0060312

Station 4 8 JUL 28 2003

S

ENGINEERING DATA TRANSMITTAL

1. EDT 633897

2. To: (Receiving Organization) DST Integrity Project	3. From: (Originating Organization) DST Project & Maintenance Eng.	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: DST Integrity Project	6. Design Authority/Design Agent/Cog. Engr.: Chris E. Jensen	7. Purchase Order No.: N/A
8. Originator Remarks: None		9. Equip./Component No.: 241-AP-103
		10. System/Bldg./Facility: DST
		12. Major Assm. Dwg. No.: N/A
11. Receiver Remarks:	11A. Design Baseline Document? ☐ Yes ☒ No	13. Permit/Permit Application No.: N/A
		14. Required Response Date: 23 July 03

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	RPP-13802	All	0	Ultrasonic Inspection Results for Double-Shell Tank 241-AP-103 - FY 2003	EQ	1	1	

RECEIVED SEP 11 2003 EDMC

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		Design Authority N/A									
		Design Agent N/A									
1	1	Cog. Eng. CE Jensen		15 July 03	23-26						
1	1	Cog. Mgr. BH Thacker		7-16-03	55-18						
1	1	QA WL Adams	WL Adams	7/16/03	55-09						
		Safety N/A									
1	1	Env. TL Faust		7/22/03							

18.	19.	20.	21. DOE APPROVAL (if required)
22 July 03	22 July 03	7-25-03	Ctrl No. N/A
Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	BH Thacker Design Authority/ Cognizant Manager / Date	☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments

DISTRIBUTION SHEET

To	From	
Distribution	DST Project & Maintenance Eng.	Page 1 of 1
Project Title/Work Order		Date 23 July 2003
Ultrasonic Inspection Results for Double-Shell Tank 241-AP-103 - FY 2003		EDT No. 633897
		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
RP Anantatmula	R1-14	X			
JL Castleberry	R3-26	X			
VL Callahan	H6-60	X			
GP Duncan	R3-26				X
BK Everett	S5-07	X			
TL Faust	S5-03	X			
LJ Julyk	R1-14	X			
PC Miller	R1-51	X			
MJ Ostrom	S5-07				X
TC Oten	S5-07				X
RL Schlosser	R1-14	X			
BH Thacker	S5-10				X
JO Ferguson	S5-03	X			

A-6000-135 (10/97)

ULTRASONIC INSPECTION RESULTS FOR DOUBLE-SHELL TANK 241-AP-103 - FY 2003

Chris E. Jensen
CH2M HILL HANFORD GROUP, INC.
Richland, WA 99352
U.S. Department of Energy Contract DE-AC27-99RL14047

EDT/ECN: EDT 633897 UC:
Cost Center: 7G220 Charge Code: 500447
B&R Code: Total Pages: 162

Key Words: Ultrasonic, inspection, examination, UT, DST

Abstract:
This report documents the required ultrasonic examination of double-shell tank 241-AP-103 performed during FY 2003. This examination included specified primary wall areas, welds, and lower knuckle. Results indicated that there was no reportable wall thinning, cracking, or pitting in any of the plate areas examined.

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

JUL 28 2003
DATE:
HANFORD RELEASE
STA: 4
ID: 8

7/28/03
Release Approval Date Release Stamp

Approved For Public Release

RPP-13802
Revision 0

ULTRASONIC INSPECTION RESULTS FOR DOUBLE-SHELL TANK 241-AP-103 – FY 2003

C.E. Jensen

CH2M HILL Hanford Group, Inc.

Date Published
July 2003

CH2MHILL
Hanford Group, Inc.

Post Office Box 1500
Richland, Washington

Prepared for the U.S. Department of Energy
Office of River Protection

Contract No. DE-AC27-99RL14047, Modification M030

Approved for public release; distribution is unlimited

RPP-13802, Rev. 0

Ultrasonic Inspection Results for Double-Shell Tank 241-AP-103 – FY 2003

July 2003

Prepared by:

A. M. Ermi,
COGEMA Engineering Corporation

Prepared for:

C. E. Jensen
CH2M HILL Hanford Group Inc.

This page intentionally left blank.

