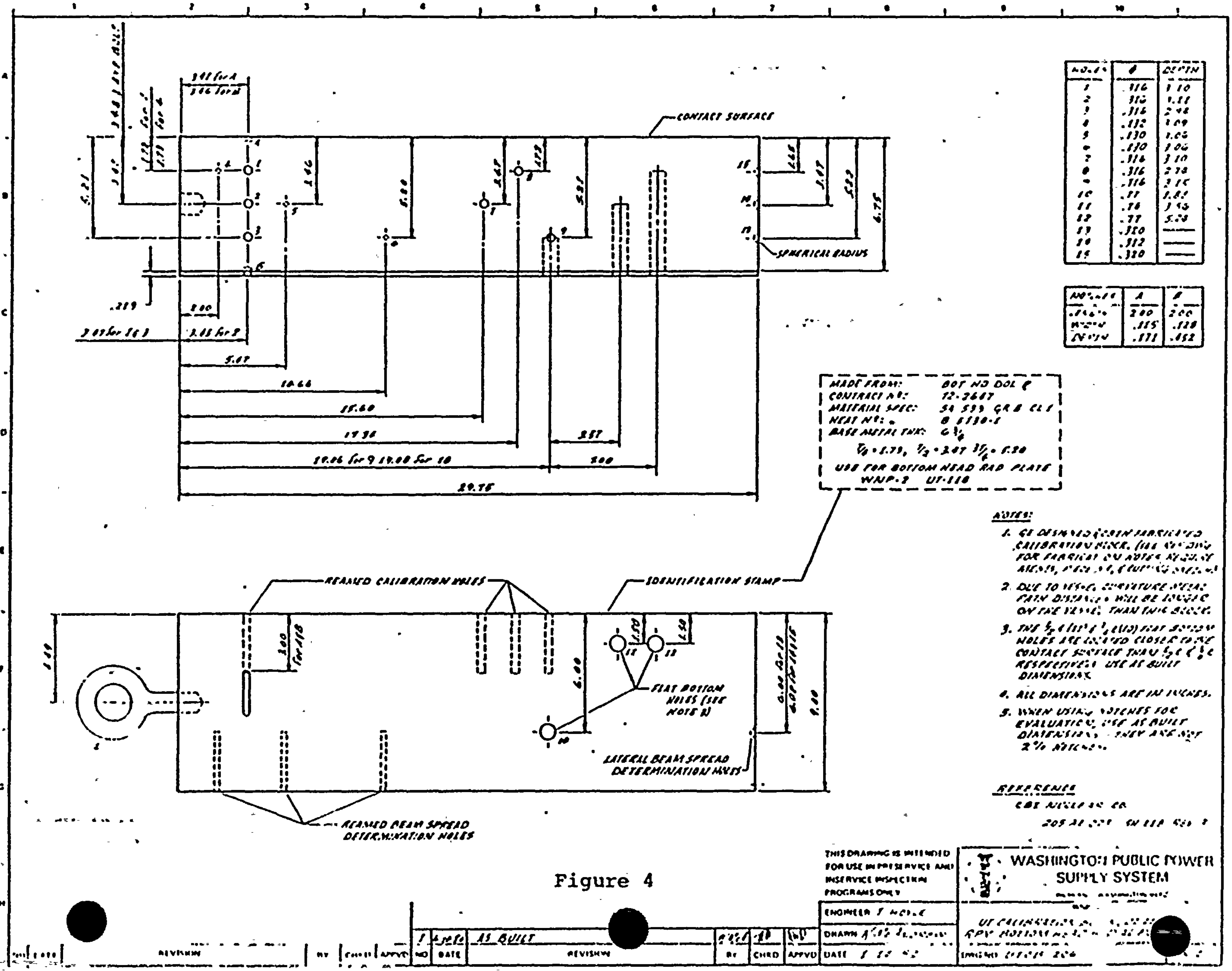

CONTACT SURFACE
SPHERICAL RADIUS
REAMED CALIBRATION HOLES
IDENTIFICATION STAMP
REAMED BEAM SPREAD DETERMINATION HOLES
FLAT BOTTOM HOLES (SEE NOTE 3)
LATERAL BEAM SPREAD DETERMINATION HOLES
NOTES:
4. ALL DIMENSIONS ARE IN INCHES.
REFERENCE
THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
AS BUILT
REVISION
ENGINEER
DRAWN
DATE

Figure 3


CONTACT SURFACE
SPHERICAL RADIUS
REAMED CALIBRATION HOLES
IDENTIFICATION STAMP
FLAT BOTTOM HOLES (SEE NOTE 3)
LATERAL BEAM SPREAD DETERMINATION HOLES
REAMED BEAM SPREAD DETERMINATION HOLES
NOTES:
4. ALL DIMENSIONS ARE IN INCHES.
REFERENCE
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AS BUILT
REVISION

Figure 4

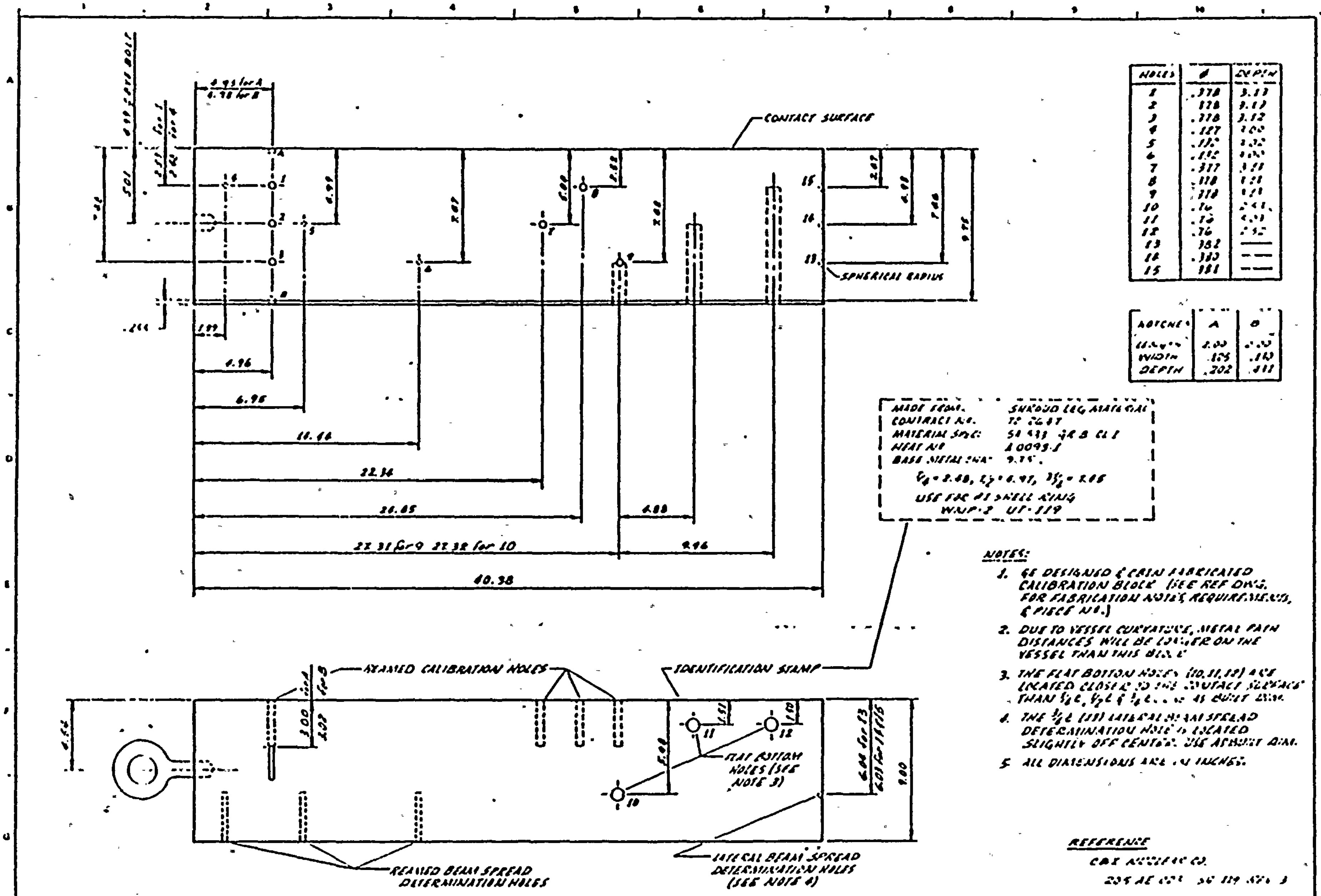

Figure 5

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVISION | BY | CHKD | APPVD | NO | DATE | REVISION | BY | CHKD | APPVD | DATE | DWG NO | REV

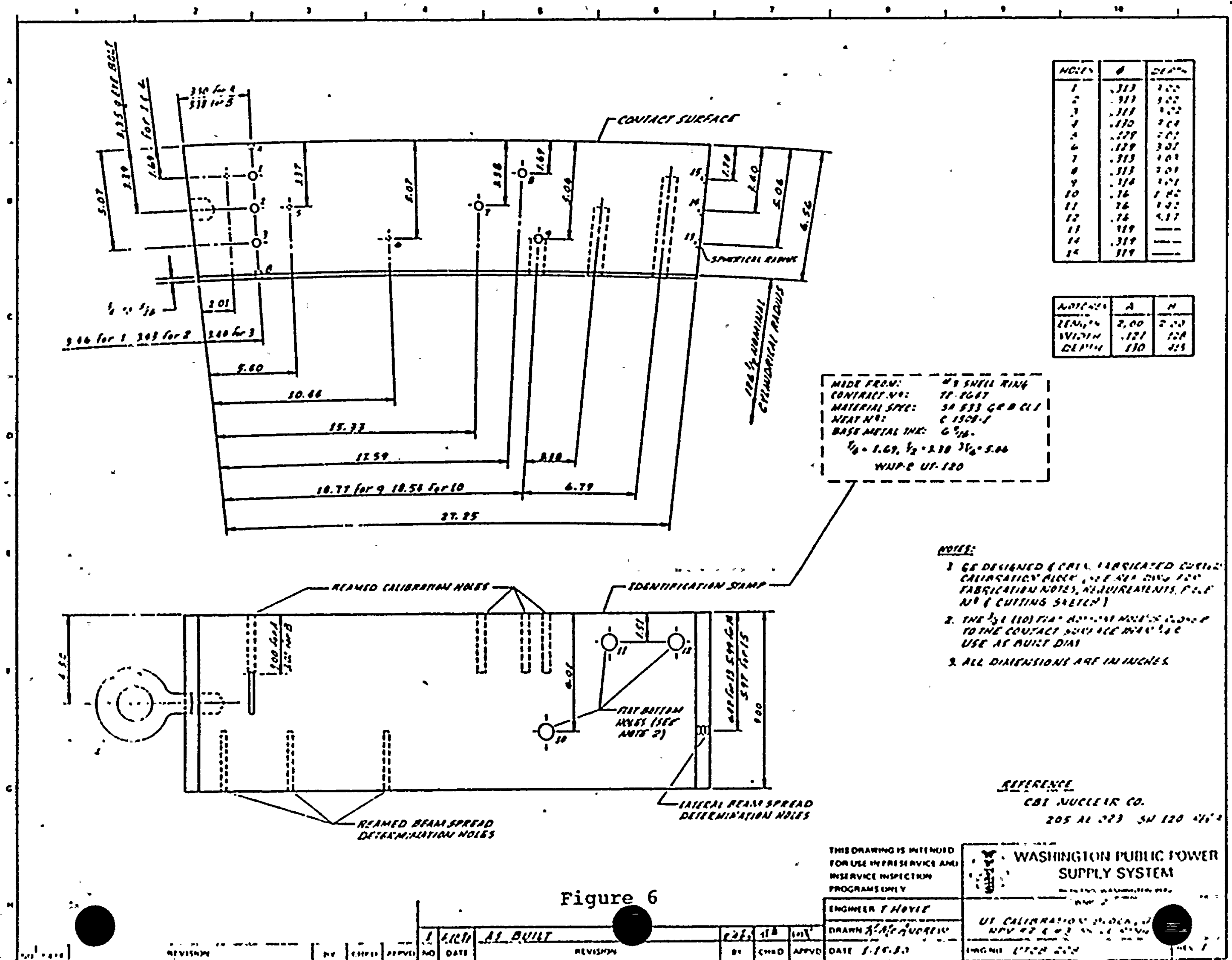
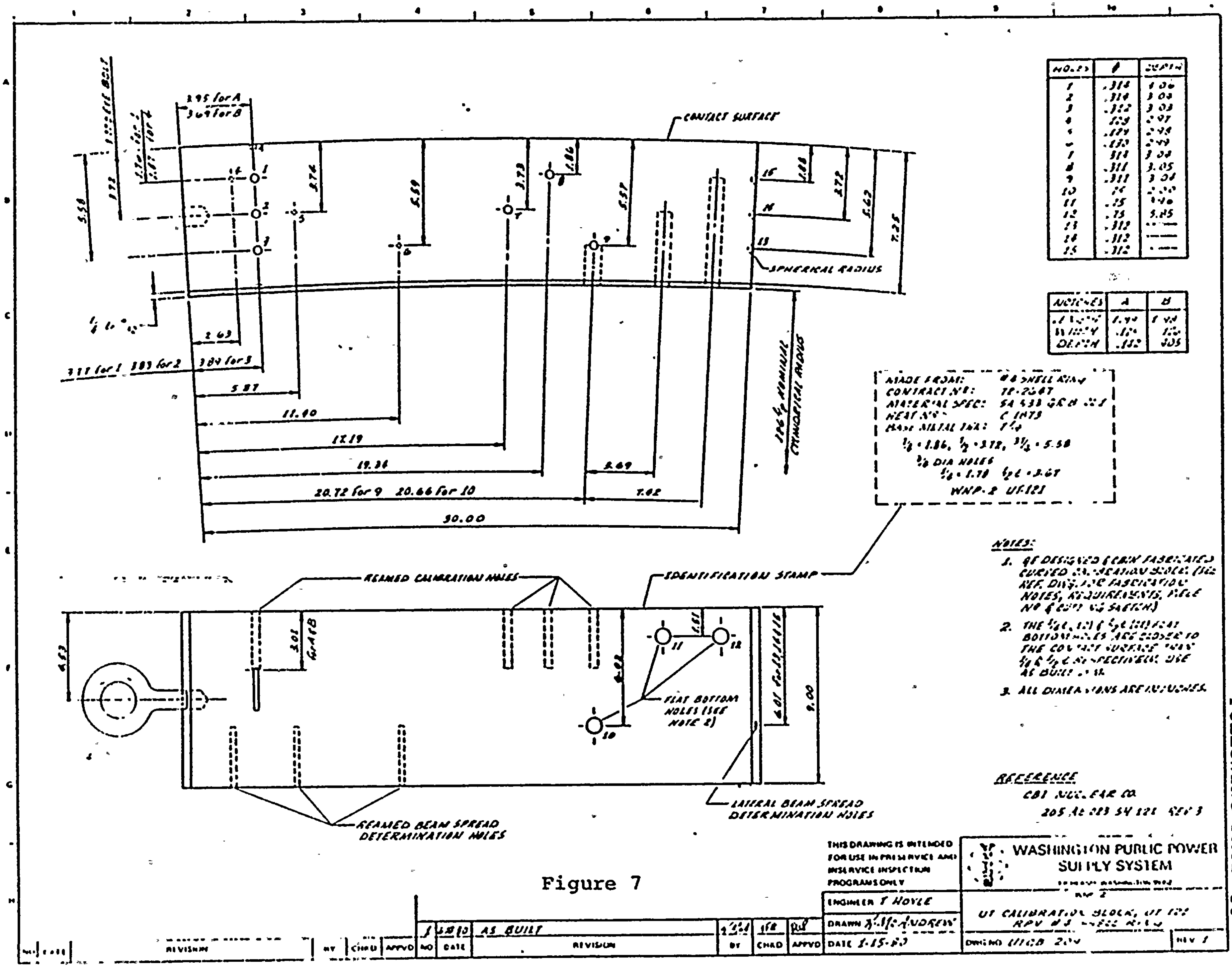

CONTACT SURFACE
SPHERICAL RADIUS
MADE FROM:
CONTRACT NO:
MATERIAL SPEC:
HEAT NO:
BASE METAL THK:
REAMED CALIBRATION HOLES
IDENTIFICATION STAMP
FLAT BOTTOM HOLES (SEE NOTE 2)
REAMED BEAM SPREAD DETERMINATION HOLES
LATERAL BEAM SPREAD DETERMINATION HOLES
NOTES:
3. ALL DIMENSIONS ARE IN INCHES
REFERENCE
CBI NUCLEAR CO.
THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
ENGINEER
DRAWN
DATE
AS BUILT
REVISION

Figure 6


CONTACT SURFACE
SPHERICAL RADIUS
30.00
REAMED CALIBRATION HOLES
IDENTIFICATION STAMP
FLAT BOTTOM HOLES (SEE NOTE 2)
REAMED BEAM SPREAD DETERMINATION HOLES
LATERAL BEAM SPREAD DETERMINATION HOLES
NOTES:
3. ALL DIMENSIONS ARE IN INCHES.
REFERENCE
CBI NUCLEAR CO.
WNP-2 UF-121
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WASHINGTON PUBLIC POWER SUPPLY SYSTEM
ENGINEER T HOYLE
AS BUILT
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Figure 7

WPS-UTC1 10/79

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ISO No. ____________
Cal. No. ______ Time ______
Job No. ____________
Date ____________
Page ______ of ______

REPORT OF ULTRASONIC CALIBRATION

SIGN

Examiner/Level __________ Examiner/Level __________ Review/Level __________
Authorized Inspector __________ Customer __________

EQUIPMENT

Instrument __________ S/N __________ ReCal Due __________ Cable __________
Recorder __________ S/N __________ ReCal Due __________
Recorder __________ S/N __________ ReCal Due __________

Vertical Linearity Check Check Completed __________

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2										

Signal 2 shall equal 50% of Signal 1 ±5% of full scale

Attenuator Linearity Check Check Completed __________

Tester Gain	Set	-6	-12	Set	+12	Set	+6
Signal Amp.	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
Actual Value							

Signal amplitude must fall within listed values

Transducers

S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______

PROC

Procedure __________ Rev. __________ Date __________

CALIBRATION

Cal. Block Type __________ S/N __________ Ref. Refl. __________ Temp. __________
Verification/Ref. Blk. __________ S/N __________ Ref. Refl. __________ Temp. __________

Instrument Settings			
Gain			
Sweep			
Delay			
Reject			
Damp.			

DAC

10
8
6
4
2
0
2 4 6 8 10

Cal. Check Time

Figure 8

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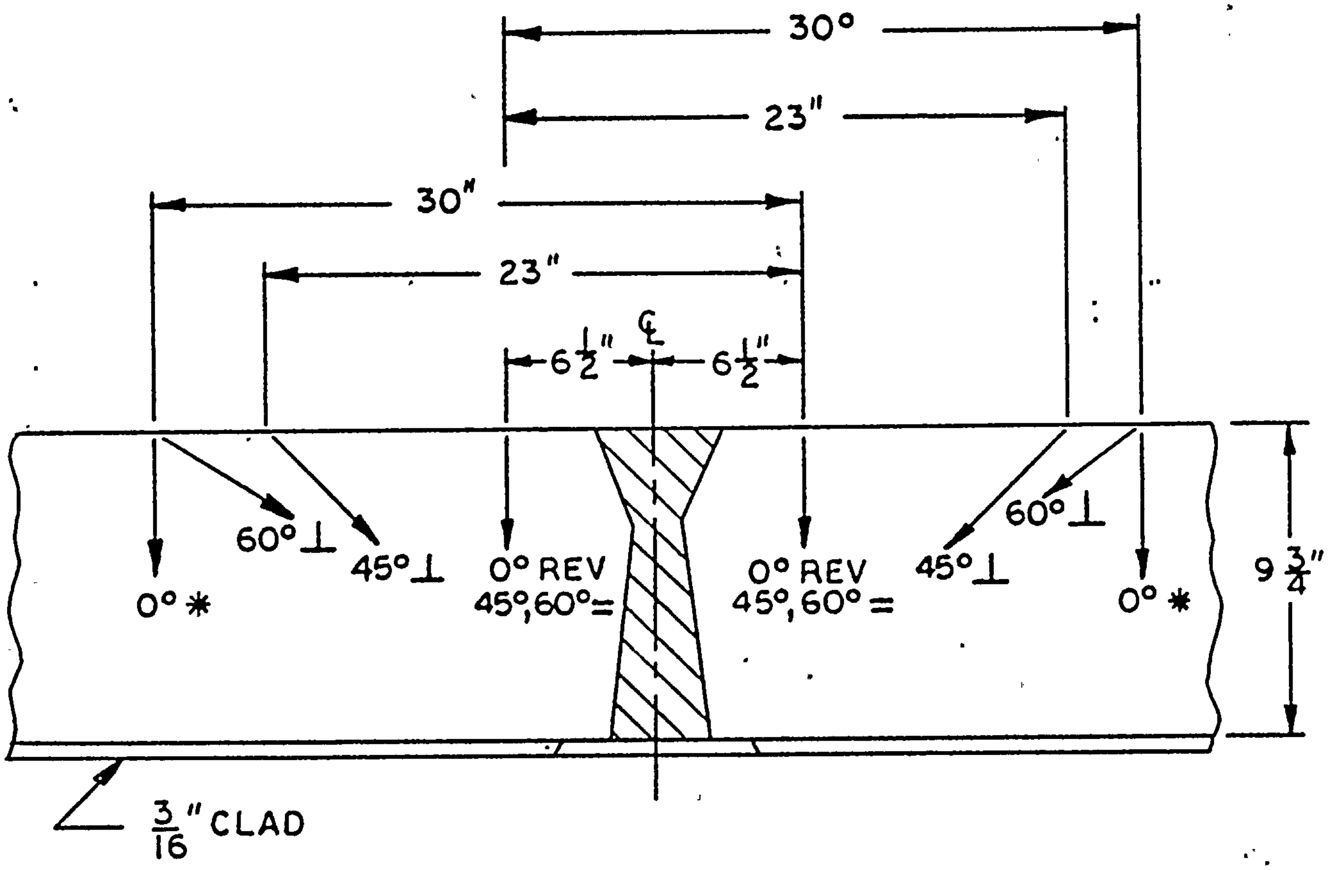
REF. DWG.: CB & I #3133-17, DET. 5
CAL. BLOCK: 119-9 $\frac{3}{4}$"



* BASE METAL

⊥ PERPENDICULAR SCAN

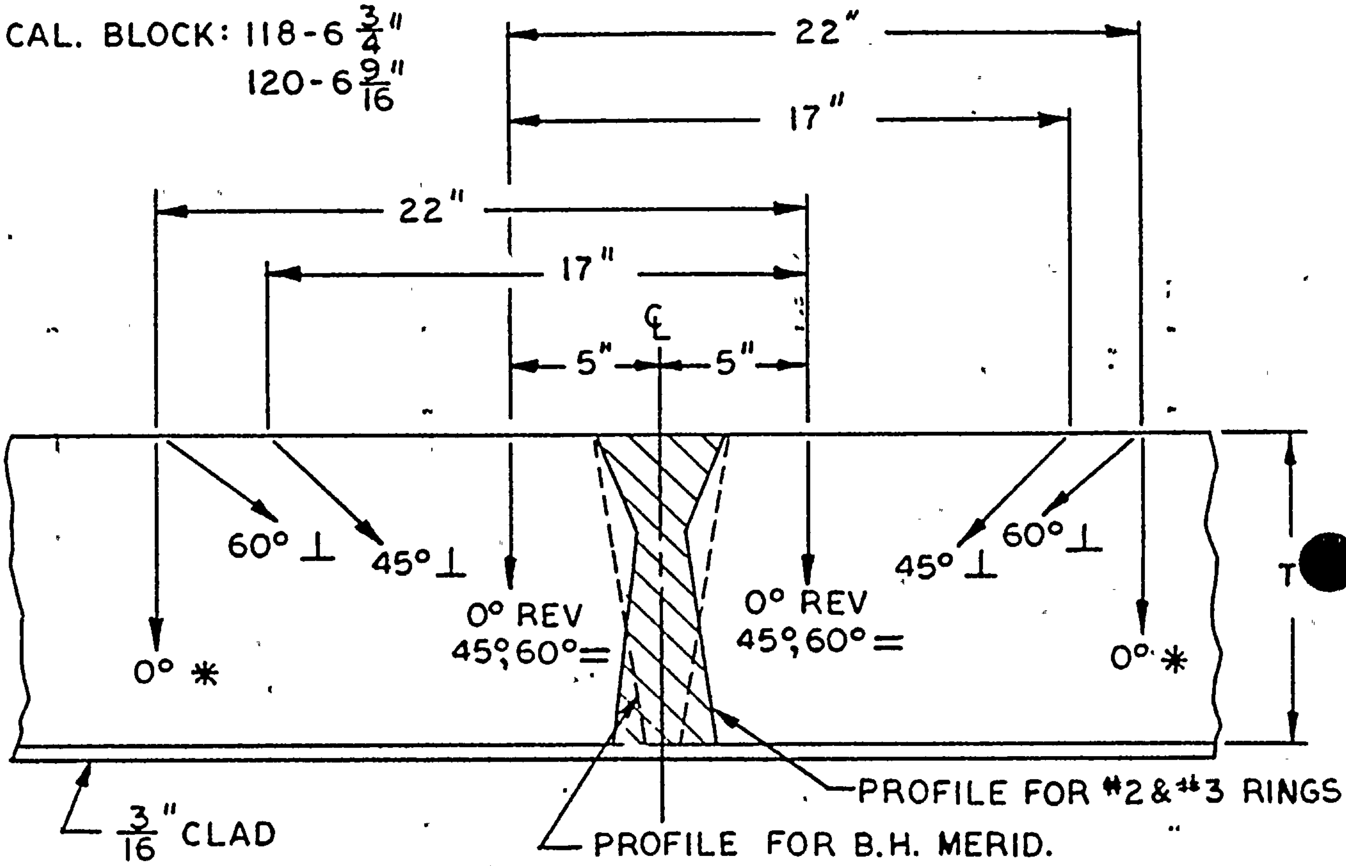
= PARALLEL SCAN

REV – REQUIRED EXAMINATION VOLUME
(WELD + $\frac{1}{2}$t EITHER SIDE)

ULTRASONIC EXAMINATION FOR
#1 SHELL RING LONGITUDINAL WELD
FIG. 9

REF. DWG: CB&I #3133-16, DET. 6 & 7
CB&I #3133-17, DET. 2

CAL. BLOCK: 118-6 3/4"
120-6 9/16"



✱ BASE METAL

⊥ PERPENDICULAR SCAN

= PARALLEL

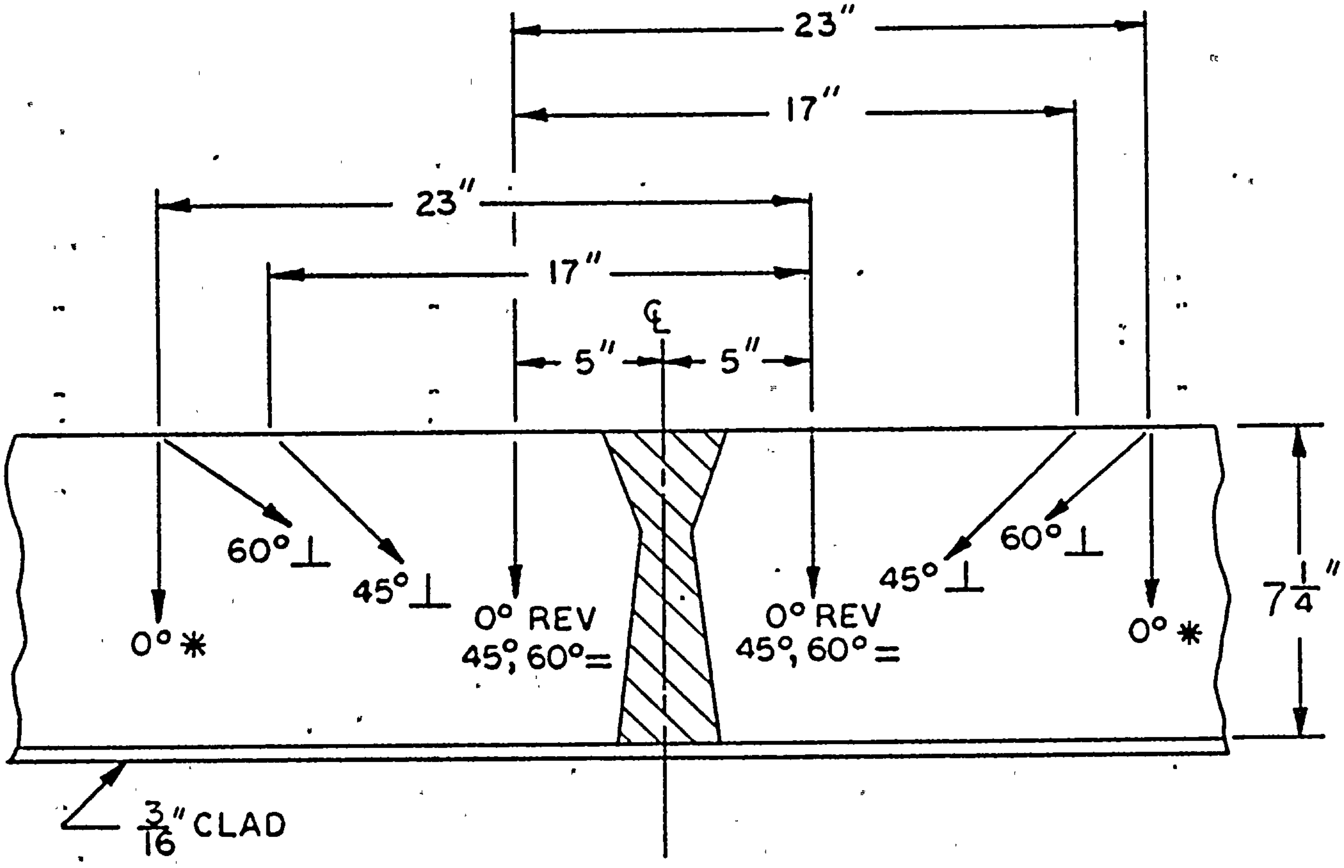
REV – REQUIRED EXAMINATION VOLUME

WELD DESCRIPTION	T	CAL BLOCK
#2 SHELL RING LONG.	6-7/16	120-6 9/16"
#3 SHELL RING LONG.	6-9/16	120-6 9/16"
BOTTOM HEAD MERIDIONAL	6-3/4	118-6 3/4"

ULTRASONIC EXAMINATION FOR #2 & #3 SHELL RING LONGITUDINAL WELDS AND BOTTOM HEAD MERIDIONAL WELDS

FIG. 10

REF. DWG.: CB&I #3133-16, DET. 8
CAL. BLOCK: 121 - 7 1/4"



✱ BASE METAL
⊥ PERPENDICULAR SCAN
= PARALLEL SCAN
REV - REQUIRED EXAMINATION VOLUME

ULTRASONIC EXAMINATION OF
#4 SHELL RING LONGITUDINAL WELD

FIG. 11

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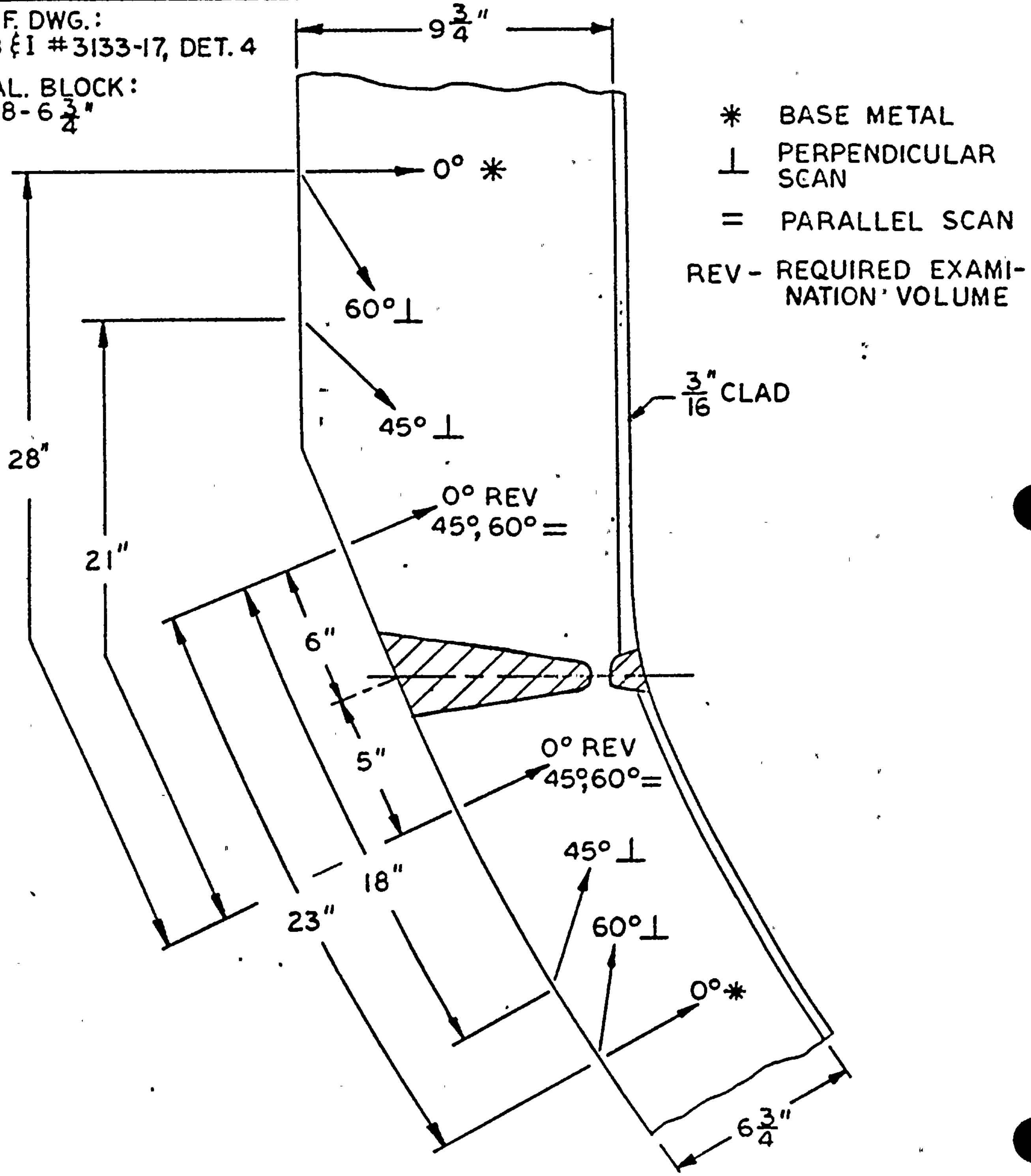
REF. DWG.:
CB&I #3133-17, DET. 4

CAL. BLOCK:
118-6 3/4"



ULTRASONIC INSPECTION OF BOTTOM HEAD TO #1 SHELL RING WELD

FIG. 12

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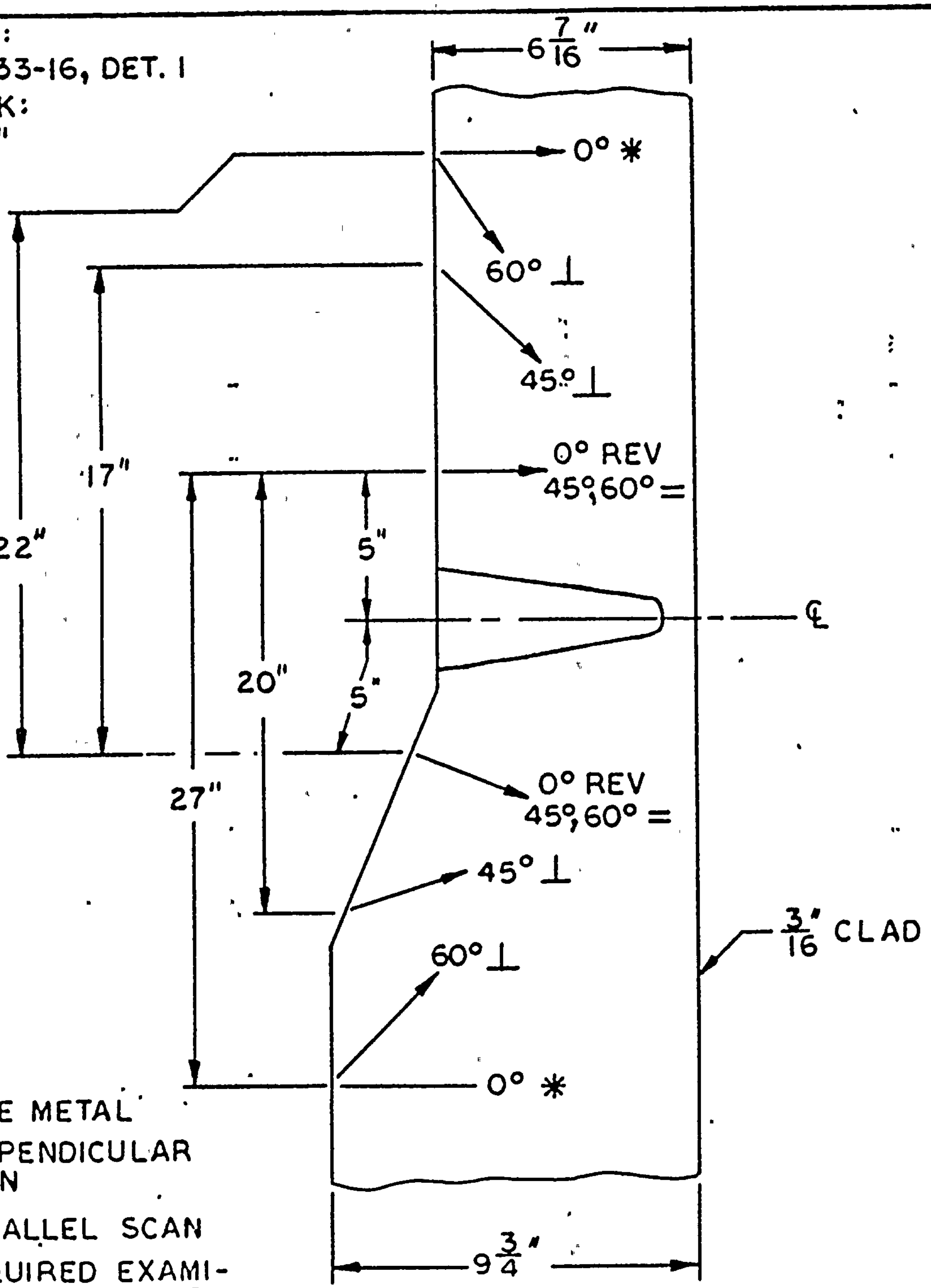
REF. DWG.:
CB&I #3133-16, DET. 1
CAL. BLOCK:
120 - 6 9/16"



* BASE METAL
⊥ PERPENDICULAR SCAN
= PARALLEL SCAN
REV - REQUIRED EXAMINATION VOLUME

ULTRASONIC EXAMINATION OF #1 TO #2 SHELL RING WELD

FIG. 13

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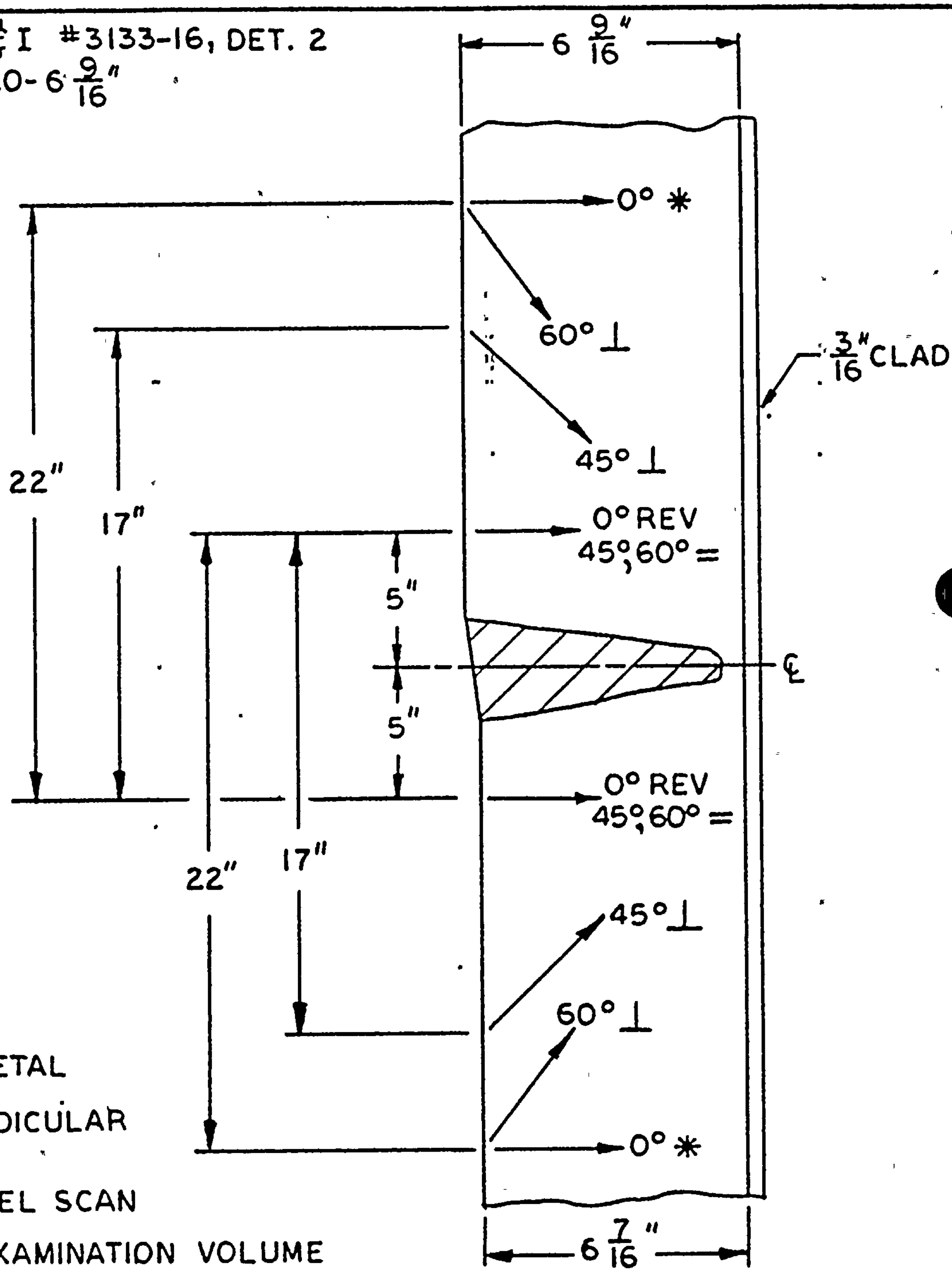
REF. DWG.: CB&I #3133-16, DET. 2
CAL. BLOCK: 120-6 9/16"



* BASE METAL

⊥ PERPENDICULAR SCAN

= PARALLEL SCAN

REV - REQ'D EXAMINATION VOLUME

ULTRASONIC EXAMINATION OF
#2 TO #3 SHELL RING WELD

FIG. 14

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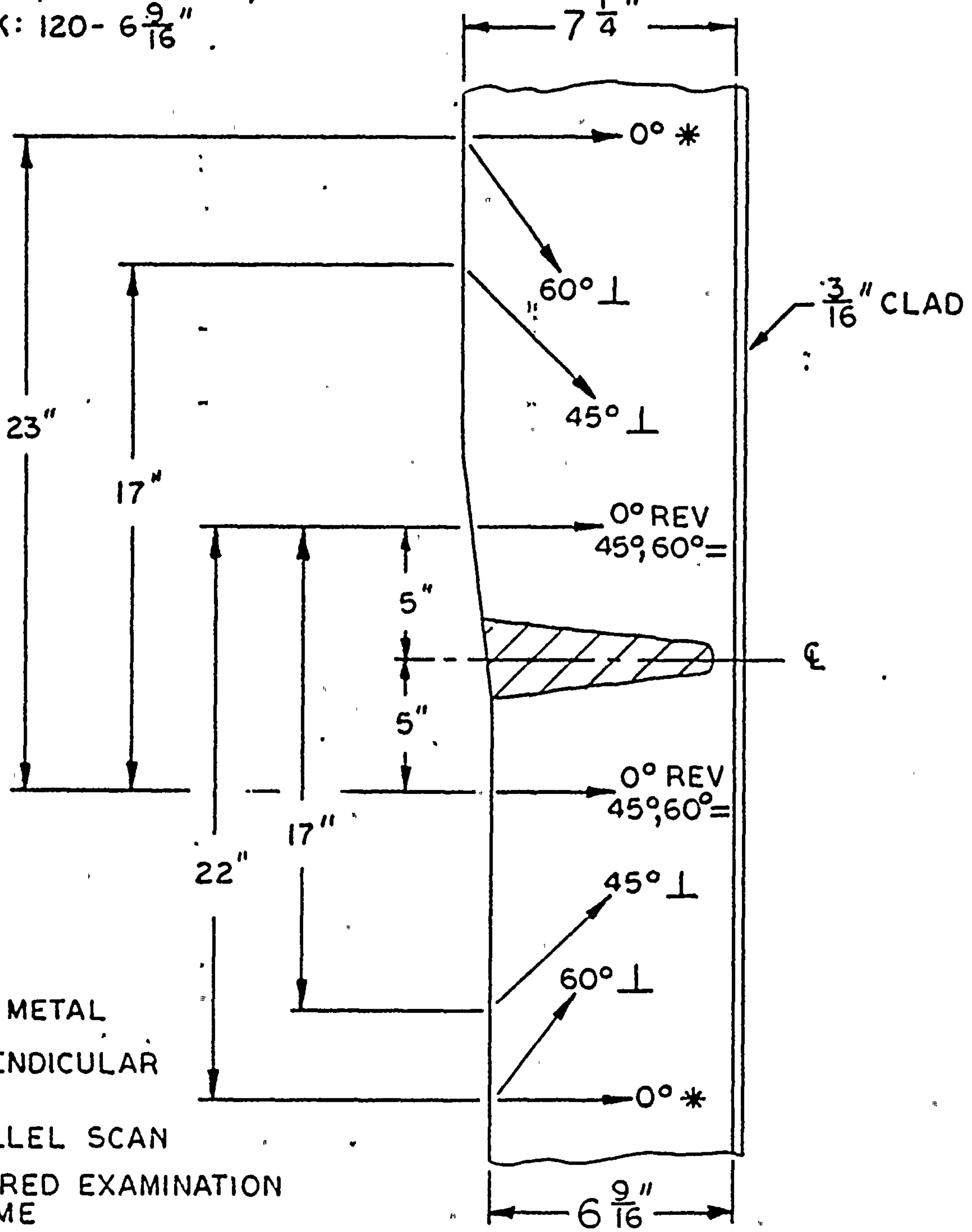
REF. DWG: CB&I #3133-16, DET. 3
CAL. BLOCK: 120- 6 9/16"