CONTENTS

1.0 INTRODUCTION 1-1

2.0 OBJECTIVE AND SCOPE 2-1

3.0 INSPECTION EQUIPMENT DESCRIPTION 3-1

4.0 UT INSPECTION DESCRIPTION 4-1

5.0 INDICATION REPORTING CRITERIA 5-1

6.0 PERFORMANCE DEMONSTRATION TEST 6-1

7.0 TANK 241-AP-103 HISTORY 7-1

8.0 GENERAL REQUIREMENTS AND INSPECTION SCOPE 8-1

9.0 EQUIPMENT SETUP AT AP TANK FARM 9-1

10.0 INSPECTION RESULTS 10-1

11.0 EVALUATION OF INSPECTION RESULTS 11-1
- 11.1 TANK 241-AP-103 UT DATA EVALUATION 11-1
- 11.2 DST ULTRASONIC INSPECTION DATA RESULTS COMPARISON 11-4

12.0 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS 12-1

13.0 REFERENCES 13-1

ATTACHMENTS

1. AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING (Procedure COGEMA-SVUT-INS-007.3, Rev. 1) ..... Att. 1-1

2. COGEMA "AUTOMATED ULTRASONIC THICKNESS DATA REPORT SHEETS" ..... Att. 2-1

3. ULTRASONIC EXAMINATION OF DOUBLE-SHELL TANK 241-AP-103 EXAMINATION COMPLETED APRIL 2003 (PNNL THIRD PARTY REVIEW) ..... Att. 3-1

FIGURES

Figure 1-1. Typical Double-Shell Tank Configuration 1-1

Figure 3-1. P-scan Crawler System on Tank Mock-up 3-1

Figure 4-1. Schematic of UT Setup for Vertical Wall Inspection 4-2

Figure 4-2. Schematic of UT Setup for First Pass of Weld Inspections 4-2

Figure 4-3. Schematic of UT Setup for Second Pass of Weld Inspections 4-3

Figure 7-1. Waste Level History of Double-Shell Tank 241-AP-103. 7-1

Figure 9-1. Field Set-Up at Riser for Double-Shell Tank on AP-Farm 9-1

Figure 10-1. Schematic of UT Scan Paths on West Side of Tank 241-AP-103 Wall (via Riser 031) 10-2

Figure 11-1. Scan Data Average Wall Thickness Compared to Nominal Plate Thickness 11-2

Figure 11-2. Gouge Adjacent to a Plate #4 Vertical Weld on Double-Shell Tank 241-AP-103 11-3

TABLES

Table 10-1. Summary of Primary Tank Wall Scan 1 (via Riser 031) 10-3

Table 10-2. Summary of Primary Tank Wall Scan 2 (via Riser 031) 10-3

Table 10-3. Summary of Primary Tank Vertical Weld Scans (via Riser 031) 10-4

Table 10-4. Summary of Plate #5 / Knuckle Horizontal Weld Scans (via Riser 031) 10-4

Table 10-5. Primary Tank Vertical Wall Scan 1 - Plate 1 (via Riser 031) 10-5

Table 10-6. Primary Tank Vertical Wall Scan 1 - Plate 2 (via Riser 031) 10-5

Table 10-7. Primary Tank Vertical Wall Scan 1 - Plate 3 (via Riser 031) 10-6

Table 10-8. Primary Tank Vertical Wall Scan 1 - Plate 4 (via Riser 031) 10-6

Table 10-9. Primary Tank Vertical Wall Scan 1 - Plate 5 (via Riser 031) 10-7

Table 10-10. Primary Tank Vertical Wall Scan 2 - Plate 1 (via Riser 031) 10-7

Table 10-11. Primary Tank Vertical Wall Scan 2 - Plate 2 (via Riser 031) 10-8

Table 10-12. Primary Tank Vertical Wall Scan 2 - Plate 3 (via Riser 031) 10-8

Table 10-13. Primary Tank Vertical Wall Scan 2 - Plate 4 (via Riser 031) 10-9

Table 10-14. Primary Tank Vertical Wall Scan 2 - Plate 5 (via Riser 031) 10-9

Table 10-15. Primary Tank Vertical Wall Weld Scan - Plate 2 (via Riser 031)..... 10-10