* BASE METAL
⊥ PERPENDICULAR SCAN
= PARALLEL SCAN
REV - REQUIRED EXAMINATION VOLUME

ULTRASONIC EXAMINATION OF
#3 TO #4 SHELL RING WELD

FIG. 15

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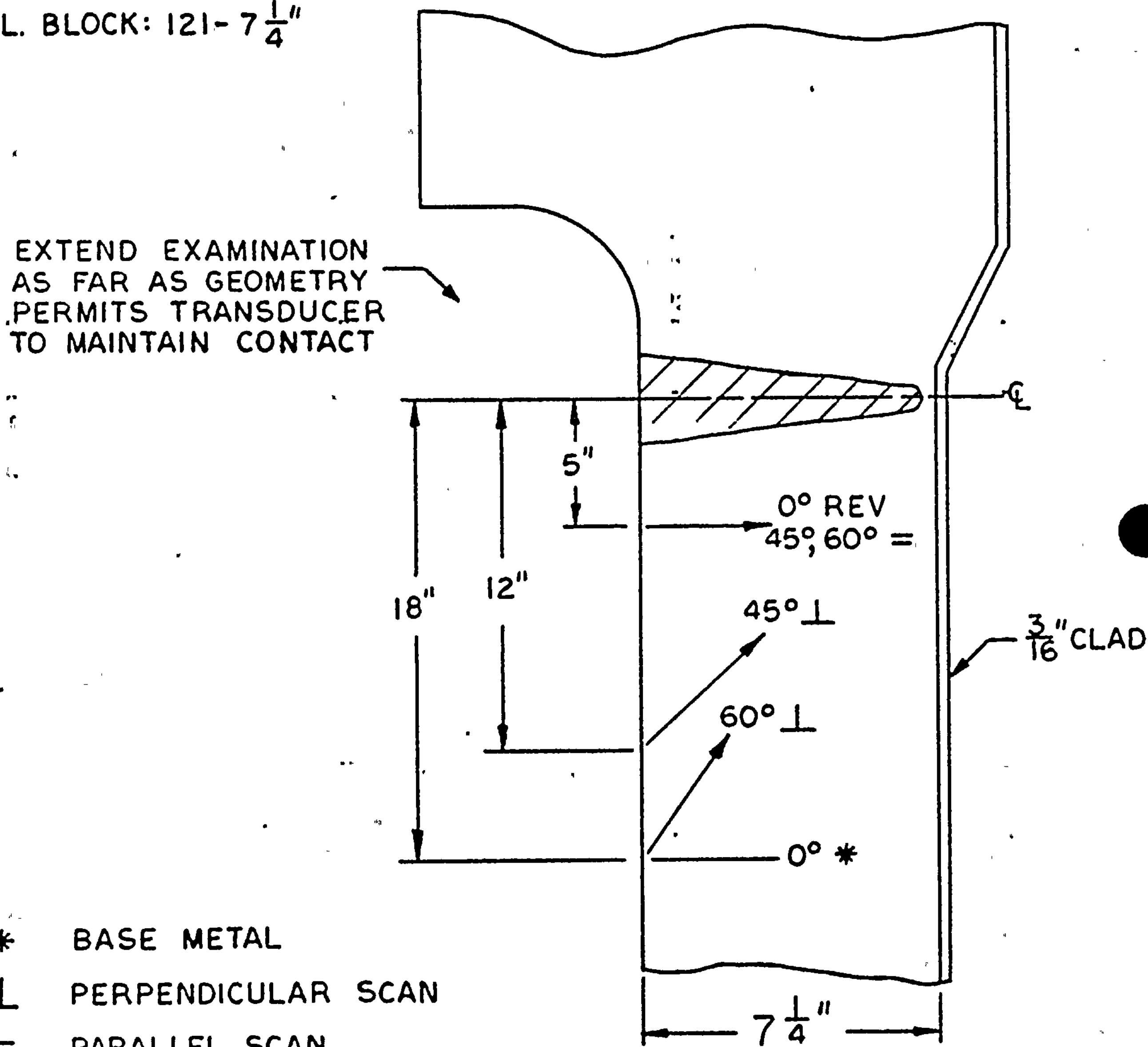
408-297-8766

REF. DWG.: CB&I #3133-16, DET. 4
CAL. BLOCK: 121-7 1/4"



* BASE METAL
⊥ PERPENDICULAR SCAN
= PARALLEL SCAN
REV - REQUIRED EXAMINATION VOLUME

ULTRASONIC EXAMINATION OF
#4 SHELL RING TO FLANGE WELD

FIG. 16

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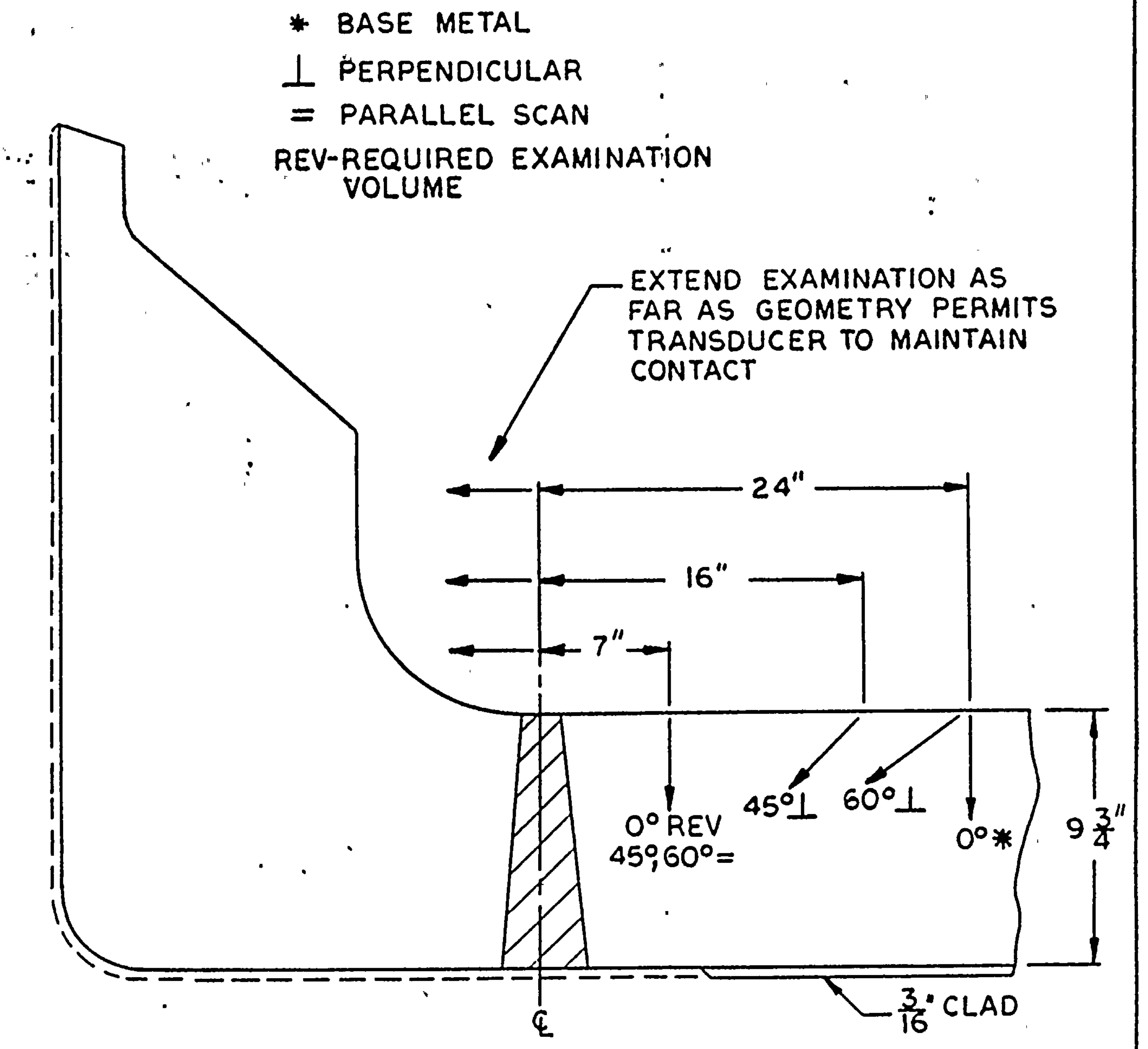
San Jose, Ca. 95112
408-297-8766

REF. DWG.: CB&I #3133-57-N1
-61-N2
-83-N9

CAL. BLOCK:
119 - 9 3/4"



ULTRASONIC EXAMINATION OF
NOZZLE TO #1 SHELL RING WELDS (N1, N2 & N9)

FIG. 17

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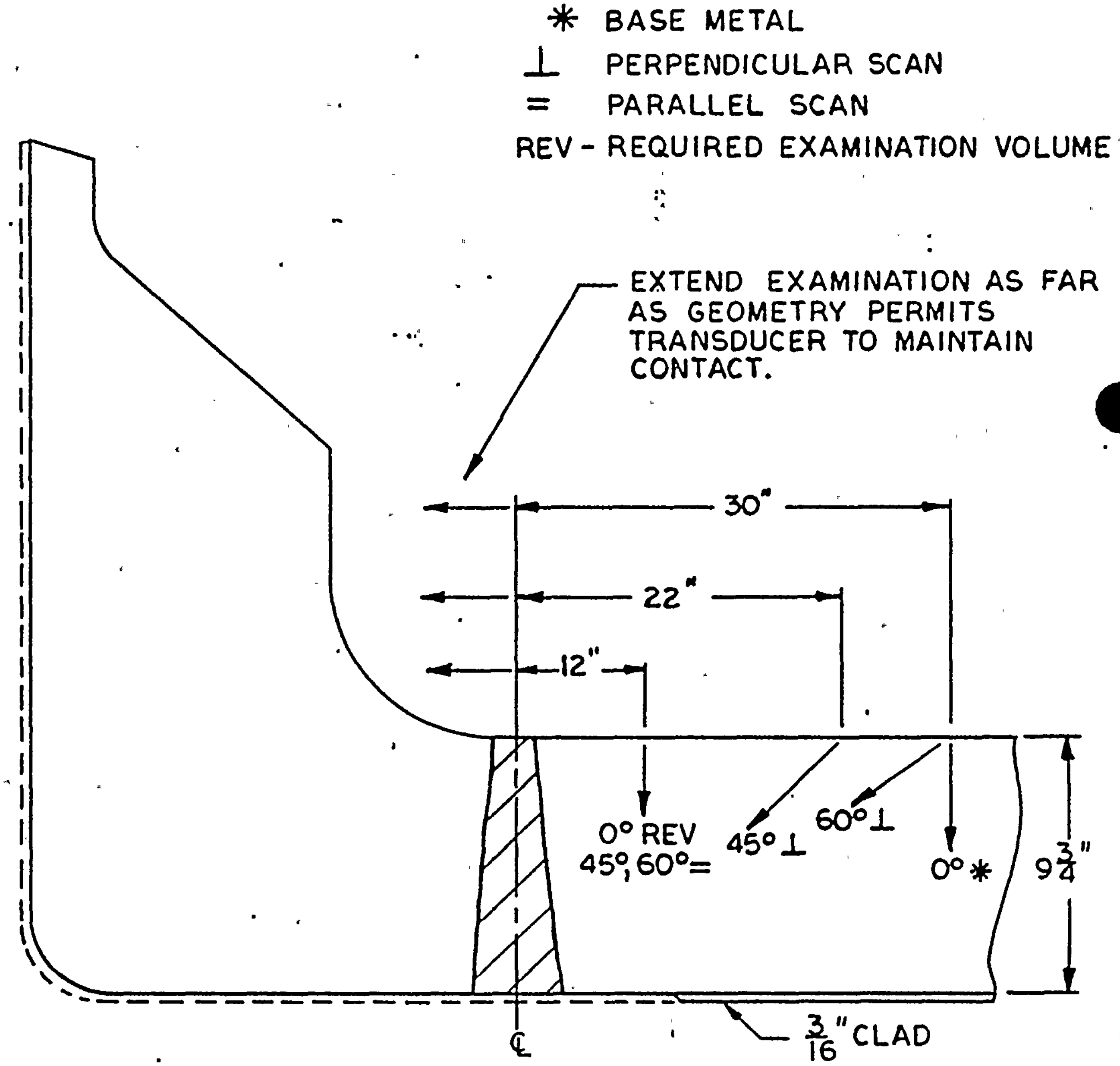
408-297-8766

REF. DWG.: CB&I #3133-61 AND MRP-4
CAL. BLOCK: 119-9 3/4"



ULTRASONIC EXAMINATION FOR MRP-4 - REPAIR AREA AROUND RECIRC. INLET NOZZLE N2 - 120°.

FIG. 18

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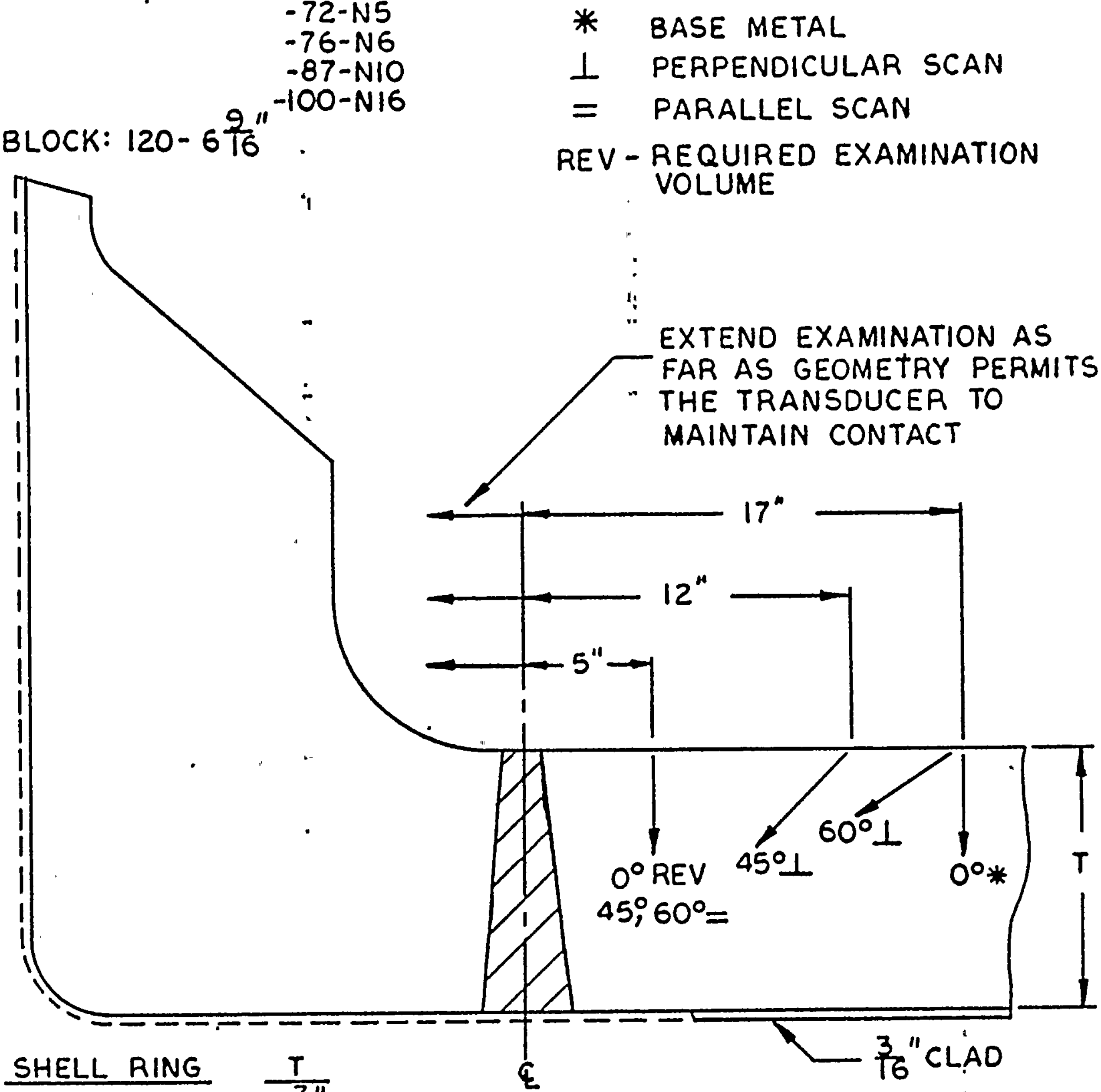
REF. DWG.: CB&I #3133-68-N4
-72-N5
-76-N6
-87-N10
-100-N16

CAL. BLOCK: 120- 6 9/16"



SHELL RING	T
#2	6 7/16"
#3	6 9/16"

ULTRASONIC EXAMINATION FOR NOZZLE TO #2 AND #3 SHELL RING WELDS (N4, N5, N6, N10 & N16)

FIG. 19

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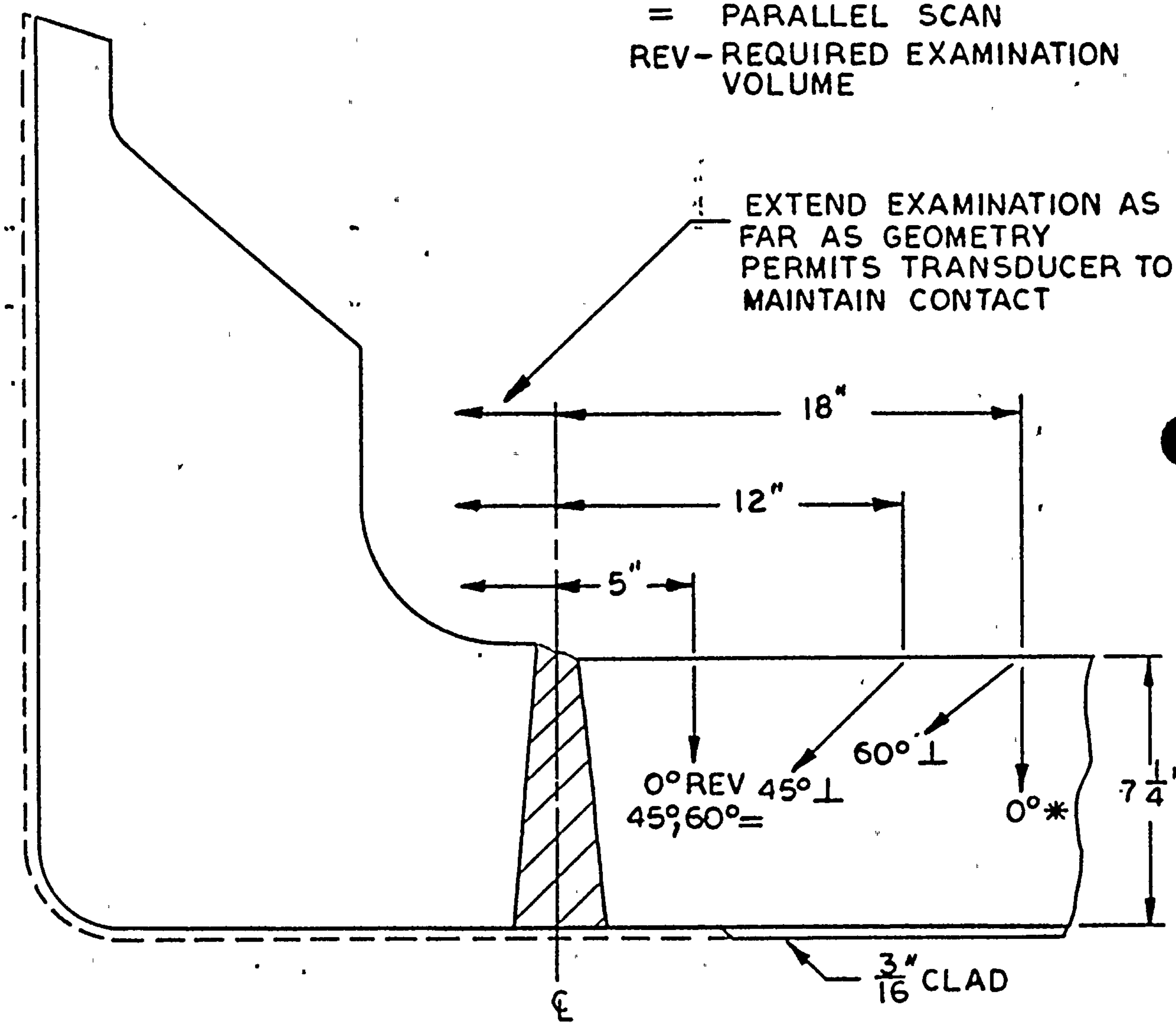
REF. DWG.: CB&I #3133-64
CAL. BLOCK: 121-7 1/4"

* BASE METAL
⊥ PERPENDICULAR SCAN
= PARALLEL SCAN
REV- REQUIRED EXAMINATION VOLUME



ULTRASONIC EXAMINATION FOR NOZZLE TO #4 SHELL RING WELD (N3)

FIG. 20

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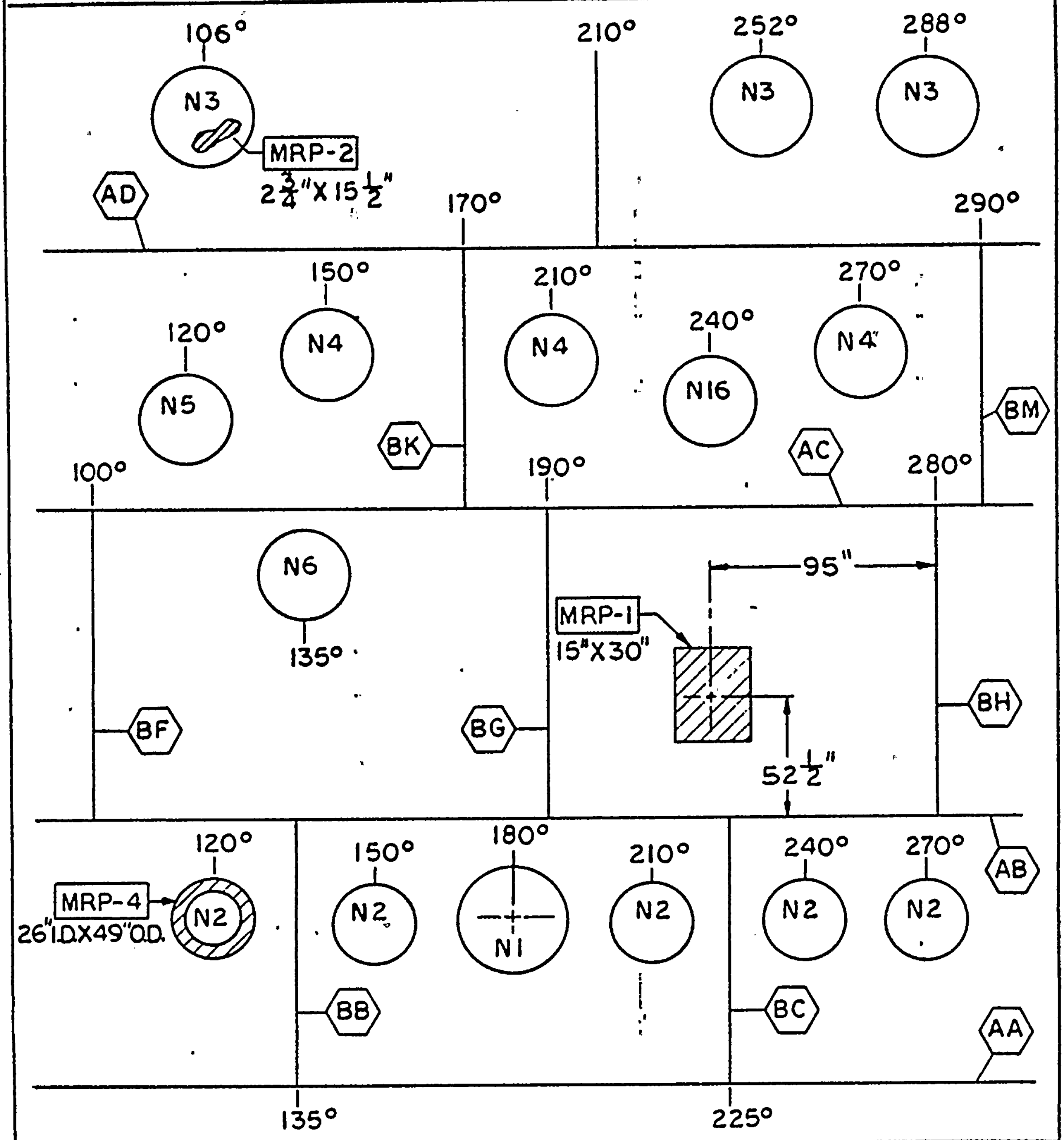

REACTOR PRESSURE VESSEL
MAJOR REPAIR AREAS

FIG. 21

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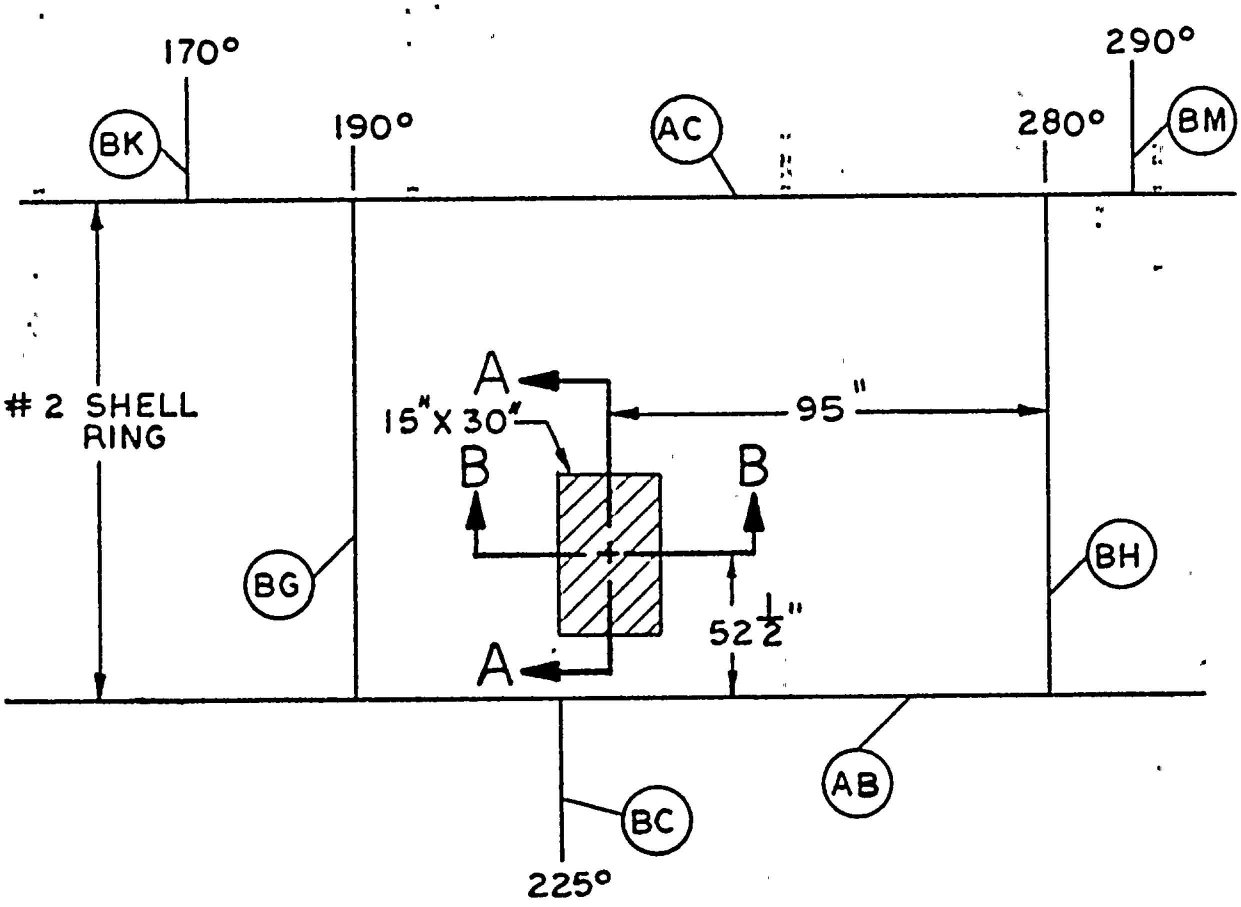
REF DWG.: MRP-1
CAL. BLOCK: 120-6 7/16"



ULTRASONIC EXAMINATION FOR
MRP-1 REPAIR AREA

FIG. 22a

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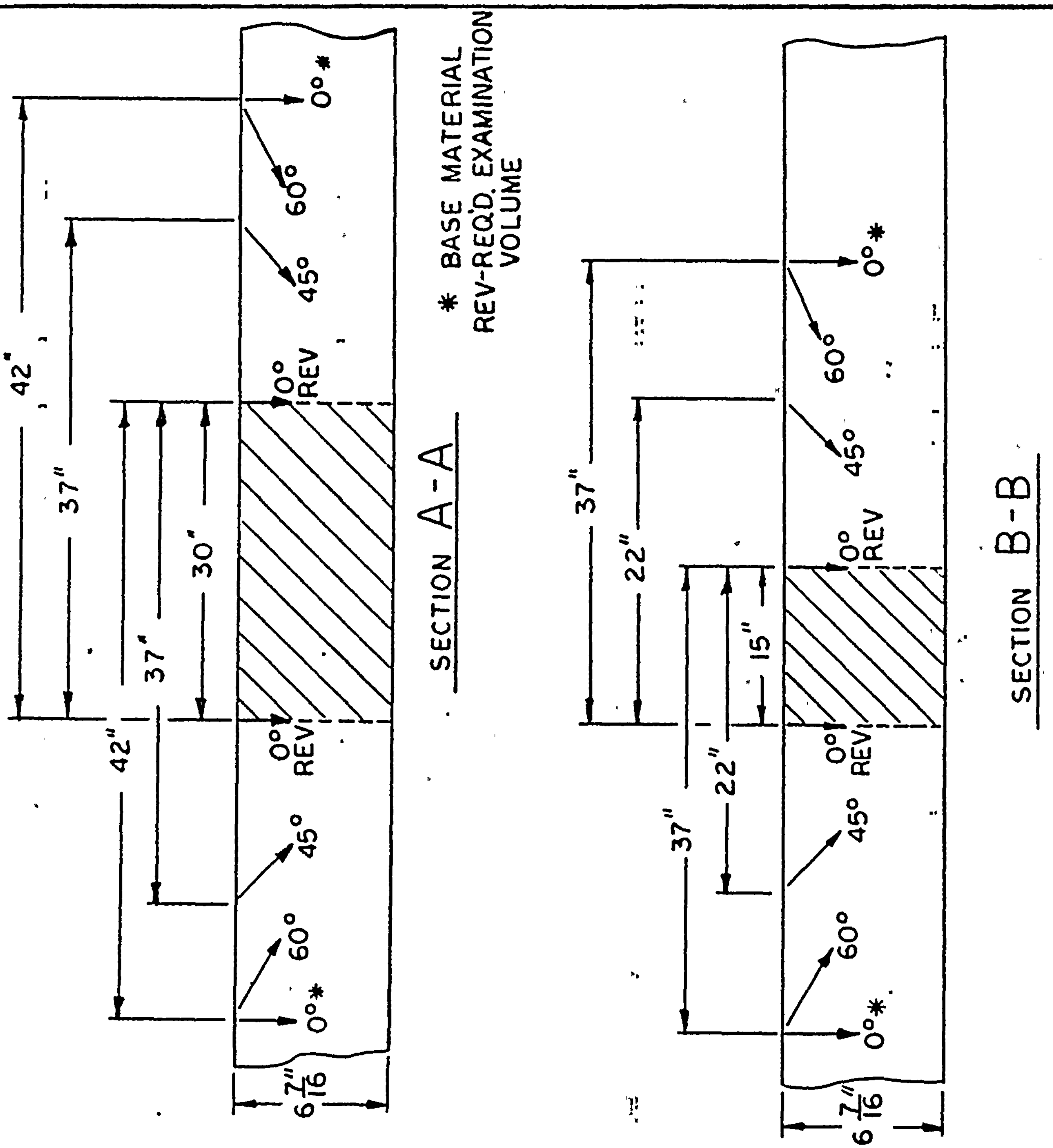
408-297-8766



ULTRASONIC EXAMINATION FOR
MRP-1 REPAIR AREA

FIG. 22b

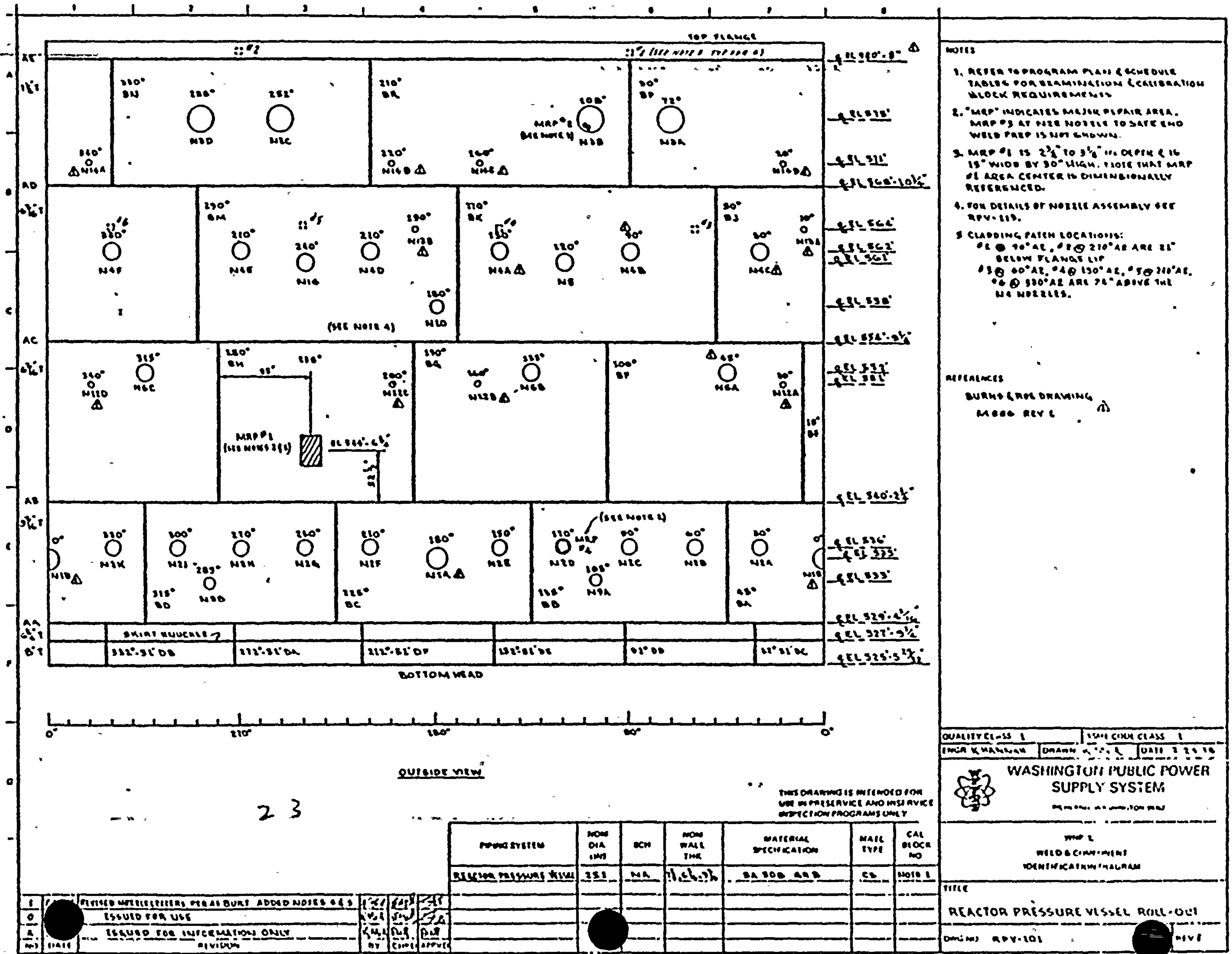
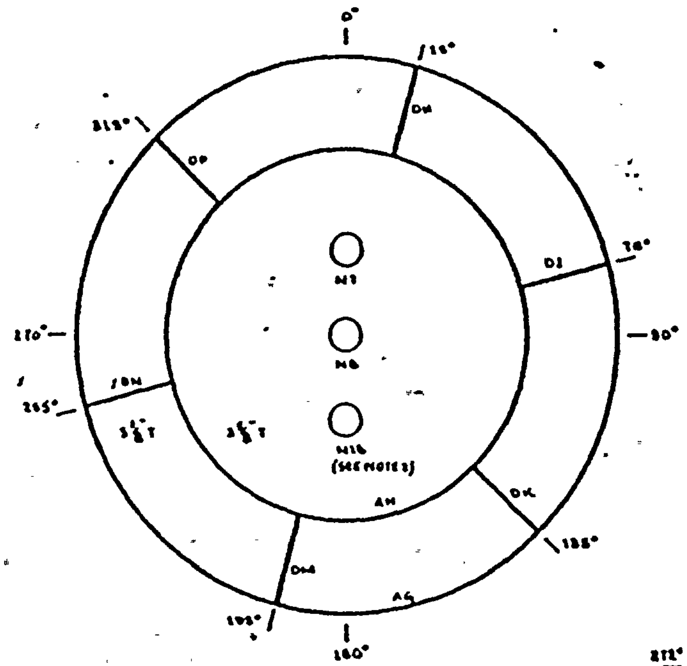
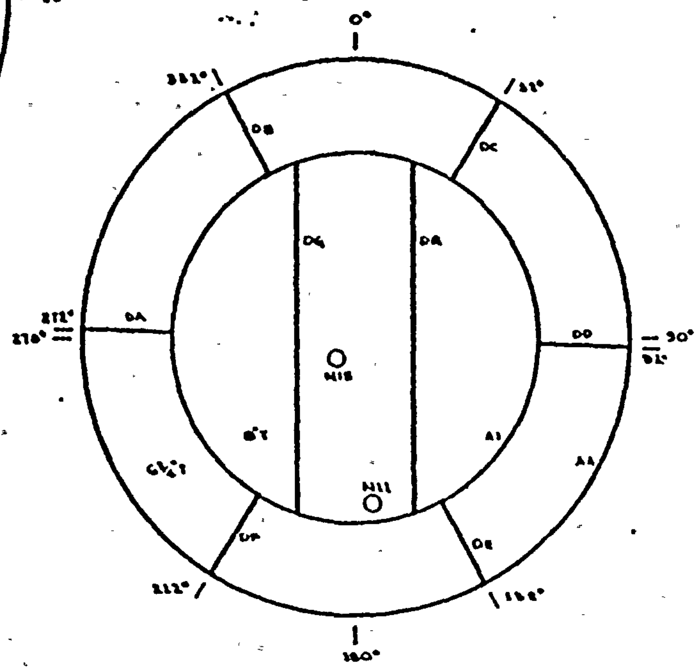

TOP FLANGE
NOTES
BOTTOM HEAD
SKIRT KNUCKLE
OUTSIDE VIEW
REFERENCES
WASHINGTON PUBLIC POWER
SUPPLY SYSTEM
THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY
PIPING SYSTEM
MATERIAL SPECIFICATION
REACTOR PRESSURE VESSEL
ISSUED FOR USE
ISSUED FOR INFORMATION ONLY
REVISION
TITLE
REACTOR PRESSURE VESSEL ROLL-OUT
23

Figure 23



TOP HEAD ASSEMBLY (RPV)

PLAN VIEW



BOTTOM HEAD ASSEMBLY (RPV)

INSIDE PLAN VIEW

NOTES

1. REFER TO PROGRAM PLAN & SCHEDULE TABLES FOR EXAMINATION CALIBRATION BLOCK REQUIREMENTS
2. FOR DETAILS OF NOZZLE ASSEMBLY SEE RPV-111

REFERENCES

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

PIPING SYSTEM	NOM DIA (IN)	SCH	NOM WALL THK	MATERIAL SPECIFICATION	MATL TYPE	CAL BLOCK NO
TOP HEAD	251	NA	3 7/8, 5 1/8	SA 508 GR B	CS	NOTE 1
BOTTOM HEAD	251	NA	6 1/2, 8	SA 508 GR B	CS	NOTE 1

1		ADDED NOTE 3.			
0		ISSUED FOR USE			
A		ISSUED FOR INFORMATION ONLY			
NO	DATE	REVISION	BY	CHKD	APPVD

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

TITLE
REACTOR PRESSURE VESSEL
TOP & BOTTOM HEAD VIEWS

DRAWING RPV 102

 LMT-UTX2 10/79

Lambert • MacGill • Thomas, Inc.
Testing • Engineering • Service • Training
771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

Location ______
Report No. ______
Cal.No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF VISUAL AND ULTRASONIC EXAMINATION

ITEM

Description ______ Size ______ Material ______ S/N(s) ______

Location ______ Preparation ______ Temp ______

SIGN

Examiner/Level ______ Examiner/Level ______ Review/Level ______

Authorized Inspector ______ Customer ______

EQUIPMENT

Tester 1 ______ S/N ______ 2 ______ S/N ______
Recorder 1 ______ S/N ______ 2 ______ S/N ______
Transducer 1 ______ 2 ______
3 ______ 4 ______

Couplant ______ Cable ______ Marker ______ Photo ______

PROC

Calibration Procedure ______ Rev. ______
Examination Procedure ______ Rev. ______
Recording Procedure ______ Rev. ______

CALIB

Calib. Blk. ______ Temp. ______ Ref. ______ Amp. ______ Sweep ______
Ref. Gain ______ Damp. ______ Reject ______ Gate ______
Alarm ______ Mag. Tape Count ______ Chart ______ Cal. Check Time ______

EXAMINATION

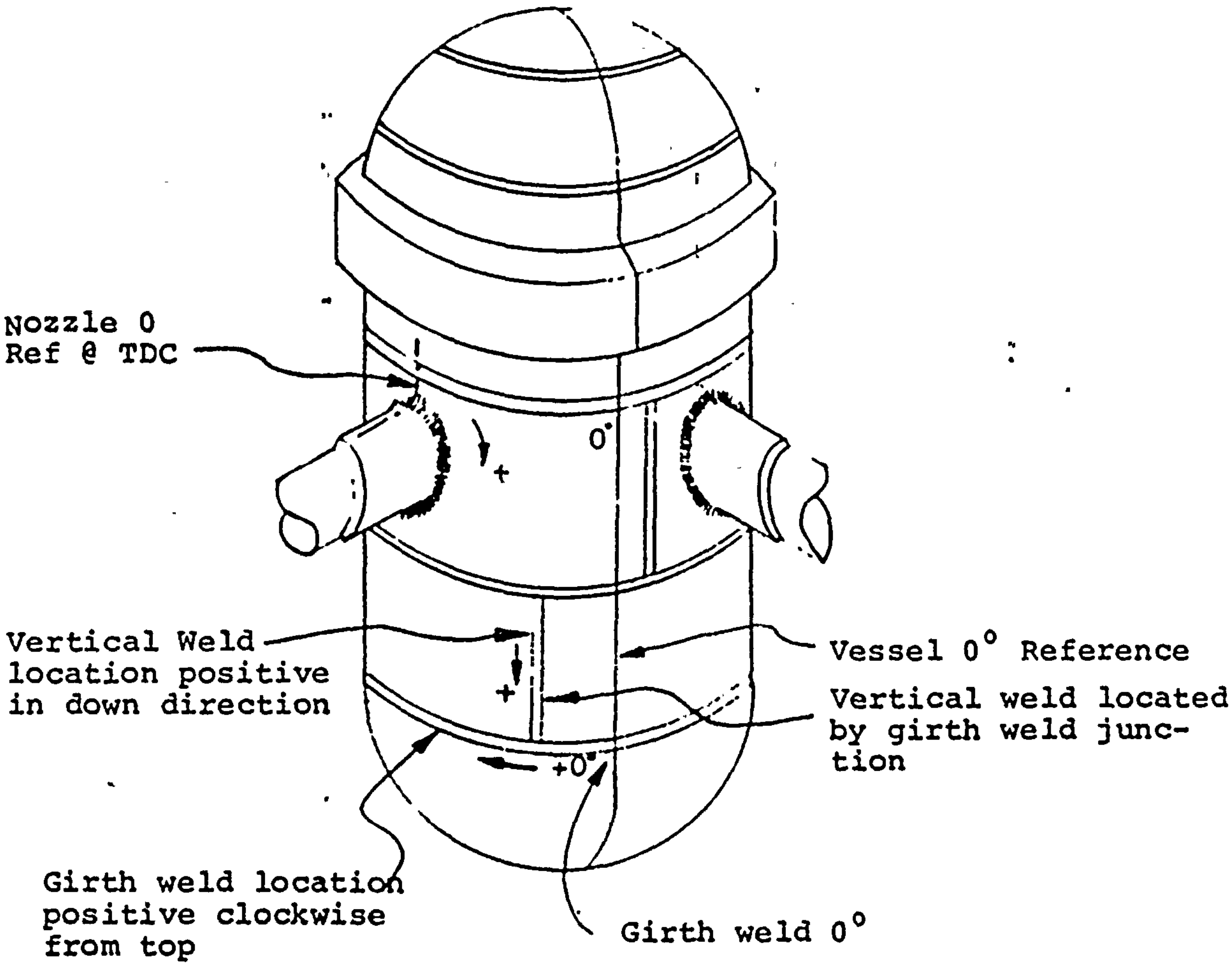
Cal. Ref. Blk. ______ Ref. Refl. ______ Amp. ______ Sweep Position ______
Scan Gain ______ Ref. Dwg. ______ Reject Level ______ Report Level ______

NAD = No Apparant Disc. L = Linear G = Geometry S = Spot M = Multiples

Scan	Type	Disp.	Scan	Type	Disp.	Scan	Type	Disp.
0	PT							
1	Visual		7			13		
2	Base Metal		8			14		
3			9			15		
4			10			16		
5			11			17		
6			12			18		

Sketch	Scan	Description of Indications

Figure 25



RECORDING CONVENTIONS

Figure 26

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14030 Elvira St.
Saratoga, Ca. 95070
408-867-4109

Job Location ______

Report No ______

Exam Date ______

NOTIFICATION OF REPORTABLE INDICATION

Part I - LMT Findings

LMT Job No. ______ I.D.# ______ ISO No. ______

NDT Method: UT ____ PT ____ MT ____ ET ____ VT ____

Description of Indication: (Sketch/photograph attached Yes __ No __)

Examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Field Supervisor Date:

Notification Acknowledged by
Client Representative: Date:

Part II - Re-examination

Findings: (Sketch/photograph attached Yes __ No __)

Re-examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Supervisor Date:

Closed
Client Representative. Date:

Figure 27

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Location ____________
Report ____________
Job No. ____________
Date ____________
Page ________ of ______

ULTRASONIC INDICATION DATA TABULATION

I. Indication No. ____________________ Scan ____________________

II. MAXIMUM AMPLITUDE DATA

1. Amplitude ____________ % DAC ____________
2. Metal Path ____________
3. Transducer Position ____________________

III. INDICATION LENGTH

1. Length measured between ______ % DAC limits
2. Indication length ____________________
3. Transducer Position ____________________

IV. INDICATION CROSS SECTION DATA AT ______ INTERVALS ALONG THE INDICATED LENGTH BETWEEN ________ % DAC POINTS

Measurement Reference ____________________

Trans.Pos. Along Ind.	Transducer ⊥ Ind. Min. Metal Path			Transducer ⊥ Ind. Max. Metal Path			% t	
	Metal Path	Amp.	Dist. Index to Ref.	Metal Path	Amp.	Dist. Index to Ref.	Height	Dist. from Near Surf.

Figure 28.

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408-297-8766

TABLE IWB-3510
ALLOWABLE INDICATIONS
FOR MATERIALS SA-533, SA-508

a/ℓ[1]	Surface Indications Percent a/t	Subsurface Indications Percent a/t
0	1.88	2.32
0.05	2.00	2.42
0.10	2.18	2.61
0.15	2.42	2.91
0.20	2.71	3.25
0.25	3.08	3.68
0.30	3.48	4.13
0.35	3.48	4.63
0.40	3.48	5.24
0.45	3.48	5.86
0.50	3.48	6.51

[1] For intermediate ratios, linear interpolation is permitted.

Figure 29

TABLE IWB-3511.1
ALLOWABLE PLANAR INDICATIONS

Material: Ferritic steels that meet the requirements of NB-2331 and have specified minimum yield strength of 50 ksi or less at room temperature
Thickness Range: 4 in. and greater

Aspect Ratio, a/ℓ[1]	Surface Indications, a/t,%[2]	Subsurface Indications, a/t,%[2,3]
0.	2.0	2.6
0.05	2.1	2.8
0.10	2.3	2.9
0.15	2.6	3.2
0.20	2.9	3.6
0.25	3.2	4.1
0.30	3.7	4.6
0.35	3.7	5.2
0.40	3.7	5.8
0.45	3.7	6.5
0.50	3.7	7.2

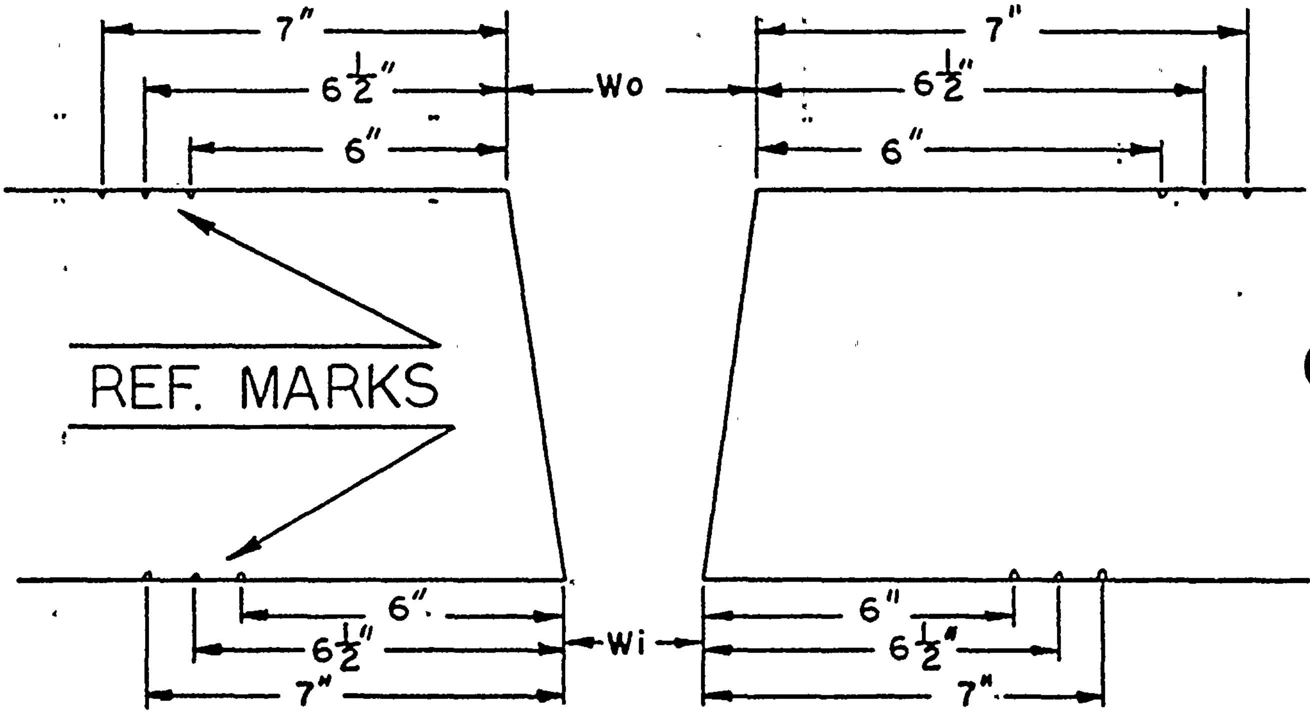
NOTES:
(1) Dimensions a and ℓ are defined in the figures referenced in IWB-3511.1. For intermediate flaw-aspect ratios, a/ℓ, linear interpolation is permissible.
(2) Component thickness t is measured normal to the pressure-retaining surface of the component. Where the section thickness varies, the average thickness over the length of the planar indication is the component thickness.
(3) The total depth of an allowable subsurface indication is twice the listed value.

TABLE IWB-3511.3
ALLOWABLE LAMINAR INDICATIONS

Component Thickness, t in.[1,2]	Laminar Area,[3] sq in.
4	12
6	18
8	24
10	30
12	36
14	42
16	48

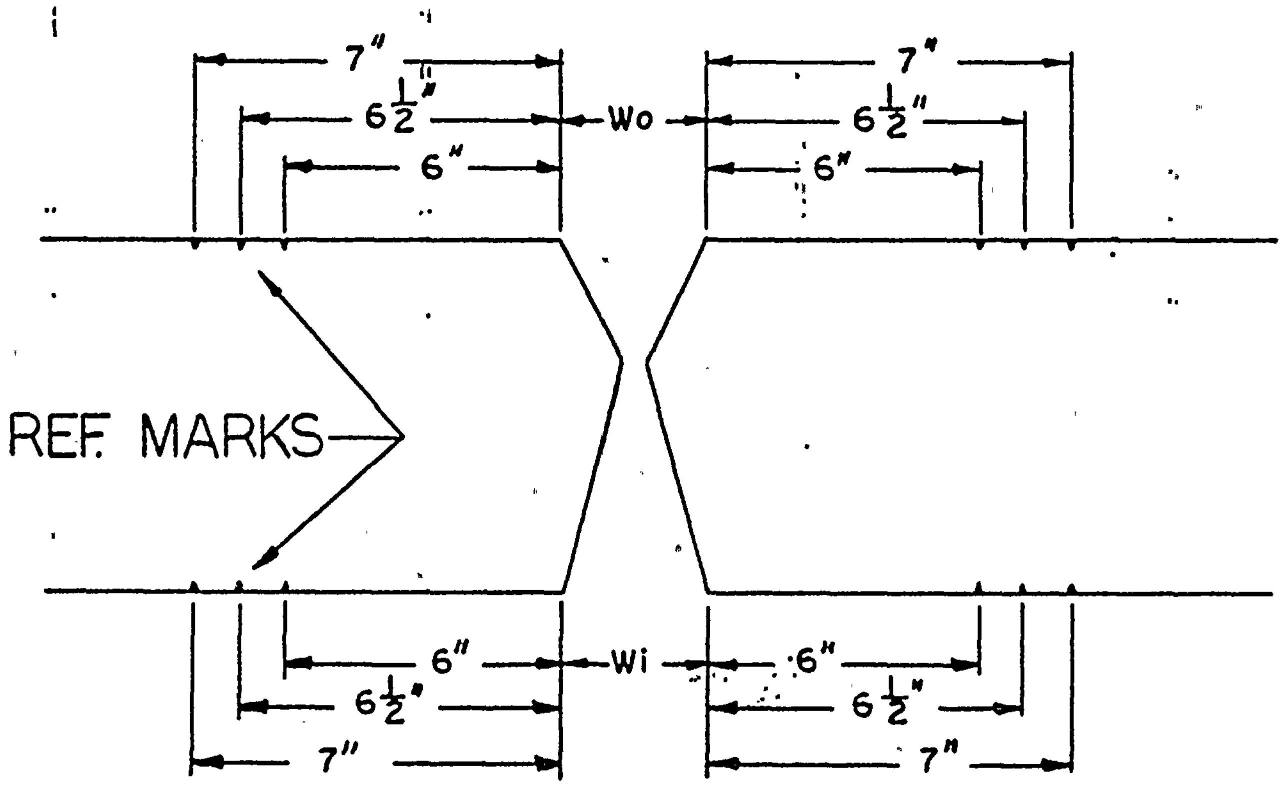
NOTES:
(1) Component thickness t is measured normal to the pressure-retaining surface of the component. Where the section thickness varies, the average thickness over the area of the laminar indication is the component thickness.
(2) For intermediate thicknesses, linear interpolation of area is permissible.
(3) The area of a laminar flaw is defined in IWB-3360.

Figure 30



SINGLE BEVEL JOINT MARKING

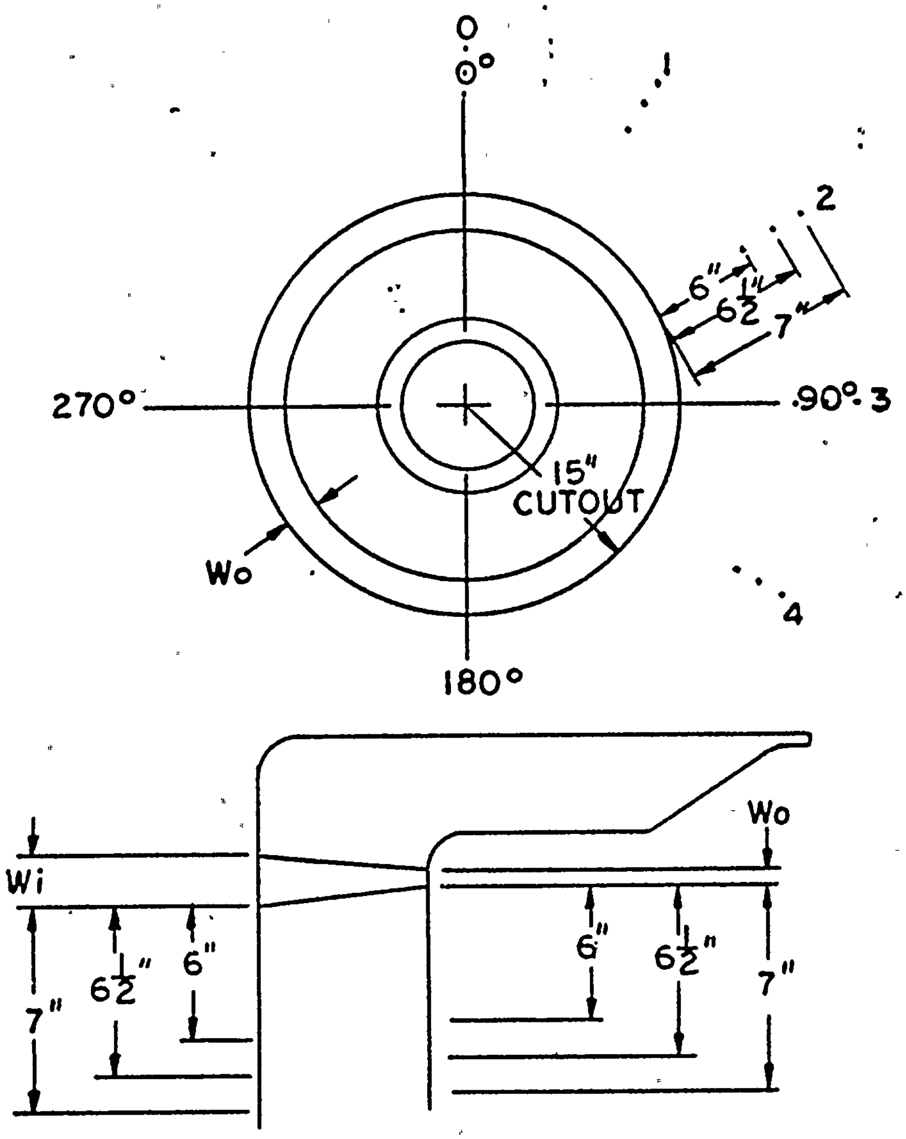
Figure 31



DOUBLE BEVEL JOINT MARKING

Figure 32

SIZE OF CUTOUT	NUMBER OF INTERVALS
UP TO 4"ϕ	4
OVER 4" AND INCLUDING 12"ϕ	12
OVER 12" AND INCLUDING 25"ϕ	24
OVER 25"ϕ	72



NOZZLE-TO-SHELL WELD

Figure 33

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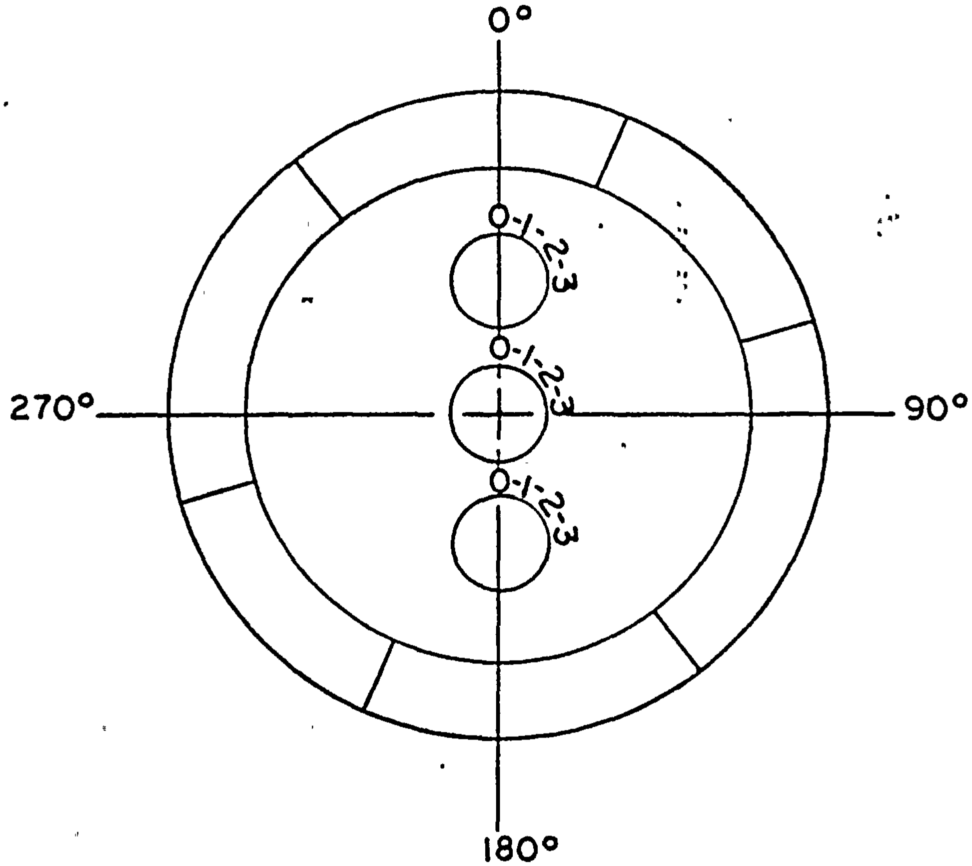

TOP HEAD NOZZLES
(OUTSIDE VIEW)

Figure 34

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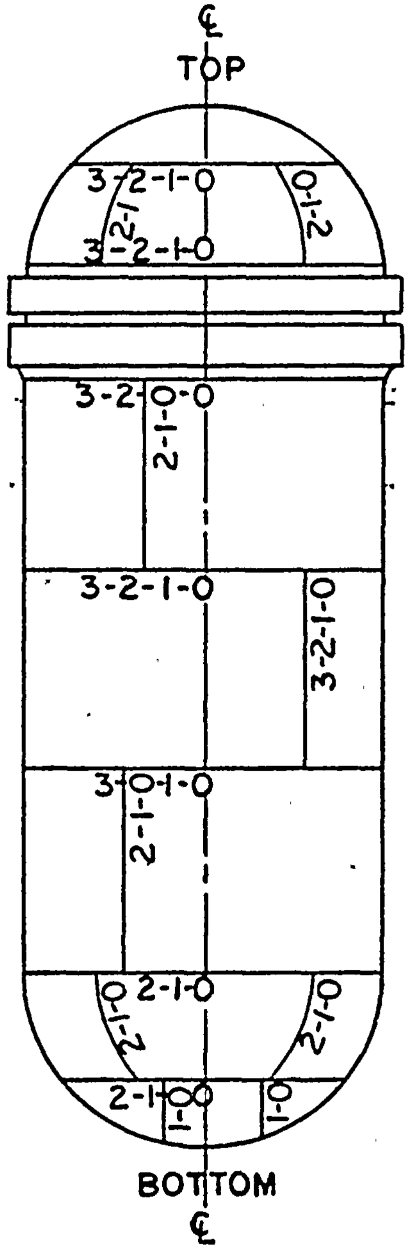

VESSEL LONGITUDINAL AND GIRTH SEAMS

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

WNP-2 PSI PROGRAM PLAN

L A T E R

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

N O T U S E D

(Purposely left blank)

GENERAL ELECTRIC

VESSEL WELD & LOCATION

GENERAL ELECTRIC COMPANY, 175 CURTNER AVENUE, SAN JOSE, CALIFORNIA 95125
Phone (408) 297-3000 TWX No. 910-338-0116

NUCLEAR ENERGY SYSTEMS DIVISION

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m/c 352

November 10, 1976
GEWP-2-76-471
GI2-76-499

WNP NO. 2	
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OE TRAPP	3
GE DEEGAN	+
GL GELHAUS	
C R Edwards	
SITE MANAGER	
FD FRISCH	
D. L. Gano	
COMMIT CONTROL	

Mr. W. G. Conn
Washington Public Power Supply System
3000 George Washington Way
P. O. Box 968
Richland, WA 99352

SUBJECT: W02808
WPPSS Hanford 2 Contract 2
TRANSMITTAL OF DOCUMENT VPF 3133-482

Dear Bill:

At the request of your Mr. Dean Gano, enclosed is a copy of VPF No. 3133-482 entitled "Weld Identification and Marking Procedure".

Normal distribution of the document will be made in the near future.

Very truly yours,

F. A. MacLean
F. A. MacLean
Project Manager
Hanford 2

/mr
Enclosure
cc: JJ Verderber w/a
JE Stice w/a
PA Milani
M Allison

RECEIVED
NOV 15 1976
WNP-2 FILES

IDENTIFICATION WIP-1

WELD IDENTIFICATION AND MARKING PROCEDURE

PRODUCT NUCLEAR REACTOR VESSELS
CUSTOMER STANDARD

REV. NO. 0
BY WRP DATE 3-12-74

REVIEWED	CB ENGR	CHNG ENGR	GEN WELD	INSP TEST	CORP NU QA	REC CONST QA	RES MFG QA				BY	DATE
	RGK		JBM		LAG	DJS	PMS			PREPARED	WRP	3-12-74
						VMY	JY			CHECKED	LAG	5-01-74
						WJG	RDT			AUTHORIZED	LAG	5-06-74
							F			TYPED		

1.0 SCOPE

1.1 This procedure describes the required methods for establishing the center line of all full penetration reactor pressure vessel weld seams, and marking system when required, which remain on the outside of the vessel.

2.0 REFERENCE

2.1 Customer's contract specification - See Contract QA Handbook

3.0 RESPONSIBILITIES

3.1 Department assigned.

GENERAL ELECTRIC
Atomic Power Equipment Department

- ☐ Disapproved per comments Revise and resubmit for approval
- ☐ Approved with Comments Revise and resubmit IN FINAL FORM
- ☐ Refer to EDS No ______
- ☒ Approved No further action req'd
- ☐ Approved Submit certified copy
- ☐ Certified by Seller and Approved by Buyer

Reviewed by [signature]
Date 1/17/76
VPF No 3133-482-2

4.0 PRELIMINARY LAYOUT

4.1 Preliminary layout is required to insure that the center line of a welded seam can be accurately located on the completed weld. The method utilizes reference marks that are stamped using low stress dies. The reference marks are located primarily on the outside of plate material at a standard distance from the edge of the weld preps, prior to the welding of a seam. By using these reference marks, the center line of the weld can accurately be located.

is TP Section XI) Div I says ... no ... welds.

5.0 PRELIMINARY LAYOUT METHOD

5.1 Reference mark will be stamped on the outside of the vessel at a standard distance of 6, 6-1/2 and 7 inches from the weld edge prep of the plate at intervals of 12 inches except as noted in other sections of this procedure. The inside of the weld seam may also be marked if necessary.

5.2 Single bevel joint marking: Fig. 1

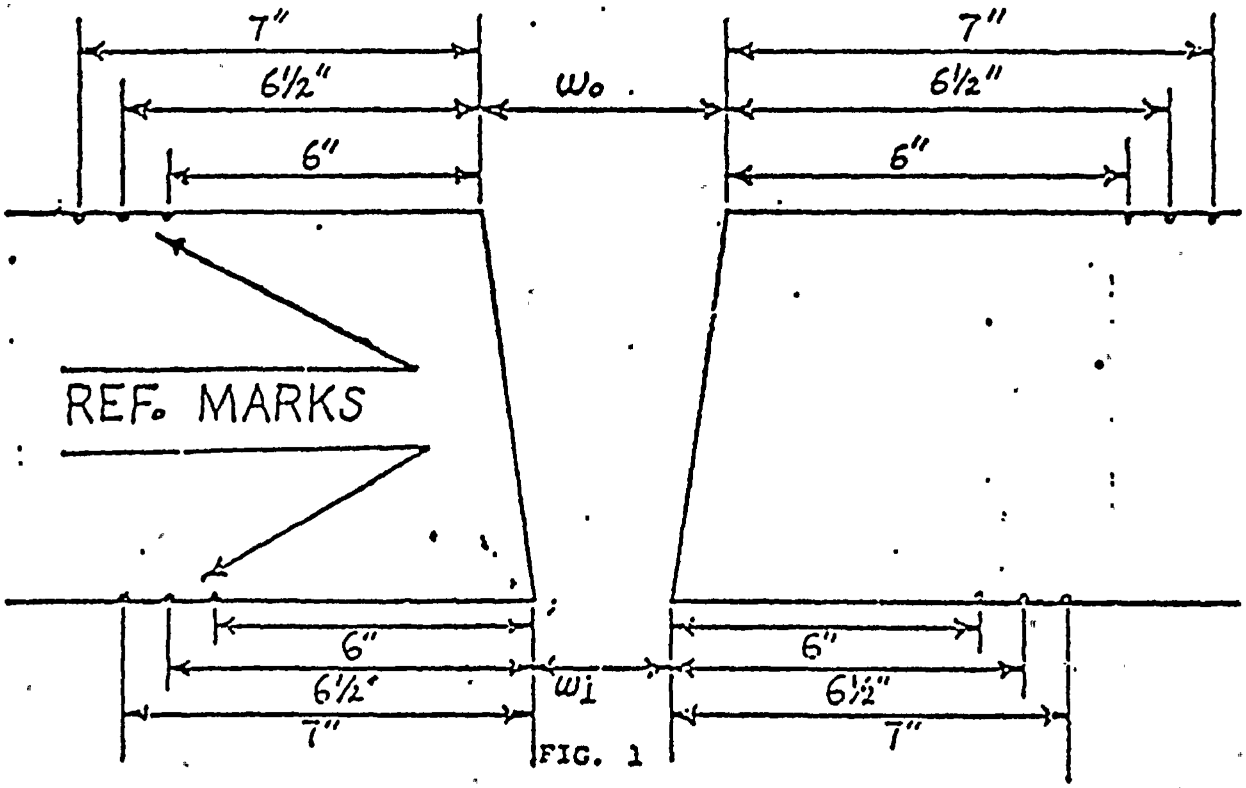


FIG. 1

5.3 Double bevel joint marking: Fig. 2

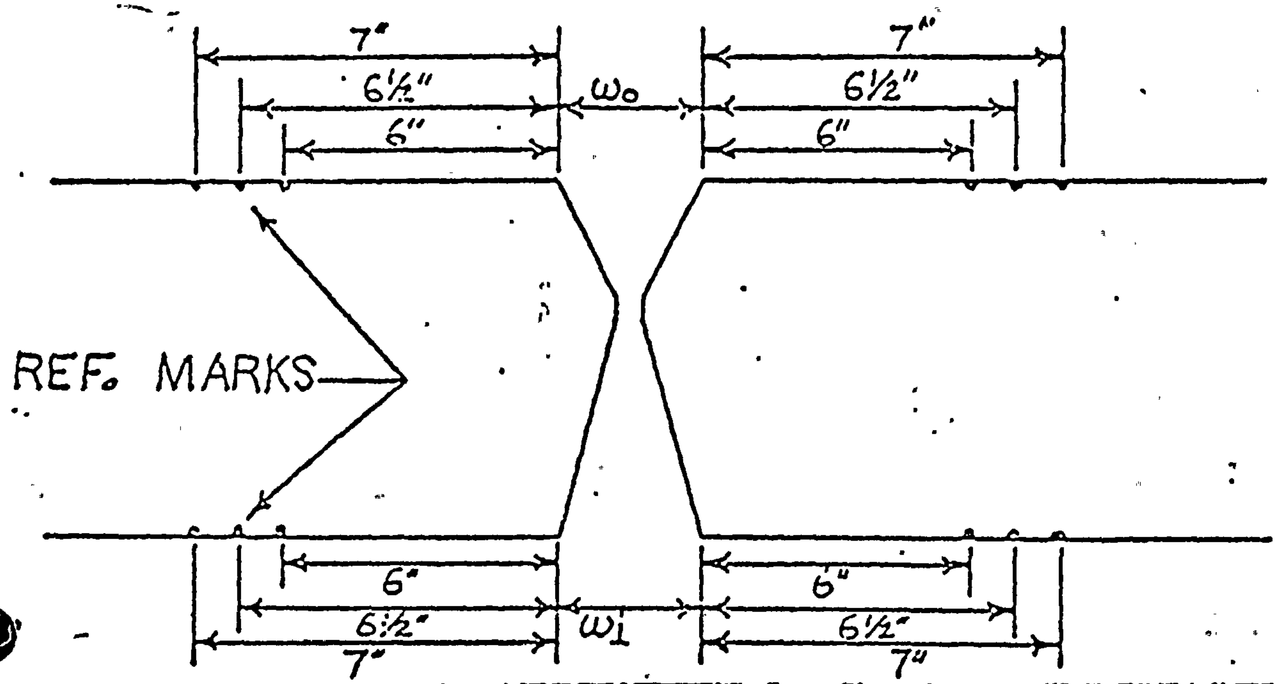


FIG. 2

5.4 For plate to plate welds, both plates must be marked.

5.5 For plate to forging (nozzles and flanges) welds, only the plate needs to be marked. See Fig. 3

5.6 The reference marks for longitudinal seams shall start approximately at the center line of the top round seam. All other seams will start as depicted in section 6.

5.7 Dimension W_o (maximum weld width) and W_1 (width of weld on narrow side) are actual measured distances for the plate to plate welds where both plates are marked. For weld where only one plate is marked, such as plate to forging the. dimensions are theoretical and are calculated from approved engineering drawings. Fig. 3.

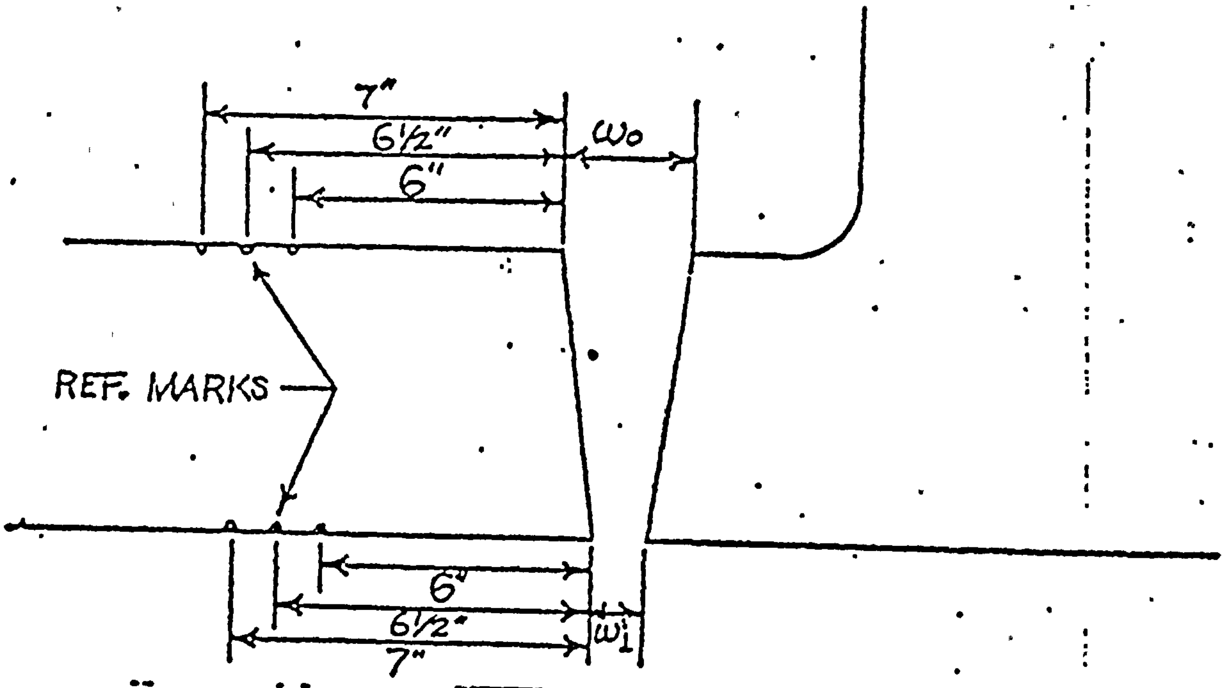


FIG. 3

5.8 Nozzle to shell welds shall have a minimum of one set of reference marks on the shell at each of the nozzle cardinal points (0°, 90°, 180° and 270°). These welds will always have as a minimum, the following number of intervals marked on the outside of the vessel. See Fig. 4A.

Size of Cutout		Number of Intervals		
Up to and including 12"ø	12	4	0-4	4
Over 12" and including 25"ø	24	8	4-12	12
Over 25" and including 38"ø	72	12	12-24	24
Over 38" and including 52"ø	72	16	24-∞	72
Over 52" and including 65"ø	72	20		

5.9 Nozzle to shell weld:

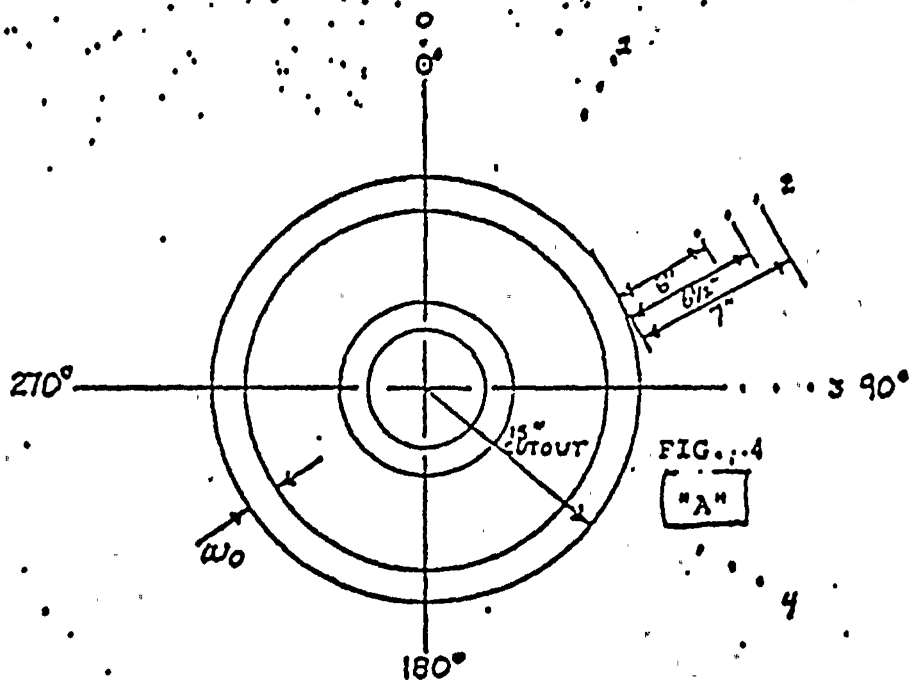


FIG. 4
"A"

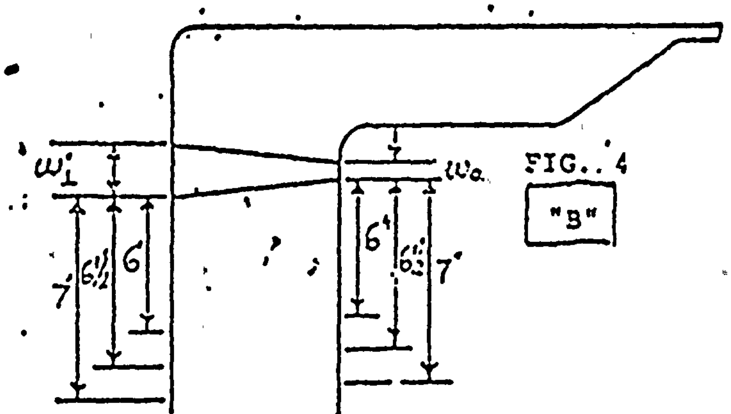


FIG. 4
"B"

FIG. 4

5.10 Nozzle to safe end weld and weld neck flanges:

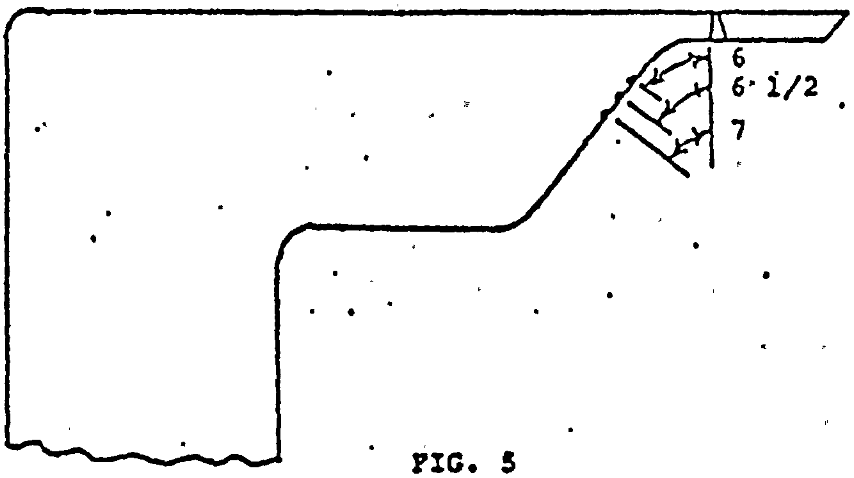


FIG. 5

5.11 The reference marks will be stamped on the outside of the nozzle forging at a standard distance of 6, 6-1/2 and 7 inches from the edge of the weld prep. All stamping will be on the thicker portion of the forging at least beyond the point where the neck starts to thicken. These measurements are made along the surface with a flexible rule.

5.12 The number of intervals around will be the same as in paragraph 5.8, using the outside diameter in place of size of cutout. Fig. 4

6.0 FINAL LAYOUT

6.1 Final layout describes the direction and starting point for marking numbers, location of numbers in relation to the seam, and the use of reference marks.

6.2 Reference marks described in 4.0 preliminary layout will be used to locate the boundaries of welds. This is accomplished by reviewing the engineering drawings and measuring from the reference marks the standard distance to the edges of the original weld prep. The center point of dimensions W_o and W_i can be considered the center line of the weld. Fig. 1

6.3 Fig..6 is an example of an engineering drawing that shows a single bevel weld joint with a 5/8" back-up bar and a 15° included angle weld prep.

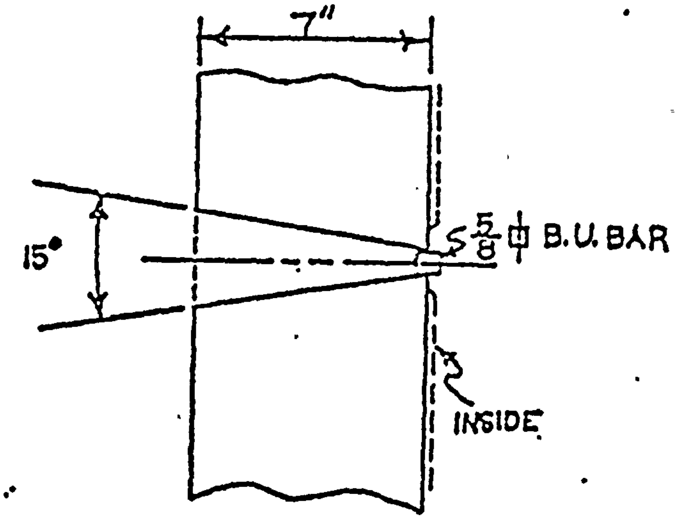


FIG. 6

6.4 With the information from the drawings and the use of the reference marks, evaluate the seam to be marked and identify the wide side of the weld.

6.5 Fig. 7 is an example of a typical weld joint described in 6.3. See Fig. 6.

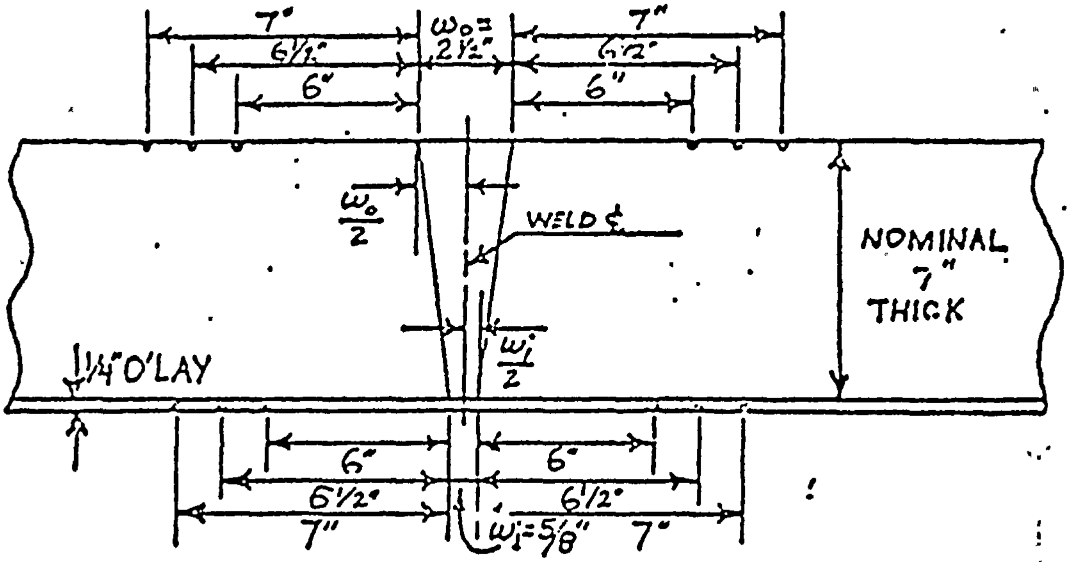


FIG. 7

6.5.1 Measure the standard distance from the reference marks toward the weld to find the original edges of the seam. The distance between the edges represents the width of the weld.

6.6 When laying out seams where only one set of reference marks are given the theoretical width calculated from the approved engineering drawings must be used in determining the theoretical weld boundary and center line of the seam.

6.6.1 Nozzle to shell weld: Fig. 8

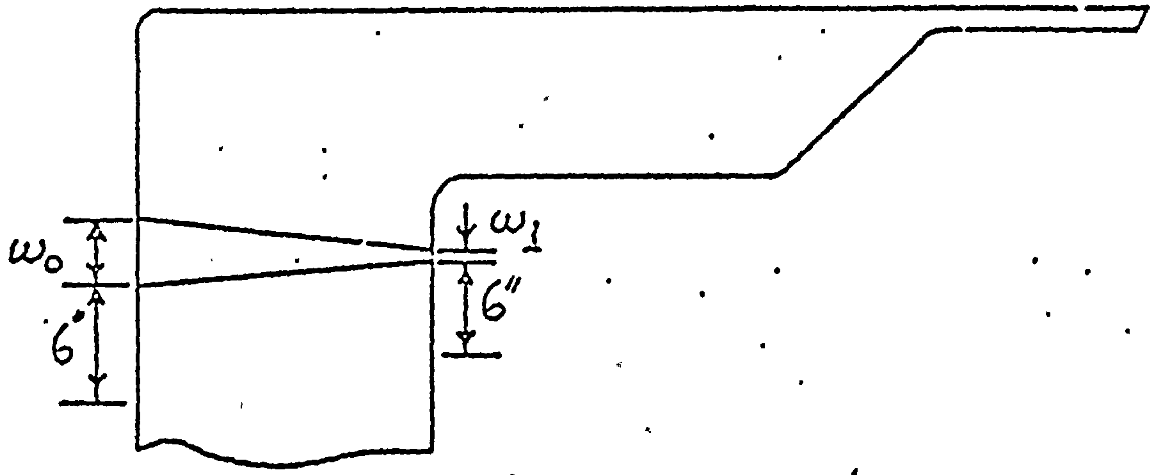


FIG. 8

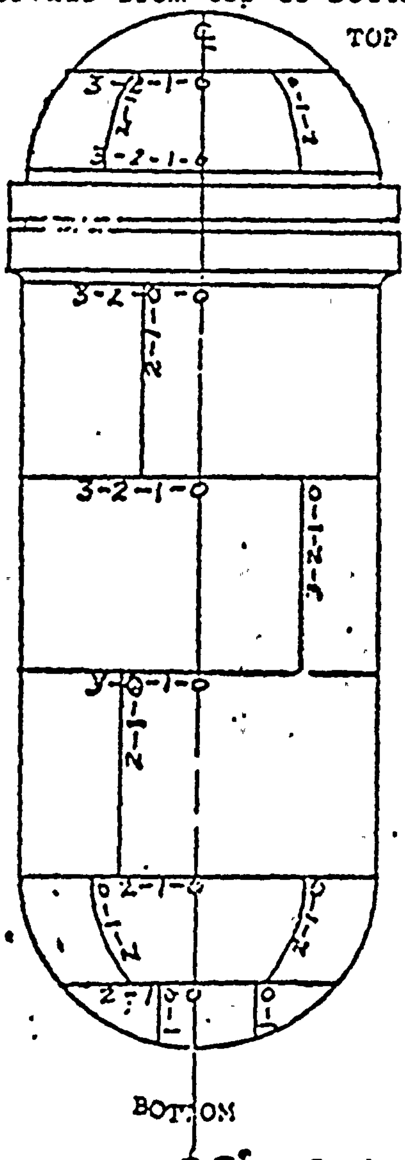
6.6.2 To determine the width of the weld (W_1 and W_o) locate the original weld edge using the reference marks on the plate. Measure from this edge the theoretical width calculated from the approved engineering drawings and mark the opposite edge of the weld. This dimension will then be W_1 or W_o, the center of which will be the center line of the weld.

6.7 Location, direction and stamping of reference numbers will be as follows: See Fig. 9.

6.7.1 Vessel longitudinal and girth seams:

6.7.2 For circumferential seams, number intervals clockwise looking down from the top of the vessel starting at the vessel 0° line. For longitudinal seams, number the intervals from top to bottom.

OK per App. I



℄ 0° FIG. 9

6.7.3 Top head nozzles (outside view): See 5.8 & Fig. 4

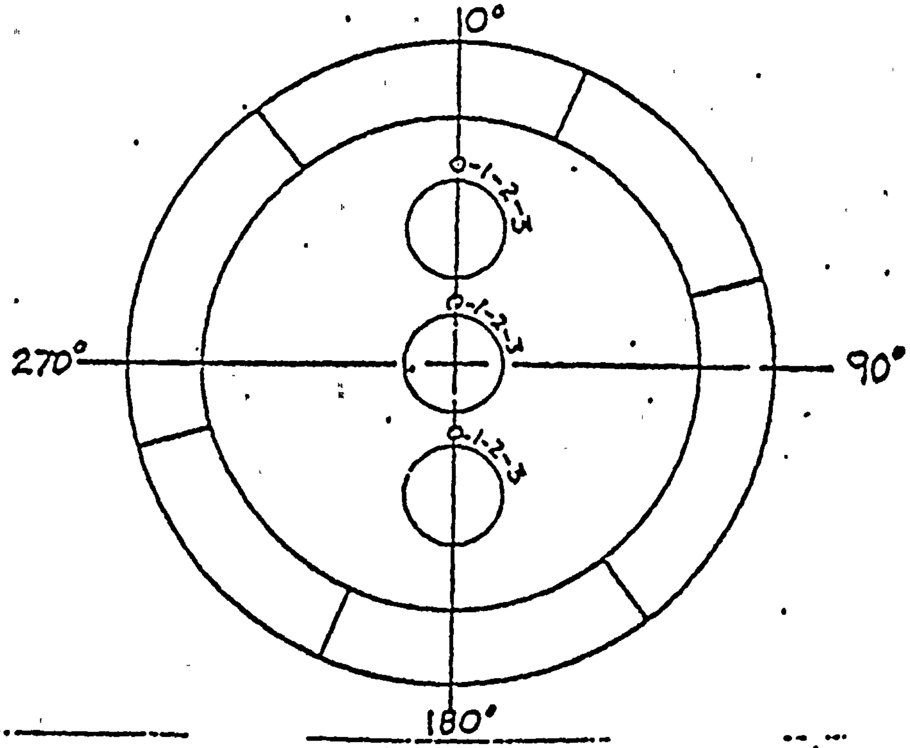


FIG. 10

6.7.4 Nozzle to shell weld: See 5.8 & Fig. 4.

6.7.5 All interval numbers shall be stamped with low stress dies.. Each stamping will be on the outside of the vessel and will be $W_o/2 + 1/2"$ from the center line of the weld. The marking shall remain on the vessel.

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408-297-8766

WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-34 Revision No. 2

Procedure Title NUCLEAR PRESERVICE AND INSERVICE AXIAL LONGITUDINAL WAVE EXAMINATION OF COMPONENT STUDS AND BOLTS

LMT, Inc. QA Review and Approval D.B. MacGill Level III 12-17-80
(Quality Assurance Officer)

Client Approval [signature] 10/20/81 [signature] 10/21/81

Authorized Nuclear Inspector Approval [signature] 10/20/81

Specific Qualification Record

Component	Examiners	Date
CAL. STANDARD	M. Worby/II	10-20-81

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP 02	ISI ENGINEER D.P. Ramey	DATE 12-24-80
CONTRACT NO. C-14402	TITLE PSI ~~Servicer~~ for NSSS & ~~Ass~~ociated Nuclear Piping	
CONTRACTOR LMT, Inc.		

DOCUMENT TITLE	REV.
UTP-34 Nuclear Preservice and Inservice Axial Longitudinal wave Examination of component Studs and Bolts.	2

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) Dec 15, 1980 (WPLM-2-80-34)

PREVIOUSLY APPROVED ☐ YES ☒ NO (DATE IF YES)

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
D.W. Porter 12/24/80 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER		X		
[illegible] 12/29/80 PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR		X		
SUPERVISOR, ISI/NDE, GENERATION SERVICES				
12/24/80 [illegible] 12/29/80 MANAGER, QUALITY SERVICES		X		

NOTES/COMMENTS:

II A 1b Summer 1975 typo

ANI(T) concurrence: [illegible] 1-6-81

WP-702 EDP 9.0

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771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

TITLE: NUCLEAR PRESERVICE AND INSERVICE AXIAL LONGITUDINAL WAVE EXAMINATION OF COMPONENT STUDS AND BOLTS

I. PURPOSE AND SCOPE

A. Scope

This procedure provides instructions for implementation of the requirements of ASME Boiler and Pressure Vessel Code, Sections V and XI, for the ultrasonic examination of welds in pressure vessel, piping, and component bolts and studs greater than two inches in diameter, not including reactor pressure vessel studs.

B. Scope

This procedure is applicable to axial longitudinal wave ultrasonic examination of forged bolting.

II. REFERENCES

A. This procedure is in compliance with the applicable sections of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;

QUALIFICATION:

Approved for use J R Lambert 12/17/80

DB MacGill Level III 12-17-80

II. A. 1. a) Section V, Nondestructive Examination, 1974 edition, Summer 1975 addenda.

b) Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1974 edition, Summer ~~1974~~ 1975 TR addenda.

2. American Society for Nondestructive Testing;

a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification Programs in Nondestructive Testing."

b) LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

c) LMT, Inc. Operating and Quality Assurance Manual, Revision 12, approved for the WNP-2 Preservice Inspection by WPPSS.

III. DEFINITIONS

UT System - Includes the ultrasonic tester, cable, transducer, and wedge, if used.

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

IV. B. The responsible Level III Field Supervisor, LMT, Inc., or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

A. The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a successful calibration for each different length/diameter combination of stud or bolt to be examined.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. As a minimum, examination teams shall consist of one Level II examiner and one Level I examiner or one Level II examiner and one NDE Trainee as defined in QA-6.

C. Personnel shall be qualified and certified according to the requirements of ASME XI, SNT-TC-1A, and LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Ultrasonic testers shall be of the pulse echo type. Instruments shall have an amplitude display linear within 5% of calibrated screen height over 80% of that height; and an attenuator, stepped in increments of 2 dB or less, which is accurate over the range of the test to ±20% of nominal value. Instruments shall have had their internal alignment and calibration verified within 90 days of any implementation of this procedure.

   1. A record of calibration shall be available at the jobsite for WPPSS audit.

B. Connecting cables shall be coaxial, and their length limited to less than that at which significant signal degradation (2 dB) occurs, but shall not exceed 200 feet.

C. Electronic recording equipment, when used, shall be electronically aligned within 180 days of use.

   1. A record of calibration shall be available at the jobsite for WPPSS audit.

D. Search units shall be certified by the manufacturer as to essential properties, including bandwidth, damping, center frequency within 10% of nominal, and relative gain.

VII. D. 1. A record of search unit properties shall be available at the jobsite for WPPSS review.

2. Search units shall be selected according to Table 1.

3. Other frequencies and sizes may be used where part geometry or grain structure impedes effective use of the transducers shown in Table 1.

Material Thickness (Length)	L-wave Transducer Diameter (inc.)	Frequency (MHz)
2" to 10"	.5"	5
>10" to 36"	.75"	1-5

Table 1

E. Couplant materials shall be as low as practicable in sulfur and halogen content. Certification shall be provided on a batch basis for each brand name of couplant. Analysis for halogens and sulfur shall be made according to ASTM D-129-64 and ASTM D-808-63.

1. Residual halogens and sulfur shall not exceed 1% by weight.

2. Certification, by batch number, for each batch of couplant used, shall be maintained on file at the jobsite.

VII. F. Calibration blocks shall be representative of the full length of the component studs to be examined, and of the form and dimension of Figures 1 and 1a.

1. Whenever practical, the calibration block shall be made from material identical to that being examined.

VIII. PREPARATION

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before beginning any examination program:

a) Procedure and Qualification

b) Calibration Sheets

c) Inspection Reports

d) Material and Equipment Certifications

e) Personnel Certifications

f) NRC Form 4 (operating nuclear plants only)

g) NRC Form 5 (operating nuclear plants only)

h) Status Indicators (Hold tags)

i) Radiation Work Permits (where applicable)

B. Physical

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

VIII. B. 1. a) Insulation removal

b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

c) Cleanup requirements

d) Safety precautions (other work in area, etc.)