Table 10-16. Primary Tank Vertical Wall Weld Scan - Plate 3 (via Riser 031)..... 10-10

Table 10-17. Primary Tank Vertical Wall Weld Scan - Plate 4 (via Riser 031)..... 10-11

Table 10-18. Primary Tank Vertical Wall Weld Scan - Plate 5 (via Riser 031)..... 10-11

Table 10-19. Primary Tank Vertical Wall Weld Scan Flaws - Plates 4 and 5 (via Riser 031) 10-11

Table 10-20. Primary Tank Horizontal Weld - Plate 5 to Knuckle Scan, Plate Side (via Riser 031) 10-12

Table 10-21. Primary Tank Horizontal Weld - Plate 5 to Knuckle Scan, Knuckle Side (via Riser 031) 10-13

Table 11-1. Double-Shell Tanks Chronological Inspection Results Findings..... 11-4

Table 11-2. Tank Wall Thinning By Nominal Plate Size..... 11-6

TERMS

ASME	American Society of Mechanical Engineers
CH2M HILL	CH2M HILL Hanford Group, Inc.
COGEMA Engineering	COGEMA Engineering Corporation
DST	double-shell tank
DSTIP	Double-Shell Tank Integrity Project
FY	fiscal year
HAZ	heat-affected zone
ID	inner-diameter
JCS	Job Control System
NDE	Nondestructive Examination
PDT	Performance Demonstration Test
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction Facility
RL	U.S. Department of Energy, Richland Operations Office
RMS	Root Mean Square
T-SAFT	Tandem Synthetic Aperture Focusing Technique
TWINS	Tank Waste Information Network System
TWRS	Tank Waste Remediation System
UT	Ultrasonic Testing
WDOE	Washington State Department of Ecology

EXECUTIVE SUMMARY

Background

Through FY 1999, six double-shell tanks were ultrasonically examined to meet the integrity requirements of the *Washington Administrative Code*, Chapter 173-303, "Dangerous Waste Regulations". Subsequent to the examinations, integrity assessment reports were issued for each double-shell tank farm and submitted to the Washington State Department of Ecology in FY 1999. In June 2000, the Washington State Department of Ecology issued Administrative Orders 00NWPKW-1250 and 00NWPKW-1251 providing prescriptive examination requirements for all double-shell tanks by FY 2005. This report documents the required ultrasonic examination of double-shell tank 241-AP-103, completed in the third quarter of FY 2003.

Methodology

The primary wall examinations consisted of a vertical 30-inch strip consisting of two 15-inch ultrasonic examination scans. The primary wall vertical examinations were looking for wall thinning, cracking, and pitting in the tank wall. The weld heat-affected zones examined included 25 linear feet of vertical welds and 20 linear feet of horizontal welds. These examinations were performed using the P-scan nondestructive examination technique.

The ultrasonic examinations were carried out in accordance with ASME Boiler and Pressure Vessel Code, Section V, "Nondestructive Examinations". The personnel and non-destructive examination equipment were qualified to perform the examinations on the double-shell tanks by performance demonstration tests administered by Pacific Northwest National Laboratories.

The required accuracy for the ultrasonic examinations is to be within 0.020 inches for wall thinning, 0.050 inches for pitting, and 0.10 inches for cracking. The performance demonstration test revealed that the examiners meet this requirement.

Results

Results indicated that there was no reportable wall thinning in any of the plate areas examined. In addition, there were no reportable pitting indications nor any crack-like indications detected in any of the plates (excluding weld heat-affected zones).

There were no reportable wall thinning nor reportable pitting indications detected in any of the weld heat-affected zones for the primary tank vertical weld scans and the knuckle-to-shell horizontal weld scan. However, there was one linear indication detected in the weld heat-affected zone of the Plate #5 vertical weld. The linear indication measured 2.92 inches in length, but it was indeterminate whether the linear indication was inner-diameter connected or if it was in the weld. It is recommended that a follow-up inspection using different evaluation methods be performed to more precisely characterize the linear indication and to establish if it is reportable.