C. <u>Surface Preparation</u>

1. Responsibility

a) It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

b) Surfaces shall be sufficiently smooth and clean so that a meaningful examination may be performed.

IX. LIMITATIONS

A. This procedure is based on ASME nuclear requirements; it may not be applicable to military, API, or AWS requirements without modification.

B. This examination is limited to a search for transversly oriented flaws.

X. CALIBRATION

A. Test calibration is performed on a complete system. Any change in the ultrasonic instrument, transducer cable, or transducer requires test recalibration. A change in qualified personnel, recording instrumentation or recorder connection requires a calibration check.

B. Instrument alignment verification for screen height and amplitude control linearity shall be performed daily before any examinations are performed.

1. Instrument Linearity Verification

a) Position the search unit on a calibration block to obtain two echoes with a 2:1 amplitude ratio.

b) Set the larger echo to 80% of calibrated screen height.

c) Vary the amplitude of the larger echo from 100% to 20% of calibrated screen height in 10% increments.

d) Note that at each increment the smaller echo remains 1/2 the larger within a tolerance band of ±5% of full screen height.

X. B. 1. e) Record successful performance of the verification on a Calibration Report form (Figure 2).

2. Attenuator Linearity Verification

a) Position the search unit to obtain an 80% of full scale echo on the calibrated screen.

b) Adjust the sensitivity control to decrease the system gain by 6 dB and 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

c) Position the search unit to obtain a 40% of full scale echo on the calibrated screen.

d) Adjust the sensitivity control to increase the system gain by 6 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full screen.

e) Position the search unit to obtain a 20% of full scale echo on the calibrated screen.

f) Adjust the sensitivity control to increase the system gain by 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

X. B. 2. g) Record successful performance of the verification on a Calibration Report form (Figure 2.).

Indication Set	Gain Change	Indication Tolerance Limits
80%	-6 dB	32% to 48%
80%	-12 dB	16% to 24%
40%	+6 dB	64% to 96%
20%	+12 dB	64% to 96%

Table 2

C. Straight Beam Test

1. Calibration is performed on a complete system on the appropriate calibration block at the beginning of each day's testing of that material. Calibration is performed with the transducer on the end of the calibration standard opposite the flat bottomed hole. Calibration using a calibration block is established by a distance amplitude curve connecting the response from the notch reference reflector at each end of the calibration standard. The amplitude of the near notch response shall be set at 80% of the tester screen height. The back reflection of the 14-inch standard shall be set to seven horizontal divisions of the tester screen and the back reflection of the 23-inch standard shall be set at eight horizontal divisions of the tester

X. C. 1. screen. Record the distance amplitude response on the tester screen and on the Calibration Report form.• This is the Primary Reference Response. Also note the response of the flat bottomed hole on the tester screen and on the Calibration Report.

2. Without further adjusting the gain, obtain, record and mark on the tester screen the response of the No. 5 hole in a Rompas block. Also record the two range responses (near and far) from the curved surface reference reflectors; i.e., at least two inches, and 14 inches/23 inches (for the appropriate test length), if used.

XI. PERFORMANCE

A. Calibration Verification

1. Calibration shall be verified before and after each examination.
2. Verification shall be made using the response of the basic block, as per X.C.1., or using the recorded response of the standard reference block as per step X.C.2.
3. Responses within ±2 dB and within ±.5" or 5% of bolt or stud length, whichever is greater, shall be proof of calibration.

XI. A. 4. Failure to demonstrate calibration shall require recalibration and retest of the part under consideration.

B. Sensitivity

1. Scanning sensitivity shall be twice (2x) that of the Primary Reference Response.
2. Penetration of straight beam energy shall be verified by an observable back surface echo.

C. Coverage

1. Where practical, the part shall be completely scanned from an available end (Figure 4) with a continuous movement of the transducer to maximize the back reflection and to ensure the full volume of the part is examined.

D. Limitations

Limitations that prevent full compliance with XI.C. shall be recorded on the Examination Report form (Figure 3).

XII. EVALUATION

A. Methods

1. For each indication that exceeds 50% of the reference levels, the following information must be recorded:

XII. A. 1. a) Peak amplitude (% DAC) with corresponding range to indication and search unit position.

b) Range and transducer position at 50% DAC amplitude points.

c) Length and depth of reflector.

B. Evaluation Criteria

Any indication exceeding 50% of the Primary Reference Distance Amplitude Curve shall be evaluated by the examiner to determine the extent, size, location, and shape of the reflector. These parameters shall be included on the Notification of Reportable Indication form (QAF-16), Figure 5.

C. Reference Systems for Recording Indications

Each stud examined shall be identified with a stamped or vibra-tooled component and stud number. Indications shall be located in inches from the scanning surface end of the bolt or stud, in inches from the outer surface, and in degrees circumferentially, from a reference mark on the flat bolt or stud surface.

D. Acceptance Criteria

Acceptance criteria contained in Paragraph IWB-3515 of ASME Section XI, 1974 edition, addenda through Summer 1975, are summarized in the table drawn in Figure 6.

XIII. RECORDS

A. A Report of Visual and Ultrasonic Examination (Figure 3) shall be prepared for each item examined, and shall be related to a Report of Ultrasonic Calibration (Figure 2).

B. Oscillograph chart records shall be made of all examinations.

1. Chart records used in indication analysis shall utilize two channels, one corresponding to vertical deflection of the tester signal and the other to horizontal.

   a) These channels shall be calibrated to match the oscilloscope display. That is, an indication 90% of vertical amplitude appearing at five divisions on the tester screen should have a nine division deflection on one chart channel and a five division deflection on the other.

2. Chart records shall include pre and post test calibration checks made at the same scanning speed as the test.

3. Location and other pertinent information shall be manually noted on each chart.

XIII. B. 3. a) Pertinent information includes, but is not limited to, date, time, item, equipment, examiners, scans, gain, and recorder settings and speed.

C. Recording Conventions

1. Ultrasonic scans and the location of indications shall be recorded as follows:

a) In inches, axially, from examination surface;

b) In inches or degrees, CW or CCW from circumferential datum point.

D. Other types of recording, such as event or alarm monitoring may be used as an aid to the examiner where feasible.

XIV. REVIEW

A. Examination Reports shall be subject to review by an assigned LMT Level III for conformity to the requirements of this procedure.

B. Following the final LMT review, the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the Authorized Nuclear Inspector.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Co-ordinator. Additional reports which may include examination documentation as reference material shall be generated from copies.

B. Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.

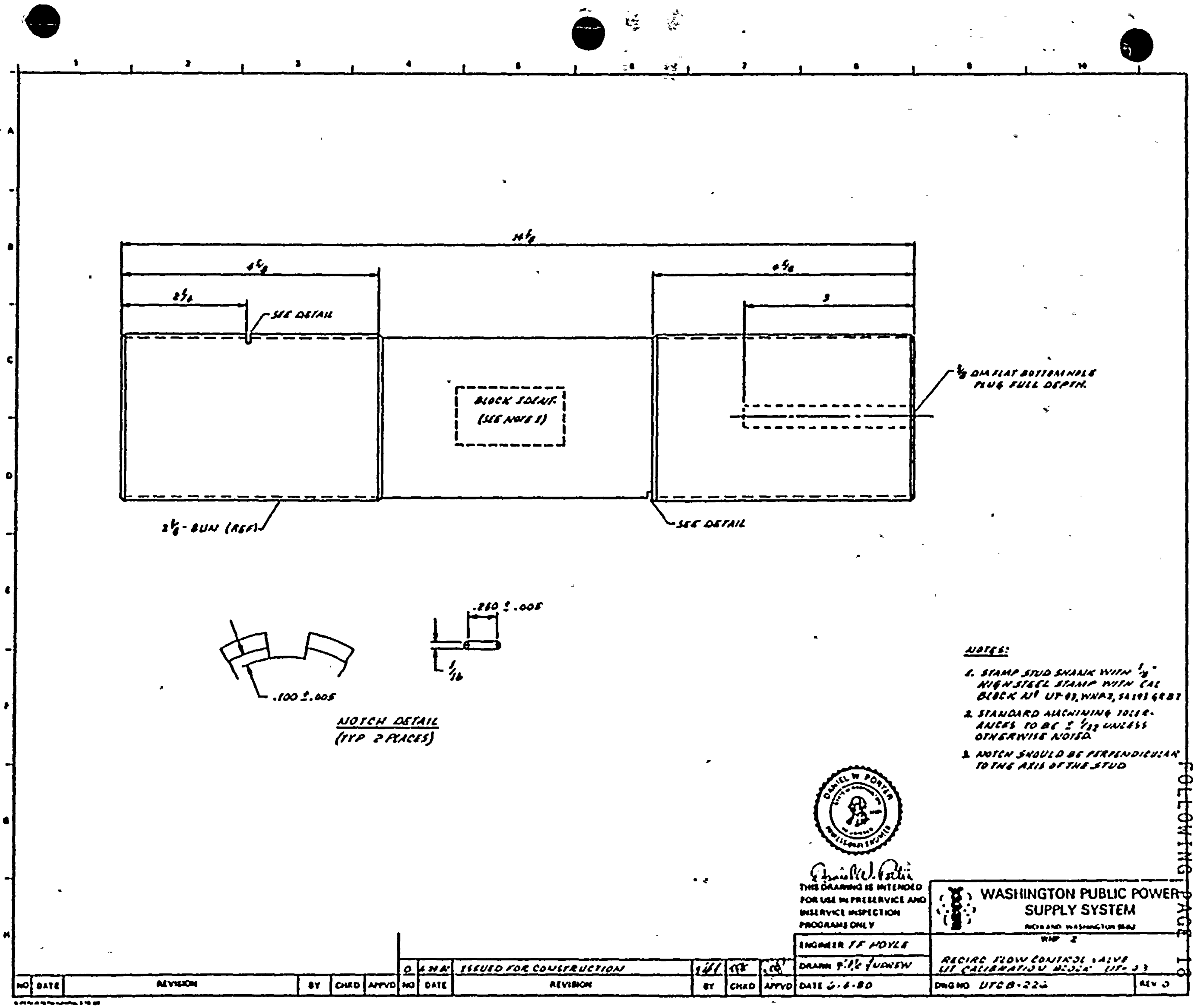
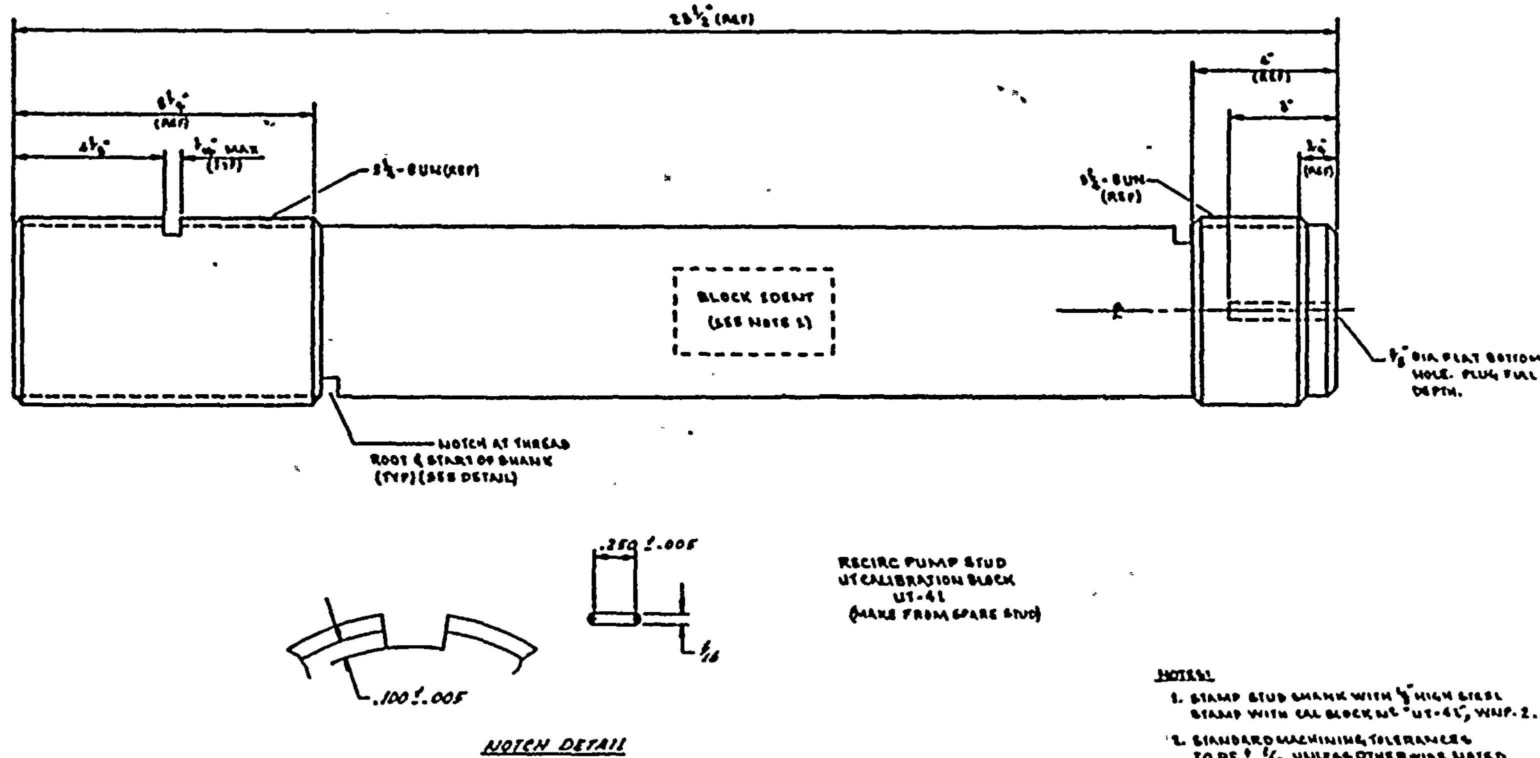

SEE DETAIL
BLOCK IDENT. (SEE NOTE 1)
DIA FLAT BOTTOM HOLE PLUG FULL DEPTH.
BUN (REF)
SEE DETAIL
.250 ± .005
.100 ± .005
NOTCH DETAIL (TYP 2 PLACES)
NOTES:
1. STAMP STUD SHANK WITH 1/8" HIGH STEEL STAMP WITH CAL BLOCK NO UT-83, WNP2
2. STANDARD MACHINING TOLERANCES TO BE ± 1/32 UNLESS OTHERWISE NOTED.
3. NOTCH SHOULD BE PERPENDICULAR TO THE AXIS OF THE STUD
THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP 2
ISSUED FOR CONSTRUCTION
ENGINEER
DRAWN
DATE
DWG NO UTCB-22
REV 0
NO DATE REVISION BY CHKD APPVD

FIGURE 1



RECIRC PUMP STUD
UT CALIBRATION BLOCK
UT-41
(MAKE FROM SPARE STUD)

NOTES:

1. STAMP STUD SHANK WITH ⅛" HIGH STEEL STAMP WITH CAL BLOCK NO. "UT-41", WNP. 2.
2. STANDARD MACHINING TOLERANCES TO BE ± 1/32 UNLESS OTHERWISE NOTED
3. LOCATE THREE NOTCHES 120° APART.
4. NOTCH SHOULD BE PERPENDICULAR TO THE AXIS OF THE STUD.

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

NO	DATE	REVISION	BY	CHKD	APPVD
1	6/78	CORRECTED NOTCH DETAIL	KMcA		
0	1/78	ISSUED FOR CONSTRUCTION	KMcA		

ENGINEERING HALLAS
DRAWN K. McANDREW
DATE 7-11-78

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP 2
RECIRC PUMP STUD UT 41
UT CALIBRATION BLOCK
DWG NO UTCB-223 REV 1

FIGURE 1 a)

LMT-UTC-1 4/80

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Testing • Engineering • Service • Training

771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

Location ______
Cal. No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF ULTRASONIC CALIBRATION

SIGN

Examiner/Level ______ Examiner/Level ______ Review/Level ______

Authorized Inspector ______ Customer ______

EQUIPMENT

Instrument ______ S/N ______ ReCal Due ______ Cable ______
Recorder ______ S/N ______ ReCal Due ______
Recorder ______ S/N ______ ReCal Due ______

Vertical Linearity Check Check Completed ______

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2										

Signal 2 shall equal 50% of Signal 1 ±5% of full scale

Attenuator Linearity Check Check Completed ______

Tester Gain	Set	-6	-12	Set	+12	Set	+6
Signal Amp.	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
Actual Value	X			X		X	

Signal amplitude must fall within listed values

Transducers

S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______

PROC

Procedure ______ Rev. ______ Date ______

CALIBRATION

Cal. Block Type ______ S/N ______ Ref. Refl. ______ Temp. ______
Verification/Ref. Blk. ______ S/N ______ Ref. Refl. ______ Temp. ______

Instrument Settings

	∟	∠	
Gain			
Sweep			
Delay			
Reject			
Damp.			

DAC

Vertical axis: 10, 8, 6, 4, 2, 0
Horizontal axis: 2, 4, 6, 8, 10

Cal. Check Time

FIGURE 2

LMT-UTX2 10/79

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San Jose, Ca. 95112
408-297-8766

Location ______
Report No. ______
Cal.No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF VISUAL AND ULTRASONIC EXAMINATION

ITEM

Description ______ Size ______ Material ______ S/N(s) ______

Location ______ Preparation ______ Temp ______

SIGN

Examiner/Level ______ Examiner/Level ______ Review/Level ______

Authorized Inspector ______ Customer ______

EQUIPMENT

Tester 1 ______ S/N ______ 2 ______ S/N ______
Recorder 1 ______ S/N ______ 2 ______ S/N ______
Transducer 1 ______ 2 ______
3 ______ 4 ______
Couplant ______ Cable ______ Marker ______ Photo ______

PROC

Calibration Procedure ______ Rev. ______
Examination Procedure ______ Rev. ______
Recording Procedure ______ Rev. ______

CALIB

Calib. Blk. ______ Temp. ______ Ref. ______ Amp. ______ Sweep ______
Ref. Gain ______ Damp. ______ Reject ______ Gate ______
Alarm ______ Mag. Tape Count ______ Chart ______ Cal. Check Time ______

EXAMINATION

Cal. Ref. Blk. ______ Ref. Refl. ______ Amp. ______ Sweep Position ______
Scan Gain ______ Ref. Dwg. ______ Reject Level ______ Report Level ______

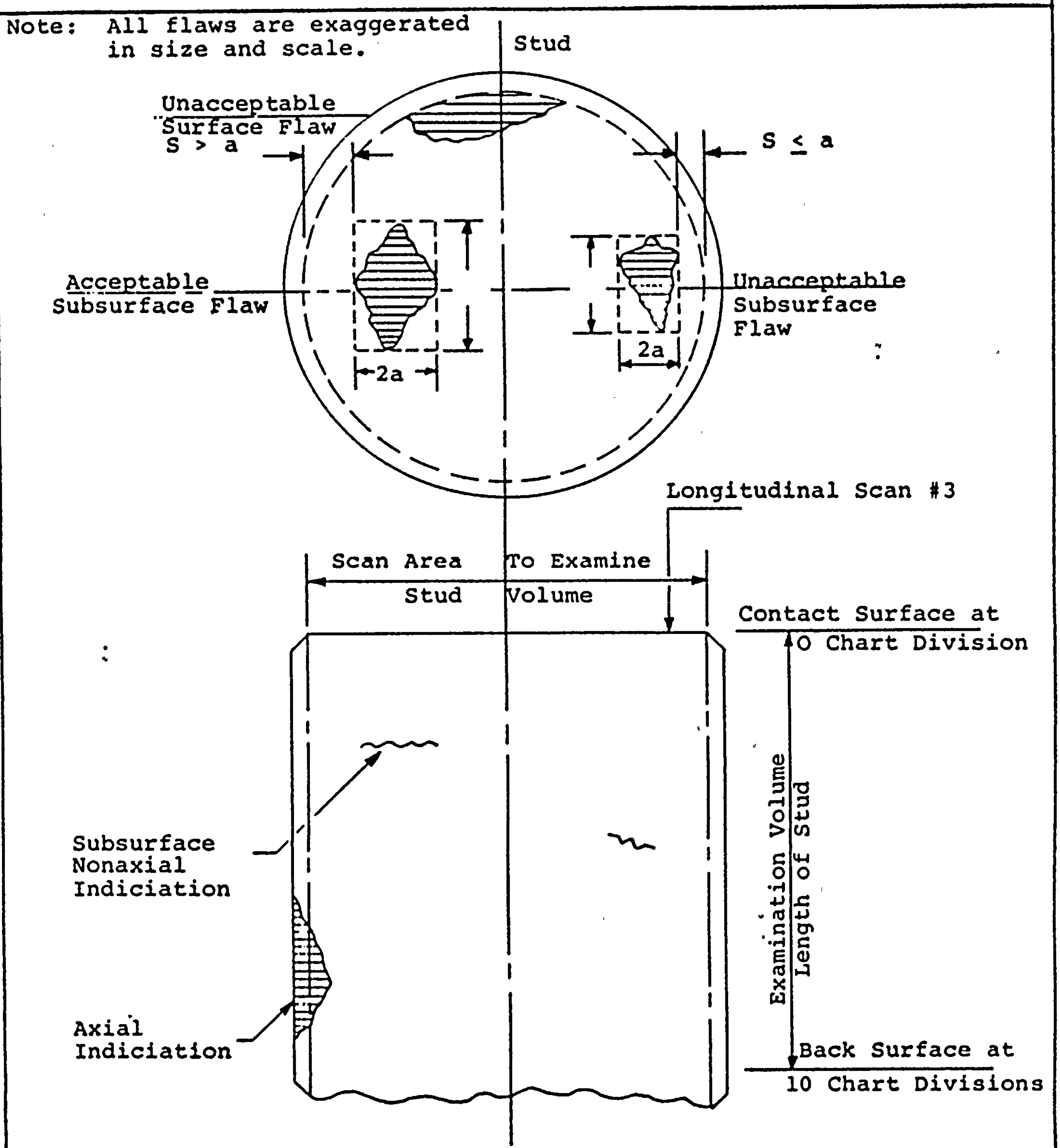
NAD = No Apparent Disc. L = Linear G = Geometry S = Spot M = Multiples

Scan	Type	Disp.	Scan	Type	Disp.	Scan	Type	Disp.
.0	PT							
1	Visual		7			13		
2	Base Metal		8			14		
3			9			15		
4			10			16		
5			11			17		
6			12			18		

Scan	Description of Indications

Sketch

FIGURE 3



Component Stud Scanning

FIGURE 4

Lambert • MacGill • Thomas, Inc.
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14030 Elvira St.
Saratoga, Ca. 95070
408-867-4109

Job Location ____________

Report No ____________

Exam Date ____________

NOTIFICATION OF REPORTABLE INDICATION

Part I - LMT Findings

LMT Job No. ____________ I.D.# ____________ ISO No. ____________

NDT Method: UT _____ PT _____ MT _____ ET _____ VT _____

Description of Indication: (Sketch/photograph attached Yes __ No __)

Examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Field Supervisor Date:

Notification Acknowledged by
Client Representative: Date:

Part II - Re-examination

Findings: (Sketch/photograph attached Yes __ No __)

Re-examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Supervisor Date:

Closed
Client Representative Date:

FIGURE 5

TABLE IWB-3515.1
ALLOWABLE PLANAR INDICATIONS

Materials: SA-193 Grade B7, SA-320 Grade L43, SA-540 Class 3 Grade B23, B24 that meet the requirements of NB-2333

Diameter Range: Nominal Sizes Greater than 4 in.

Aspect Ratio, a/ℓ[1]	Subsurface[2] Indications, a, in.
0 0	0.10
0.10	0.10
0.20	0 15
0.30	0.15
0.40	0.20
0.50	0.25

Diameter Range: Nominal Sizes 2 in. and Greater, But Not Over 4 in.

Aspect Ratio, a/ℓ[1]	Subsurface[2] Indications, a, in.
0.0	0 075
0.10	0 075
0.20	0.10
0.30	0.10
0 40	0.15
0.50	0.18

NOTES:
(1) Dimensions a and ℓ are defined in Fig. IWB-3515.1. For intermediate flaw aspect ratios, a/ℓ, linear interpolation is permissible.
(2) The total depth of an allowable subsurface indication is twice the listed value.

FIGURE 6

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San Jose, Ca. 95112
408-297-8766

WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-33 Revision No. 5

Procedure Title ULTRASONIC EXAMINATION OF MAIN STEAM FLUED HEAD ATTACHMENT WELDS

LMT, Inc. QA Review and Approval DBMacGill Level III 3-17-81
(Quality Assurance Officer)

Client Approval DPRamey, ISI Engineer WNP-2 4/8/81

Authorized Nuclear Inspector Approval [illegible] 4-8-81

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP 02	ISI ENGINEER DP Ramey	DATE 3/24/81
CONTRACT NO. C-14402	TITLE PSI Services for NSSS & Related Nuclear Piping	
CONTRACTOR LMT, Inc		

DOCUMENT TITLE	REV.
UTP-33 UT Examination of Main Steam Flued Head Attachment Welds	5

PREVIOUSLY REVIEWED [X] YES [ ] NO (DATE IF YES) 6-26-80

PREVIOUSLY APPROVED [X] YES [ ] NO (DATE IF YES) 6-26-80

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

Correct Step X. D. 1. a) and Figure 2 pg 23 to calibration Block as built condition

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
* D. W. Porter 3/30/81 — SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER		X		
N/A — PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR				
[signature] 3/30/81 — SUPERVISOR, ISI/NDE, GENERATION SERVICES		X		
[signature] 4/1/81 [signature] 4-1-81 — MANAGER, QUALITY SERVICES		X		

NOTES/COMMENTS:

Pg 12 X. D. 1. should be Figure 2.

Pg 13 X. E should be Figure 2.

Pg 23 Figure 2: Add surfaces 1, 2, 3 and 4 as shown.

ANI-I REVIEW: [signature] 4-3-81

WP-702 EDP 9.0

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Testing • Engineering • Service • Training
771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

TITLE: ULTRASONIC EXAMINATION OF MAIN STEAM FLUED HEAD ATTACHMENT WELDS

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the intent of the ASME Boiler and Pressure Vessel Code, Section XI, for the straight beam and angle beam contact ultrasonic examination of main steam flued heads.

B. Scope

This procedure is applicable to the manual longitudinal and shear wave examination of the main steam flued head attachment welds, performed from the outside surfaces.

II. REFERENCES

A. This procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;
   a) Section V, "Nondestructive Examination", 1974 edition, addenda through Summer 1975.

QUALIFICATION:

Approved for use [signature] / Level III 3/16/81
[signature] Level III 3-17-81

II. A. 1. b) Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components", 1974 edition, addenda through Summer 1975.

2. American Society for Nondestructive Testing;

a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification in Nondestructive Testing."

3. a) LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

b) LMT Operating and Quality Assurance Manual, Revision 12, approved for the WNP-2 Preservice Inspection by WPPSS.

III. DEFINITIONS

Flued Head: The fitting that connects the process pipe to the containment penetration sleeve which is used to pass process piping through the nuclear containment vessel wall (see Figure 1).

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

IV. B. The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a successful calibration.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualifications as per the Procedure Qualification.

B. As a minimum, examination teams shall consist of one Level II examiner and one Level I examiner, or one Level II examiner and one NDE Trainee as defined in LMT Procedure QA-6.

C. Personnel shall be qualified and certified according to the requirements of ASME XI, SNT-TC-1A, and LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Ultrasonic testers shall be of the pulse echo type. Instruments shall have an amplitude display linear within 5% of calibrated screen height over 80% of that

VII. A. height; and an attenuator, stepped in increments of 2 dB or less, which is accurate over the range of the test to ±20% of nominal value. Instruments shall have had their internal alignment and calibration verified within 90 days of any implementation of this procedure.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

B. Connecting cables shall be coaxial, and their length limited to less than that at which significant signal degradation (2 dB) occurs, but shall not exceed 200 feet.

C. Electronic recording equipment shall be electronically aligned within 180 days of use.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

D. Search units shall be certified by the manufacturer as to essential properties, including bandwidth, damping, center frequency within 10% of nominal, and relative gain.

1. A record of search unit properties shall be available at the jobsite for WPPSS audit.

2. The angle beam search unit wedges shall be checked prior to each day's use to determine actual beam angle in metal when checked on a standard reference

VII. D. 2. block, such as an IIW or DSC. The actual beam angle shall be recorded and shall be 45°, ±2°, or 60°, ±3° to be acceptable for initial or further use. Other beam angles shall be within ±3° of their nominal.

3. The results of examinations performed with angle beam search units which meet the above requirement are acceptable provided the search unit beam angle on subsequent checking is within ±3° of the nominal angle. Should this tolerance not be met on subsequent checking, determination of the need for re-examination shall be made and the basis for the decision documented.

4. Search units shall be selected according to Table 1. Additional search units may be used for evaluation or in unusual circumstances; however, such use shall be documented by an approved Field Change to this procedure as per LMT, Inc. Quality Assurance Procedure QA-5, "Procedure Generation and Control."

Material	L-wave Examination		Angle Beam Examination		
Thickness	Size	Frequency	Size	Frequency	Angle
Over 2.5"	.5" to 1"	1 MHz to 2.25 MHz	.5"x.5" to 1.5"x1.5"	1 MHz to 2.25 MHz	45° and 60°

Table 1

VII. E. Couplant materials shall be as low as practicable in sulfur and halogen content. Certification shall be provided on a batch basis for each brand name of couplant. Analysis for halogens and sulfur shall be made according to ASTM D-129-64 and ASTM D-808-63.

1. Residual halogens and sulfur shall not exceed 1% by weight.
2. Certification, by batch number, for each batch of couplant used, shall be maintained on file at the jobsite.

F. The WNP-2 Calibration Block UT-40 shown in Figure 2 shall be used.

1. The identity of the calibration block shall be recorded on each Calibration and Examination Report form (see Figures 3 and 4).

VIII. PREPARATION

A. Documentation

1. The following preliminary documentation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before beginning any examination program:
   a) Procedure Qualification
   b) Calibration Sheets

VIII. A. 1. c) Inspection Reports

d) Material and Equipment Certifications

e) Personnel Certifications

f) NRC Form 4 (operating nuclear plants only)

g) NRC Form 5 (operating nuclear plants only)

h) Status Indicators (Hold tags)

i) Radiation Work Permits (when applicable)

B. Physical

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

   a) Insulation removal

   b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

   c) Cleanup requirements

   d) Safety precautions (other work in area, etc.)

C. Surface Preparation

1. Responsibility

   It shall be the responsibility of the Level II examiner to determine the need for surface preparation.

2. Surfaces shall be sufficiently smooth and clean so that a meaningful examination can be performed.

VIII. C. 3. Welds shall be identified and all required marking procedures completed before performing any examinations.

IX. LIMITATIONS

This procedure is for use on the WNP-2 main steam flued head fittings; it is not adaptable to other applications without modification.

X. CALIBRATION

A. Test calibration is performed on a complete system. Any change in the ultrasonic instrument, transducer cable, or transducer requires test recalibration. A change in qualified personnel, recording instrumentation, or recorder connection cable requires a calibration check; however, instrument alignment verification need not be made with the transducer used for testing.

B. Instrument alignment verification for screen height and amplitude control linearity shall be performed daily before the day's examinations.

1. Instrument Linearity Verification

a) Position the search unit on a calibration block to obtain two echoes with a 2:1 amplitude ratio.

X. B. 1. b) Set the larger echo to 80% of calibrated screen height.

c) Vary the amplitude of the larger echo from 100% to 20% of calibrated screen height in 10% increments.

d) Note that at each increment the smaller echo remains 1/2 the larger within a tolerance band of ±5% of full screen height.

e) Record successful performance of the verification on a Calibration Report form (Figure 3).

2. Attenuator Linearity Verification

a) Position the search unit to obtain an 80% of full scale echo on the calibrated screen.

b) Adjust the sensitivity control to decrease the system gain by 6 dB and 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

c) Position the search unit to obtain a 40% of full scale echo on the calibrated screen.

d) Adjust the sensitivity control to increase the system gain by 6 dB. Compare the response with

X. B. 2. d) Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full screen.

e) Position the search unit to obtain a 20% of full scale echo on the calibrated screen.

f) Adjust the sensitivity control to increase the system gain by 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

g) Record successful performance of the verification on a Calibration Report form.

Indication Set	Gain Change	Indication Tolerance Limits
80%	-6 dB	32% to 48%
80%	-12 dB	16% to 24%
40%	+6 dB	64% to 96%
20%	+12 dB	64% to 96%

Table 2

X. C. Straight Beam Test Calibration (Reference Figure 2)

1. Calibration shall be performed on WNP-2 Block UT-40 whose temperature is within 25°F of that of the main steam flued head to be examined.
2. Sweep Range Calibration for the L-wave Scan from the Plane Surface.
   a) With the search unit on surface 1, position the responses from T/4 (hole No. 1) and 3T/4 (hole No. 3) holes at 2 and 6 screen divisions, respectively.
3. Distance Amplitude Correction for the L-wave Scan from the Plane Surface.
   a) Position the search unit on surface 1 to obtain the maximum response from the hole giving the highest amplitude signal.
      (1) Set this response to 80% of full screen height. Mark the response point on the screen.
      (2) Without further adjusting the gain, obtain and mark on the screen the responses from the other holes.
   b) Connect the responses with a smooth curve which shall terminate when the signal-to-noise ratio

X. C. 3. b) is less than four. This is the Plane Surface L-wave Primary Reference Response.

c) Obtain, record, and mark on the tester screen the response of the 1/8" side drilled hole in an IIW-2 block or the No. 5 hole in a Rompas block, if used.

D. 1. Sweep Range Calibration for L-wave Scan from the Circumferential Surface (Reference Figure 1)

a) With the search unit on surface 2, position the responses from hole 2 and hole 4 at 1.5 and 6.8 divisions of the tester horizontal scale.

2. Distance Amplitude Correction for L-wave Scan from the Circumferential Surface.

a) Using surface 2, position the search unit to obtain the maximum response from the hole giving the highest amplitude signal.

(1) Set this response to 80% of full screen height. Mark the response point on the screen.

(2) Without further adjusting the gain, obtain and mark on the screen the responses from the other holes.

b) Connect the responses with a smooth curve which shall terminate when the signal-to-noise ratio

X D. 2. b) is less than four. This is the Circumferential Surface L-wave Primary Reference Response.

c) Using surface 3, and without further adjusting the gain, obtain and mark on the screen the response from hole 4.

d) Obtain, record, and mark on the tester screen the response of the 1/8" side drilled hole in an IIW-2 block or the No. 5 hole in a Rompas block, if used.

E. <u>Angle Beam Test Calibration (45° and 60°</u>)

(Reference Figure 1)

1. Calibration shall be performed from surface 4 of Basic Calibration Block WNP-2, UT-40, whose temperature is within 25°F of that of the main steam flued head to be examined.

2. Sweep Range Calibration

a) Position the responses from the T/4 (hole 5) and 3T/4 (hole 1) holes to 2 and 6 screen divisions, respectively.

3. Distance Amplitude Correction

a) Position the search unit to obtain the maximum response from the hole (1, 4, 5) giving the highest amplitude.

X. E. 3. a) (1) Set this response to 80% of full screen height. Mark the response point on the tester screen.

(2) Without further adjusting the gain, obtain and mark on the screen the response from the other holes (1, 4, 5).

b) Connect the responses with a smooth curve which shall terminate when the signal-to-noise ratio is less than four. This is the Primary Reference Response.

c) Using surface 1, position the 45° search unit to obtain maximum response from the notch. Mark this response on the tester screen.

d) Obtain, record, and mark on the tester screen the response of the 1/8" side drilled hole in an IIW-2 block or the No. 5 hole in the Rompas block, if used.

XI. <u>PERFORMANCE</u>

A. <u>Calibration Verification</u>

1. Calibration shall be verified before and after each examination, with any change in test personnel, and at intervals not to exceed four (4) hours.

XI. A. 2. Verification shall be made using the response of the basic block or using the verification block response, as per Section X, for a single point amplitude and range check.

3. The response within 2 dB and 10% of the original vertical and horizontal screen values respectively shall be considered proof of calibration.

4. An unacceptable calibration check shall be cause for full examination of the test system to determine the reason for the calibration change. Typical causes for calibration change are ambient temperature effects on transducers and electronics, control settings inadvertently changed, and loss of couplant between the transducer and wedge. If, in the judgment of the examiner, the cause of the calibration change has been corrected or may be compensated for by a change in control settings, calibration may be restored using the calibration check response.

5. Any examination that has been performed in a non-calibrated condition shall be repeated.

6. Record the time(s) at which verification is performed on the Calibration Report form (Figure 3).

XI. B. Sensitivity

1. Scanning sensitivity shall be at least two times (2x) that of the Primary Reference Response.
2. Penetration of straight beam energy shall be verified by a back surface echo, where geometry permits (see Figure 1).

C. Coverage

1. The material through which angle beams pass shall be scanned with a straight beam, maintaining a 50% to 80% back reflection amplitude, when geometry permits (see Figure 1).
2. The weld and the entire flued head shall be scanned with a calibrated straight beam, applied from both the outer cylindrical and plane surfaces (see Figures 5 - 7).
3. The weld and flued head shall be scanned in four (4) directions by angle beams at 45° and 60°, applied from the outer plane surfaces of the fitting (see Figures 8 - 12).
4. Overlap between parallel scans shall be nomionally 15% and in no case shall be less than 10%.

D. Directions

1. There shall be four (4) angle beam scans perpendicular to the weld; two 45° and two 60° in each direction.

XI. D. 2. There shall be four (4) angle beam scans parallel to the weld; two 45° and two 60° in each direction.

3. Scans shall be identified according to the conventions of Figures 5 - 12.

E. Speed

1. Scanning speed shall not exceed four inches per second.

F. Limitations

1. Physical or other limitations that prevent full compliance with Paragraph XI. C. and D. shall be recorded on the Examination Report form (Figure 4).

G. Automatic Alarms

1. Automatic alarms may be used as an aid to the examiner.

XII. EVALUATIONS

A. Methods

1. For each indication that exceeds 50% of the reference level, the following information must be recorded.

a) Peak amplitude (% DAC) with corresponding range to indication (inches), search unit position, and search unit direction.

XII. A. 1. b) Range and transducer position at DAC amplitude points;

c) Length of reflector.

B. Evaluation Criteria

1. Any indication exceeding 100% of the Primary Reference Distance Amplitude Curve shall be evaluated by the examiner to determine the extent, size location, and shape of the reflector. These parameters shall be included on the Notification of Reportable Indication form QAF-16 (Figure 13).

C. Reference System for Recording Indications

1. The reference system of Figure 1 shall be used to locate indications. Reference markers will be placed at eight equally spaced locations around the flued head fitting on the circumferential tapered surface beginning with 0 at Top Dead Center (TDC).

D. Acceptance Criteria

1. The acceptance criteria for ferritic piping contained in Paragraph IWB-3514 of ASME Section XI, 1974 edition, addenda through Summer 1975, summarized in the table drawn in Figure 14 shall be applied to the examination.

XIII. RECORDS

A. A Report of Visual and Ultrasonic Examination (Figure 4) shall be prepared for each examination angle of each flued head. These reports shall reference the appropriate Report of Ultrasonic Calibration (Figure 3).

B. Oscillograph chart records shall be made of all examinations.

1. Chart records used in indication analysis shall utilize two channels, one corresponding to vertical deflection of the tester signal and the other to horizontal.

   a) These channels shall be calibrated to match the oscilloscope display. That is, an indication 90% of vertical amplitude appearing at five divisions on the tester screen should have a nine division deflection on one chart channel and a five division deflection on the other.

2. Chart records shall include pre and post test calibration checks made at the same scanning speed as the test.

3. Location and other pertinent information shall be manually noted on each chart.

XIII. B. 3. a) Pertinent information includes, but is not limited to, date, time, item, equipment, examiners, scans, gain, and recorder settings and speed.

C. Recording Conventions

Ultrasonic scans and the location of indications shall be recorded according to Figure 1.

D. Other types of recording, such as event or alarm monitoring, may be used as an aid to the examiner where feasible.

XIV. REVIEW

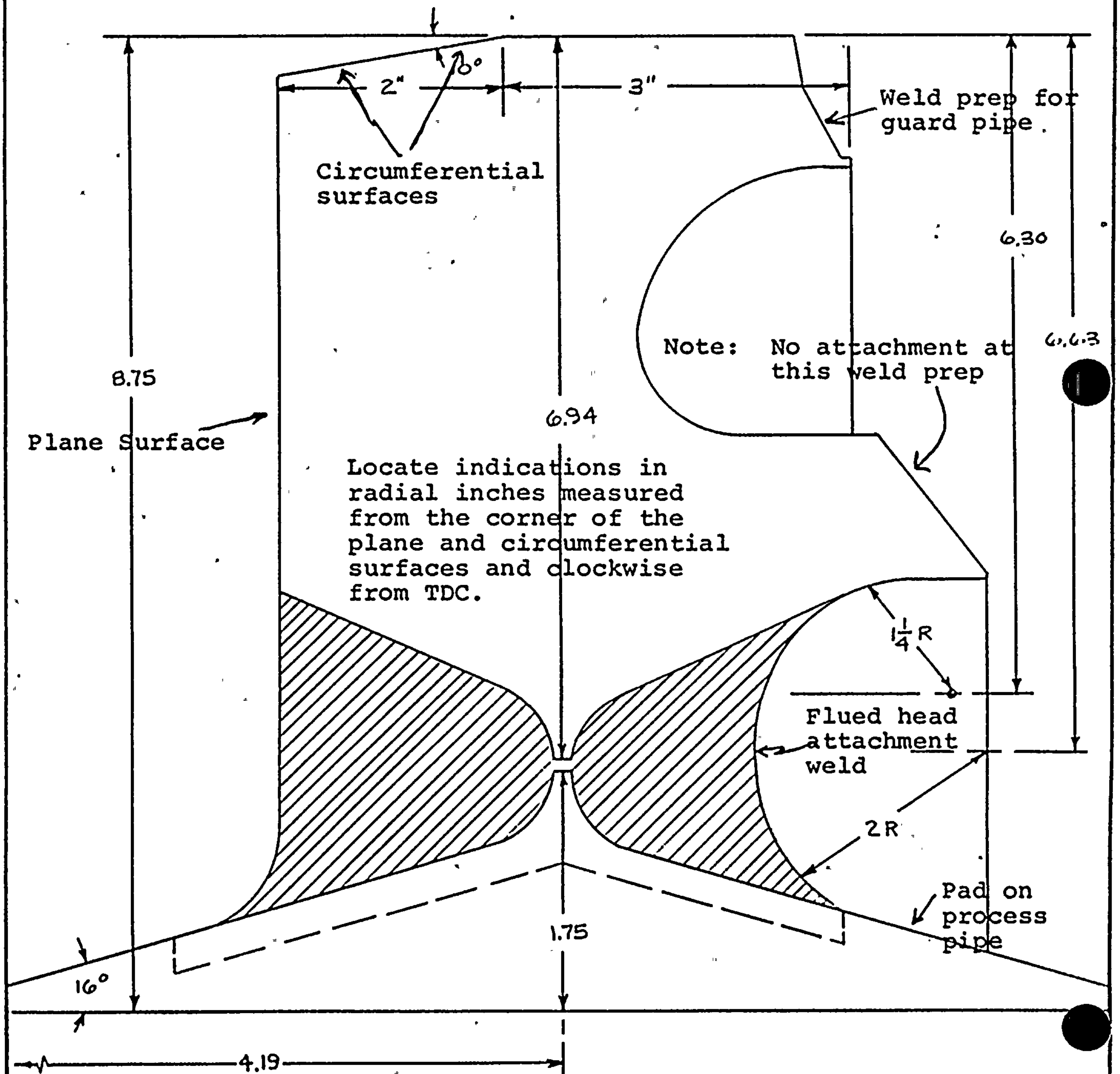
A. Examination reports shall be subject to review by an assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the final LMT review, the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the Authorized Nuclear Inspector.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

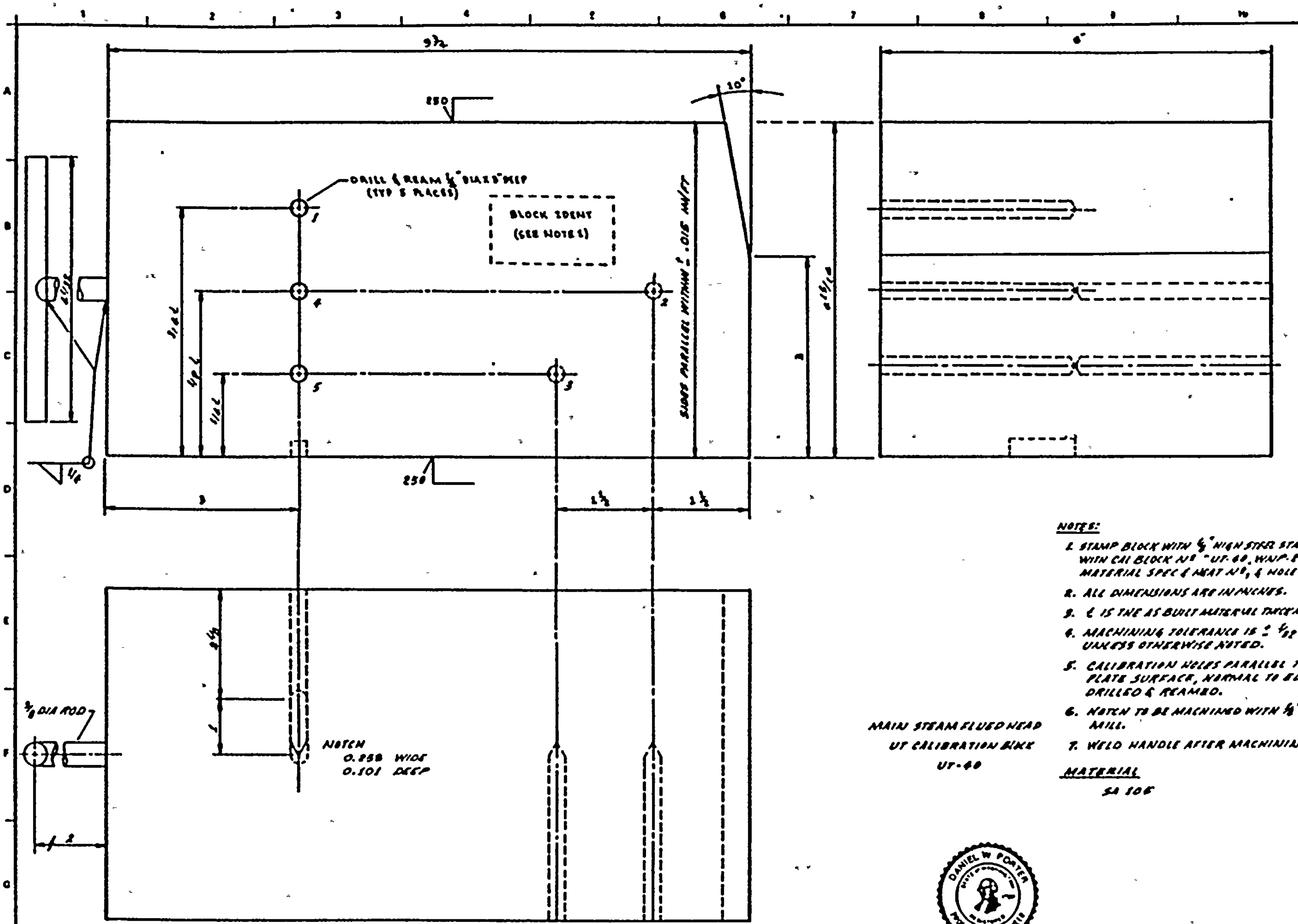
A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Coordinator. Additional reports which may include examination documentation as reference material shall be generated from copies.

XV. B. Field storage facilities shall provide a safe storage area, and access to the files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.



FLUED HEAD

Figure 1



MAIN STEAM FLUED HEAD
UT CALIBRATION BLOCK
UT-40

NOTES:

1. STAMP BLOCK WITH ⅛" HIGH STEEL STAMP WITH CAL BLOCK NO "UT-40, WNP-2", MATERIAL SPEC & HEAT NO, & HOLE NOS.
2. ALL DIMENSIONS ARE IN INCHES.
3. t IS THE AS BUILT MATERIAL THICKNESS.
4. MACHINING TOLERANCE IS ± 1/32 UNLESS OTHERWISE NOTED.
5. CALIBRATION HOLES PARALLEL TO PLATE SURFACE, NORMAL TO EDGE, DRILLED & REAMED.
6. NOTCH TO BE MACHINED WITH ¼" END MILL.
7. WELD HANDLE AFTER MACHINING.