In addition, a small, 1.42 inch long gouge was observed on an area of Plate #4, just above the Plate #4 / Plate #5 horizontal weld. The gouge does not appear to pose any threat to the tank integrity, but this area should be monitored during subsequent tank inspections.

Conclusions

Based on the overall results of this examination, the material condition of the tank is satisfactory for continued operation. However, it is recommended that the linear indication detected in the weld heat-affected zone in Plate #5 be further evaluated. As a result of that follow-up inspection, an assessment regarding the integrity of the tank can be made and a decision regarding subsequent inspection intervals can be formulated.

The tanks inspected to date are summarized in the following table.

Double-Shell Tanks Inspected Through May 2003

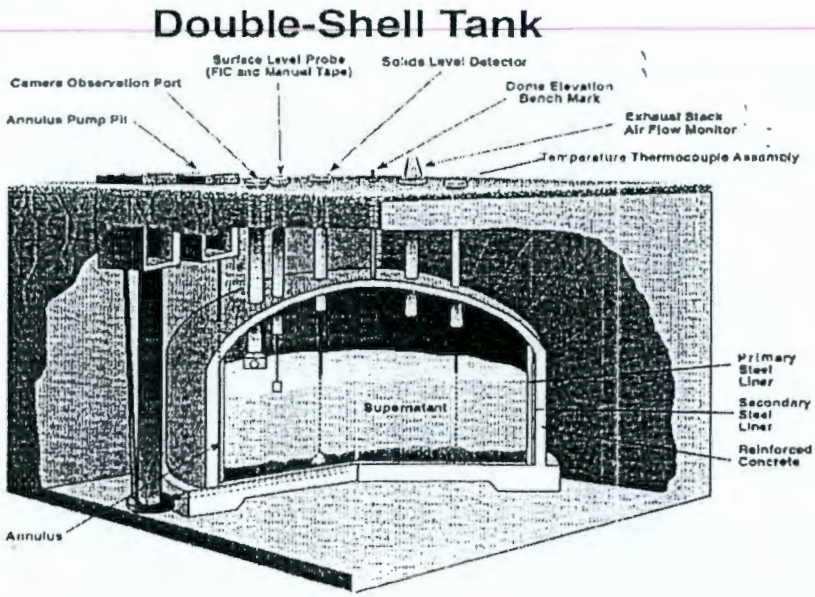
Double-Shell Tank	Inspection Year (FY)						
	1997	1998	1999	2000	2001	2002	2003
AN-101						x	
AN-102					x		
AN-105			x			(1)	
AN-106			x				
AN-107		x					
AP-101							x (3)
AP-103							x (4)
AP-105							x
AP-107				x			
AP-108				x		(2)	
AW-101					x		
AW-102						x	(5)
AW-103	x						
AW-104						x	
AW-105					x		
AW-106						x	
AY-101					x	x	
AY-102			x				
AZ-101			x				

(1) Limited scope reexamination.
(2) Linear indication evaluated.
(3) Includes primary knuckle Tandem Synthetic Aperture Focusing Technique (T-SAFT) examination.
(4) Linear indication detected; Further evaluation recommended.
(5) Primary knuckle T-SAFT examination only.

1.0 INTRODUCTION

In May 1996 the Tank Waste Remediation System (TWRS) Decision Board recommended, and U.S. Department of Energy, Richland Operations Office (RL) agreed, that the condition of the double-shell tanks (DST) should be determined by ultrasonic testing (UT) inspection of a limited area in six of the 28 DSTs (Figure 1-1). The Washington State Department of Ecology (WDOE) agreed with the strategy of limited ultrasonic inspection of DSTs. Data collected during the UT inspections will be used to assess the condition of the tank, judge the effects of past corrosion control practices, and satisfy a regulatory requirement to periodically assess the integrity of waste tanks.

Figure 1-1. Typical Double-Shell Tank Configuration.



In November 1996, DST 241-AW-103 was the first tank inspected to determine if Hanford DST walls could be inspected without removing the existing surface rust and scale. Equipment similar to that used to perform routine inspections of oil tanks and large pipelines was used. UT sensors were mounted on a remote-controlled crawler that used magnetic wheels to affix itself and move about on the tank walls. The crawler was deployed into the tank annulus and vertically traversed the primary and secondary containment walls to collect data on the wall thickness and the size of any pits or cracks. The successful completion of this inspection met the requirements of RL Milestone T21-97-455 and represented the first UT inspection of a Hanford DST (*Final Report - Ultrasonic Examination of Tank 241-AW-103 Walls*, Leshikar 1997).

In fiscal year (FY) 1998, FY 1999, and FY 2000, similar inspections were performed per Engineering Task Plans HNF-2820 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks*, Pfluger 1999) and RPP-5583 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2000*, Jensen 2000) on 241-AN-107, 241-AN-106, 241-AN-105, 241-AY-102, 241-AZ-101, 241-AP-107, and 241-AP-108. An

attempt was made to examine 241-AY-101 in FY 1999, but corrosion product on the tank wall prevented reliable examination.

In June 2000, WDOE issued an Administrative Order requiring UT examinations of the remaining 20 DSTs through FY 2005 (*Administrative Order No. 00NWPKW-1251, Failure to Comply with Major Milestone M-32 of the Tri-Party Agreement*, Silver 2000). Based on the results of the above listed eight DST inspections and per WDOE Administrative Order requirements (Silver 2000), Engineering Task Plans RPP-6839 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2001*, Jensen 2000a), RPP-7869 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2002*, Jensen 2002), RPP-8867 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks 241-AP-108, 241-AY-101, and 241-AZ-102 - FY2002*, Jensen 2002a), and RPP-11832 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2003*, Jensen 2002b) were prepared for ultrasonic DST inspections scheduled for FY 2001, FY 2002, and FY 2003.

In FY 2001, UT inspections were performed on four DSTs: 241-AN-102, 241-AW-101, 241-AW-105, and 241-AY-101 (following cleaning of selected areas of the 241-AY-101 wall). In FY 2002, UT inspections were performed on five more DSTs: 241-AN-101, 241-AW-102, 241-AW-104, 241-AW-106 and 241-AY-101 (a more extensive examination of 241-AY-101). The FY 2002 examination of 241-AP-108 was limited to characterization of the linear indication found in FY 2000. In addition, a limited scope reexamination of the upper walls of tank 241-AN-105 was performed in FY 2002. A primary knuckle inspection on 241-AW-102 using the Tandem Synthetic Aperture Focusing Technique (T-SAFT) not completed during FY 2002 was completed in early FY 2003.

DST 241-AP-103 was the third of four tanks selected for inspection in FY 2003 (the others being 241-AP-101, 241-AP-105 [completed] and 241-AZ-102). Inspection of tank 241-AP-103 was completed in the third quarter of FY 2003, and is the subject of this report. The services of COGEMA Engineering Corporation (COGEMA Engineering) were retained to provide UT examinations, procedures and inspectors, and report the inspection results. Examination of 241-AP-103 was performed with UT equipment provided by CH2M HILL Hanford Group, Inc. (CH2M HILL).

2.0 OBJECTIVE AND SCOPE

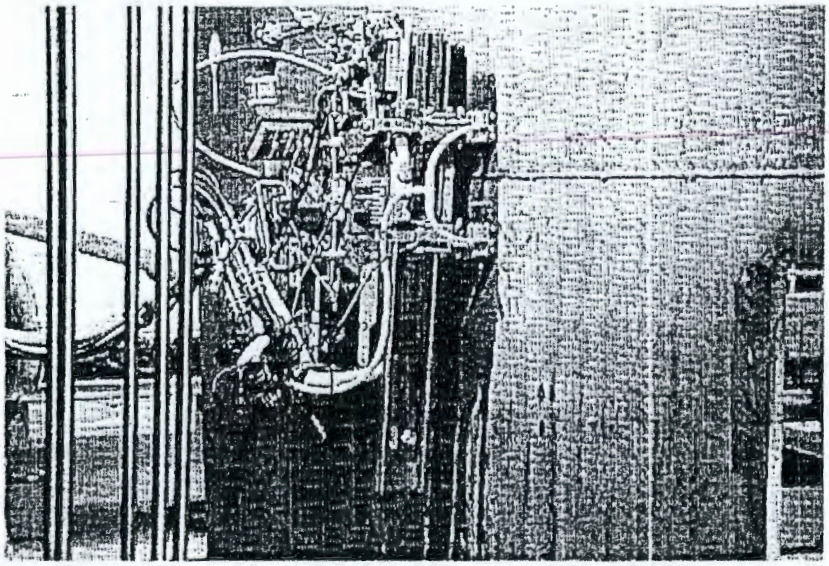
This report describes the inspection system, evaluates the inspection results, and documents findings with conclusions and recommendations. The inspections were conducted in accordance with the criteria and scope set forth in RPP-11832 (Jensen 2002b) for the FY 2003 UT inspection of DST 241-AP-103.