MATERIAL

SA 106

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
RICHLAND WASHINGTON 99352

WNP 2
MAIN STEAM FLUED HEAD
UT CALIBRATION BLOCK, UT-40

2		AS BUILT (PREVIOUS REV NOT AS BUILT)			
1		REVISED TO AS-BUILT STATUS			
0		ISSUED FOR CONSTRUCTION			

ENGINEER N.C. HALLAS
DRAWN K. McANDREW

NPS-UTC1 10/79

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ISO No. ________
Cal. No. ________ Time ________
Job No. ________
Date ________
Page ______ of ______

REPORT OF ULTRASONIC CALIBRATION

SIGN

Examiner/Level ________ Examiner/Level ________ Review/Level ________
Authorized Inspector ________ Customer ________

EQUIPMENT

Instrument ________ S/N ________ ReCal Due ________ Cable ________
Recorder ________ S/N ________ ReCal Due ________
Recorder ________ S/N ________ ReCal Due ________

Vertical Linearity Check Check Completed ________

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2										

Signal 2 shall equal 50% of Signal 1 ±5% of full scale

Attenuator Linearity Check Check Completed ________

Tester Gain	Set	-6	-12	Set	+12	Set	+6
Signal Amp.	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
Actual Value							

Signal amplitude must fall within listed values

Transducers

S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______

PROC

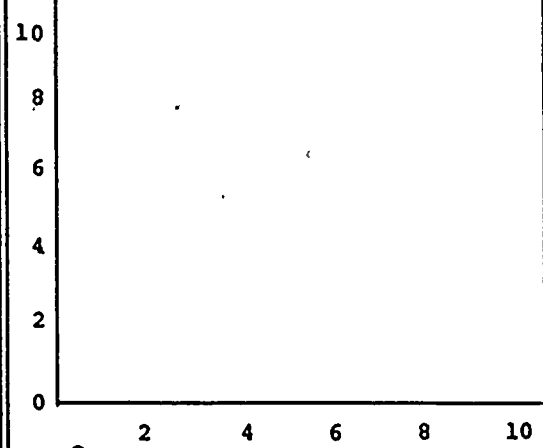
Procedure ________ Rev. ________ Date ________

CALIBRATION

Cal. Block Type ________ S/N ________ Ref. Refl. ________ Temp. ________
Verification/Ref. Blk. ________ S/N ________ Ref. Refl. ________ Temp. ________

Instrument Settings			
Gain			
Sweep			
Delay			
Reject			
Damp.			

DAC



Cal. Check Time

Figure 3

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ISO No. ____
Report No. ____
Cal.No. ____ Time ____
Job No. ____
Date ____
Page ____ of ____

REPORT OF VISUAL AND ULTRASONIC EXAMINATION

ITEM
ISI No. ____ Size ____ Material ____ S/N(s) ____
Description ____
Location ____ Preparation ____ Temp. ____

SIGN
Examiner/Level ____ Examiner/Level ____ Review/Level ____
Authorized Inspector ____ Customer ____

EQUIPMENT
Tester 1 ____ S/N ____ 2 ____ S/N ____
Recorder 1 ____ S/N ____ 2 ____ S/N ____
Transducer 1 ____ 2 ____
3 ____ 4 ____
Couplant ____ Cable ____ Marker ____ Photo ____

PROC
Calibration Procedure ____ Rev. ____
Examination Procedure ____ Rev. ____
Record Procedure ____ Rev. ____

CALIB
Calib. Blk. ____ Temp. ____ Ref. ____ Amp. ____ Swp. ____
Ref. Gain ____ Damp ____ Reject ____ Gate ____
Alarm ____ Mag. Tape Count ____ Chart ____ Cal. Check Time ____

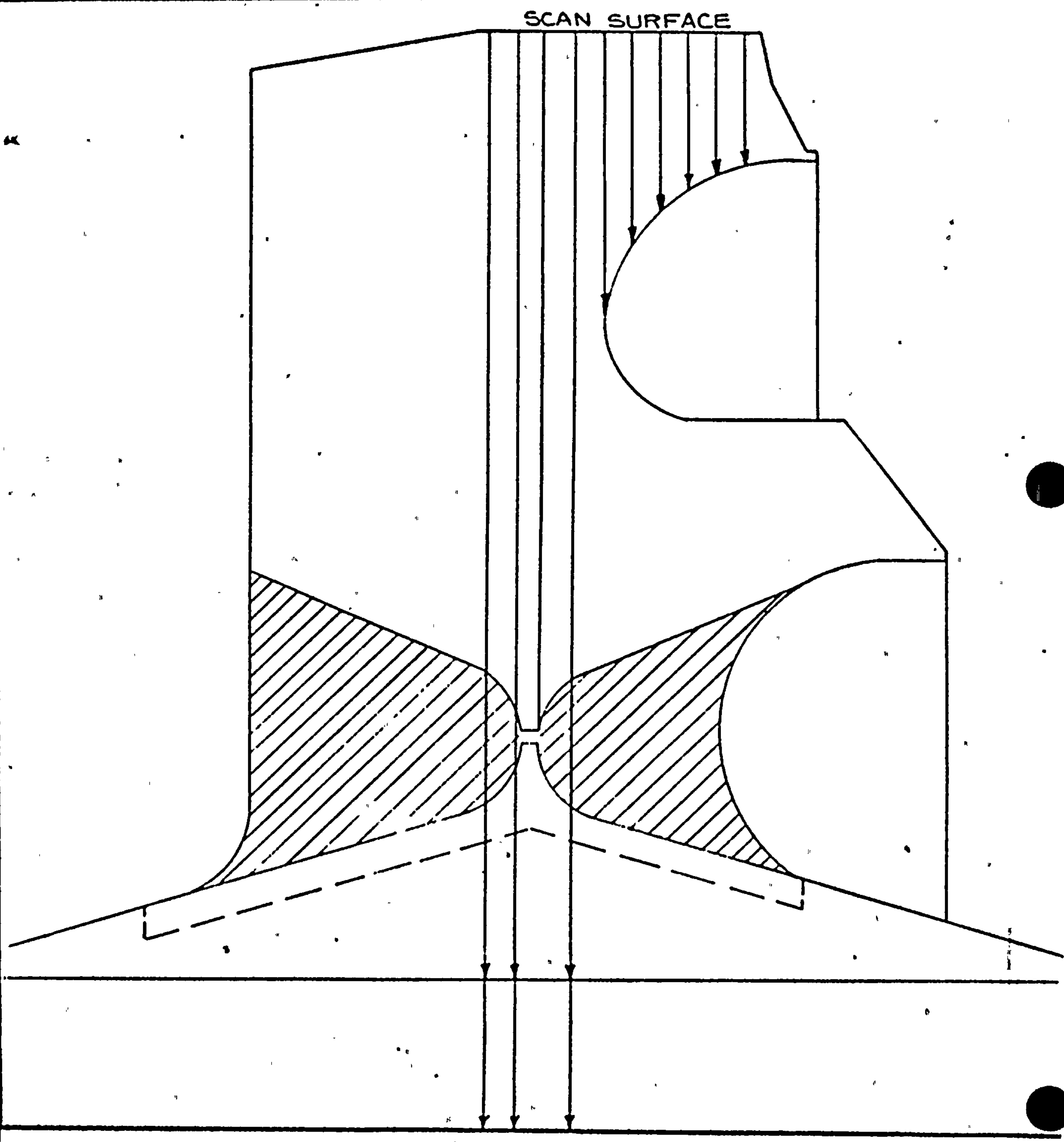
EXAMINATION
Cal. Ref. Blk. ____ Ref. Rfl. ____ Amp. ____ Sweep Position ____
Scan Gain ____ Ref. Dwg. ____ Reject Level ____ Report Level ____

NAD = No apparent disc. L = Linear G = Geometry S = Spot M = Multiples

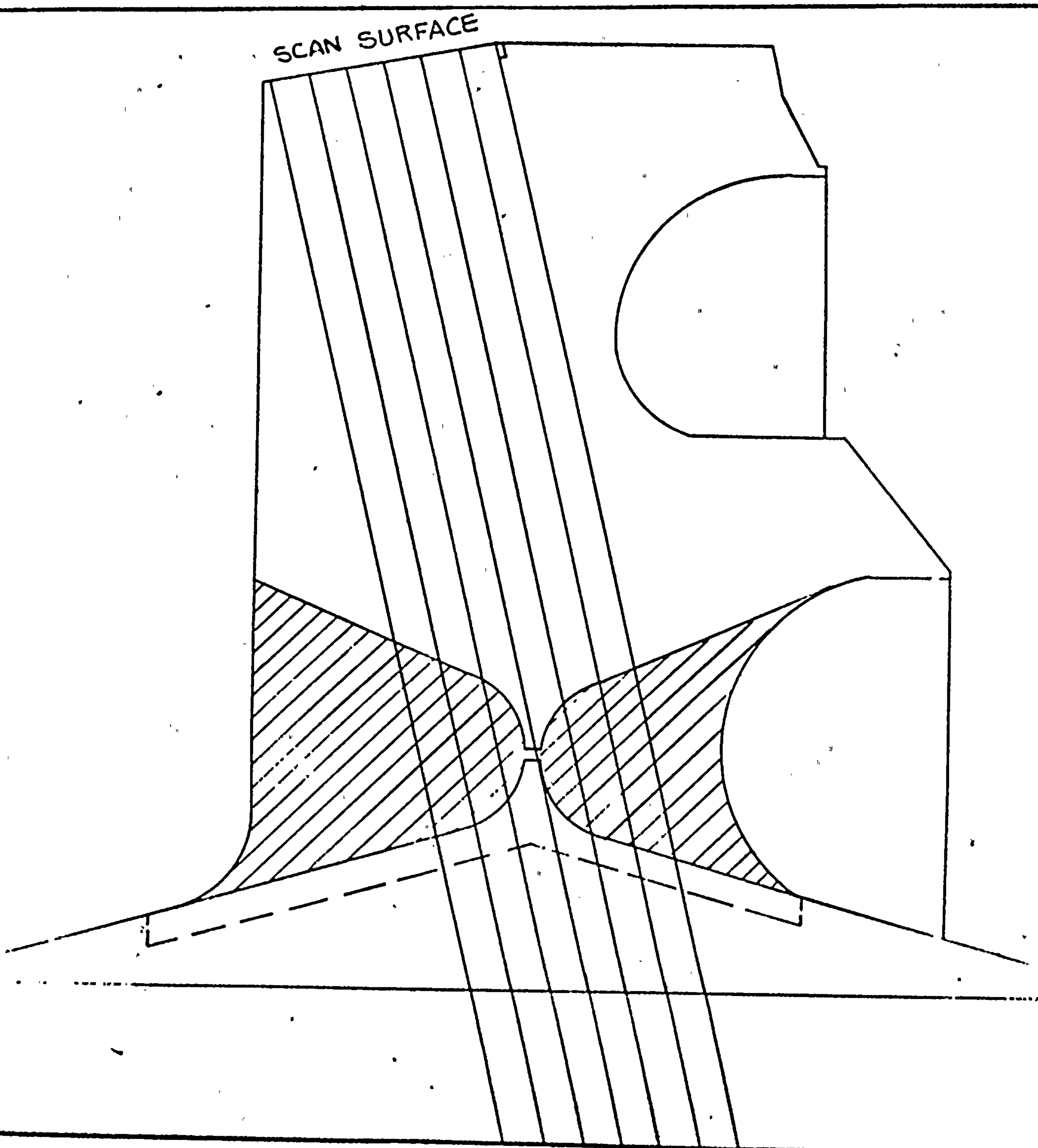
Scan	Type	Disp.	Scan	Type	Disp.	Scan	Type	Disp.
0	PT							
1	Visual		7			13		
2	Base Metal		8			14		
3			9			15		
4			10			16		
5			11			17		
6			12			18		

Scan	Description of Indications

Figure 4



SCAN 3
L-WAVE SCAN
FIG. 5



SCAN 4
L-WAVE SCAN
FIG 6

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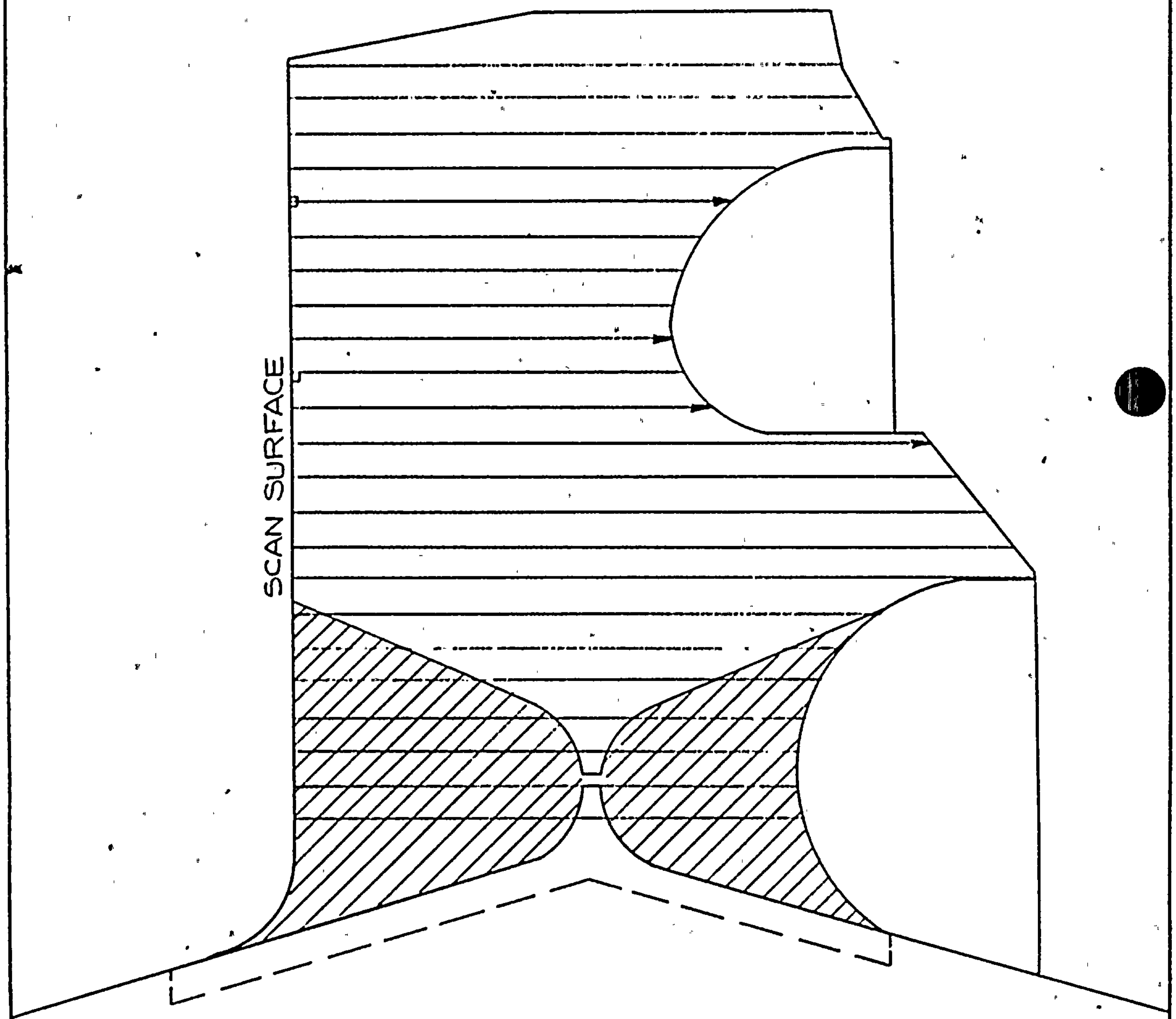
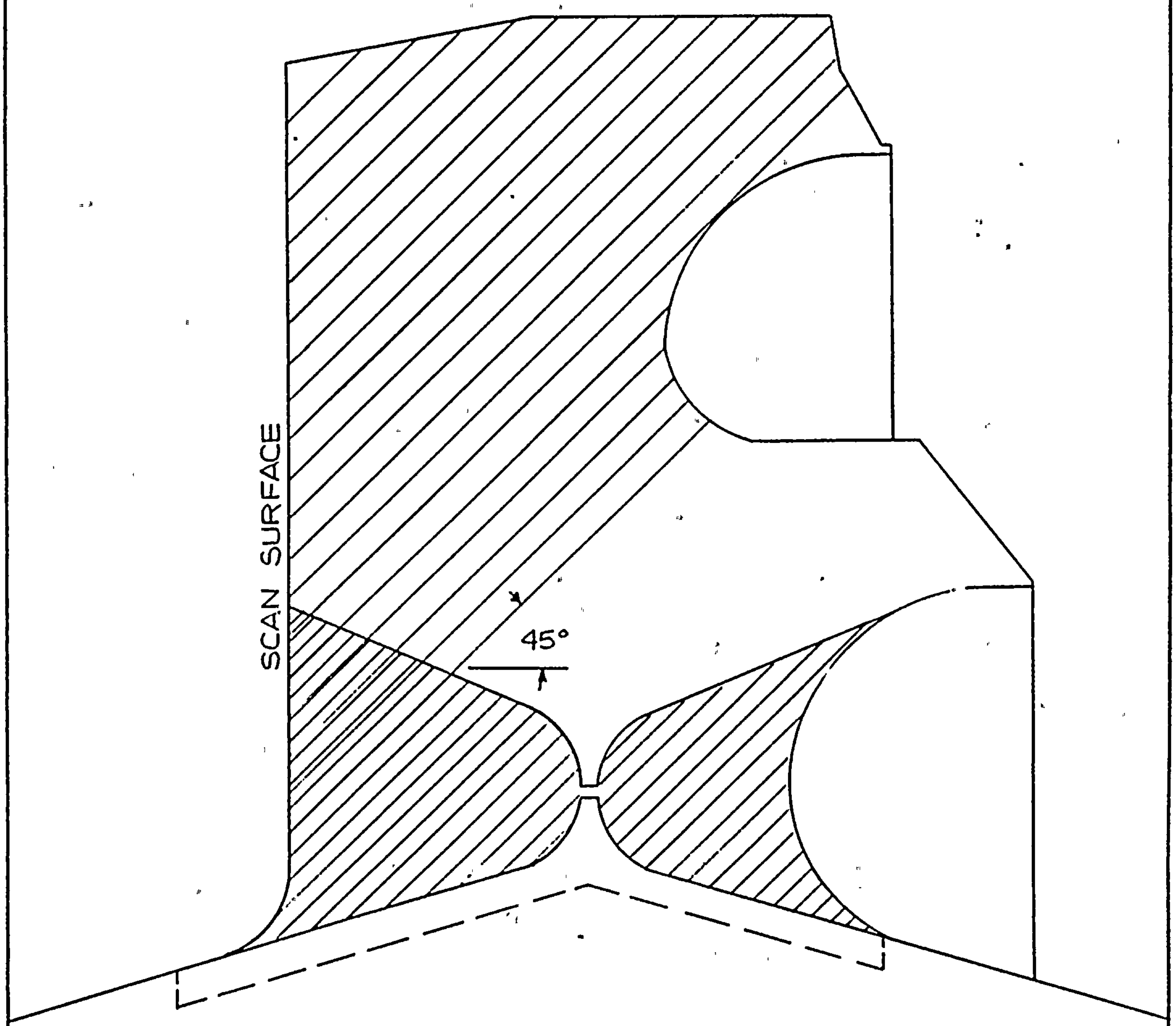


SCAN 5
L-WAVE SCAN
FIG. 7



SCAN 6
45° SCAN, PERPENDICULAR TO THE WELD OUTWARD
FIG. 8

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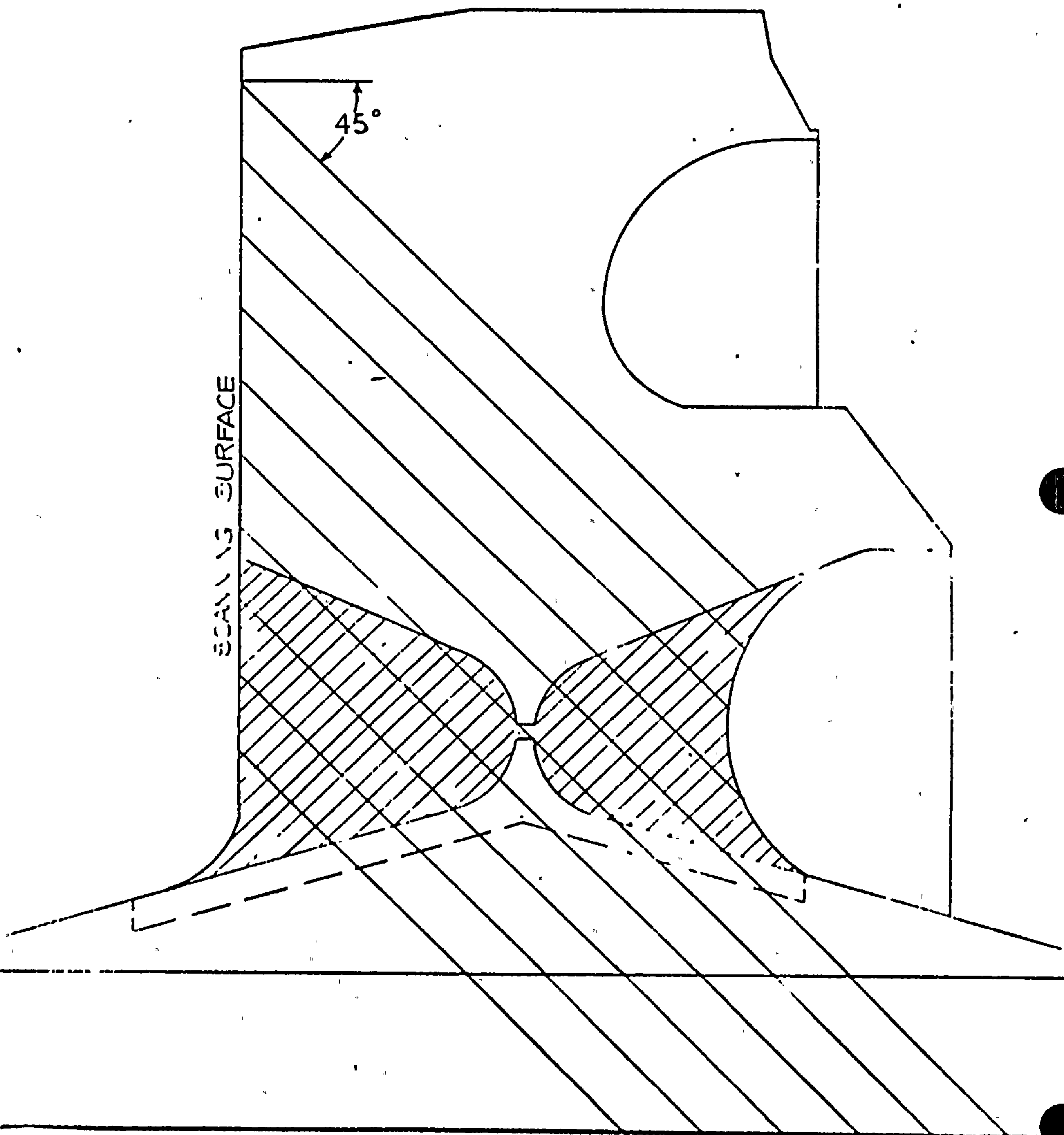

SCAN 7
45° SCAN PERPENDICULAR TO
WELD INWARD
FIG. 9

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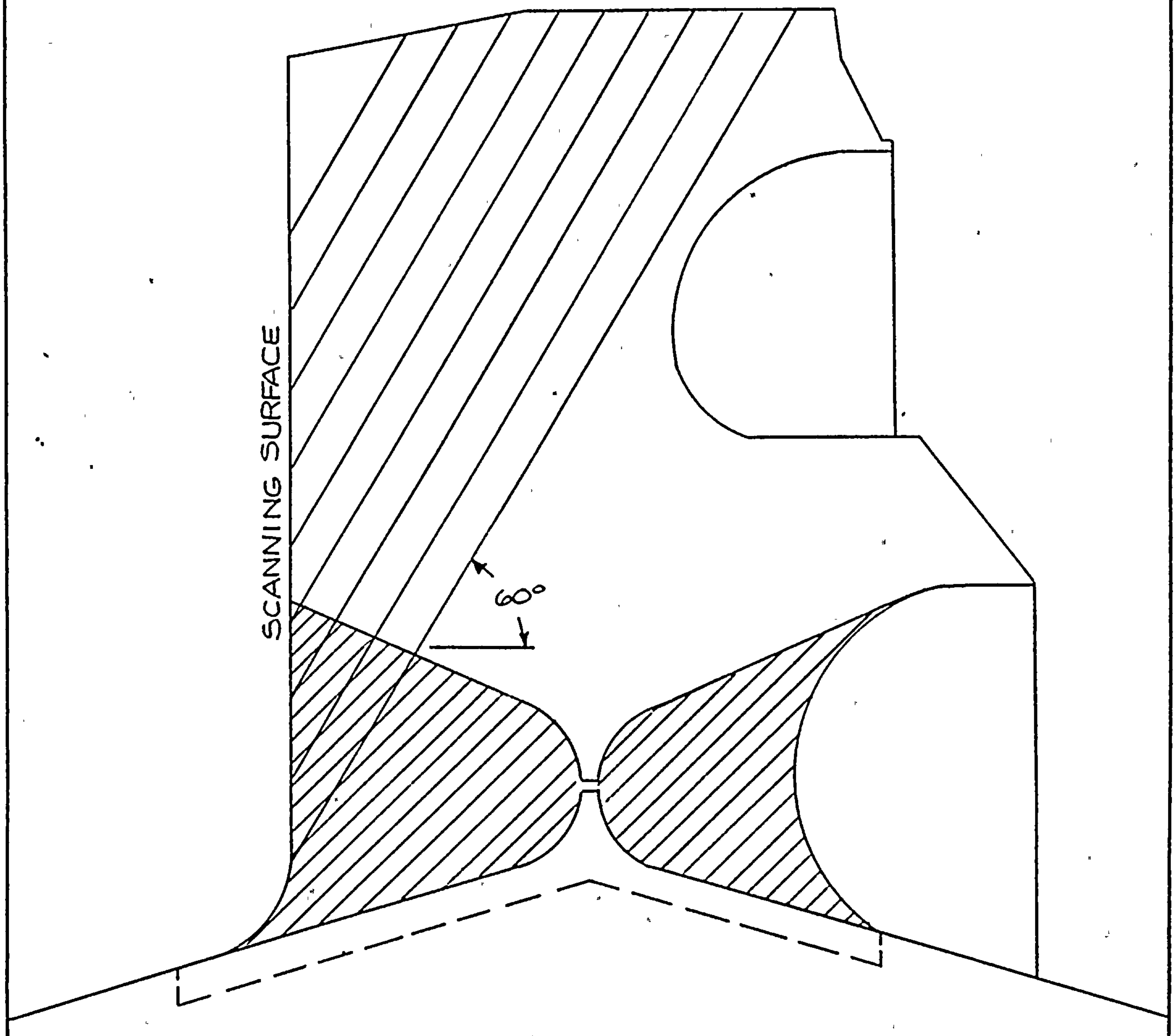

SCAN 8
60° SCAN PERPENDICULAR TO THE WELD OUTWARD
FIG. 10

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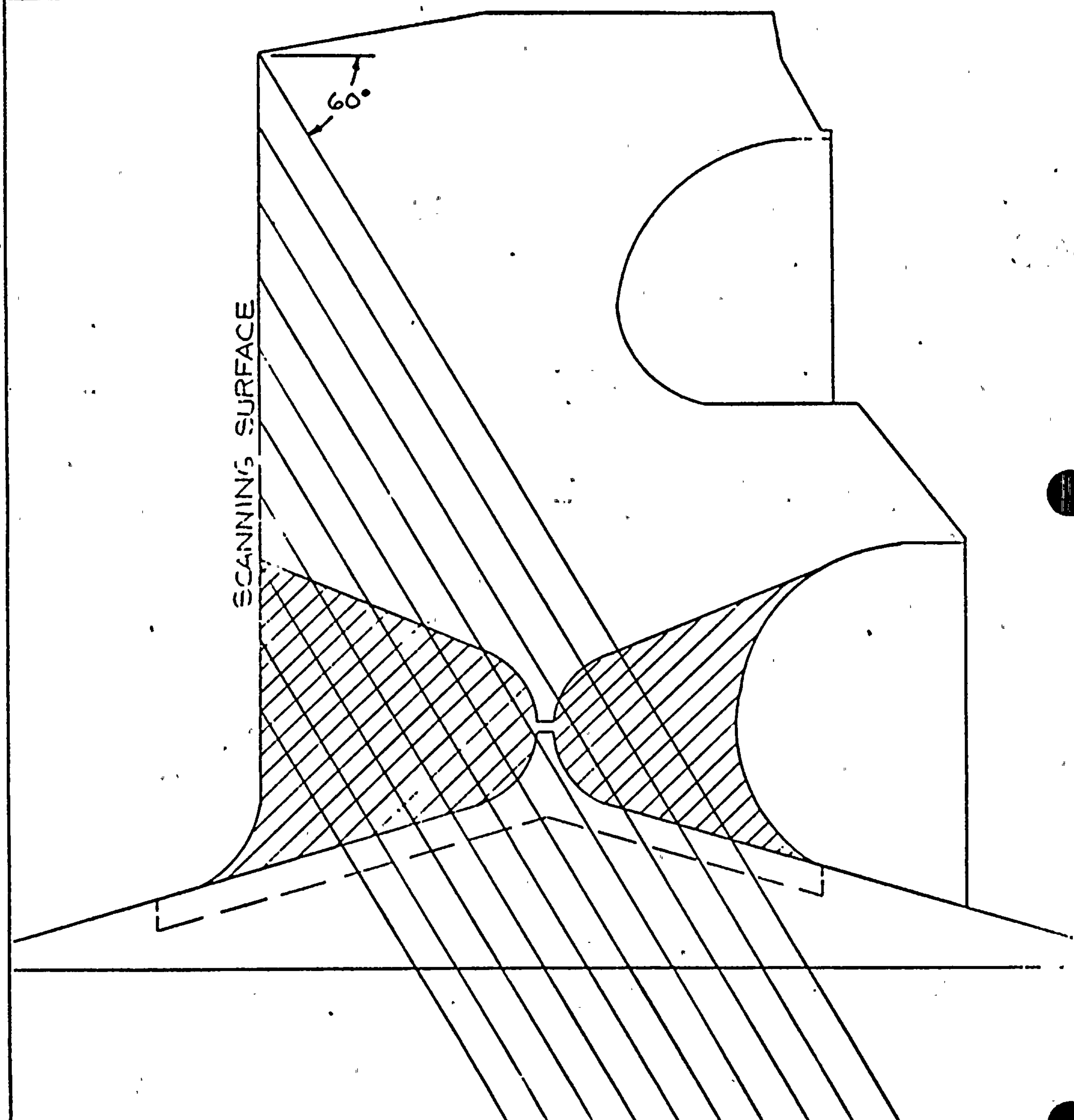
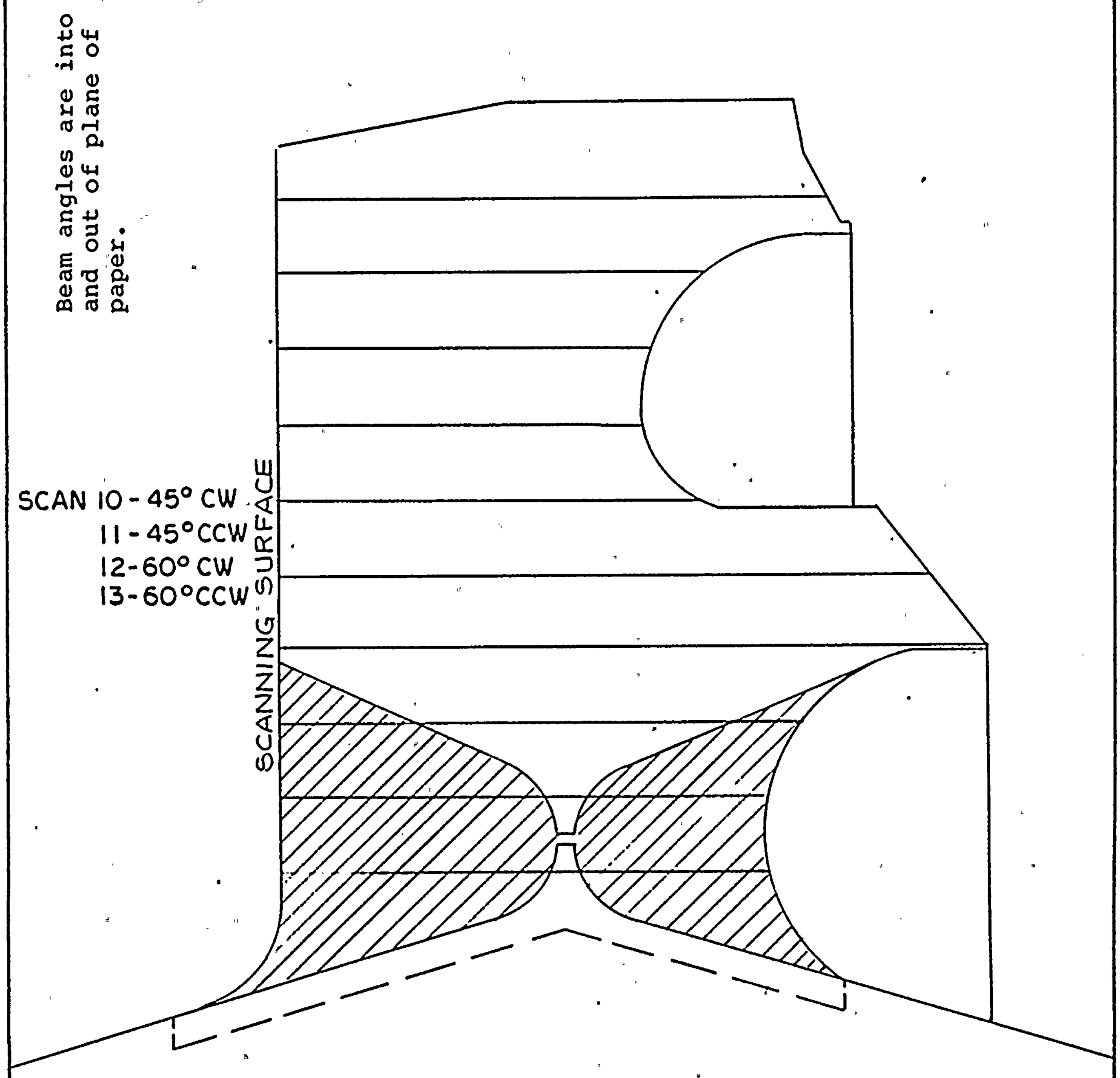


SCAN 9
60° SCAN,
PERPENDICULAR TO WELD
INWARD

FIG. 11



SCANS 10-13
45° AND 60° CIRCUMFRENTIAL SCANS CW & CCW
FIG 12

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Job Location ______________

Report No ______________

Exam Date ______________

NOTIFICATION OF REPORTABLE INDICATION

Part I - LMT Findings

LMT Job No. ____________ I.D.# ____________ ISO No. ____________

NDT Method: UT _____ PT _____ MT _____ ET _____ VT _____

Description of Indication: (Sketch/photograph attached Yes __ No __)

Examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Field Supervisor Date:

Notification Acknowledged by Client Representative: Date:

Part II - Re-examination

Findings: (Sketch/photograph attached Yes __ No __)

Re-examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Supervisor Date:

Closed Client Representative Date:

Figure 13

Material: Ferritic steels that meet the requirements of NB-2330 and a specified minimum yield strength of 50 ksi or less
Thickness Range: t, 0.1 to 6.0 in.

Nominal Wall Thickness t, in.[2]	Allowable Depth by Volumetric for Pipe Sizes <4"	Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4"	
		Surface Indications a/t, %	Subsurface Indications a/t, %[3]
Preservice Examinations			
0.1 to 0.312		. . .	. . .
Over 0.312 to 2.0		10.4 minus 0.9t	10.4 minus 0.9t
Over 2.0 to 6.0		10.4 minus 0.9t	10.4 minus 0.9t
	10%		
Inservice Examinations			
0.1 to 0.312		. . .	. . .
Over 0.312 to 2.0		15.3 minus 1.3t	15.3 minus 1.3t
Over 2.0 to 6.0		15.3 minus 1.3t	15.3 minus 1.3t

NOTES:

[1]The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

[2]t is the nominal pipe wall thickness, or the actual wall thickness as determined by UT examination.

[3]The total depth of an allowable subsurface indication is twice the listed value.

ALLOWABLE INDICATIONS

Figure 14

Date 1/8/79

Revision 0

WNP-2 PSI PROGRAM PLAN

N O T U S E D

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-17 Revision No. 1

Procedure Title MANUAL ULTRASONIC EXAMINATION OF RHR HEAT EXCHANGER WELDS

LMT, Inc. QA Review and Approval [signature] Level III 1-2-81
(Quality Assurance Officer)

Client Approval [signature] ISI Engineer 1/23/81

Authorized Nuclear Inspector Approval [signature] 1/23/80

Specific Qualification Record

LEVEL I & II EXAMINERS

Component	Examiners	Date
~~R. FEW~~ CAL. BLOCK 42 & VESSEL WELDS	R. FRADKIN/II M. KING/II	1-30-81
"	G. STRAIT/II D. RICHEY/II	1-30-81
"	T. KIMBALL/TR. R. HILYARD/I	1-30-81
"	J. MILLER/I	1-30-81

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP- 02	ISI ENGINEER D.P. Ramey	DATE
CONTRACT NO. C-14402	TITLE PSI Services for NSSS and Associated Nuclear Piping	
CONTRACTOR LMT, Inc		

DOCUMENT TITLE	REV.
UTP-17 Manual Ultrasonic Examination of RHR	
Heat Exchanger Welds	1

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) December 18, 1980 (WPLM-2-80-34)

PREVIOUSLY APPROVED ☐ YES ☒ NO (DATE IF YES)

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
DR D.W. Porter 1/19/81 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
NA PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA	NA	NA	NA
Ken J. Hansen SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
1/19/81 [signature] 1/19/80 MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

ANI(I) Concurrence D.M. Fulton 1-20-81

WP-702 EDP 9.0

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PROC. UTP-17
PAGE 1
FOLLOWING PAGE 2
REVISION 1
DATE 12/11/80

TITLE: MANUAL ULTRASONIC EXAMINATION OF RHR HEAT EXCHANGER WELDS

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of ASME Boiler and Pressure Vessel Code, Sections V and XI, for the straight and angle beam contact ultrasonic examination of full penetration welds in the WNP-2 RHR heat exchanger, shown in Figure 1.

B. Scope

This procedure is applicable to the manual, contact 45° and 60° angles and straight beam examinations of welds and the associated heat affected zones in the base metal extending for a distance of one wall thickness from the weld edge. It is limited to welds in ferritic material .75" to 1.25" in thickness, and to examinations performed from the outside surface of the component. The procedure is applicable to nozzle attachment welds.

QUALIFICATION:

Approved for use TJ Lambert 1/5/81

DB MacGill Level III 1-2-81

II. REFERENCES

A. The procedure is in compliance with the applicable portions of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code;
   a) Sections V and XI, 1974 edition, Summer 1975 addenda.
2. Applicable Code Case;
   a) Code Case 1698 removing transfer measurement.
3. American Society for Nondestructive Testing;
   a) Recommended Practice No. SNT-TC-1A, June 1975, "Personnel Qualification and Certification Programs in Nondestructive Testing."
   b) LMT, Inc. Procedure QA-6, "Qualification and Certification of NDE Personnel."
   c) LMT, Inc. Operating and Quality Assurance Manual, Revision 12, approved for the WNP-2 Preservice Inspection by WPPSS.

III. DEFINITIONS

None.

VI. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, Inc., or his designated Level III alternate, LMT, shall qualify the procedure for a particular examination.

V. PROCEDURE QUALIFICATION

A. The procedure shall be qualified for specific examinations, personnel, and equipment by performing and documenting a successful calibration. A demonstration examination of at least one area of each different geometry (shell-to-head, shell-to-flange, and nozzle-to-head welds) shall also be performed in the presence of the LMT Level III.

VI. PERSONNEL REQUIREMENTS

A. Examiners using this procedure shall have levels of qualification as per the Procedure Qualification.

B. As a minimum, examination teams shall consist of one Level II examiner and one Level I examiner or one Level II examiner and one NDE Trainee as defined in QA-6.

VI. C. Personnel shall be qualified and certified according to the requirements of ASME Sections V and XI, SNT-TC-1A, and LMT Procedure QA-6, "Qualification and Certification of NDE Personnel."

VII. <u>EQUIPMENT AND MATERIAL REQUIREMENTS</u>

A. Ultrasonic testers shall be of the pulse echo type. Instruments shall have an amplitude display linear within 5% of calibrated screen height over 80% of that height; and an attenuator, stepped in increments of 2 dB or less, which is accurate over the range of the test to ±20% of nominal value. Instruments shall have had their internal alignment and calibration verified within 90 days of any implementation of this procedure.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

B. Connecting cables shall be coaxial, and their length limited to less than that at which significant signal degradation (2 dB) occurs, but shall not exceed 200 feet.

C. Electronic recording equipment, when used, shall be electronically aligned within 180 days of use.

1. A record of calibration shall be available at the jobsite for WPPSS audit.

VII. D. Search units shall be certified by the manufacturer as to essential properties, including bandwidth, damping, center frequency within 10% of nominal, and relative gain.

1. A record of search unit properties shall be available at the jobsite for WPPSS review.
2. The angle beam search unit wedges shall be checked prior to each day's use to determine actual beam angle in metal when checked on a standard reference block, such as an IIW or DSC. The actual beam angle shall be recorded and shall be 45°, ±2° or 60°, ±3° to be acceptable for initial or further use. Other beam angles shall be within ±3° of their nominal value.
3. The results of examinations performed with angle beam search units which meet the above requirements are acceptable provided the search unit beam angle on subsequent checking is within ±3° nominal. Should this tolerance not be met on subsequent checking, determination of the need for re-examination shall be made and the basis for the decision documented.

VII. D. 4. Search units shall be selected according to Table 1. Additional search units may be used for evaluation or in unusual circumstances; however, such use shall be documented by an approved Field Change to this procedure as per LMT, Inc. Quality Assurance Procedure QA-5.

Material	L-Wave Exam		Angle Beam Exam		
Thickness	Size	Frequency	Size	Frequency	Angle
.75" to 1.25"	.25"to .5"	5 MHz*	.5"x.5"	2.25 MHz	45° and 60°

Table 1

*Five MHz is recommended to obtain flaw and near surface resolution comparable to the 2.25 MHz angle beam test.

E. Couplant materials shall be as low as practicable in sulfur and halogen content. Certification shall be provided on a batch basis for each brand name of couplant. Analysis for halogens and sulfur shall be made according to ASTM D-129-64 and ASTM D-808-63.

1. Residual halogens and sulfur shall not exceed 1% by weight.

VII. E. 2. Certification, by batch number, for each batch of couplant used, shall be maintained on file at the jobsite.

F. Calibration block shall be No. UT-42, Figure 2, with calibration reflectors as shown.

1. In order that ASME Code Case 1698 be applicable, the calibration block shall be made from material nominally identical to that being examined.

   a) The material of the calibration block and its heat treatment shall be recorded and certified.

2. The dimensions and locations of the block and the reference reflectors shall be recorded and certified.

VIII. <u>PREPARATION</u>

A. <u>Documentation</u>

1. The following preliminary documentation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before beginning any examination program:

   a) Procedure and Qualification
   b) Calibration Sheets
   c) Inspection Reports
   d) Material and Equipment Certifications

VIII. A. 1. e) Personnel Certifications

f) NRC Form 4 (operating nuclear plants only)

g) NRC Form 5 (operating nuclear plants only)

h) Status Indicators (Hold tags)

i) Radiation Work Permits (where applicable)

B. <u>Physical</u>

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before specific examinations are performed:

a) Insulation removal

b) OSHA requirements (ladders, lighting, fresh air, scaffolding, etc.)

c) Cleanup requirements

d) Safety precautions (other work in area, etc.)

C. <u>Surface Preparation</u>

1. It shall be the responsibility of the Level II examiner to determine the suitability of the surface for ultrasonic examination.

2. Surfaces should be sufficiently smooth and clean that a meaningful examination may be performed. Areas where surface conditions would interfere with ultrasonic examination shall be documented and recorded.

VIII. C. 3. Welds shall be identified and all required marking procedures completed before performing any examinations.

IX. LIMITATIONS

A. This procedure is based on ASME nuclear requirements; it may not be applicable to military, API, or AWS requirements without modification.

B. This procedure is limited to ferritic steels.

C. The heat exchanger welds have not been ground and prepared specifically for ultrasonic examination. All areas where scanning proves to be ineffective shall be documented and recorded.

X. CALIBRATION

A. Calibration is performed on a complete system. Any change in the ultrasonic instrument, transducer cable or transducer requires test recalibration. A change in qualified personnel, recording instrumentation or recorder connection cable requires a calibration check; however, instrument alignment verification need not be made with the transducer used for testing.

X. B. Instrument alignment verification for screen height and amplitude control linearity shall be perfomed before the initial examination in any given series and repeated at intervals not exceeding 90 days.

1. Instrument Linearity Verification
    - a) Position the search unit on a calibration block to obtain two echoes with a 2:1 amplitude ratio.
    - b) Set the larger echo to 80% of calibrated screen height.
    - c) Vary the amplitude of the larger echo from 100% to 20% of calibrated screen height in 10% increments.
    - d) Note that at each increment the smaller echo remains 1/2 the larger within a tolerance band of ±5% of full screen height.
    - e) Record successful performance of the verification on a Calibration Report form (Figure 3).
2. Attenuator Linearity Verification
    - a) Position the search unit to obtain an 80% of full scale echo on the calibrated screen.

X. B. 2. b) Adjust the sensitivity control to decrease the system gain by 6 dB and 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

c) Position the search unit to obtain a 40% of full scale echo on the calibrated screen.

d) Adjust the sensitivity control to increase the system gain by 6 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full screen.

e) Position the search unit to obtain a 20% of full scale echo on the calibrated screen.

f) Adjust the sensitivity control to increase the system gain by 12 dB. Compare the response with Table 2 to determine its acceptability. Estimate system response to ±1% of calibrated full scale.

g) Record successful performance of the verification on a Calibration Report form (Figure 3).

X. B. 2. g)

Indication Set	Gain Change	Indication Tolerance Limits
80%	-6 dB	32% to 48%
80%	-12 dB	16% to 24%
40%	+6 dB	64% to 96%
20%	+12 dB	64% to 96%

Table 2

X. C. Examination Calibration

1. Calibration is performed on a complete system on the appropriate basic calibration block, UT-42 (Figure 2) at the beginning of each day's testing of that material.
   a) Calibration shall be performed with the calibration block temperature within ±25°F of the material to be examined.
2. Straight Beam
   a) Calibrate the sweep range such that the left edge of the signal from the T/2 SDH appears at three divisions and the first back reflection (T) appears at six divisions. This may be set from the basic calibration block and the distance, T, shall be clearly marked on the tester scope face.
   b) Amplitude calibration for straight beam examinations of materials one inch or less in thickness is achieved by setting the response

X. C. 2. b) from the primary reference reflector at T/2 (SDH) to 50% of the calibrated scope overlay. This point shall be clearly marked on the scope, and recorded on the Calibration Report form (Figure 3).

3. Angle Beam

a) The angle beam examination should be calibrated to examine material in two beam directions, down and up. This requires a 1.5 node range calibration.

b) Calibrate the sweep range such that the first I.D., first O.D., and second I.D. signals appear at 3, 6, and 9 divisions, respectively. These points shall be clearly marked and identified during calibration.

c) Amplitude calibration shall be made using the T/2 SDH as the primary reference reflector, so that the weld root area is included in the calibration zone. This is justified on the basis of ASME XI (1974 and IWA 2240, "Alternative Examination Methods."

X. C. 3. d) Amplitude calibration shall place the maximum response from the primary reference reflector to 75%, ±5% of calibrated tester screen height. The maximum response of the reference reflector at multiple node positions shall be determined and plotted on the tester screen and on the Calibration Report form (Figure 3).

(1) The plotted response points shall be smoothly connected to form the primary reference response curve (DAC).

D. Verification

1. The response of the calibrated system to the No. 5 side drilled hole (SDH) in a Rompas or the 1/8" SDH in an IIW-2 block shall be determined and logged on the calibration record and on the tester screen.

XI. PERFORMANCE

A. Straight Beam Base Metal Examination for Laminations

1. The examination shall be performed to determine if any reflectors exist which may affect an angle beam test. Test sensitivity should be set to show a clear back reflection. The entire area through which the angle beam will pass shall be examined

XI. A. 1. and any areas giving indications equal to or greater than the remaining back reflection or areas which exhibit loss of back reflection shall be noted on the examination report; however, this is not an examination for acceptance of the part.

B. Calibration Verification

1. Calibration verification shall be performed before and after each examination, with any change in test personnel, at at least once every four hours.

2. The calibration check shall as a minimum consist of verification of the DAC curve by a single point amplitude and range check using the basic calibration block or a portable block such as the Rompas whose response has been related to that of the basic block (X.D.1.).

a) The amplitude response of the reference reflector during the calibration check shall be within ±2 dB, and its sweep location within ±10% of the calibration reference response value recorded on the calibration sheet to be acceptable.

XI. B. 2. b) An unacceptable calibration check shall be cause for full examination of the test system to determine the reason for the calibration change. Typical causes for calibration change are ambient temperature effects on transducer and electronics, control settings inadvertently changed, and loss of couplant between the transducer and wedge. If, in the judgment of the examiner, the cause of the calibration change has been corrected or may be compensated for by a change in control settings, calibration may be restored using the calibration check response.

c) Any examination that has been performed in a noncalibrated condition shall be repeated.

C. Straight Beam Examination

1. Should any geometric or other limitation make performance of all angle beam scans impractical, a calibrated straight beam examination is required.
2. Calibration verification shall be performed as required for the angle beam examination (XI.B.1. and 2.) using either the basic calibration block or the reference standard, and must meet the same requirements to be acceptable.

XI. D. Coverage

1. Girth and longitudinal examinations shall cover the weld metal and adjoining base metal for a distance of at least one plate thickness on each side of the weld (Figure 4). Nozzle-to-vessel weld examinations shall cover the weld metal and vessel side base metal for a distance of at least one plate thickness (Figure 5). This volume shall be fully examined with two parallel and two axial orinetations of the angle beam transducer and in two directions of the ultrasonic beam (Figure 8).

2. The 0° lamination scan transducer shall thoroughly cover the area of the weld and the base metal for a distance from the weld edge of five plate thicknesses (see Figures 4, 5 and 8).

E. Sensitivity

Scanning sensitivity for both angle and straight beam examinations shall be at least two times (2x) the primary reference sensitivity.

F. Scanning Speed

Scanning for both angle and straight beam examinations shall not exceed four inches per second.

G. Limitations

Physical or other limitations that prevent full compliance with the requirements of this procedure shall be recorded on the Examination Report form, Figure 6).

XI. H. Automatic Alarms

Automatic alarms or recording may be used as an aid to the examiner.

XII. EVALUATION

A. Methods

1. For each indication that exceeds 50% of the reference level, the following information must be recorded.

   a) Peak amplitude (% DAC) with corresponding range to indication (inches), search unit position, and search unit direction;

   b) Range and transducer position at 50% DAC amplitude points;

   c) Length of reflector.

B. Evaluation Criteria

1. Any indication exceeding 100% of the primary reference distance amplitude curve shall be evaluated by the examainer to determine the extent, size, location and shape of the reflector. These parameters shall be included on the Notification of Reportable Indication form QA-31 (Figure 7), and recorded on the Ultrasonic Indication Data Tabulation form (Figure 10).

XII. C. Reference System for Recording Indications

1. The reference system of Figures 1 and 8 shall be used to locate indications.

   a) Indications shall be located in inches from the appropriate reference marker.

D. Acceptance Criteria

1. Acceptance criteria contained in paragraph IWB-3511 of ASME Section XI, 1974 edition, addenda through Summer 1975, are summarized in the table drawn in Figure 9.

XIII. RECORDS

A. A report of Visual and Ultrasonic Examination (Figure 6) shall be prepared for each item examined, and shall be related to a Report of Ultrasonic Calibration (Figure 3).

B. Oscillograph chart records shall be made of all 0° straight and angle beam examinations.

1. Chart records used in indication analysis shall utilize two channels, one corresponding to vertical deflection of the tester signal and the other to horizontal.

XIII. B. 1. a) These channels shall be calibrated to match the oscilloscope display. That is, an indication 90% of vertical amplitude appearing at five divisions on the tester screen should have a nine division deflection on one chart channel and a five division deflection on the other.

2. Chart records shall include pre and post test calibration checks made at the same scanning speed as the test.

3. Location and other pertinent information shall be manually noted on each chart.

a) Pertinent information includes, but is not limited to, date, time, item, equipment, examiners, scans, gain, and recorder settings and speed.

C. Recording Conventions

Ultrasonic scans and the location of indications shall be recorded according to Figure 8.

D. Other types of recording, such as event or alarm monitoring, may be used as an aid to the examiner where feasible.

XIV. REVIEW

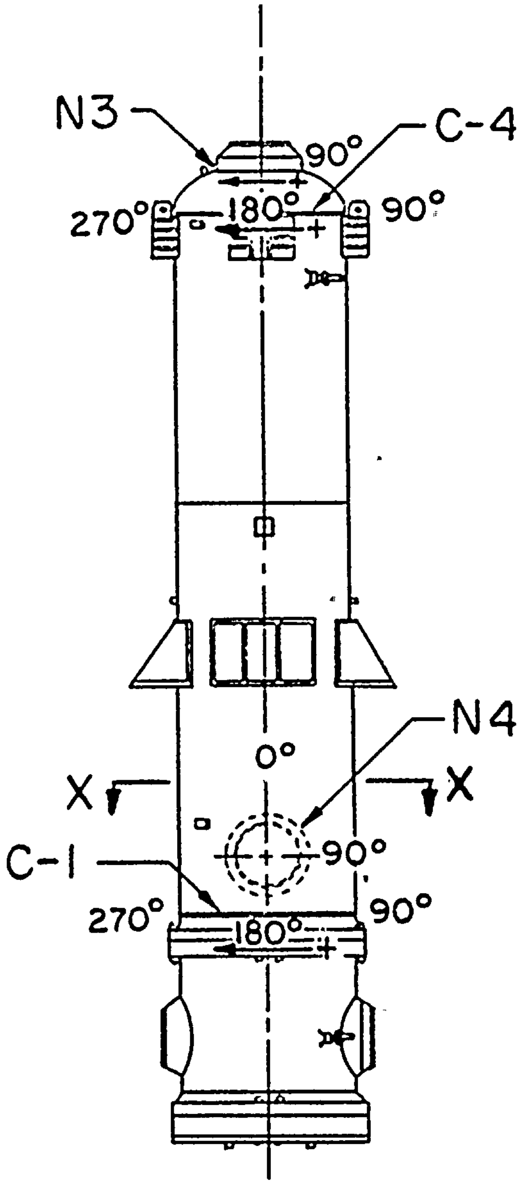
A. Examination Reports shall be subject to review by an assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the final LMT review, the reports will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the Authorized Nuclear Inspector.

XV. DOCUMENTATION STORAGE AND DISTRIBUTION

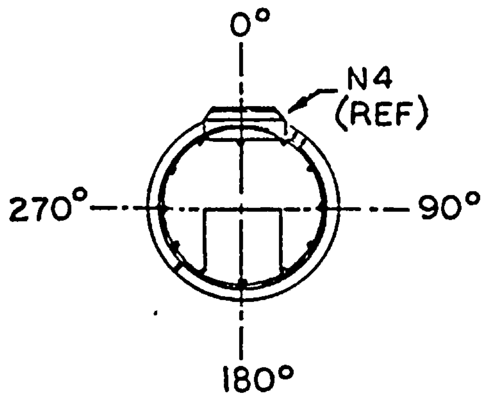
A. Original examination documentation shall become the property of WPPSS upon sign-off by the ISI Field Coordinator. Additional reports which may include examination documentation as reference material shall be generated from copies.

B. Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor, his designated representatives, WPPSS representatives, and the Authorized Nuclear Inspector.



NOTE:

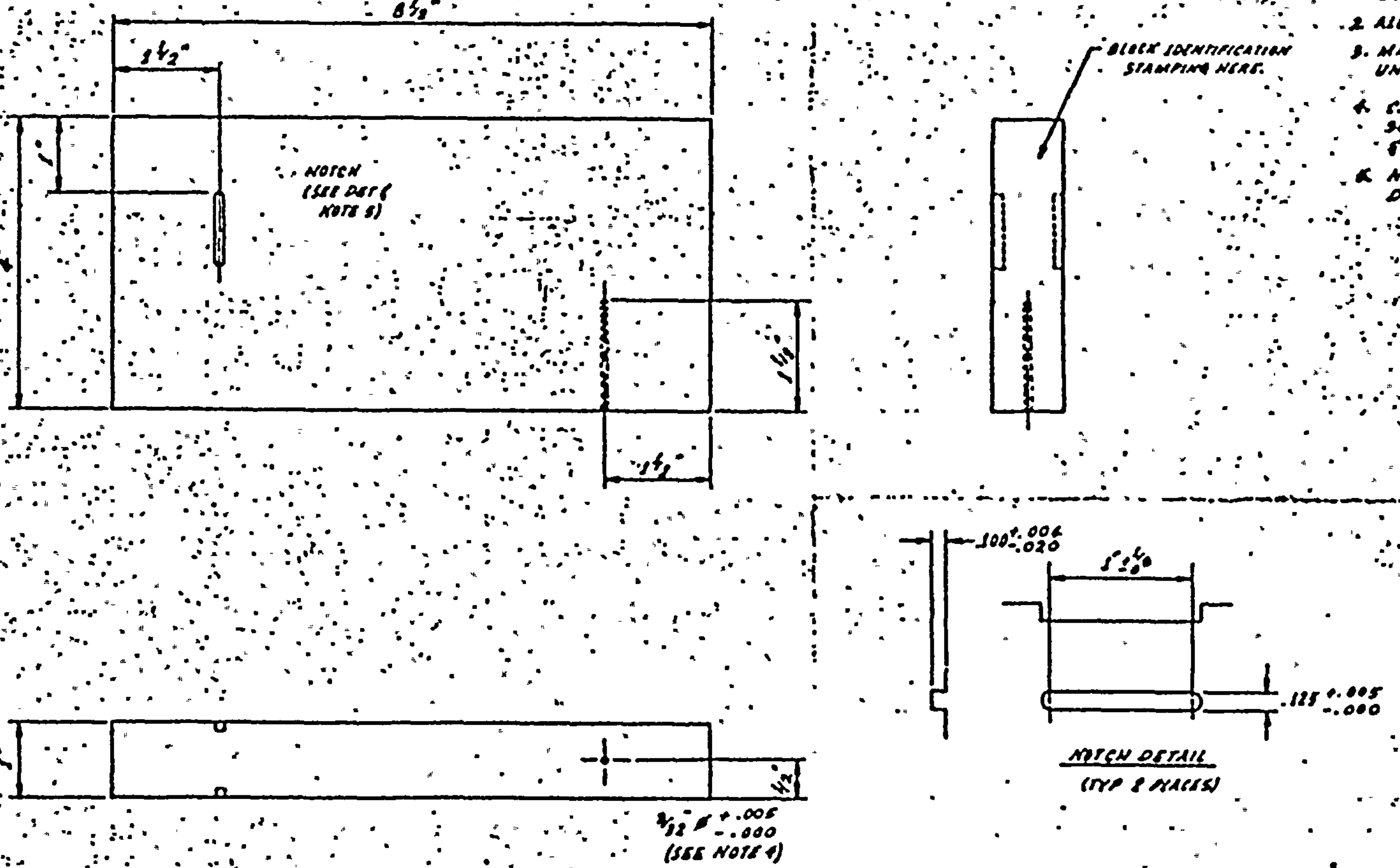
1. C-1, C-4 & N-3 GIRTH WELD LOCATION POSITIVE CLOCKWISE FROM TOP.
2. N-4 0° AT T. D. C.



SECTION X-X

FULL PENETRATION
HEAT EXCHANGER WELDS

FIG. 1



NOTES:

1. STAMP BLOCK WITH 1/8" HIGH STEEL STAMP WITH MATERIAL SPEC, HEAT NO., CAL BLOCK NO. & "WNP-2, RHR-HT-EXCH."
2. ALL DIMENSIONS ARE IN INCHES.
3. MACHINING TOLERANCE IS ± 1/32 INCH UNLESS OTHERWISE NOTED.
4. CALIBRATION HOLE PARALLEL TO PLATE SURFACE, NORMAL TO EDGE, DRILLED & REAMED.
5. NOTCHES TO BE MACHINED WITH .125 DIA FLAT END MILL.

MATERIAL

SA 516 GR 70

Drawing Approved For Estimate & Fabrication
Rev. A
Date 4/11/79
By T.B. Landahl Jr.

Daniel W. Porter

QA COPY

THIS DRAWING IS INTENDED FOR USE IN PRESERVICE AND INSERVICE INSPECTION PROGRAMS ONLY

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
RICHLAND WASHINGTON 99352

NO	DATE	REVISION	BY	CHKD	APPVD	NO	DATE	REVISION	BY	CHKD	APPVD
						0	3/21/79	ISSUED FOR CONSTRUCTION			

ENGINEER T HOYLE
DRAWN K. McANDREW
DATE 6-26-79

WNP-2
RHR HEAT EXCHANGER CALIBRATION BLOCK UT. 42
DWG NO UTCB-225
REV 0

LMT-0?-A 4/10/79 WTS-005

Figure 2

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ISO No. ______
Cal. No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF ULTRASONIC CALIBRATION

SIGN

Examiner/Level ______ Examiner/Level ______ Review/Level ______
Authorized Inspector ______ Customer ______

EQUIPMENT

Instrument ______ S/N ______ ReCal Due ______ Cable ______
Recorder ______ S/N ______ ReCal Due ______
Recorder ______ S/N ______ ReCal Due ______

Vertical Linearity Check Check Completed ______

Signal 1	100	90	80	70	60	50	40	30	20	10
Signal 2										

Signal 2 shall equal 50% of Signal 1 ±5% of full scale.

Attenuator Linearity Check Check Completed ______

Tester Gain	Set	-6	-12	Set	+12	Set	+6
Signal Amp.	80%	32 to 48	16 to 24	20%	64 to 96	40%	64 to 96
Actual Value							

Signal amplitude must fall within listed values

Transducers

S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______
S/N ______ Mfg. ______ Type ______ Size ______ Freq. ______ Index ______ Angle ______

PROC

Procedure ______ Rev. ______ Date ______

CALIBRATION

Cal. Block Type ______ S/N ______ Ref. Refl. ______ Temp. ______
Verification/Ref. Blk. ______ S/N ______ Ref. Refl. ______ Temp. ______

Instrument Settings

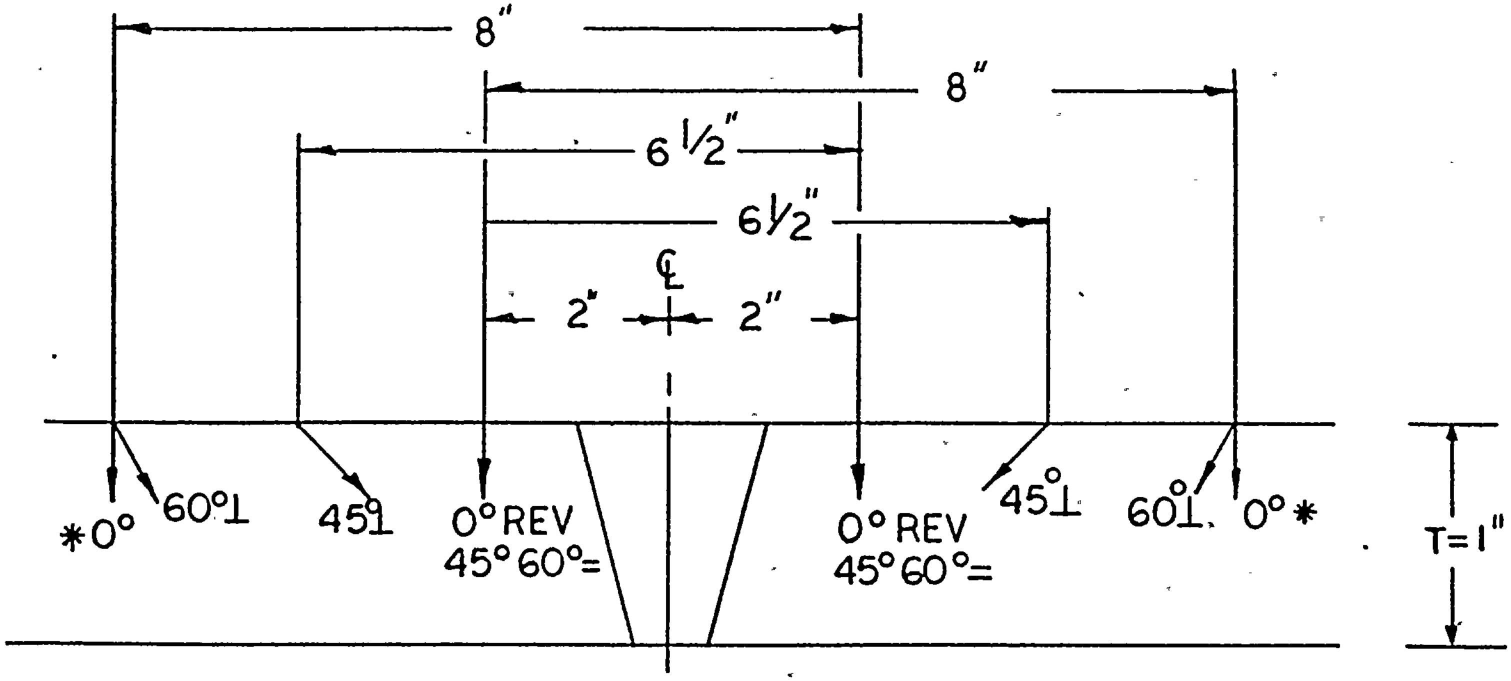
	L	∠	
Gain			
Sweep			
Delay			
Reject			
Damp.			

DAC

10
8
6
4
2
0
2 4 6 8 10

Cal. Check Time

Figure 3



* BASE METAL
⊥ PERPENDICULAR SCAN
= PARALLEL SCAN
REV REQUIRED EXAMINATION VOLUME (WELD + T EITHER SIDE)

ULTRASONIC EXAMINATION OF C1 & C4 VESSEL WELDS
FIG. 4

WPS-UTX2 2/79

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Report No. ______
Cal.No. ______ Time ______
Job No. ______
Date ______
Page ______ of ______

REPORT OF VISUAL AND ULTRASONIC EXAMINATION

ITEM

ISI No. ______ Size ______ Material ______ S/N(s) ______
Description ______
Location ______ Preparation ______ Temp. ______

SIGN

Examiner/Level ______ Examiner/Level ______ Review/Level ______
Authorized Inspector ______ Customer ______

EQUIPMENT

Tester 1 ______ S/N ______ 2 ______ S/N ______
Recorder 1 ______ S/N ______ 2 ______ S/N ______
Transducer 1 ______ 2 ______
3 ______ 4 ______
Couplant ______ Cable ______ Marker ______ Photo ______

PROC

Calibration Procedure ______ Rev. ______
Examination Procedure ______ Rev. ______
Record Procedure ______ Rev. ______

CALIB

Calib. Blk. ______ Temp. ______ Ref. ______ Amp. ______ Swp. ______
Ref. Gain ______ Damp ______ Reject ______ Gate ______
Alarm ______ Mag. Tape Count ______ Chart ______ Cal. Check Time ______

EXAMINATION

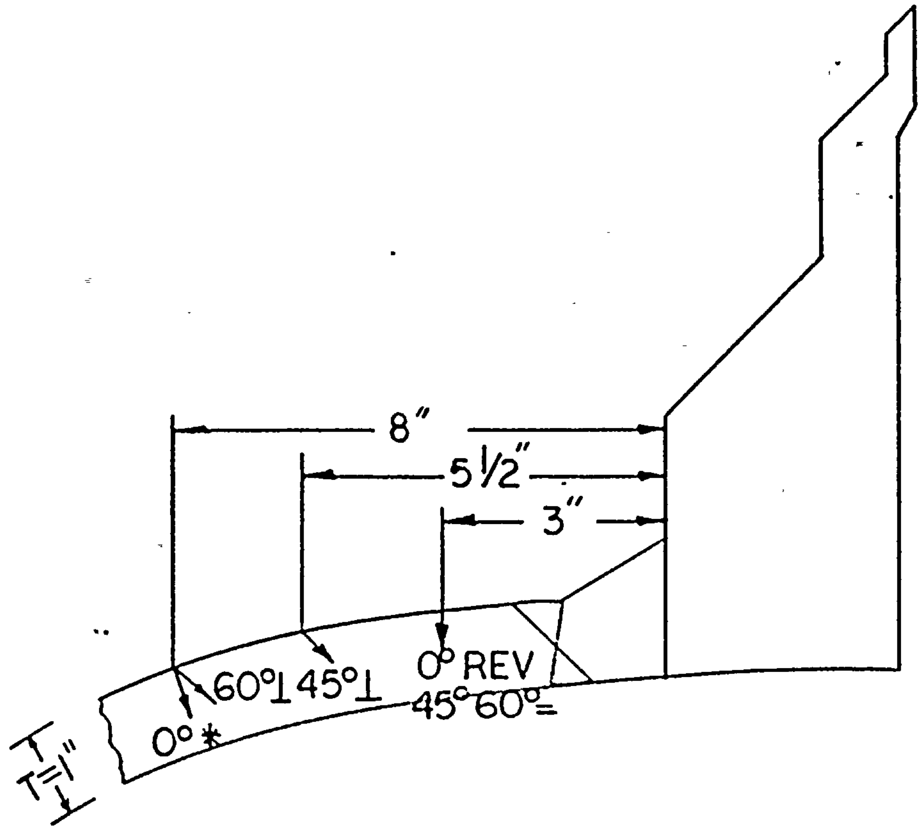
Cal. Ref. Blk. ______ Ref: Rfl. ______ Amp. ______ Sweep Position ______
Scan Gain ______ Ref. Dwg. ______ Reject Level ______ Report Level ______

NAD = No apparent disc. L = Linear G = Geometry S = Spot M = Multiples

Scan	Type	Disp.	Scan	Type	Disp.	Scan	Type	Disp.
0	PT							
1	Visual		7			13		
2	Base Metal		8			14		
3			9			15		
4			10			16		
5			11			17		
6			12			18		

Scan	Description of Indications

Figure 6



* BASE METAL

⊥ PERPENDICUAR SCAN

= PARALLEL SCAN

REV-REQUIRED EXAMINATION VOLUME (WELD + T EITHER SIDE)

FIG. 5 ULTRASONIC EXAMINATION OF N3 & N4 NOZZLE TO VESSEL WELDS

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Saratoga, Ca. 95070
408-867-4109

Job Location ______

Report No ______

Exam Date ______

NOTIFICATION OF REPORTABLE INDICATION

Part I - LMT Findings

LMT Job No. ______ I.D.# ______ ISO No. ______

NDT Method: UT ____ PT ____ MT ____ ET ____ VT ____

Description of Indication: (Sketch/photograph attached Yes __ No __)

Examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Field Supervisor Date:

Notification Acknowledged by
Client Representative: Date:

Part II - Re-examination

Findings: (Sketch/photograph attached Yes __ No __)

Re-examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Supervisor Date:

Closed
Client Representative Date:

Figure 7

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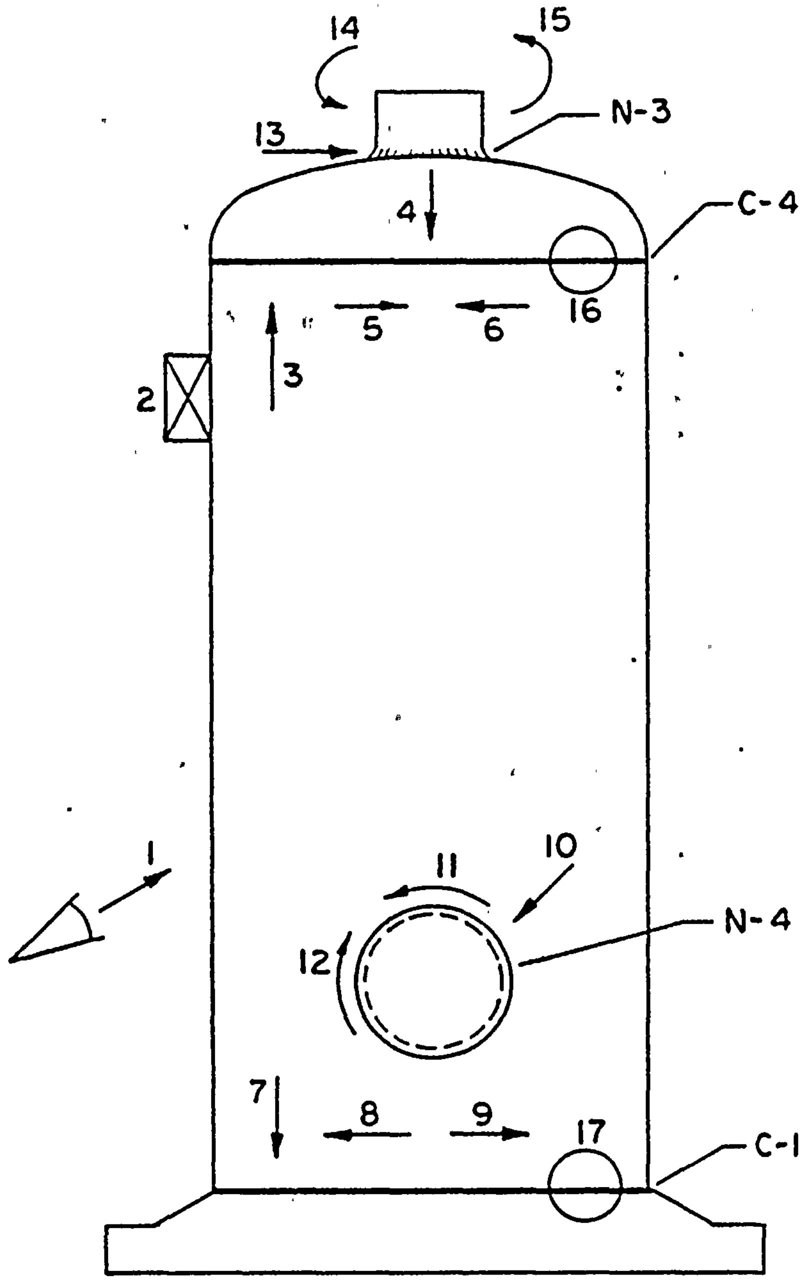
1. VISUAL
2. BASE METAL (WHEN REQ'D.)
3-9. ANGLE BEAM
10,13. ANGLE BEAM PERPENDICULAR TO N/V WELD
11,12,14,15. ANGLE BEAM PARALLEL TO N/V WELD
16,17. 0° WELD AND HAZ (WHEN REQ'D.)



MANUAL SCAN DIRECTIONS

FIG. 8

ALLOWABLE PLANAR INDICATIONS

Material: *Ferritic steels that meet the requirements of NB-2331 and have specified minimum yield strength of 50 ksi or less at room temperature*

Aspect Ratio, a/ℓ [1]	Surface Indications, a/t, % [2]	Subsurface Indications, a/t, % [1,2,3]
0	2.0	2.6
0.05	2.1	2.8
0.10	2.3	2.9
0.15	2.6	3.2
0.20	2.9	3.6
0.25	3.2	4.1
0.30	3.7	4.6
0.35	3.7	5.2
0.40	3.7	5.8
0.45	3.7	6.5
0.50	3.7	7.2

NOTES

(1) Dimensions a and ℓ are defined in the figures referenced in IWB 3511.1. For intermediate flaw aspect ratios, a/ℓ, linear interpolation is permissible.

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

(3) The total depth of an allowable subsurface indication is twice the listed value.

Figure 9

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Location ________
Report ________
Job No. ________
Date ________
Page ______ of ______

ULTRASONIC INDICATION DATA TABULATION

I. Indication No. ____________________ Scan ____________________

II. MAXIMUM AMPLITUDE DATA

1. Amplitude __________ % DAC __________
2. Metal Path __________
3. Transducer Position ____________________

III. INDICATION LENGTH

1. Length measured between ______ % DAC limits
2. Indication length ____________________
3. Transducer Position ____________________

IV. INDICATION CROSS SECTION DATA AT ______ INTERVALS ALONG THE INDICATED LENGTH BETWEEN ________ % DAC POINTS

Measurement Reference ____________________

Trans.Pos. Along Ind.	Transducer ⊥ Ind. Min. Metal Path			Transducer ⊥ Ind. Max. Metal Path			% t	
	Metal Path	Amp.	Dist. Index to Ref.	Metal Path	Amp.	Dist. Index to Ref.	Height	Dist. from Near Surf.

Figure 10

Date 1/8/79

Revision 0

WNP-2 PSI PROGRAM PLAN

N O T U S E D

(Purposely left blank)

Date 1/8/79

Revision 0

WNP-2 PSI PROGRAM PLAN

NOT USED

(Purposely left blank)

Date 1/8/79

Revision 0

WNP-2 PSI PROGRAM PLAN

N O T U S E D

(Purposely left blank)

Date 1/8/79
Revision 0

WNP-2 PSI PROGRAM PLAN

N O T U S E D

(Purposely left blank)

LMT-QAF7 - 9/77

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PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. MEP-2 Revision No. 1

Procedure Title WELD MARKING PROCEDURE

LMT, Inc. QA Review and Approval D.B. MacGill Level III 10-17-80
(Quality Assurance Officer)

Client Approval D.F. Ramey, ISI Engineer 3/31/81

Authorized Nuclear Inspector ~~Approval~~ Concurrence [signature] 3-31-81

Specific Qualification Record

Job Site	Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP 02	ISI ENGINEER DP Ramey	DATE 3/11/81
CONTRACT NO. C-14402	TITLE PSI Services for NSSS & Associated Nuclear Piping	
CONTRACTOR LMT, Inc.		

DOCUMENT TITLE	REV.
MEP-2 "Weld Marking Procedure"	1

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) 2/7/79

PREVIOUSLY APPROVED ☒ YES ☐ NO (DATE IF YES) 2/7/79

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

Added section XI.C "Welded Support Lug Marking"

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
ANI-I REVIEW: [signature] 3/30/81				
[signature] 3/12/81 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER		X		
N/A PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR				
[signature] 3/16/81 SUPERVISOR, ISI/NDE, GENERATION SERVICES		X		
3/20/81 [signature] 3/20/81 MANAGER, ~~QUALITY SERVICES~~ Operational QA & Services		X		

NOTES/COMMENTS:

(1) Add: XI.C.1.c) "When 2 sets of lugs are present, the upstream set shall be stamped as in XI.C.1.b). The downstream set shall start with the next number and be stamped numerical clockwise begining as in Figure 4."

(2) Incorporate field change to VII.A. dated 1/17/80

WP-702 EDP 9.0

Lambert • MacGill • Thomas, Inc.
Testing • Engineering • Service • Training
771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

TITLE: WELD MARKING PROCEDURE

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides instructions for implementation of the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1974 edition, addenda through Summer 1975, for weld identification and marking methods to be used during the Preservice Inspection (PSI) of the WNP-2 Nuclear Plant.

B. Scope

This procedure is applicable to austenitic and ferritic pipe welds.

II. REFERENCE DOCUMENTS

A. LMT Operating and Quality Assurance Manual, Revision 12, approved for the WNP-2 PSI by WPPSS.

B. ASME Boiler and Pressure Vessel Code, Section XI, 1974 edition, Winter 1975 addenda.

QUALIFICATION:

Approved for use [signature] 10/23/80
[signature] Level III
10-17-80

II. C. Contract No. C-14402, pages E-1 through E-5.

D. LMT Procedure QA-26, "WNP-2 Management Plan."

III. DEFINITIONS

None.

IV. RESPONSIBILITY

The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the cover sheet.

V. PROCEDURE QUALIFICATION

This procedure shall be considered qualified upon acceptance by WPPSS and successful completion of an "example" weld.

VI. PERSONNEL REQUIREMENTS

A. This procedure shall be implemented under the direction of the LMT Field Supervisor and LMT examination personnel.

B. LMT personnel shall provide direction and control for the weld marking operations but are not necessarily required to perform hands-on operations. The actual marking operations may be performed by other WPPSS-employed personnel.

VII. EQUIPMENT AND MATERIALS REQUIREMENTS

A. Die stamps shall be one-quarter inch low stress dot type.

VII. A. 1. Stainless dies shall be used on stainless piping and alloy steel dies shall be used on carbon and alloy steel components.

VIII. PREPARATION

A. Documentation

1. The following documentation shall be submitted to the WPPSS ISI Field Coordinator before beginning the weld marking operations:
   a) Procedure
   b) Materials Certifications (for dies)
   c) Personnel Certifications
2. Progress reports may be submitted on a continuing basis, but not before the weld marking operation begins.

B. Physical Preparation

1. The following physical preparation requirements shall be reviewed by the examiner with the WPPSS ISI Field Coordinator before work is begun on individual systems or in specific areas:
   a) Insulation removal
   b) Safety precautions (work in other areas, etc.)

C. Surface Preparation

This procedure is specifically intended for use at the WNP-2 plant of the Washington Public Power Supply System (WPPSS) and may not be generally applicable to other projects.

X. CALIBRATION

Angle location around the weld shall be made from circumferential tape measurements at or near the weld. Nominal degree locations are shown in Figure 1.

XI. PERFORMANCE

A. Weld Identification

1. Welds identified by ISI identification numbers on Weld and Component Identification Diagrams found in Section 8 of the WPPSS Preservice Inspection Program Plan and indicated as requiring volumetric or surface examination on the associated Program Plan and Schedule Tables shall be physically marked with the appropriate ISI identification numbers shown on the Diagrams.
    a) Branch connections and fitting seam welds shall not be marked.
2. Identification numbers shall be located as conspicuously as possible and to the extent practical:
    a) parallel to the weld;
    b) entirely within a band between two and three inches from the weld centerline;
    c) on the downstream side of pipe-to-pipe welds;

XI. A. 3. When weld is obstructed preventing marking as specified in Paragraph 2., the marking shall be located as near to the specific position as possible.

d) on the pipe side of pipe-to-fitting welds;

e) on either side of seam welds.

3. Deviations from the above practice shall be approved in advance by the WPPSS ISI Field Coordinator.

4. Typical physical locations of markings are shown in Figure 2.

B. <u>Weld Centerline and Reference Point Determination and Marking</u>

1. Welds listed in the Program Plan and Schedule Tables in Section 8.0 of the WPPSS Preservice Inspection Plan as subject to volumetric examination shall be physically identified by the LMT examiner and centerlines and reference marks established according to the following rules as shown in Figure 3.

a) Weld centerline reference points shall be established by stamping a "+" at the visually determined center of the weld.

b) The number of reference points shall be according to Table 1.

XI. A. 2.

Nominal Pipe Diameter	Reference Stamp Locators
8" or less	0°, 180°
Over 8" up to and including 16"	0°, 90°, 180°, 270°
Over 16" up to and including 30"	0°, 45° 90° 135° 180°, 225°, 270°, 315°

Table 1

B. 1. c) The girth weld zero reference mark shall be located as follows:

1) At the TDC of horizontal pipe runs;
2) In line with the extension on the nearest elbow or fitting on vertical pipe;
3) At the upstream intersection of vertical branch piping with the horizontal pipe TDC when criteria 2) does not apply.

d) All reference marks (+) shall be identified with degree position stamped adjacent to the reference mark (+) between one and two inches from the weld centerline and parallel to the weld.

XI. B. 1. e) The longitudinal seam weld zero mark shall be located at the upstream girth weld.

f) Reference marks shall be located using a cloth tape measurement from reference zero according to Figure 1.

C. <u>Welded Support Lug Marking</u>

1. Welded support lugs identified by ISI identification number on weld and component identification diagrams found in Section 8 of the WPPSS Preservice Inspection Program Plan and indicated as requiring volumetric or surface examination on the associated Program Plan and Schedule Tables shall be physically marked with the orientation numbers as shown in Figure 4.

   a) The lugs shall be marked on an accessible side, but not on a surface designated for ultrasonic scanning.

   b) Stamping shall be numerical (Number 1 through the number of lugs) clockwise when looking in the direction of flow (only the individual lug number need be stamped on the lug).

XII. EVALUATION

Each completed marked weld shall be evaluated by the LMT examiner for compliance with the requirements of this procedure.

XIII. RECORDS

Completion and acceptance of each weld shall be noted by the LMT examiner at the time of completion on a system ISO or other representative drawing and a copy of the marked drawing shall be submitted to the WPPSS ISI Field Coordinator as the marking of the piping shown on the drawing is completed. A typical isometric drawing is shown in Figure 5.

XIV. REVIEW

A. Records of weld identification are subject to review by the assigned LMT Level III examiner for conformity to the requirements of this procedure.

B. Following the final LMT review, the records will be transmitted to the WPPSS ISI Field Coordinator for review by WPPSS and the ANI.

XV. STORAGE

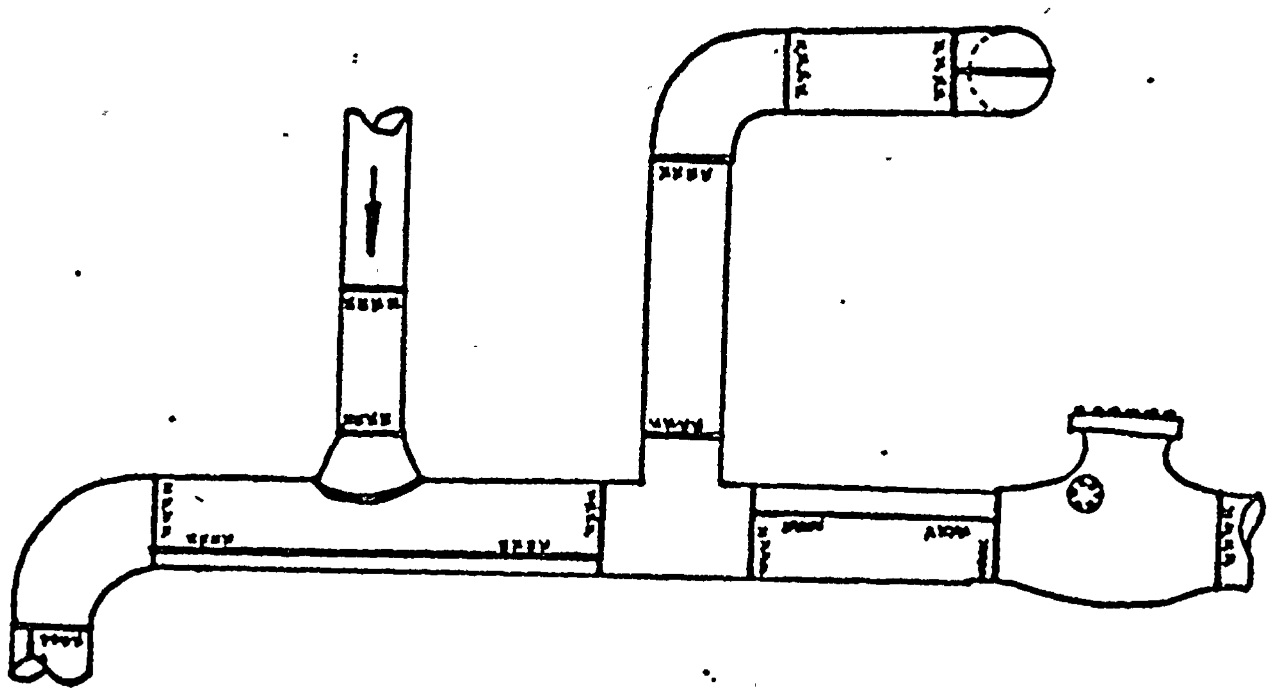
A. Original documentation shall become the property of WPPSS upon sign-off of the ISI Field Coordinator. Additional reports which may include the documentation as reference material shall be generated from copies.

B. Field storage facilities shall provide a safe storage area and access to files shall be limited to the LMT Field Supervisor and his designated representatives, WPPSS representatives, and the Authorized Nuclear Inspector.

SPECIFIC ANGLE LOCATIONS AROUND A PIPE'S CIRCUMFERENCE

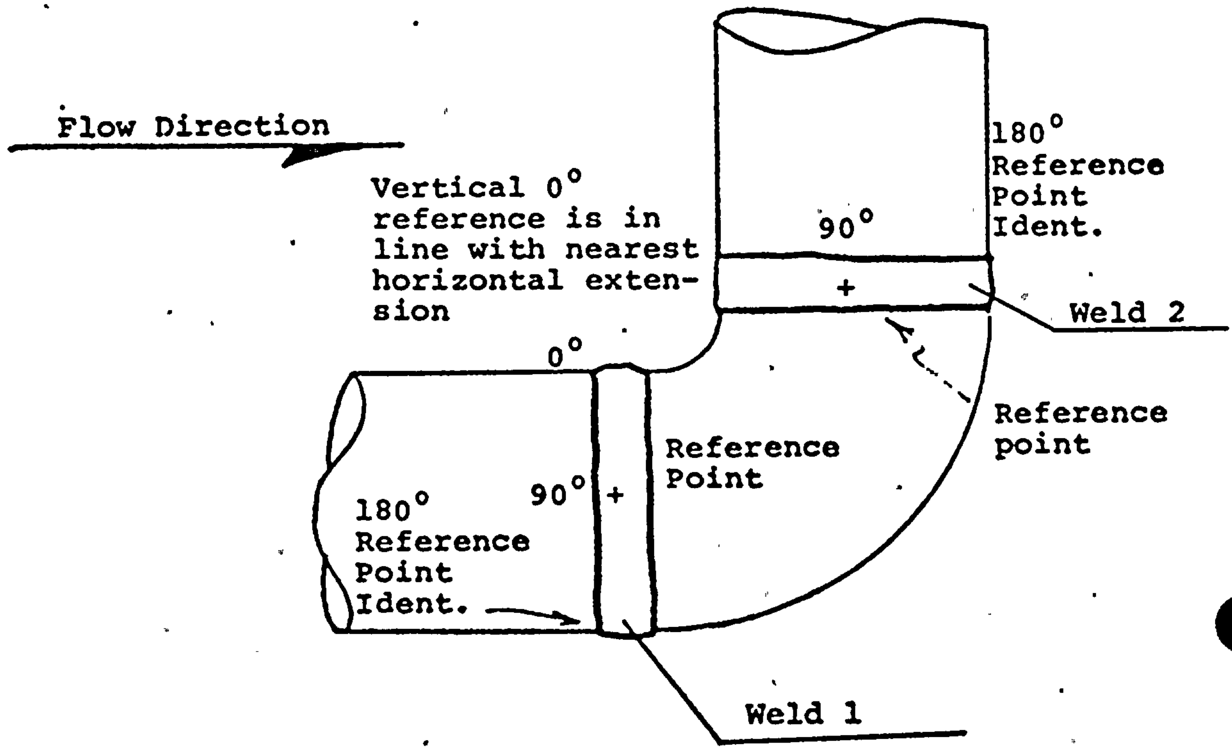
Nominal Pipe Size	O.D.	Circum-ference	45°	90°	135°	180°	225°	270°	315°	360°
1.0"	1.315	4.13	.52	1.03	1.55	2.07	2.58	3.1	3.61	4.13
1.5"	1.900	5.97	.75	1.49	2.24	2.98	3.73	4.48	5.22	5.97
2.0"	2.375	7.46	.93	1.87	2.80	3.73	4.66	5.6	6.53	7.46
2.5"	2.875	9.03	1.13	2.26	3.39	4.52	5.65	6.77	7.90	9.03
3.0"	3.500	11.00	1.37	2.75	4.12	5.50	6.87	8.25	9.62	11.00
4.0	4.500	14.14	1.77	3.53	5.30	7.07	8.84	10.6	12.37	14.14
6.0"	6.625	20.81	2.60	5.2	7.80	10.41	13.01	15.61	18.21	20.81
8.0"	8.625	27.10	3.39	6.77	10.16	13.55	16.94	20.32	23.71	27.10
10.0"	10.750	33.77	4.22	8.44	12.66	16.89	21.11	25.33	29.55	33.77
12.0"	12.75	40.06	5.01	10.01	15.02	20.03	25.03	30.04	35.05	40.06
14.0"	14.00	43.98	5.50	11.00	16.49	21.99	27.49	32.99	38.48	43.98
16.0"	16.00	50.27	6.28	12.57	18.85	25.13	31.42	37.70	43.98	50.27
18.0"	18.00	56.55	7.07	14.14	21.21	28.27	35.34	42.41	49.48	56.55
20.0"	20.00	62.83	7.85	15.71	23.56	31.42	39.27	47.12	54.98	62.83
22.0"	22.00	69.12	8.64	17.28	25.92	34.56	43.2	51.84	60.48	69.12
24.0"	24.00	75.40	9.42	18.85	28.27	37.70	47.12	56.55	65.97	75.40
26.0"	26.00	81.68	10.21	20.42	30.63	40.84	51.05	61.26	71.47	81.68
28.0"	28.00	87.96	11.00	21.99	32.99	43.98	54.98	65.97	76.97	87.96

Figure 1



WELD IDENTIFICATION MARKING LOCATION

Figure 2



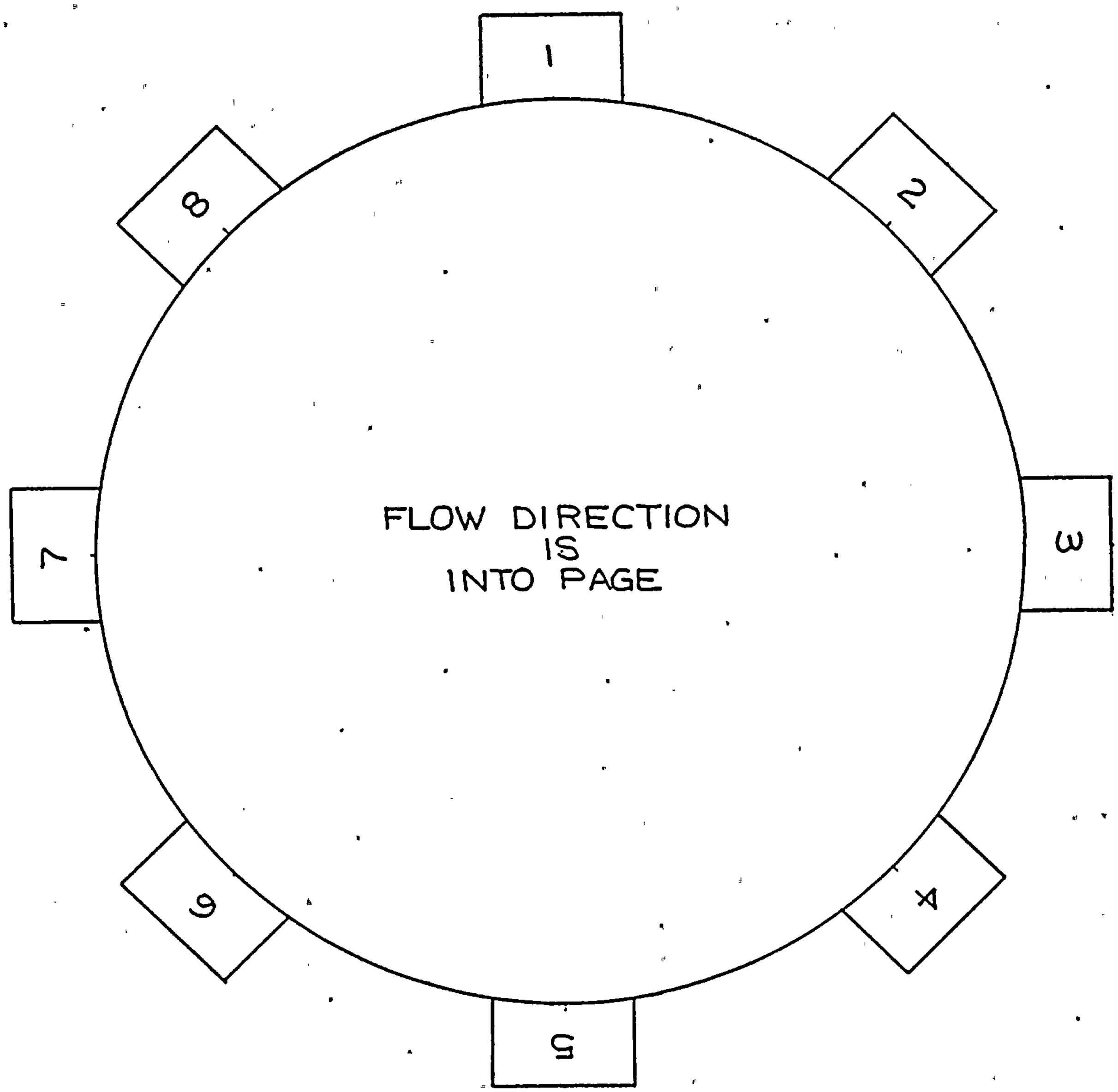
1. Reference arrow is always in the direction of flow.