This page intentionally left blank.

3.0 INSPECTION EQUIPMENT DESCRIPTION

Crawler / Scanning Bridge System – The crawler is a remotely controlled device that delivers the ultrasonic transducers to the tank walls. The crawler used during P-scan imaging weighs approximately 30 pounds and has dimensions (including its traveling bridge) of approximately 21 inches wide by 18 inches long by 6 inches high. The traveling bridge on the crawler can be outfitted with various ultrasonic transducer configurations (Figure 3-1).

Figure 3-1. P-scan Crawler System on Tank Mock-up.



The P-scan crawler systems is deployed through a 24 inch annulus inspection riser using a customized deployment tool. The crawler attaches to the tank wall with two pairs of magnetic wheels. As the crawler moves slowly forward the transducers glide from side-to-side over the tank wall surface. Water couplant is continuously fed to each transducer at a rate needed to maintain an acceptable signal.

Deployment Tool – A deployment tool was specifically designed to insert and retrieve the scanning system into and out of the DST annular space. The scanner sits on a platform that is manually lowered to the appropriate elevation. The platform has cables attached that can be controlled to move the scanner platform into contact with the examination surface. The scanner is then driven onto the surface. The deployment tool is retracted until the scanner needs to be removed from the annular space.

P-scan – P-scan is the name of the computerized pulse-echo ultrasonic inspection system used by the inspection vendor. The P-scan system is manufactured by Force Institute in Denmark. It acquires data from zero and angle beam transducers mounted on the crawler, allows real-time analysis, and records the data in electronic memory for post inspection analysis. Force Institute has designated "P-scan mode" to represent the angle beam (flaw length) view and "T-scan

mode" to represent the zero beam (thickness) view. T-scan mode is used for normal operation and, if crack-like indications are detected, then the P-scan mode is employed.

During normal T-scan and P-scan operations, the waveforms of the reflected sound wave signals for each transducer are displayed in the "A-scan monitoring mode". The displays are continuously monitored (but not saved), and are primarily used to verify that the transducers are functioning properly (e.g., there is proper probe contact, adequate water flowing, and correctly operating transducer cables). When an indication is detected, the area is rescanned using the "A-scan recording mode". The recorded A-scan waveforms are then reviewed off-line, serving as an additional tool in the evaluation of the indication.

Overview Camera – This camera was deployed to observe the area immediately around the inspection area and to aid crawler deployment in the annulus.

Side-view Camera – This camera and light system were installed in a riser adjacent to the inspection riser to provide an overall view of the inspection process.

Riser Enclosure – A modular structure that is placed over the inspection riser. This structure is used to combat adverse weather conditions and supplies an internal hoist for deployment of equipment.

Data Acquisition Control Center – A pull-type trailer was used to house the crawler controls, video monitors, and data collection and evaluation hardware. The trailer was located inside the AP Tank Farm boundary fence.

4.0 UT INSPECTION DESCRIPTION

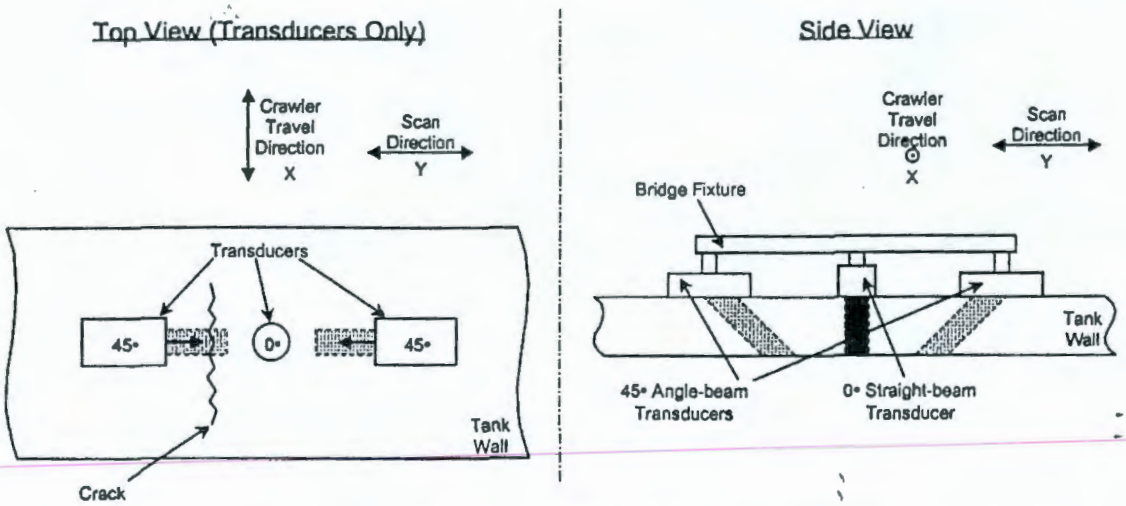
The following is the description of the data collection methodology:

Tank inspection was performed under Job Control System (JCS) work package number 2E-02-1531. All work steps, guidelines, procedures, personnel responsibilities, and protocol for the inspection (Jensen 2002b) were included in the subject work package. The COGEMA Engineering procedure that establish the methods, equipment and requirements for the P-scan imaging system UT measurements and flaw detection is *Automated Ultrasonic Examination For Corrosion And Cracking*, COGEMA-SVUT-INS-007.3 (Attachment 1).

The remotely controlled, steerable crawler was used to deliver the P-scan UT transducers to the tank wall (Figure 3-1). The crawler was deployed through the 24 inch diameter annulus inspection Riser Number 031 to perform the vertical wall scans, and the vertical and horizontal weld scans.

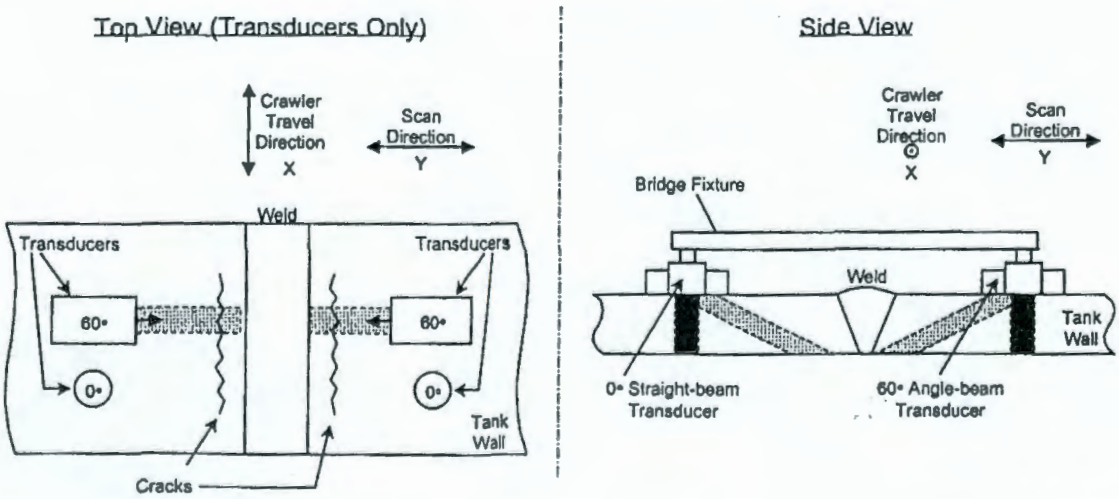
The P-scan crawler inspects the primary tank wall using one dual-element 0 degree transducer to detect wall thinning and corrosion pitting, and two 45 degree shear-wave transducers to detect cracking transverse to the scanning direction. This examination setup is illustrated in the Figure 4-1 schematic. To detect cracks parallel to the weld, a 60 degree shear-wave transducer was directed toward the weld and a dual-element 0 degree transducer is also included to detect wall thinning and corrosion pitting (Figure 4-2). To detect cracks oriented perpendicular to welds, two opposing 45 degree shear-wave transducers were directed parallel to the weld. Welds were examined from both sides of the weld crown (Figure 4-3). Note that weld and weld examination refer to the UT examination of the heat-affected zone (HAZ).