2. Zero Reference is at Top Dead Center on a horizontal run.

3. For vertical runs, Zero Reference is on a line with 0 Reference on the nearest horizontal run or extension.

<u>REFERENCE POINT DETERMINATION AND MARKING</u>

Figure 3



LUG MARKING
FIG. 4

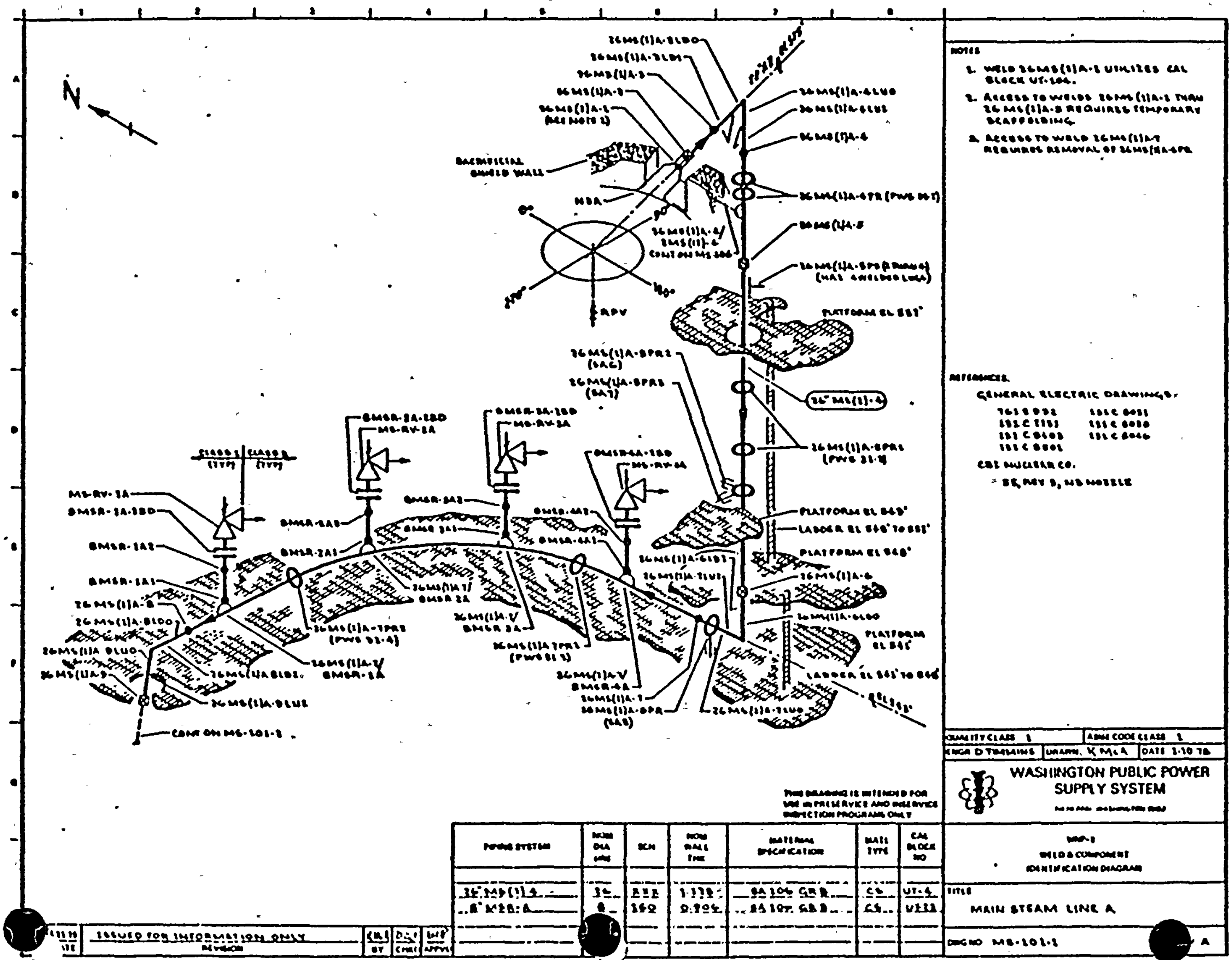

NOTES
SACRIFICIAL SHIELD WALL
RPV
0°
90°
180°
270°
PLATFORM EL 548'
PLATFORM EL 541'
CONT ON MS-101-2
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
QUALITY CLASS 1
ASME CODE CLASS 1
DATE 3-10-78
WELD & COMPONENT IDENTIFICATION DIAGRAM
TITLE
MAIN STEAM LINE A
DWG NO MS-101-1
A
ISSUED FOR INFORMATION ONLY
REVISION

Figure 5

WASHINGTON PUBLIC POWER SUPPLY SYSTEM QCS & I INSTRUCTION		NO: QCI 7-1 REV: Rev. 0 RESP. ORG: QCS&I
APPROVED:	APPROVED: 1-2-79	
TITLE: VISUAL EXAMINATION INSTRUCTION		

1.0 SCOPE

This instruction defines the requirements for preservice visual examination of nuclear power plant components by QCS&I Personnel or vendor contractor personnel nder QCS&I supervision for conditions such as scratches, wear, cracks, corrosion, erosion, misalignment or improper movement of parts or components, or evidence of leakage.

2.0 APPLICABLE DOCUMENTS, CODES AND STANDARDS

The following documents form a part of this examination instruction to the extent specified herein.

2.1 Codes and Standards

a. American Society of Mechanical Engineers, ASME Boiler and Pressure Vessel Code.

(1) Section XI, Inservice Inspection of Nuclear Power Plant Components, Editions and Addenda through 1977 edition.

(2) Section V, Nondestructive Examination, Editions and Addenda through 1977 edition.

b. ODI No. 902, "Training and Certification Procedure; ISI/NDE Examiners".

c. Topical Report WPPSS-QA-004, Operational Quality Assurance Program.

3.0 DESCRIPTION

The principal objective of the techniques described herein is the location and recording of surface conditions for parts or components requiring visual examinations under the scope of ASME Boiler and Pressure Vessel Code Section XI, Inservice Inspection of Nuclear Power Plant Components, according to the requirements given in ASME Boiler and Pressure Vessel Code Section V, Nondestructive Examination, and this instruction.

4.0 REQUIREMENTS

4.1 Personnel Requirements

All personnel performing the examinations shall be certified to at least Level 1 Visual and records of the certification maintained in accordance with ODT No. 902; "Training and Certification Procedure; ISI/NDE Examiners".

4.2 Direct Visual Examination

Direct visual examination may be made when access is sufficient to place the eye within 24 inches of the surface to be examined and at an angle not less than 30° to the surface to be examined. Mirrors may be used to improve the angle of vision. Lighting of 15 to 50 foot candles at the examination surface (as measured by a mode 703-3A Weston Light Meter or equivalent) is required. Resolution shall be considered adequate, when the combination of lighting, access, and angles of vision can resolve a black line 1/32 of an inch wide on an 18% neutral gray background placed on the surface to be examined.

4.3 Remote Visual Examination

Remote visual examination may be substituted for direct visual examination where access does not permit direct visual examination. Remote visual examination may include visual aids such as telescopes, periscopes, borescopes, fiberoptics or TV cameras and monitoring systems, with or without attachments for permanent recording. Mirrors, movable lights or rotating optics, or any combination thereof, may be employed. Where practical such systems shall have a resolution capability at least equivalent to that obtainable by direct visual observation.

4.4 Replication

Surface replication methods shall be considered acceptable provided the surface resolution is at least equivalent to that obtainable by the visual observation.

4.5 Cleaning

Surfaces which require cleaning or decontamination for valid interpretation of results shall be prepared by an approved process.

5.0 EXAMINATION

5.1 Valve Bodies

The normally accessible internal pressure boundary surfaces shall be examined for signs of distress. Where applicable, the stem, disk, seat, internal pilot valve, rings, stem-to-disk connection and packing shall be visually examined for mechanical damage. In addition, the valve bowl, seat, disk and stem may be examined for evidence of metallurgical damage such as erosion, corrosion, or cracking.

5.2 Pump Casings

The normally accessible internal pressure boundary surfaces shall be examined for signs of distress. Examine the accessible interior surfaces, and where applicable the pump bowl and the pump impeller for evidence of cracking, corrosion, erosion, galling, mechanical damage, or other abnormal conditions.

5.3 Pressure Retaining Bolting

Bolting may be examined either in place under tension, when the connection is disassembled, or when the bolting is removed. The parts to be examined shall include (where applicable and accessible) bolts, studs, nuts, washers, bushings, threads in base material and flange ligaments between threaded stud holes. The areas of threads, shanks, and heads shall be examined. Discontinuities such as laps, galling, corrosion, seams, or cracks which would be detrimental to the intended service should be noted.

5.4 Support Components

Included are the support components that extend from the piping, valve, and pump attachment to and including the supporting structure. The components shall be examined for evidence of movement, misalignment, breakage, and other deleterious conditions. The support settings of constant and variable springtype hangers, snubbers, and shock absorbers shall be recorded.

5.5 Closure Head and Vessel Cladding

When required, clad surfaces shall be examined for evidence of metallurgical or mechanical damage such as cracking, corrosion, or gouges.

5.6 Vessel Interior Surfaces, Attachments, and Core Support Structures

The areas shall include the space above and below the reactor core made accessible for examination by the removal of components during normal refueling outages. Also included are attachments and core-supports, guide rod brackets, core spray brackets, and jet pump riser brace arm. The components shall be examined for evidence of mechanical damage such as breakage, movement, gouges, cracks, or corrosion. Any extraneous parts shall also be examined and the results noted.

5.7 Visual Examination For Leakage

Visual Examination for Evidence of Leakage During Pressure Tests or Hydrostatic Tests will be Performed in Accordance with Requirements of IWA-5000, IWB-1220, IWC-2510 and IWD-2000 of Section XI as Follows:

5.7.1 Vessel Penetrations

Each vessel penetration designated for examination shall be examined for evidence of leakage.

5.7.2 Exempt Components

The examination of exempt components, which may be conducted without the removal of insulation shall be performed by inspecting (1) the exposed surfaces of and joints in component insulation to locate evidence of leakage and (2) the floor areas (or equipment) directly underneath components for evidence of accumulated leakage that may drip from components.

5.7.3 Examination of Insulated Joints - Vertical

Examination of insulated joints along vertical surfaces of vessels, walls, and piping need not be performed, provided the lowest terminal ends of vertical surfaces are examined, and the insulation design is such that any leakages originating along the vertical surfaces can accumulate and leak from the insulation joint at the lowest elevation.

5.7.4 Examination of Insulated Joints - Horizontal

Examination of insulation joints along horizontal surfaces of components shall be conducted at each insulation joint except where accessibility is limited by structural members or other components. In the latter cases, either the insulation shall be removed to permit component examination, or provisions shall be included to channel potential leakages to areas accessible for examination.

5.7.5 Leakages

All leakages observed during pressure or hydrostatic tests shall be noted. At locations where leakages are normally expected and collected (E.G., valve stems, pump seals), the examination shall verify that the leakage collection system is operative.

5.7.6 Sources of Leakages

The source of leakages (other than normal controlled leakages) shall be located and the area shall be examined to the extent necessary to establish the requirements for corrective action.

5.8 Data Recording

All indications or abnormal surface conditions visible on welds, base metal, and support or restraint members, shall be reported and detailed according to Paragraph 5.9. Scratches, gouges, wear, corrosion or erosion on surfaces, misalignment or movement of parts, or evidence of leakage shall be of primary concern. When settings or gauge readings are required (such as on hangers), the readings shall be recorded.

5.8.1 Visual Examination Forms

A separate Visual Examination form must be prepared for each type of component examined, (Figures 1, 2, 3 and 4).

5.8.2 Visual Aids

Record on the appropriate examination form the identity of all visual aids or replication methods used. (Use backside of form if necessary).

5.9 Submittals

Examination records shall contain the following information:

a. Nuclear project number
b. Date of Examination
c. Identification and signature of examiner
d. Identification of part examined
e. Examination results
f. Other information as required on examination data form prepared for specific components
g. Instruction number and revision

The recorded data shall be reviewed by an individual certified to at least a Level II in Visual Examinations to determine if additional examination and/or evaluation is required and for further disposition.

5.10 Evaluation of Discontinuities

All parts listed below having indications exceeding the acceptable limits of this instruction shall be recorded.

When visual examinations performed in accordance with this instruction detect evidence of discontinuities, those discontinuities shall be evaluated per the following:

5.10.1 Recordable Indications

(a) Only indications with major dimensions greater than 1/16 in. (1.6mm) shall be considered relevant.

(b) Unless otherwise specified in this Subsection, the following relevant indications are unacceptable:

(1) Any cracks or linear indications;

(2) Rounded indications with dimensions greater than 3/16 in. (4.8mm);

(3) Four or more rounded indications in a line separated by 1/16 in. (1.6mm) or less edge to edge;

(4) 10 or more rounded indications in any 6 sq. in. ($3870 mm^2$) or surface with the major dimension of this area not to exceed 6 in. (152mm) with the area taken in the most unfavorable location relative to the indications being evaluated.

5.10.2 Broken Parts

Broken components or reduced cross sections shall be recorded.

5.10.3 Threaded Parts

Bolts and bolting material which have longitudinal or circumferential indications shall be recorded.

5.10.4 Unequal Wear

Components which have evidence of unequal wear shall be recorded.

5.10.5 Galling/Spalling

Components which have galled or spalled parts shall be reported.

5.10.6 Misalignment/Movement

Components which appear to be misaligned or appear to have moved shall be recorded. Abnormal misalignment or movement of the component part shall be reported.

5.10.7 Erosion-Corrosion

Components exhibiting evidence of either erosion or corrosion shall be recorded. If either erosion or corrosion has readily discernible depth the area shall be evaluated to the extent that its minimum wall thickness is determined and recorded.

5.11 Evaluation of Data

The recorded data shall be reviewed by a certified Level II or Level III examiner to determine: if additional examination or evaluation is required prior to disposition; arrange for the additional activity; witness the additional examinations as required; prepare any additional evaluation.

5.12 Disposition of Recordable Indications

Recordable indications which exceed the acceptance limits specified in this instruction or where no acceptance limit is given shall be dispositioned by processing a "Request for Disposition: RFD Form.

5.12.1 The RFD (Figure 5) is used to report and track deficiencies or suspected deficiencies detected during the preservice examination (instructions for completing an RFD are found in Figure 6).

5.12.2 One RFD shall be issued for each data sheet with indications requiring disposition.

5.12.3 A RFD log (Figure 7) shall be established and maintained by the Manager Central Maintenance group which records and tracks each RFD issued.

5.12.4 Instructions for routing of RFD's are:

(a) The examiner/originator completes the applicable sections of the RFD, assigns it a number from the RFD log, and completes the applicable RFD log entries.

(b) The examiner/originator shall insert a copy of the RFD in the log book and transmit the original to Manager Project Engineering.

(c) The project cognizant engineer determines the disposition, arranges for any necessary corrective actions, completes the RFD form and returns it to the originator.

(d) The examiner/originator completes the log and files the closed out RFD in the log book.

5.13 <u>Review and Control of Data</u>

The recorded data shall be reviewed by a certified Level II or Level III examiner to:

a. Assure that the data sheets are complete, legible, and reproducible.

b. Assure that all recorded indications which exceed the acceptable limits specified in this instruction have been identified and recorded in accordance with paragraph 5.12 of this instruction.

c. Assure that components which are repaired due to reported indications are reexamined to provide a new baseline.

d. Sign-off all data sheets to indicate approval and close out of data sheet.

Following sign-off of the data sheets the reviewer shall file them in the Central Maintenance ISI files. The requirements for final control of the data sheets shall be specified in Section 12 of the Central Maintenance ISI/NDE Program Manual.

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Rev. 0

DATA SHEET NO.________
REF. DWG. NO. ________

INTERNAL PRESSURE BOUNDARY SURFACE
VISUAL EXAMINATION DATA SHEET

WNP-________ DATE:________________

ITEM EXAMINED:________________________ PHOTO ID: ROLL#________ FRAME#________

EXAMINER'S NAME:________________________ QUALIFICATION LEVEL:________________

FINDING	YES	NO	N/A	Location and Other Information (Additional Comments on Reverse Side)
CRACKS				
VALVE OR PUMP BOWL				
SYMPTOMS OF STRUCTURAL DISTRESS				
EROSION				
SCRATCHES				
PITS				
GOUGES				
GALLING				
BREAKAGE				
WEAR				
CORROSION				
OTHER				

ADDITIONAL COMMENTS AND EVALUATION:

REVIEWED BY: LEVEL:

FIGURE 1

DATA SHEET NO. ____________
REF. DWG. NO. ____________

BOLTING AND RPV INTERNALS
VISUAL EXAMINATION DATA SHEET

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WNP-________ DATE:________________

ITEM EXAMINED:______________________ PHOTO ID: ROLL#________ FRAME#________

EXAMINER'S NAME:____________________ QUALIFICATION LEVEL:________________

AUTHORIZED INSPECTOR'S SIGNATURE:______________________________________

FINDING	YES	NO	N/A	Location and Other Information (Additional Comments on Reverse Side)
CRACKS				
THREAD ROOT AREA				
SYMPTOMS OF STRUCTURAL DISTRESS				
SCRATCHES				
PITS				
GOUGES				
WEAR				
GALLING				
BREAKAGE				
MISALIGNMENT				
MOVEMENT				
CORROSION				
OTHER				

ADDITIONAL COMMENTS AND EVALUATION:

REVIEWED BY: LEVEL:

FIGURE 2

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Rev. 0

DATA SHEET NO. ________
REF. DWG. NO. ________

HYDROTEST - LEAKAGE
VISUAL EXAMINATION DATA SHEET

WNP-________ DATE:________

ITEM EXAMINED:________ PHOTO ID: ROLL#________ FRAME#________

EXAMINER'S NAME:________ QUALIFICATION LEVEL:________

AUTHORIZED INSPECTOR'S SIGNATURE:________

TEMPERATURE:________ PRESSURE:________

AREA EXAMINED	LEAKAGE		COMMENTS
	YES	NO	

ADDITIONAL COMMENTS AND EVALUATION:

REVIEWED BY: LEVEL:

FIGURE 3

DATA SHEET NO.________
REF. DWG. NO. ________

SUPPORT MEMBER
VISUAL EXAMINATION DATA SHEET

QCI 7-1
Rev. 0

WNP-________

DATE:________________

ITEM EXAMINED:________________________

PHOTO ID: ROLL#________ FRAME#________

____

EXAMINER'S NAME:____________________

QUALIFICATION LEVEL:________________

AUTHORIZED INSPECTOR'S SIGNATURE:______________________________

HANGER OR SUPPORT MEMBER IDENTIFICATION	INDICATION		SETTING (if applicable)		COMMENTS - (System - Temp., Pressure, Wet, Dry)
	YES	NO	REQUIRED	ACTUAL	

ADDITIONAL COMMENTS AND EVALUATION:

REVIEWED BY: LEVEL:

FIGURE 4

1. R.F.D.____________

REQUEST FOR DISPOSITION

2. PROJECT____________ 3. DATE____________

4. ORIGINATOR____________ 5. TYPE OF EXAMINATION____________

6. INSTRUCTION NO.____________ REV. NO.____________

7. ITEM EXAMINED____________

8. ITEM I.D. NO.____________

9. LOCATION____________

10. DESCRIPTION OF REPORTABLE CONDITION

DISPOSITION

11. ACCEPTABLE AS IS /_/

12. UNACCEPTABLE /_/

13. UNACCEPTABLE CONDITION RECORDED ON:

RFI #____________

OTHER____________

14. CORRECTIVE ACTION TAKEN

15. REINSPECTION REQUIRED YES /_/ NO /_/

16. COMPLETED BY____________ DATE____________

FIGURE 5

INSTRUCTIONS FOR COMPLETING RFD FORM

ITEMS 1 - 10: To be completed by Examiner/Originator.

1. Enter RFD number from log book.
2. WNP Project Number.
3. Date of Report.
4. Name of Examiner/Originator.
5. Type of Examination used to discover reportable conditions.
6. Number of instruction governing examination and revision number.
7. Description of item where reportable condition exists.
8. Part number and serial number of item where reportable condition exists.
9. Describe location of item including building area, elevation, installed, not installed, etc., as applicable.
10. Enter complete description of reportable condition. Include any pertinent facts which may help in the disposition.

ITEMS 11 - 17: To be completed by Dispositioner.

11 & 12. Check either item as applicable.

13. Enter Request for Information (RFI) number or document type and number on which unacceptable condition was recorded for further disposition.
14. Brief description of corrective action taken.
15. Check appropriate box depending on corrective action taken.
16. Signature of Project Engineer and Date.

FIGURE 6

R.F.D. LOG

R.F.D. NO.	ORIGINATOR	DATE	SENT TO	RESOLUTION	DATE RESOLVED	REINSPECTION DATE	REMARKS

FIGURE 7

Lambert • MacGill • Thomas, Inc.
Testing • Engineering • Service • Training
771 East Brokaw Road
San Jose, Ca. 95112
408-297-8766

DPR 1/12/81
File copy

WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. UTP-40 Revision No. 0

Procedure Title REMOTE ULTRASONIC EXAMINATION OF REACTOR PRESSURE VESSEL LONGITUDINAL AND CIRCUMFERENTIAL WELDS

LMT, Inc. QA Review and Approval [signature] Level III 1-2-81
(Quality Assurance Officer)

Client Approval DPRamey, ISI Engineer 5/7/81

Authorized Nuclear Inspector ~~Approval~~ Review K. Collins 5/11/81

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP- 02	ISI ENGINEER DP Ramey	DATE 4/20/81
CONTRACT NO. C-14402	TITLE PSI Services for NSSS & Associated Nuclear Piping	
CONTRACTOR LMT, Inc.		

DOCUMENT TITLE	REV.
UTP-40 "Remote UT Examination of Reactor Pressure Vessel Longitudinal and Circumferential Welds	0

PREVIOUSLY REVIEWED ☒ YES ☐ NO (DATE IF YES) 12/24/80

PREVIOUSLY APPROVED ☐ YES ☒ NO (DATE IF YES)

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
D.W. Potter 4-22-81 SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER		X		
N/A PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR				
[signature] 4-23-81 SUPERVISOR, ISI/NDE, GENERATION SERVICES		X		
[signature] 4-28-81 MANAGER, ~~QUALITY SERVICES~~ Operational and QA Services		X		

NOTES/COMMENTS:

page 1 Typo ~~to~~ Bottom Head should read "Longitudinal and Circumferential welds"

page 23 Typo X. F. 2. e) "Calculate"

Page-3 I. B. 3. b) all of each weld designated to be examined -TDS

Page-6. VI B How do you certify Personnel as POLE TRACK OPERATORS -TDS and why?

ANII REVIEW - [signature] 5-5-81

WP-702 EDP 9.0

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. QA-28 Revision No. 0

Procedure Title Document Control for the WNP-2 Preservice Inspection

LMT, Inc. QA Review and Approval [signature] 2-16-79
(Quality Assurance Officer)

Client Approval TK Hoyle (ISI Engineer) 2/22/79

Authorized Nuclear Inpsector ~~Approval~~ REVIEW AND [signature] 2/22/79

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP- 2
ISI ENGINEER Thomas F. Hoyle
DATE 2/21/79

CONTRACT NO. C-14402
TITLE PSI Services for NSSS And Associated Nuclear Piping

CONTRACTOR LMT, Inc.

DOCUMENT TITLE	REV.
Document Control for the WNP-2 Preservice Inspection QA-28	0

PREVIOUSLY REVIEWED ☐ YES ☒ NO (DATE IF YES)

PREVIOUSLY APPROVED ☐ YES ☒ NO (DATE IF YES)

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISPOSITION: DISAPPROVED	COMMENTS ATTACHED
[signature] 2/21/79 — SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
NA — PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA			
[signature] for K.J.H. 2/22/79 — SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
M. F. [signature] — MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

WP-702 EDP 9.0

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TITLE:
DOCUMENT CONTROL FOR THE WNP-2 PRESERVICE INSPECTION

I. PURPOSE AND SCOPE

A. Purpose

This procedure provides rules for the control of job-related documentation during the Preservice Inspection of the WNP-2 Nuclear Power Plant with the following objectives:

1. to ensure performance of all required examinations;
2. to provide the status of examinations being performed;
3. to minimize the loss of data sheets;
4. to verify the accuracy and completeness of data via proper reviews.

B. Scope

File Complement

Job-related documentation includes, but is not limited to, the following:

1. Procedures
2. Material Certifications
3. Instrument Calibration Reports

QUALIFICATION:

Approved for use [signature] 2/16/79 Level III
[signature] 2-16-79 Level III

I. B. 4. Quality Related Forms (test reports, etc.)

5. Quality Related Drawings

6. Personnel Documentation

7. Equipment Manuals and Drawings

8. Test Calibration Records

9. Examination Reports

10. QA Reports and Correspondence

II. REFERENCES

A. This procedure is in compliance with the applicable portion of the following reference documents:

1. American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components", 1974 edition, Summer 1975 addenda.

2. LMT Operating and Quality Assurance Manual, Addendum to Revision 10, approved for the WNP-2 PSI by WPPSS.

3. WNP-2 PSI Program Plan.

III. DEFINITIONS

A. Major Task - A part of the Preservice Inspection treated as a separate entity. The following Major Tasks will be associated with the PSI:

III. A. WPS-001, "Remote Vessel Examination System"

WPS-002, "Contract Management/Procedures"

WPS-003, "Procurement of Expendables"

B. Recordable Indication - An indication which equals or exceeds Owner recording criteria. The Owner recording criteria may be more restrictive than the Code requirements.

C. Reportable Indication - Any indication which equals or exceeds Code reporting criteria.

IV. RESPONSIBILITY

A. The Technical Manager, LMT, Inc., is responsible for the generation and control of this procedure and shall so indicate by a dated signature on the procedure cover sheet.

B. The responsible Level III Field Supervisor, LMT, or his designated Level III alternate, LMT, shall implement this procedure.

V. PROCEDURE QUALIFICATION

This procedure shall be considered qualified upon acceptance by WPPSS.

VI. PERSONNEL REQUIREMENTS

All LMT personnel shall be governed by the requirements of this procedure.

VII. EQUIPMENT AND MATERIAL REQUIREMENTS

A. Filing Cabinets

1. Cabinets for original data shall be fire resistant.
2. Cabinets for reproduced data and materials shall be conventional.

B. Supplies

1. Examination data forms and associated printed matter shall be of a quality capable of providing at least two generations of copies.
2. Reports shall be completed using black felt or fiber tipped pens.
3. "White-out" is not permissable.

VIII. PREPARATION

A. Documentation

The following documentation shall be approved by WPPSS before acceptance in the job file:

VIII. A. 1. a) Procedures

b) Forms

c) Certifications

B. Physical Preparation

The file area shall be complete and LMT personnel on site before initiation of the filing system.

IX. LIMITATIONS

This document control procedure has been prepared for the PSI of the WNP-2 plant of Washington Public Power Supply System (WPPSS) and is not necessarily applicable to other situations.

X. THE PERMANENT DOCUMENT FILE

A. General

1. Examination documentation generated in the field shall be maintained according to the following rules:

   a) Original documentation shall become the property of WPPSS upon turn-over at the completion of the PSI. Original documentation which may be included as reference material for additional reports shall be generated from copies.

X. A. 1. b) Field storage facilities shall provide a safe storage area, and access to files shall be limited to the LMT Field Supervisor and his designated representatives, WPPSS representatives and the Authorized Nuclear Inspector.

c) Documentation shall be maintained in a file in a trailer or similar facility provided by WPPSS in or adjacent to plant buildings for LMT use.

B. Filing System

The filing system shall be alphanumeric, i.e., alphabetic, subdivided according to item number or date. When this system cannot be applied, the file shall be either alphabetic or numeric.

C. File Categories

1. Tasks

Each major task of the PSI shall be assigned a unique job number, and all related documentation will be maintained in file, under this number. The following items will be maintained under each major task:

X. C. 1. a) Correspondence

Correspondence shall carry a WNP number and date and copies shall be filed in a numerical correspondence file as well as the appropriate job file.

b) Procedures

Procedures shall be filed in numerical order.

c) Material Certifications

Material Certifications shall be filed alphabetically by vendor in chronological order.

d) Instrument Calibration Records

Calibration reports shall be filed alphabetically by item or manufacturer in chronological order.

e) Unused Quality Related Forms

Quality related forms shall be filed by form number.

f) Quality Related Drawings

Quality related drawings not generated by LMT will be filed in the appropriate task file or with the equipment manuals to which they apply.

g) Personnel Documentation

Personnel documentation shall be filed alphabetically.

X. C. 1. h) Equipment Manuals and Drawings

Equipment manuals and drawings will be filed in alphabetical order according to trademark identification.

i) Test Calibration Reports

Completed calibration reports shall be filed according to calibration number as described in Section X.D.3.

j) Examination Reports

Completed examination reports shall be filed according to report number as described in Section X.D.4.

k) Quality Forms

Quality forms and completed quality report forms shall be filed according to form number or the appropriate task number.

2. The LMT Field Supervisor will prepare an Examination Report Cross Reference/Tracking Log (Figure 1). The purpose of this log is three-fold. First, the log is a cross reference between the report number, WPPSS identification number, WPPSS Weld and Component Identification Diagram number, the calibration report number, and the examination results. Second, the log

X. C. 2. is used for tracking examination report forms to minimize loss of these forms. Third, the log is used as a permanent file number log by sequentially listing all examinations by system and technique on a separate page or pages (See Section X.D.4). For example, a page entitled "RHR-201, Ultrasonic" will be used to log data for the ultrasonic examinations of the welds and components shown on drawing RHR-201.

3. The LMT Field Supervisor will maintain a master system drawing display upon which the examination report will be marked for each component examined. This display will utilize the WPPSS Weld and Component Identification Drawings.

4. The LMT Field Supervisor will maintain a master system table mark-up. The WPPSS Program Plan and Schedule Tables will be marked with the permanent file number when examinations and WPPSS review are completed.

5. The LMT Field Supervisor will ensure all documents transmitted to WPPSS are complete and legible and that recordable indications are flagged by marking them in red.

X. D. Rules for Documentation Inclusion in the Permanent File

1. Job Related Documentation

   a) Identification of Task Related Documentation

   Each task will be given a unique number composed of six characters. The first three will be an abbreviation of the client name; e.g., WPS for Washington Public Power Supply System and the last three represent the number of the major task. Thus, there will be only one task utilizing the number "001."

2. Personnel Documentation

   a) Certifications

   A Certification Statement will be prepared for each qualified examiner. The statement will list in concise form the examiner's education, experience, eyesight and test grades.

   b) Each LMT employee will prepare a resume which includes the examiner's signature and initials as used in the reports. The resumes will be put in standard form and filed with the Certification.

X. D. 3. Calibration Reports

Calibration reports will be assigned a number consisting of the first and last initials of the examiner primarily responsible for the calibration, followed by a sequence number for each calibration; i.e., JD-10 represents the tenth calibration performed by John Doe. It is the responsibility of each examiner to maintain the proper sequence number of his own calibrations; however, all calibrations will be reviewed by the LMT Field Supervisor.

a) Original calibration report sheets will be forwarded to the WPPSS Data Controller for review as a "package" with all associated examination report sheets. The date the sheets are transmitted to WPPSS will be entered into the Calibration Report Tracking Log (Figure 2) at that time.

4. Examination Reports

Examination Reports will utilize an alphanumeric numbering system and will be numbered by the LMT Field Supervisor. Prior to assignment of a report number, the report will be identified by the WPPSS ISI identification number of the component examined and will be maintained in a "daily" file. Upon assignment of the

X. D. 4. report number, the document will be transferred to the WPPSS Data Controller and the appropriate entries made in the Examination Report Cross Index/Tracking Log (Figure 1).

Examination reports will be filed according to the WPPSS Weld and Component Identification Diagram number and will be grouped by examination type, i.e., ultrasonic, liquid penetrant or magnetic particle. For example, a file folder will be labeled RCIC-101-1, and within that folder will be all data sheets for all examination items shown on that drawing. Examination data sheets for each procedure used (i.e., ultrasonic, penetrant, visual) will be grouped by procedure within the folder. Following is a description of the examination report permanent file numbering system:

a) The file number will consist of a six-character number composed of three letters and three numbers separated by a hyphen. The first two letters will identify the system and the third letter will identify the examination technique. The three numbers will be used to sequentially number the

X. D. 4. a) reports according to completion date as assigned by the LMT Field Supervisor. Table 1 is a listing of the system designations and the examination technique designators.

System	Technique
RP - Reactor Pressure Vessel	U - manual ultrasonic
RI - Reactor Core Isolation Cooling	P - liquid penetrant
HP - High Pressure Core Spray	M - magnetic particle
LP - Low Pressure Core Spray	R - radiographic
RH - Residual Heat Removal	V - visual
MS - Main Steam	A - automated ultrasonic
FW - Reactor Feedwater	
RR - Reactor Recirculating Cooling	
RT - Reactor Water Cleanup	

Table 1

Example: RIU-001 is the first examination performed on the Reactor Core Isolation Cooling System using the manual ultrasonic technique.

5. When examination and calibration report forms are received from WPPSS, the date will be entered into the Examination Report Cross Index/Tracking Log and the Calibration Report Tracking Log, respectively.

XI. THE TEMPORARY FILE SYSTEM

A. Daily File

As the PSI proceeds, examination reports generated by each examination team will accumulate faster than they can be reviewed by the LMT Field Supervisor. It is the LMT Field Supervisor's task to prepare reference indexes, summaries, and tables from these reports and to assign the permanent file numbers to each report. During the time these operations are being performed, the reports will be segregated in a daily file for examination reports and calibrations with each day's documentation jointly transmitted to the WPPSS Data Coordinator in accordance with X.D.3.a.

XII. REVIEW

The WPPSS ISI Field Coordinator or his designees and the Authorized Nuclear Inspector shall have full access to the documentation files.

ISI Drawing No.__________

Technique __________

EXAMINATION REPORT CROSS INDEX/TRACKING LOG

WPS - __________

							Examination Results			
									Significant Indications	
Report No.	WPPSS ISI Identification No.	Calibration No.	Exam Date	Date to WPPSS	Date from WPPSS	Filed	No Indic.	Insig. Indic.	Geometric	Other

Figure 1

WPS - ____________

CALIBRATION REPORT TRACKING LOG

Calibration Report No.	Date	Date to WPPSS	Date from WPPSS	Filed	Examination Report No.

Figure 2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

PROCEDURE APPROVAL ROUTING SHEET

PROCEDURE/INSTRUCTION NO:	TITLE:
INP 3-3	Preservice Inspection

MANUAL: QCS&I

ROUTING SEQUENCE:

ORGANIZATION	NAME	CONCURRENCE SIGNATURE (APPROVAL OF CONTENT)	DATE
Generation Services	R. E. Smith	R E Smith	3/9/79
System Operations	G. E. Deegan	G E Deegan	3-7-79
Cent. Maintenance	J. E. Mills	J E Mills	3-5-79
WNP-2	J. R. Holder	J. R. Holder	3/7/79
QCS&I	K. J. Hannah	Ken J. Hannah	3/5/79
Design Engineering	L. T. Harrold	L T Harrold	3/12/79
OPERATIONAL QA ~~Quality~~ System	D L HOWARD ~~R. T. Johnson~~	[illegible]	3/20/79
Test & Startup	W. C. Bibb	W C Bibb	3/6/79
	Gen. Admin. File	[illegible] Perkins	3/23/79

[X] NEW [ ] REVISED [ ] INTERIM (EXPLAIN BELOW)

REASONS FOR CHANGE:

Initial issue

5243

COMMENTS WERE MINOR AND RESOLVED [ ] AND/OR AS NOTED BELOW:

MCS COORDINATOR:	DIVISION:	DATE:
R. Masterson/D.L.Weber	Generation	3/5/79

WP-225 R2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM		NO: INP 3-3
ISI/NDE PROGRAM		REV: Rev. 1
		RESP. ORG: QCS&I
APPROVED: DIV. MGR. G.E. Dugan for	APPROVED: ASST. DIR. K. T. Perkins	
TITLE: PRESERVICE INSPECTION		EFFECTIVE DATE: 8-24-79

1.0 PURPOSE AND SCOPE

1.1 This procedure describes the activities of Quality Control Services & Inspection (QCS&I) personnel. It assigns responsibilities for the implementation and completion of shop and field preservice examinations for the WNP-2 Project.

1.2 The scope of activities covered by this procedure shall be accomplished in accordance with the applicable Preservice Inspection Program Plan prepared or approved by the Supply System Engineering Department.

1.3 Preservice Inspection activities herein are quality affecting and shall conform to the guidelines by the Supply System Operational Quality Assurance Program Description (WPPSS-QA-004).

2.0 DEFINITIONS

2.1 Evaluation Review Team - The group responsible for evaluating reportable indications submitted to the team by the ISI Engineer, and issuing any resulting nonconformance reports. The team consists, as a minimum of the ISI Engineer as team leader and a representative from Project Engineering, Generation Services, and the PSI Contractor.

2.2 ISI Engineer - The individual within the Supply System ISI and Operations Support Engineering Section, assigned by the Supervisor of the section, responsible for implementation of the ISI Program Plan, and Evaluation Review Team Committee leadership.

2.3 ISI Field Coordinator - The NDE Specialist responsible for the Field Preservice Inspections and on-site liaison with the Authorized Nuclear Inspector.

2.4 NDE Specialist - The individual within Generation Services' QCS&I Subsection assigned by the Superivsor, QCS&I, responsible for the technical conduct of the Preservice Inspections, including the review and approval of NDE documentation.

2.5 Plant Technical Engineer - The individual within the Plant Technical staff who has been assigned by the Plant Superintendent or the Assistant Plant Superintendent to participate in the Preservice Inspection activities.

2.6 Preservice Inspection Program Plan - The Preservice Inspection Program Plan is a formal Supply System document developed by ISI and Operations Support Engineering for each WNP unit. The program delineates the scope of work required and examinations needed to satisfy ASME Section XI Code and other Regulatory Guide requirements.

2.7 Project Engineer - The individual within the Project Engineering Section assigned responsibility by the Project Engineering Manager for Project Engineering activities associated with PSI examinations.

2.8 Test Engineer - The individual within the Plant Test and Startup Department, assigned by the Startup and Operations Manager, responsible for association with all PSI examinations.

3.0 PROCEDURE

3.1 Field Preservice Examinations

Responsibility		Action
ISI Engineer	.1	Provides an approved Preservice Inspection Program Plan and appropriate IOM's describing the activity requested from QCS&I.
	.2	Develops Request for Proposal to obtain a Preservice Inspection Contractor.
ISI Field Coordinator	.3	Reviews, comments and concurs with the Request for Proposal.
	.4	Participates in the review of proposals submitted by PSI Proposers.
	.5	Participates in the technical evaluation of the PSI Contractor.
	.6	Prepares instructions per Reference 4.3.d for conduct of the Preservice Examinations within the QCS&I work scope.
	.7	Arranges with Projects for preparation of a PSI work area, to contain office materials and NDE equipment including calibration blocks.
	.8	Fabricates, accepts, controls and inventories all calibration blocks within the QCS&I work scope per Reference 4.3.b.
	.9	Participates in the planning meetings with the PSI Contractor.
	.10	Integrates the PSI Contractor's equipment and manpower availability into the overall PSI Schedule.

3.1 (Cont.)

Responsibility		Action
	.11	Performs or supervises the visual examination of welds and components within the QCS&I work scope following installation and weld preparation for PSI.
	.12	Performs or supervises the NDE examinations within the QCS&I work scope per PSI Program Plan.
	.13	Maintains an NDE data control system per Reference 4.3.c for the PSI records generated by the QCS&I personnel.
	.14	Performs Technical surveillance of the PSI Contractor's NDE activities per Reference 4.3.a to determine compliance with the PSI Program Plan and the Contractor's NDE procedures.
	.15	Reviews NDE calibration and data sheets for completeness and accuracy, including the necessary signatures.
	.16	Submits the data records and evaluation documents to the Authorized Nuclear Inspector to obtain the Inspector's signature.
	.17	Resolves discrepancies between the Authorized Nuclear Inspector and the PSI Contractor to obtain the Inspector's signature.
ISI Field Coordinator/ISI Engineer	.18	Meet on a recurring basis to assess schedule status of PSI Contractor.
ISI Field Coordinator	.19	Documents any accessibility problems for NDE examination and recommends corrective action or alternative examinations. Submits "Access Verification Finding Report" (AVFR) (form WP-578) to the ISI Engineer.
ISI Engineer/Test Engineer	.20	Reviews and takes appropriate action per Reference 4.4.a.
ISI Field Coordinator	.21	Evaluates NDE data and flags indications that are significant under the guidelines set by Reference 4.3.d.

3.1 (Cont.)

Responsibility		Action
	.22	Transmits NDE data and evaluations to the Supply System PSI data file in accordance with Reference 4.3.c.
	.23	Transmits NDE data and evaluations of significant indications along with the RFD, to the ISI Engineer for action by the Evaluation Review Team in accordance with Reference 4.3.d.
ISI Engineer	.24	Schedules the Evaluation Review Team as necessary.
Evaluation Review Team	.25	Reviews, evaluates, and confirms or rejects the acceptability of reported NDE data, evaluations and documents, the disposition of reported indications on an "Evaluation Review Team Report" per Reference 4.4.a.

3.2 Shop Preservice Examinations

Responsibility		Action
ISI Engineer	.1	Provides appropriate IOM's describing activity requested from QCS&I.
	.2	Develops necessary interfaces with the shop examination Contractor and the Authorized Nuclear Inspector.
	.3	Submits Shop PSI Examination Contractor's Plan, Procedures and Personnel Certifications to QCS&I in accordance with Reference 4.4.a.
NDE Specialist	.4	Reviews, comments, or concurs with the Shop Examination Contractor's Plan, Procedures, and Personnel Certifications per Reference 4.3.a.
	.5	Concurs with the resolution of technical NDE questions within the scope of the Shop Preservice Examination.
ISI Engineer/NDE Specialist	.6	Documents the discussions and agreements reached between themselves and the shop Examination Contractor.

3.2 (Cont.)

Responsibility		Action
	.7	Maintains liaison with the Authorized Nuclear Inspector to obtain his concurrence with the Shop Preservice Examination Plan, Procedures, and Personnel Certifications.
	.8	Provides technical surveillance during the Shop Preservice examination per Reference 4.3.a.
	.9	Reviews and accepts Shop PSI examination data records and evaluation documents after verifying their technical content and completeness.
	.10	Submits the data records and evaluation documents to the Authorized Nuclear Inspector for signature.
	.11	Resolves discrepancies between the Authorized Nuclear Inspector and the Shop Examination Contractor.

4.0 REFERENCES

4.1 Preservice Inspection Program Plan (Plant Unique Program) containing Code Edition/Addenda applicability.

4.2 ASME Boiler and Pressure Vessel Code Sections III, V and XI.

a. Section III, Nuclear Power Plant Components
b. Section V, Nondestructive Testing
c. Section XI, Rules For Inservice Inspection Of Nuclear Power Plant Components - Division 1

4.3 Central Maintenance QCS&I Program Manual Instructions

a. INP 3-6 Examination Contractors
b. INP 3-9 NDE Calibration Blocks and Standards
c. INP 3-10 Examination Data
d. INP 3-11 Data Evaluation
e. INP 3-14 Preparation and Control of QCS&I Instructions

4.4 Engineering Division Procedures

a. EDP 9-3, Conduct of Preservice Examinations

4.0 (Cont.)

4.5 Topical Report WPPSS-QA-004 <u>Operational Quality Assurance Program</u>

5.0 <u>ATTACHMENTS</u>

None

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

PROCEDURE APPROVAL ROUTING SHEET

PROCEDURE/INSTRUCTION NO:	TITLE:
INP 3-10	Examination Data

MANUAL: QCS&I Manual

ROUTING SEQUENCE:

ORGANIZATION	NAME	CONCURRENCE SIGNATURE (APPROVAL OF CONTENT)	DATE
Generation Services	R. E. Smith	R E Smith	3/9/79
System Operations	G. E. Deegan	G. E. Deegan	3-7-79
Cent. Maintenance	J. E. Mills	J E Mills	3-5-79
WNP-2	J. R. Holder	J. R. Holder	3/7/79
QCS&I	K. J. Hannah	Ken J. Hannah	3/5/79
Design Engineering	L. T. Harrold	L T Harrold	3/12/79
Quality System	R. T. Johnson	[illegible] for RTJ	
Test & Startup	W. C. Bibb	W C Bibb	3/6/79
	Gen. Admin. File		

[X] NEW [ ] REVISED [ ] INTERIM (EXPLAIN BELOW)

REASONS FOR CHANGE:

Initial issue

COMMENTS WERE MINOR AND RESOLVED [ ] AND/OR AS NOTED BELOW:

MCS COORDINATOR:	DIVISION:	DATE:
R. Masterson/D.L. Weber	Generation	3/5/79

WP-225 R2

WASHINGTON PUBLIC POWER SUPPLY SYSTEM ISI/NDE PROGRAM	NO: INP 3-10 REV: Rev. 0 RESP. ORG: QCS&I
APPROVED: DIV. MGR. [signature] / APPROVED: ASST. DIR. [signature]	
TITLE: EXAMINATION DATA	EFFECTIVE DATE: 3/15/79

1.0 PURPOSE AND SCOPE

This procedure details the practice to be followed by QCS&I Personnel, in the collection, distribution, control, evaluation and storage of ISI/NDE examination data resulting from the performance of the WNP-2 Preservice Inspection (PSI), Inservice Inspection (ISI) and other Quality affecting NDE activities. Data indicating potential deficiencies is further processed in a separate procedure, INP 3-11, to obtain acceptable resolution of the suspected conditions.

2.0 DEFINITIONS

2.1 Data Controller - The individual delegated by the ISI Field Coordinator responsible for the maintenance of records from the time of receipt from the Field Supervisor until the final transmittal to Engineering Document Control.

2.2 ISI Field Coordinator - The NDE Specialist within Generation Services' QCS&I Subsection assigned by the Supervisor, QCS&I, responsible for the Field Preservice Inspections and on-site liaison with the Authorized Nuclear Inspector.

2.3 Field Supervisor - The individual (employed by WPPSS or a subcontractor) responsible for the conduct of the examination.

2.4 Recordable Indication - An indication which equals or exceeds Owner recording criteria. The Owner recording criteria may be more restrictive than the code requirements.

3.0 PROCEDURE

3.1 Preservice Inspection at WNP-2.

Responsibility		Action
ISI Field Coordinator	.1	Delegates Data Controller by IOM to QCS&I Supervisor, cognizant WNP-2 Project Engineer, WNP-2 ISI Engineer and Field Supervisor.
Data Controller	.2	Establishes a filing system using the guides established in Reference 4.3.
Field Supervisor	.3	Obtains records generated by the group under his direction.
	.4	Review records generated for completeness, legibility, accuracy and acceptability.

3.1 (Cont.)

Responsibility		Action
	.5	Assigns numbers to examination reports using his own procedures/instructions.
	.6	Flags data which contains recordable indications and forwards all records to the data controller.
		NOTE: WPPSS personnel to use Attachment 5.3 or similar. Subcontractors to use the applicable approved procedure.
Data Controller	.7	Reviews all records for completeness of data and legibility. Returns incomplete records to the Field Supervisor for completion and resubmittal, per steps 4-6.
	.8	Logs in completed records using the Log Sheet (Attachment 5.4 or similar).
	.9	Forwards completed records to the ISI Field Coordinator, using Attachment 5.3.
ISI Field Coordinator or Designee	.10	Reviews all records received.
	.11	Processes all deviations in accordance with Reference 4.1.
	.12	Forwards completed records to the ANI for review, verification and returns records to Data Controller.
Data Controller	.13	Makes two copies of records: forwards one copy to the ISI Engineer, using Attachment 5.3.
	.14	Returns original Report to responsible Field Supervisor for filing in permanent file.
	.15	Places the second copy in the QCS&I file.
Field Supervisor	.16	Following completion of PSI, compiles applicable records into a completed package and forwards to ISI Field Coordinator.

3.1 (Cont.)

Responsibility		Action
ISI Field Coordinator or Designee	.17	Verifies completed package contains all applicable records.
	.18	Maintains resulting Quality Assurance records in accordance with Reference 4.2.

3.2 Inservice Inspections - (To be formulated at a later date).

4.0 REFERENCES

4.1 INP 3-11 Data Evaluation

4.2 INP 3-15 Records

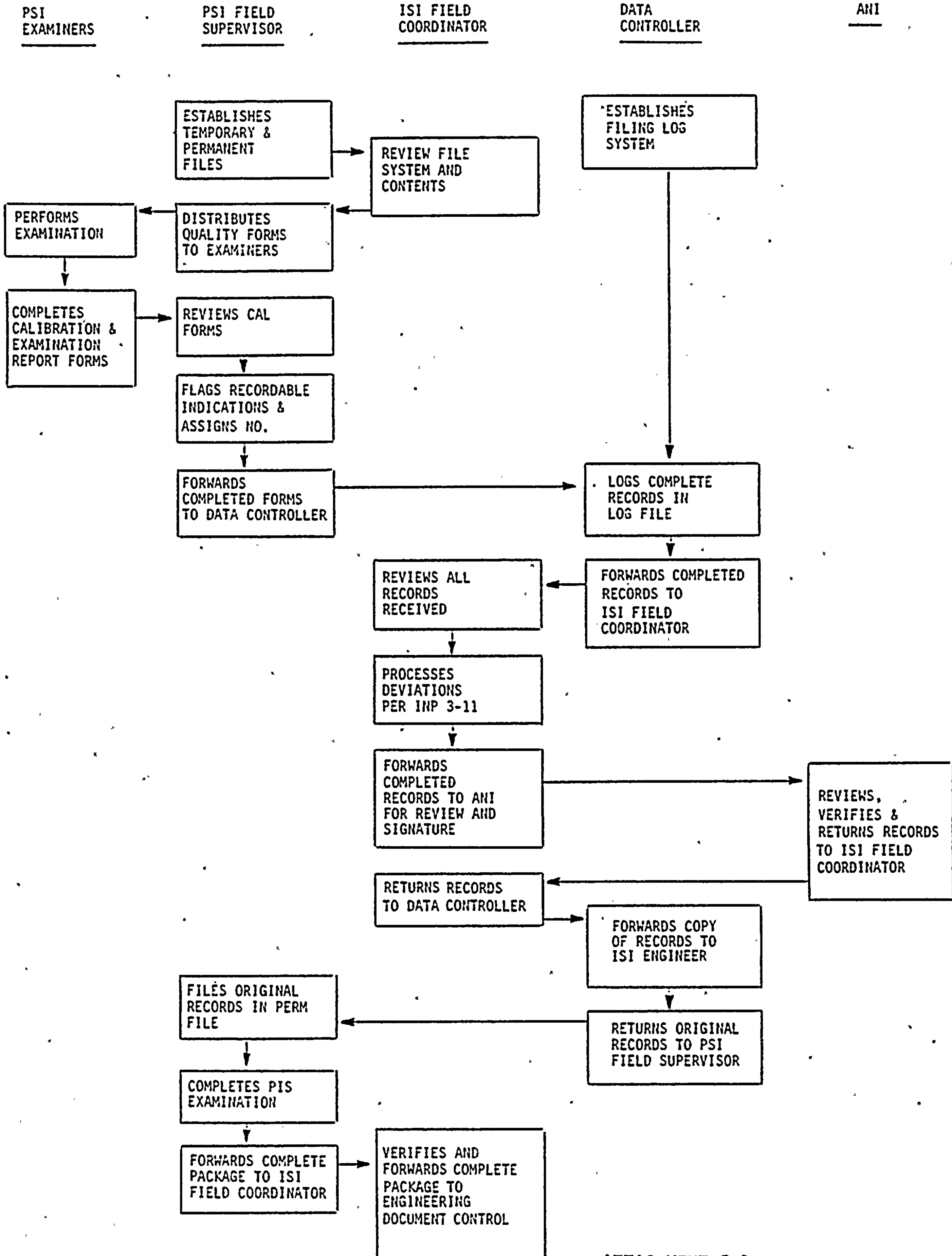
4.3 QCS&I-008 WNP-2 Baseline Data Filing System

5.0 ATTACHMENTS

5.1 Flow Sheet

5.2 Log

5.3 Transmittal Sheet



ATTACHMENT 5.1

DATA FROM LMT

ITEM NO.	DATE RECEIVED	REPORT NO.	REVIEWED BY	RECORDABLE DATA Y/NO	EVALUATION SHEET NO.	RFD NO.	RFD		REVIEWED BY	CLEARED DATE
							DATE OUT	DATE IN		

QCS&I TRANSMITTAL SHEET FOR EXAMINATION DATA

To: ______________________ Date: ____________

From: ______________________

EXAMINATION DATA

IDENTIFICATION	RECORDABLE DATA	
	YES	NO

ATTACHMENT 5.3

WASHINGTON PUBLIC POWER SUPPLY SYSTEM ISI/NDE PROGRAM	NO: INP 3-11 REV: Rev. 0 RESP. ORG: QCS&I
APPROVED: DIV. MGR. G. E. Deegan for / APPROVED: ASST. DIR. [signature]	
TITLE: DATA EVALUATION	EFFECTIVE DATE:

1.0 PURPOSE AND SCOPE

This procedure describes the method for QCS&I personnel by which indications, recorded during the performance of the WNP-2 Preservice Inspection (PSI), Inservice Inspection (ISI), or other specialized examinations, are documented and monitored during evaluation and disposition. Collection of data is described in a separate Procedure, 3-10.

2.0 DEFINITIONS

2.1 Data Controller - The individual, delegated by the ISI Field Coordinator, responsible for the maintenance of records from the time of receipt from the Field Supervisor until the final transmittal to Engineering Document Control.

2.2 Evaluation - As used pertaining to indications, the process of applying Code acceptance criteria to determine the acceptability or rejectability of an indication.

2.3 Evaluation Review Team - The group responsible for evaluating reportable indications, submitted to the team by the ISI Engineer, and issuing any resulting nonconformance reports. The team consists, as a minimum, of the ISI Engineer as Team Leader and a representative from Project Engineering, Generation Services, and the PSI Contractor.

2.4 Indication - Evidence or signal, obtained by application of an examination technique, revealing the presence of a flaw or surface degradation; may also be caused by geometry or material properties.

2.5 ISI Engineer - The individual within the ISI and Operations Support Engineering Section (Engineering Division), assigned by the Supervisor of that section, to assume primary responsibility for all ISI activities on a given project.

2.6 Construction Engineer - The individual, within the Supply System Projects Group, responsible for providing project support for the Preservice Inspection.

2.7 ISI Field Coordinator - The NDE Specialist, within Generation Services' QCS&I Subsection, responsible for the Field Preservice Inspections and on-site liaison with the Authorized Nuclear Inspector.

2.8 ISI Field Supervisor - The individual (employed by the Supply System or a subcontractor) responsible for conduct of the examination.

2.0 (Cont.)

2.9 Project Engineer - The individual within the Project Engineering organization, responsible for Project's interface during all PSI Examination Activities.

2.10 Recordable Indication - An indication which equals or exceeds Supply System recording criteria. Supply System recording criteria may be more restrictive than the Code requirements.

2.11 Request For Disposition (RFD) - The form used by QCS&I personnel to document requests to the ISI and Operations Support Engineering Section (Engineering Division) for hardware disposition.

2.12 Sizing of Indications - Application of the sizing criteria given in ASME Section XI, IWB-3000 and IWC-3000, to determine the size of a flaw indication - part of the evaluation process.

2.13 Test Engineer - The individual within the Plant Test and Startup Department, responsible for Test and Startup interface during all PSI examinations.

3.0 PROCEDURE

3.1 Preservice Inspection at WNP-2.

Responsibility		Action
Field Supervisor	.1	Collects and forwards records in accordance with Reference 4.2.
ISI Field Coordinator/ Designee	.2	Evaluates all recordable indications.
ISI Field Coordinator/ Designee	.3	Completes an evaluation sheet (Attachment 5.1).
ISI Field Coordinator and the Construction Engineer	.4	Resolves surface indications detected by either liquid penetrant, magnetic particle, or visual examination methods, per approved Project Procedures.
ISI Field Coordinator/ Designee	.5	Forwards evaluation sheets to the Data Controller.
	.6	Prepares an RFD (Attachment 5.2).

3.1 (Cont.)

Responsibility		Action
	.7	Forwards the record copy of the RFD, along with the evaluation sheet and accompanying information, to the ISI Engineer for action. Also transmits information copies to the Project Engineer, QCS&I Supervisor and the Startup and Operations Manager.
ISI Engineer	.8	Convenes the Evaluation Review Team, per Reference 4.1, to disposition the RFD and assures generation of the Evaluation Review Team Report (ERTR).
	.9	Works with Project Engineer (prior to system Provisional Acceptance) or the Test Engineer (following system Provisional Acceptance) to obtain corrective action per ERTR via the Request for Information (RFI) or the Startup Work Request (SWR), respectively.
	.10	Forwards the completed RFD package to the ISI Field Coordinator.
ISI Field Coordinator	.11	Reviews returned RFD for completion.
	.12	Clears component for service.
	.13	Forwards complete RFD to the Data Controller.
Data Controller	.14	Processes records according to Reference 4.2 requirements.

3.2 Inservice Inspection at WNP-2

This section will be written prior to ISI activities.

4.0 REFERENCES

4.1 EDP 9.3 Preservice Examination
4.2 INP 3-10 Examination Data

5.0 ATTACHMENTS

5.1 Evaluation Sheet
5.2 Request for Disposition
5.3 Flow Sheet

PRESERVICE EXAMINATION
EVALUATION SHEET

1. EVAL. SHEET #________________

2. PLANT ________________ 3. DATE ________________

4. ORIGINATOR ________________ 5. TYPE OF EXAMINATION __________

6. EXAMINATION PROCEDURE NO. ______ REV. NO. ________________

7. ITEM EXAMINED ________________________________

8. ISI NO. ________________ 9. ISI DRAWING NO. __________

10. LOCATION ________________________________

11. DESCRIPTION OF RECORDABLE CONDITION

12. RESOLUTION OF SURFACE INDICATIONS PER APPROVED QCS&I INSTRUCTIONS

/_/ Acceptable /_/ Surface Conditioning Requested

13. EVALUATION OF VOLUMETRIC INDICATIONS PER APPROVED QCS&I INSTRUCTIONS

/_/ Geometry /_/ Material Properties /_/ Other

/_/ Flaw Size $\geq$ 80% of the acceptance level

/_/ Flaw Size > 80% of the acceptance level (requires Evaluation Review Team Action and RFD documentation)

14. <u>JUSTIFICATION</u>

15. COMPLETED BY ________________ DATE ________________

16. LEVEL III ________________ NDE METHOD ________________

17. CONCURRENCE ISI FIELD COORDINATOR ________________

18. REEXAMINATION NO.________ RESULTS ________ EVAL. SHEET #________

1. R.F.D. ________

REQUEST FOR DISPOSITION

2. PLANT ____________________ 3. DATE ____________________

4. ORIGINATOR ____________________ 5. TYPE OF EXAMINATION __________

6. EVALUATION SHEET NO. ____

7. ITEM EXAMINED ____

8. ISI NO. ____________________ 9. ISI DRAWING NO. __________

10. LOCATION ____

11. DESCRIPTION OF CONDITION REQUIRING EVALUATION REVIEW TEAM ACTION

DISPOSITION

12. ACCEPTABLE AS IS /_/

13. UNACCEPTABLE /_/

14. UNACCEPTABLE CONDITION RECORDED ON:

RFI ____________________

15. DISPOSITIONED BY ____________________ DATE ____________________

EVALUATION REVIEW TEAM LEADER

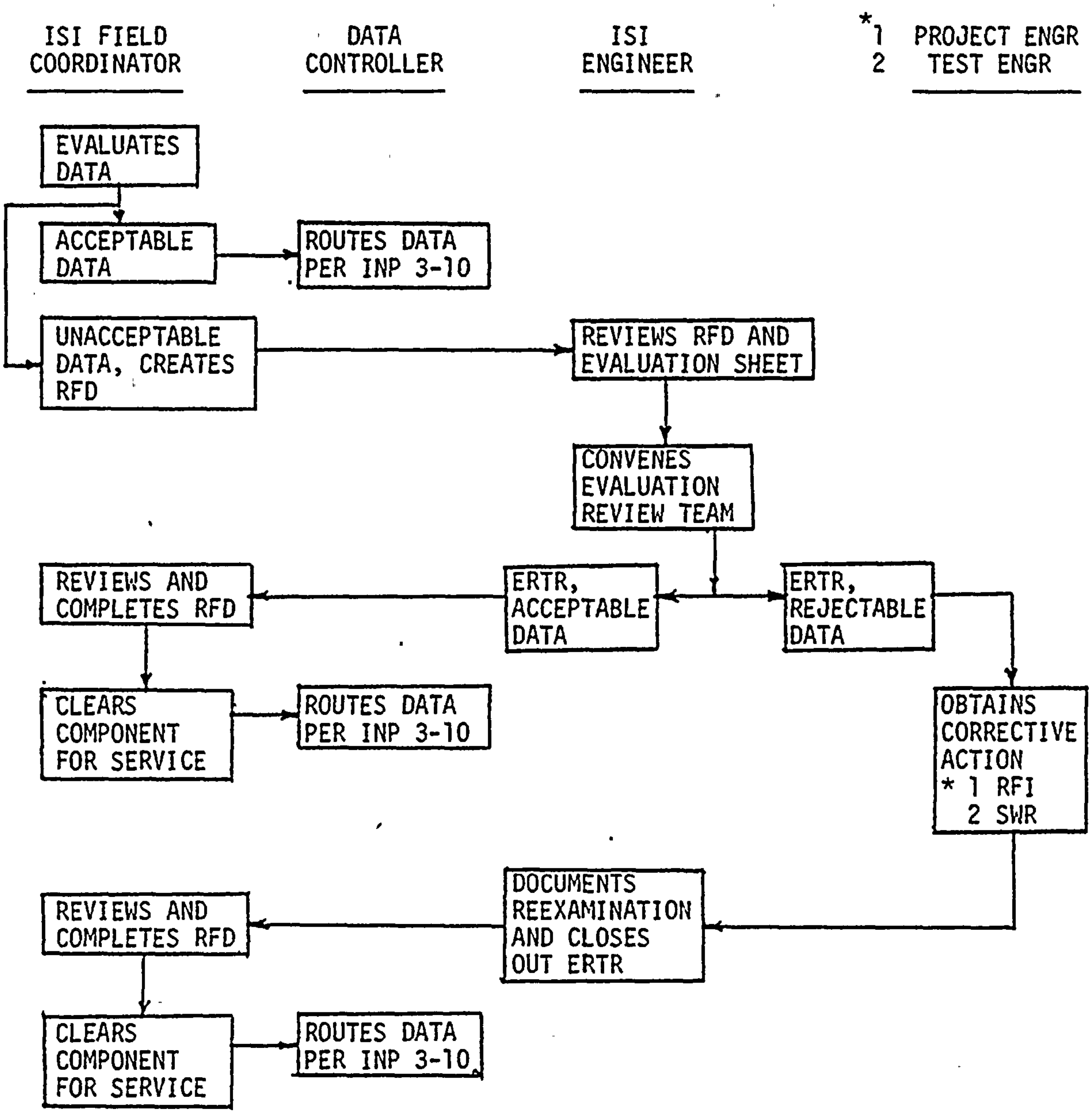
16. ERTR ____________________

17. AN(I) I - VERIFY/WITNESS

18. COMPONENT CLEARED FOR SERVICE BY ISI FIELD COORDINATOR.

SIGNATURE DATE

SIGNATURE DATE



Footnote:

* 1 Prior to system provisional Acceptance

2 Following system Provisional Acceptance

WASHINGTON PUBLIC POWER SUPPLY SYSTEM	NO: EDP-9.0
ENGINEERING PROCEDURE	REV: 0
	RESP. ORGN: Engineering
APPROVED: DIV. MGR. R Gille Voight for R G Cockrell	APPROVED: ASST. DIR. D L Renberger
TITLE: CONTROL OF INSERVICE INSPECTION ACTIVITIES	

1.0 PURPOSE AND SCOPE

This procedure identifies responsibilities and establishes guidelines for all Supply System Inservice Inspection (ISI) activities within the Engineering charter, either by explicit coverage herein or reference to other Engineering Division procedures. ISI includes Preservice Inspection (PSI) activities. This is the controlling procedure for the subordinate ISI procedures listed below. In case of conflicts between this procedure and those subordinate procedures, the responsibilities and guidelines of this procedure govern.

The subordinate procedures are:

EDP-9.1	ISI Access and Design Control
EDP-9.2	Preparation of PSI Plan
EDP-9.3	Conduct of PSI Examinations
EDP-9.4	Preparation of ISI Plan
EDP-9.5	Conduct of ISI Examinations
EDP-9.6	PSI/ISI Final Report Preparation

Unless specifically stated otherwise, all responsibilities, definitions, and statements of applicability found in this procedure are applicable to all subordinate procedures.

This procedure is applicable to ISI activities associated with ASME Section III, Class 1, 2, and 3 pressure boundary systems and components subject to the rules of ASME Section XI.

Inservice testing of pumps and valves, also governed by ASME Section XI, articles IWP and IWV respectively, are not included in the scope of this or the subordinate procedures.

2.0 DEFINITIONS

<u>ISI Engineer</u> - The individual within the Supply System ISI and Operations Support Section assigned by the supervisor of that section to assume primary responsibility for all ISI activities on a given project.

Project Engineer - The individual within the Supply System Project Engineering Department who has been assigned responsibility by the Project Engineering Manager for the Project Engineering activities associated with ISI.

NDE Specialist - The individual within Generation Services ISI/NDE Subsection assigned by the Supervisor, ISI/NDE, with responsibility for assisting the ISI Engineer in assuring the successful completion of the ISI planning and examination activities.

Quality Services Representative - The individual within the Quality Services organization assigned by the Manager, Quality Services, with responsibility for QA activities associated with the ISI planning and examination activities.

3.0 PROCEDURE

3.1 Assignment of Responsibilities for ISI - Design and Construction Phase of a Supply System Nuclear Power Plant

Responsibility	Action
Project Engineering Manager	1. Authorizes ISI and Operations Support Engineering to assume primary responsibility for the completion of all ISI activities required by the ASME Code, the Supply System Project Safety Analysis Reports, and the NRC regulations applicable to ISI commensurate with project funds approved for ISI activities by the Project Manager. Authorization to proceed with all ISI activities is included except where written authorization is specifically required by a subordinate procedure, or unless otherwise stated by the Project Engineering Manager.
	2. Assigns Project Engineer.
Supervisor, ISI and Operations Support Engineering	3. Assigns ISI Engineer.
Supervisor, ISI/NDE Generation Services	4. Assigns NDE Specialist(s) from Generation Services to support ISI and Operations Support Engineering in completing ISI activities (specific tasks defined in subordinate procedures).
Manager, Quality Services	5. Assigns Quality Services Representative responsible for QA activities associated with ISI activities.

6. Maintains formal contractual liaison with Authorized Nuclear Inspector (ANI), the NRC, and the Chief Boiler Inspector, ensuring that they are cognizant of major ISI programs, activities, and schedules.

3.2 Assignment of Responsibilities for ISI - Plant Operations Phase of a Supply System Nuclear Power Plant

Responsibility	Action

"To be added at a later date."

3.3 Review and Concurrence/Approval of Contractor Submittals

Responsibility	Action
ISI Engineer	1. Coordinates the review, concurrence, and approval of contractor submittals, including revisions to previously approved documents, except for field changes (see step 6), in accordance with Table 9.0.1, "Review and Concurrence/Approval of Contractor Submittals", using form WP-702, "WPPSS Review of Contractor Technical Submittals."
Reviewers (Ref. Table 9.0.1)	2. Reviews each document as designated in Table 9.0.1 using the following guidelines as appropriate and applicable. a. Compliance with Supply System contract requirements. b. Compliance with applicable codes, standards, and regulations referenced in the contract. c. Compliance with Supply System Quality Assurance requirements and commitments. d. Identification of any exceptions to a, b, or c above, including areas requiring coordination with or notification of the Supply System Authorized Nuclear Inspector or the NRC.

3. Transmits comments and/or approval of the contractor submittal in accordance with Table 9.0.1 using form WP-702, designating the document as "Approved," "Approved as Noted," or "Disapproved." Disapproval by any one review renders the document formally disapproved.

ISI Engineer

4. Coordinates the disposition of comments and redistribution of documents revised during comment resolution in accordance with steps 1 through 3. Comment resolution may require the return of the document to the contractor for revision and resubmittal.

5. Distributes copies of all "Approved" and "Approved as Noted" documents to all reviewers for their records.

6. Coordinates the review, concurrence, and approval of field changes to previously approved contractor submittals, either using steps 1 through 5 or by obtaining telecon or telecopy approval from the appropriate reviewers prior to implementation of the change. Such field changes shall be incorporated into the final report (see EDP-9.6).

8. Transmits completed review and approval forms and telecon/telecopy forms generated in steps 1 and 6 to Central Engineering Files in accordance with EDP-3.16, "Control of Engineering Records, Policy and Responsibilities."

3.4 Preparation of ISI Input to PSAR and FSAR

Responsibility	Action
ISI Engineer	1. Coordinates the preparation and review of ISI input for Supply System Nuclear Project PSARs and FSARs in accordance with EDP-8.2, "Preparation and Review of SARs."

2. Coordinates the review and approval of ISI input for Supply System Nuclear Project PSAR and FSAR ammendments in accordance with EDP-8.3, "Review and Approval of SAR and License Ammendments."

4.0 REFERENCES

4.1 EDP-3.16, Engineering Document and Record Control, Policy and Responsibility.

4.2 EDP-8.2, Preparation and Review of SARs.

4.3 EDP-8.3, Review and Approval of SAR and License Ammendments.

4.4 QA-004, WPPSS Operational Quality Assurance Program.

5.0 ATTACHMENTS

5.1 Table 9.0.1, WPPSS Review of Contractor Submittals.

TABLE 9.0.1

WPPSS REVIEW OF CONTRACTOR SUBMITTALS

REVIEWER	PROCEDURES, MANAGEMENT PLANS	CERTIFI-CATIONS	DATA AND EVALUATION RECORDS	PROGRAM PLAN/ REPORT	DESIGN DOCUMENTS	QA MANUAL	OTHER
Supervisor, ISI and Operations Support Engineer	R, A	R, A	R, A	R, A	R, A 1)	R	A 1)
Project Engineering Manager 2)	R	N	N	R, A	R	N	R
Plant Technical Supervisor	R	R	N	R, A	R	R	R
Supervisor, ISI/NDE, Generation Services	R, A	R, A	R, A	R, A	R, A	R	R
Manager, Quality Services	R, C	R, C	R	R	R	R, A	N

R = Review for Information

A = Comment and/or Accept/Approve

C = Comment and/or concur

N = No Action or Not Applicable

Notes:

1) Approval as required by Supply System contract or specification.
2) Preservice only.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM ENGINEERING PROCEDURE		NO: EDP-9.2 REV: 0 RESP. ORGN: Engineering
APPROVED: DIV. MGR. R G Cockrell	APPROVED: ASST. DIR. D L Renberger	
TITLE: PREPARATION OF PRESERVICE INSPECTION (PSI) PROGRAM		

1.0 PURPOSE AND SCOPE

This procedure identifies responsibilities and establishes guidelines for the preparation of the Preservice Inspection Program Plan for any WPPSS Nuclear Project. Each Program Plan will define those activities necessary to ensure that the preservice examination requirements of the ASME Boiler and Pressure Vessel Code, Section XI; and the WPPSS Operational Quality Assurance Program Description are satisfied.

This procedure provides instruction for the preparation of a preservice inspection plan which governs the planning activities that are performed on ASME Section III, Class 1, 2, and 3 pressure boundary systems and components subject to the rules of ASME Section XI.

Preservice Planning activities for Inservice Testing of Pumps and Valves, governed by ASME Section XI, Articles IWP and IWV, respectively, are not included in the scope of this procedure.

2.0 DEFINITIONS

PSI Program Engineer--The individual within the ISI and Operations Support Engineering Section who has been designated to coordinate the preparation, implementation, and maintenance of Preservice Inspection Program Plans.

Assisting Engineer--An individual within the Supply System who has been designated to assist the PSI Program Engineer in the preparation of Preservice Inspection Program Plans. More than one Assisting Engineer may be designated to accomplish this task. At least one Assisting Engineer shall be assigned from Project Engineering.

Review Engineer--An individual(s) within the Supply System who has been designated to perform an independent review of those plans, diagrams, drawings, tables, instructions, and procedures provided by the PSI Program Engineer or an Assisting Engineer.

Preservice Inspection Program Plan--That document prepared in accordance with the requirements of articles IWA-1000 and IWA-6220(a) of ASME Section XI which defines those areas of components

and systems subject to examination, and the examination techniques to be used. It contains, in part, ISI Boundary Diagrams, Weld and Component Identification Diagrams, Program Plan and Schedule Tables, Administrative Procedures, Examination Procedures, Requests for Relief, and various other sources of information related to the Preservice Examinations. This Program Plan is used by qualified examination personnel in performing Preservice Examinations in accordance with the requirements of 10CFR50.55a(g), the rules of ASME Section XI, and other regulatory requirements.

ISI Boundary Diagrams--Drawings which define the ASME Section XI examination requirements for each of the ASME Section III, Class 1, 2, and 3 systems.

Weld and Component Identification Diagrams--Isometric and component roll-out drawings which depict piping and components, welds, weld and component identification numbers, access considerations, platforms, spatial references, and other information that may be helpful to the examiner.

Program Plan and Schedule Tables--A tabular listing of each weld and component which is identified on a corresponding Weld and Component Identification Diagram, giving the examination requirements for each item.

Examination Access--Capability to physically reach and examine a weld or component. Typical examination access design features include: weld crown contour and surface finish to achieve ultrasonic coupling, removability of insulation, adequate clearance from hangers or restraints, and requirements for platforms, ladders, or temporary scaffolding.

3.0 PROCEDURE

Responsibility		Action
Supervisor, ISI and Operations Support Engineering	1.	Assigns PSI Program Engineer, Assisting Engineer(s) and Reviewing Engineer(s) for the Plan preparation. Assignment of Assisting Engineer(s) and Reviewing Engineer(s) participating from outside the ISI and Operations Support Engineering Section shall be by the manager/supervisor of the participating organization.
PSI Program Engineer	2.	Establishes the ASME Section XI Code Edition and Addenda, and related regulatory requirements, that are applicable to the WPPSS Nuclear Project for which the Preservice Inspection Program Plan is to be prepared.

Note: The applicable ASME Code and Addenda is defined by 10CFR50.55a(g) and by the Safety Analysis Report (SAR) and addenda thereto.

PSI Program Engineer/ Assisting Engineer	3.	Prepares ISI Boundary Diagrams which define for each Class 1, 2, and 3 system, the examination requirements of ASME Section XI. Boundary Diagrams are based on the current issue of the respective flow diagrams (P & IDs). Submits draft of diagrams to Review Engineer and applicable Plant Technical Supervisor.
Review Engineer/Plant Technical Supervisor	4.	Performs a review, independent of the PSI Program or Assisting Engineer of the Inspection Boundary Diagrams for accuracy and completeness, and documents the review on ISI Boundary Diagram Review Checklist (WP-575). Returns draft and checklist to PSI Program Engineer/Assisting Engineer.
PSI Program Engineer/ Assisting Engineer	5.	Resolves Review Engineer's and Plant Technical Supervisor's comments and has diagram original prepared by drafting or typing.
	6.	Proof checks the drafted or typed diagram, against the original, implements any corrections that are necessary; initials the diagram original, and submits the diagram original to the Review Engineer.
Review Engineer	7.	Reviews any corrections made and initials diagram original as the "checker" and forwards to the Supervisor, ISI and Operations Support Engineering.
Supervisor, ISI and Operations Support Engineering	8.	Approves diagram and returns it to the PSI Program Engineer.
PSI Program Engineer/ Assisting Engineer	9.	Reviews plant construction drawings to verify the examination access. Documents the review on Access Verification Forms (WP-576).
	10.	Identifies design features which might result in exceptions to the requirements of the AMSE Section XI Code. Documents findings on Access Verification Finding Report (AVFR) (WP-578).

11. Establishes a weld and component numbering system for the unique identification of each item and/or area subject to preservice examination giving due consideration to commonality of project numbering systems.

12. Prepares Weld and Component Identification Diagrams which:

    12a. Depict the general orientation of the piping systems and the components subject to preservice inspection.

    12b. Identify and locate each weld and component subject to preservice examination.

    12c. Identify access problems and considerations identified in step 3.0.10 above.

13. Submits draft of diagrams to Reviewing Engineer.

Review Engineer

14. Performs review of the Weld and Component Identification Diagrams independent of the PSI Program or Assisting Engineer. Documents the review on the Weld and Component Identification Diagram, and Program Plan and Schedule Table Checklist (WP-594).

15. Forwards draft and checklist through preparation/review/approval cycle (3.0.5 through 3.0.8).

PSI Program Engineer/
Assisting Engineer

16. Prepares Program Plan and Schedule tables which identify the individual examination requirements of each item or area subject to Preservice Examination. Submits draft to Review Engineer.

Review Engineer

17. Performs independent review of the Program Plan and Schedule Tables. Documents the review on the Weld and Component Identification Diagram, and Program

Plan and Schedule Table Checklist (WP-594).

18. Forwards draft and checklist through preparation/review/approval cycle (3.0.5 through 3.0.8) with the exception that the tables are not initialed.

PSI Program Engineer/ Assisting Engineer	19.	Reviews plant as-built configuration by direct observation at the construction site to verify examination access. Documents this review on Access Verification Forms (WP-576).
	20.	Identifies design and/or construction features identified during as-built review at the construction site which might result in exceptions to the requirements of the ASME Code, and documents these on AVFRs as in 3.0.10.
	21.	Updates the Preservice Inspection Program Plan documents to reflect changes in plant design which are identified from review of latest available drawings and by direct observation at the plant site, and to reflect the information, such as exceptions to Section XI examination requirements, which are recorded on AVFRs. Assures that any revisions to Weld and Component Identification Diagrams, Inspection Boundary Diagrams, and Program Plan and Schedule Tables which result from the update receive the same review cycle as for the original issue.
PSI Program Engineer	22.	Assembles all required information (including approved contractor and Supply System administrative and examination procedures, approved diagrams, QA program, drawings, and tables) into a completed Preservice Inspection Program Plan.
	23.	Forwards completed Preservice Inspection Program Plan to the Supervisor, ISI & Operations Support Engineering; Plant Technical Supervisor; and the Project Engineering Manager with a cover sheet for concurrence signature.

Supervisor, ISI & Operations Support Engineering	24.	Assures that the Preservice Inspection Program Plan has been adequately reviewed and the various checklists are completed. Obtains concurrence with the Plan from the Manager, Operations Quality Assurance; the Plant Technical Supervisor; and the Project Engineering Manager.
	25.	Rejects the plan and returns it to the PSI Program Engineer with comment, or approves the plan by signing the cover sheet and returns it to the PSI Program Engineer for implementation.
PSI Program Engineer	26.	Obtains acceptance of the Preservice Inspection Program Plan from the Supply System Authorized Nuclear Inspector.
	27.	Files the Preservice Inspection Program Plan with the Washington State Chief Boiler Inspector and requests Licensing Engineering to submit the Plan to the Nuclear Regulatory Commission.
	28.	Submits all Quality Assurance records generated as a result of preparation of the Plan to Central Files. Quality Class 1 items are transmitted using a Quality Assurance Record Receipt form WP-174. Quality Assurance records consist of originals of the forms used in developing the plan plus the signed cover sheet for the completed plan.

4.0 REFERENCES

4.1 American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI.

4.2 WPPSS Operational Quality Assurance Program Description.

4.3 10CFR50.55a(g).

4.4 Appropriate Safety Analysis Report (SAR).

5.0 ATTACHMENTS

None

CONDUCT OF PRESERVICE EXAMINATIONS

1.0 PURPOSE AND SCOPE

This procedure identifies responsibilities and establishes guidelines for the conduct of shop and field preservice examinations for any Supply System nuclear project. Preservice examination activities described herein are conducted in accordance with a Preservice Inspection Program Plan prepared by the Supply System in accordance with EDP-9.2, Preparation of PSI Program Plan, or by the PSI Contractor.

This procedure governs only the conduct of preservice examination activities up through transmittal of final documentation to Supply System possession, which includes all QA data records and data reports.

Note: Preparation of the Supply System final report for submittal to the NRC is governed by EDP-9.6, PSI/ISI Report Preparation.

2.0 DEFINITIONS

Preservice Inspection (PSI) Contractor--An outside agency performing PSI examination services under contract to the Supply System.

Evaluation Review Team--The group responsible for evaluating reportable indications submitted to the team by the ISI Engineer, and issuing any resulting nonconformance reports. The team consists, as a minimum, of the ISI Engineer as team leader and a representative from Project Engineering, Generation Services, and the PSI Contractor.

PSI Program Plan Master Copy--Sole copy of the PSI Program Plan used for controlling field changes to the plan. The master copy shall be dated and initialed by the ISI Engineer and shall be clearly identified as the master copy.

3.0 PROCEDURE

3.1 Shop Preservice Examinations

Responsibility	Action
ISI Engineer	1. Ensures that the PSI Contractor prepares Shop Preservice Inspection Program Plan, including NDE and management procedures, drawings, and examination schedule; and

		submits the plan to the Supply System for review and approval. Coordinates any required changes to the program with the Contractor.
	2.	Coordinates review and approval of Shop PSI Program Plan, and any changes thereto, with Generation Services, Project Engineering, and Quality Services in accordance with EDP-9.0; Control of ISI Activities.
Quality Services Representative(s)	3.	Perform surveillance of PSI examination activities.
Applicable Project Manager, Quality Assurance or Manager, Project Engineering	4.	Notifies Authorized Nuclear Inspector, (ANI), Chief Boiler Inspector, and the NRC of Shop Preservice Examination Schedule. Ensures that the Shop PSI Program Plan is submitted to the ANI for review and acceptance.
ISI Engineer/ NDE Specialist	5.	Monitors shop preservice examination activities and provides technical surveillance reports.
	6.	Reviews data evaluations and contractor nonconformance reports for technical adequacy. Obtains concurrence with disposition of nonconformances from the Project Engineer and assigned Quality Services Engineer.
	7.	Reviews and accepts shop PSI examination data records and evaluation documents per EDP-9.0, after verifying the completeness of their technical content.
	8.	Submits the data records and evaluation documents to the Authorized Nuclear Inspector (ANI) for signature.
	9.	Resolves discrepancies between the ANI and the shop PSI Contractor in order to obtain the ANI's signature.
ISI Engineer/Quality Services Representative	10.	Reviews and concurs with disposition of nonconformances.
ISI Engineer/NDE Specialist	11.	Reviews and approves shop PSI Final Data Report.

ISI Engineer	12.	Submits all quality-related records to Central Files, in accordance with EDP-3.16.

3.2 Field Preservice Examinations

Responsibility		Action
Supervisor, ISI, and Operations Support Engineering	1.	Assign ISI Engineer to assume primary responsibility for all PSI Program activities.
ISI Engineer	2.	Assesses the need for outside examination agency support for PSI examinations. The overall scope of examination activities is defined in the PSI Program Plan prepared in accordance with EDP-9.2. Coordinates with Generation Services to define the outside examination agency scope, i.e., those examination activities which are beyond the capabilities of Generation Services personnel. Certain field NSSS major component examinations may be performed in accordance with a Contractor-prepared PSI Program Plan which is reviewed and approved per EDP-9.0. Steps 4, 5, 7, and 8 of this procedure are not applicable under those circumstances.
	3.	Prepares documents necessary to hire an outside agency (PSI Contractor) in accordance with EDP-4.11, Procurement of Materials and Services. Issues a purchase requisition and coordinates with Contract Formation Personnel to prepare and issue a request for proposals, evaluate proposals, and award a PSI Contract per EDP-4.24, Bid Analysis/Vendor Selection (Supply System Specifications).
	4.	Formally assigns, via IOM, to Generation Services those PSI examinations defined in the PSI Program Plan but not within the PSI Contractor's scope, and requests an examination schedule.
	5.	Ensures that the PSI Contractor and Generation Services prepare NDE procedures, management plans, and other input required to be submitted to the ISI Engineer for completion of the PSI Program Plan per EDP-9.2 and per the established schedule.

Quality Services Representative(s)	6.	Performs surveillance of PSI examination activities.
Applicable Project Manager, Quality Assurance or Manager, Project Engineering	7.	Assures the Authorized Nuclear Inspector/ Chief Boiler Inspector and the NRC are notified of the PSI examination schedule. Ensures that the PSI Program Plan is submitted to the ANI for review and acceptance.
NDE Specialist	8.	Inventories and assembles all calibration blocks required to complete the PSI examinations, unless specifically designated in the PSI Contract as being within the PSI Contractor's scope. Obtains calibration block design drawings, as required, from ISI Engineer. Calibration block fabrication; if required, shall be performed utilizing Engineering instructions and design drawings which have been prepared and approved per EDP-4.4, Drawing Preparation and Control.
ISI Engineer	9.	Coordinates the review and concurrence/ approval of Contractor submittals per EDP-9.0, and incorporates those submittals into the PSI Program Plan per EDP-9.2.
	10.	Completes the PSI Program Plan and coordinates its final review and approval per EDP-9.2.
	11.	Conducts pre-examination planning meeting(s) with the participation of the PSI Contractor, Project Engineer, NDE Specialist(s) Quality Assurance Representative, and Project Construction Management to establish interfaces and the examination schedule.
	12.	Administers the technical, planning, and scheduling portions of the PSI Contract.
	13.	Assures that the ISI Contractor performs PSI examinations within the PSI Contract scope in accordance with Contractor NDE and administrative procedures approved per EDP-9.0, and the established examination schedule.
Project Engineer/ NDE Specialist(s)	14.	Coordinates craft and utility support with Project Construction Management for all PSI examinations activities.

Project Construction Management	15.	Provides utility support (e.g., demineralized water, compressed air/nitrogen, lighting, electricity, trailer space, scaffolding, ladders, and clean room facilities as required) and craft support, as requested by the NDE Specialist or Project Engineer.
	16.	Provides storage or transport of NDE equipment or calibration blocks upon request by the NDE Specialist or Project Engineer.
NDE Specialist(s)	17.	Performs PSI examinations not within the PSI Contractor's scope.
	18.	Technically monitors the conduct of the PSI Contractor's NDE activities, including examinations and evaluations of indications performed by the Contractor, to ensure their compliance with the approved procedures applicable to each activity.
	19.	Provides site liason with the Authorized Nuclear Inspector.
ISI Engineer	20.	Monitors overall conduct of PSI Program activities to ensure compliance with the requirements and commitments of the PSI Program Plan.
	21.	Coordinates PSI Program Plan revisions per EDP-9.2, except for field changes (see Step 22).
	22.	Controls field changes to the PSI Program Plan by marking in the master copy (see definition in Section 2.0) the required change and dating and initialing the change. Field changes will be incorporated into formal revisions of the PSI Program Plan per EDP-9.2 on a periodic basis.
	23.	Incorporates changes into the examiner working files by ensuring that the working documents are marked up and by dating and initialing those document changes or by ensuring that those documents are replaced with copies from the master markup.

24. Expedites activities of any other participant in PSI activities to ensure their completion on a schedule supportive of the application for the Plant Operating License.

25. Ensures that the PSI Contractor and Generation Services report indications to the ISI Engineer in accordance with approved PSI Contractor or Generation Services procedures.

26. Submits reported indications to the Evaluation Review Team.

Evaluation Review Team

27. Reviews and evaluates indications reported to the Team. Disposition of indications shall be by the issuance of an ISI Evaluation Review Team Report form (WP-651) which designates the indication acceptable or unacceptable per ASME Section XI evaluation/acceptance criteria. A copy of each report(s) of unacceptable indication(s) is transmitted to the Project Engineer for resolution.

Project Engineer

28. Initiates a project request for information (RFI) in accordance with approved procedures as required to resolve unacceptable indications identified in step 25.

29. Transmits a copy of each completed RFI from step 26 to the ISI Engineer.

ISI Engineer

30. Closes out the ISI Evaluation Review Team Report(s) by recording the appropriate RFI number on form WP-651 and documenting the re-examination of the repair area(s).

31. Ensures that the PSI Contractor and Generation Services prepare and submit PSI Examination Data Reports to the ISI Engineer.

32. Coordinates review and approval of PSI Data Reports, with revisions as required, per EDP-9.0. Incorporates into the Supply System PSI Examination Final Report per EDP-9.6.

33. Transmits all quality-related records to Central Files in accordance with EDP-3.16.

4.0 REFERENCES

4.1 EDP-9.0, Control of ISI Activities.

4.2 EDP-4.11, Procurement of Materials and Services.

4.3 EDP-4.24, Bid Analysis/Vendor Selection (Supply System Specification).

4.4 EDP-9.2, Preparation of PSI Plan.

4.5 EDP-9.6, PSI/ISI Report Preparation.

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WNP-2 PROCEDURE COVER SHEET AND QUALIFICATION RECORD

Procedure No. QA-31 Revision No. 0

Procedure Title WNP-2 PSI NOTIFICATION OF REPORTABLE INDICATION PROCEDURE

LMT, Inc. QA Review and Approval [signature] 2-23-78
(Quality Assurance Officer)

Client Approval [signature] ISI Engineer 3/1/79

Authorized Nuclear Inpsector ~~Approval~~ REVIEWED [signature] 3/12/79

Specific Qualification Record

Component	Examiners	Date

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

REVIEW OF CONTRACTOR SUBMITTALS

WNP- 2	ISI ENGINEER Thomas F. Hoyle	DATE 2/28/79
CONTRACT NO. C-4402	TITLE PSI Services for NSSS and Associated Nuclear Piping	
CONTRACTOR LMT, INC		

DOCUMENT TITLE	REV.
WNP-2 PSI Notification of Reportable Indications QA-31	0

PREVIOUSLY REVIEWED ☐ YES ☒ NO (DATE IF YES)

PREVIOUSLY APPROVED ☐ YES ☒ NO (DATE IF YES)

REASONS FOR RE-SUBMITTAL (IF PREVIOUSLY APPROVED)

REVIEWER	APPROVED	APPROVED AS NOTED	DISAPPROVED	COMMENTS ATTACHED
DEB 3/1/79 L. J. Blandin 3-1-79 — SUPERVISOR, ISI AND OPERATIONS SUPPORT ENGINEER	X			
NA — PROJECT ENGINEERING MANAGER/PLANT TECHNICAL SUPERVISOR	NA			
Ken J. Hammel 3-1-79 — SUPERVISOR, ISI/NDE, GENERATION SERVICES	X			
3/1/79 M. L. Dreher 3-1-79 — MANAGER, QUALITY SERVICES	X			

NOTES/COMMENTS:

WP-702 EOP 9.0

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PROC. NO. QA-31
PAGE 1
FOLLOWING PAGE 2
REVISION 0
DATE 2/22/79

TITLE:
WNP-2 PSI NOTIFICATION OF REPORTABLE PROCEDURE

I. This document establishes the procedure LMT will follow to formally notify WPPSS of the presence of reportable indications detected during the performace of nondestructive examinations.

II. This document applies to those indication requiring owner notification according to Paragraphs 3.9.4.2 and 3.9.4.3 (b) of the PSI Contract (14402).

A. The referenced paragraph requires WPPSS notification of indication as follows:

1. Immediate verbal notification of reportable indications.

2. Written notification within one (1) working day of any unacceptable indications.

3. Written notification within five (5) working days of any indication exceeding 80% of the limits of acceptability.

B. The limits of acceptability are shown in Tables 1(A) and 1(B).

QUALIFICATION:

JRLambert Level III 2/26/79

Approved for use DBMacGill Level III 2-23-79

III. Formal notification shall consist of completing and submitting to the WPPSS ISI Coordinator LMT Form LMT-QAF-16, "Notification of Reportable Indication" as shown in Figure 1.

A. The "Notification of Reportable Indication" form shall be completed as signed by the Level II or III examiner detecting the reportable indication, and reviewed and signed by the LMT Field Supervisor.

B. Two (2) copies of the completed form shall be submitted to the WPPSS ISI Coordinator and one (1) copy shall be filed with the examination report.

C. Part II of the "Notification of Reportable Indication" form shall be completed only if re-examination is performed following rework or repair.

Material: Ferritic steels that meet the requirements of NB-2300 and a specified minimum yield strength of 50 ksi or less
Thickness Range: t, 0.1 to 6.0 in.

Nominal Wall Thickness t, in.[2]	Allowable Indication by Surface Examination Method — Length ℓ, on Outer Surface, in.		Allowable Depth by Volumetric for Pipe Sizes <4" a/t, %		Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4" — Surface Indications a/t, %		Subsurface Indications a/t, %[3]	
	Report Due		Report Due		Report Due		Report Due	
	1 day	5 days	1 day	5 days	1 day	5 days	1 day	5 days
Preservice Examinations								
0.1 to 0.312	1/16	.050						
Over 0.312 to 2.0	3/16	.150	10%	8%	(10.4-.9t)	.8(10.4-.9t)	(10.4-.9t)	.8(10.4-.9t)
Over 2.0 to 6.0	1/4	.200			(10.4-.9t)	.8(10.4-.9t)	(10.4-.9t)	.8(10.4-.9t)
Inservice Examinations								
0.1 to 0.312	1/8	.100						
Over 0.312 to 2.0	9/32	.225	10%	8%	(15.3-1.3t)	.8(15.3-1.3t)	(15.3-1.3t)	.8(15.3-1.3t)
Over 2.0 to 6.0	5/16	.250			(15.3-1.3t)	.8(15.3-1.3t)	(15.3-1.3t)	.8(15.3-1.3t)

NOTES:

(1) The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

(2) t is the nominal pipe wall thickness, or the actual wall thickness as determined by UT examination

(3) The total depth of an allowable subsurface indication is twice the listed value.

<u>The Requirements for Written Owner Notification</u>

Table 1 (A)

Material: Austenitic steels with specified minimum yield strength of 35 ksi or less Thickness Range: t, 0.1 to 3.0 in.								
Nominal Wall Thickness t, in.[2]	Allowable Indication by Surface Examination Method Length ℓ, on Outer Surface, in.		Allowable Depth by Volumetric for Pipe Sizes <4" a/t, %		Allowable Depth by Volumetric Examination Methods[1] for Pipe Sizes >4"			
					Surface Indications a/t, %		Subsurface Indications a/t, %[3]	
	Report Due		Report Due		Report Due		Report Due	
	1 day	5 days	1 day	5 days	1 day	5 days	1 day	5 days
Preservice Examinations								
0.1 to 0.312	1/16	.050						
Over 0.312 to 2.0	3/16	.150	10%	8%	(10.1-.7t)	.8(10.1-.7t)	(10.7-.7t)	.8(12.7-.9t)
Over 2.0 to 3.0	7/32	.175			(10.1-.7t)	.8(10.1-.7t)	(10.7-.7t)	.8(12.7-.9t)
Inservice Examinations								
0.1 to 0.312	1/8	.100						
Over 0.312 to 2.0	1/4	.200	10%	8%	(12.7-.9t)	.8(12.7-.9t)	(12.7-.9t)	.8(12.7-.9t)
Over 2.0 to 3.0	9/32	.225			(12.7-.9t)	.8(12.7-.9t)	(12.7-.9t)	.8(12.7-.9t)

NOTES:

(1) The allowable length, ℓ, of either a surface or subsurface indication shall not exceed 6 x a.

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

(3) The total depth of an allowable subsurface indication is twice the listed value.

The Requirements for Written Owner Notification

Table 1 (B)

Lambert • MacGill • Thomas, Inc.
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Job Location ______
Report No ______
Exam Date ______

NOTIFICATION OF REPORTABLE INDICATION

Part I - LMT Findings

LMT Job No. ______ ISO No. ______

NDT Method: UT ____ PT ____ MT ____ ET ____ VT ____

Description of Indication: (Sketch/photograph attached Yes ___ No ___)

Examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Field Supervisor Date:

Notification Acknowledged by Client Representative: Date:

Part II - Re-examination

Findings: (Sketch/photograph attached Yes ___ No ___)

Re-examination Reference:

Signature of Examiner/Certif. Level Date:

Signature of LMT Supervisor Date:

Closed Client Representative Date:

Figure 1