Figure 4-1. Schematic of UT Setup for Vertical Wall Inspection



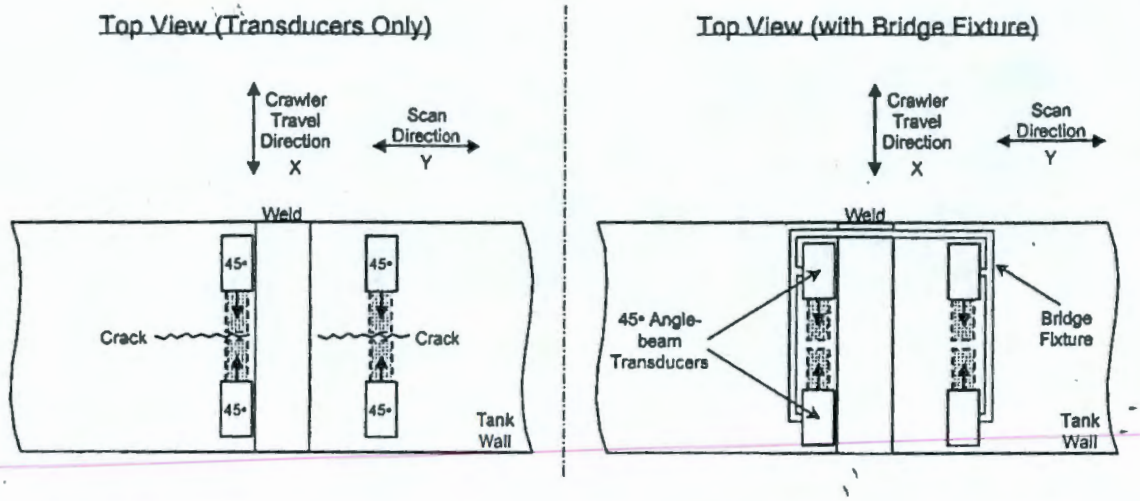
Vertical Wall Inspection Setup – Uses two 45° Transducers and one 0° Transducer (Inspect for Wall Thinning, Pitting and Axial Cracks)

Figure 4-2. Schematic of UT Setup for First Pass of Weld Inspections



First Pass of Vertical and Horizontal Weld Inspection – Uses two 60° Transducers and two 0° Transducers (Inspect for Wall Thinning, Pitting and HAZ Cracks Parallel to the Weld)

Figure 4-3. Schematic of UT Setup for Second Pass of Weld Inspections



Second Pass of Vertical and Horizontal Weld Inspection – Uses four 45° Transducers (Inspect for Heat-Affected Zone Cracks Perpendicular to the Weld)

This page intentionally left blank.

5.0 INDICATION REPORTING CRITERIA

COGEMA Engineering was required to report to the customer the following anomalies:

- Wall thinning that exceeded 10 percent of the nominal wall thickness
- Pit depths that exceeded 25 percent of the nominal wall thickness
- Cracks that exceeded 0.1 inch in depth.

The reporting criteria is established to identify indications that should be tracked. This tracking is to be used to determine if there is any active mechanism causing additional thinning, pit growth, or crack growth, based on subsequent examinations on the eight to ten year examination interval. The values are nominally 50% of the "acceptance criteria" established in *Acceptance Criteria for Non-Destructive Examination of Double-Shell Tanks* (Jensen 1995) and recommended in *Guidelines for Development of Structural Integrity Programs for DOE High-Level Waste Storage Tanks* (Bandyopadhyay et al. 1997).

For indications exceeding the "acceptance criteria", actions are initiated to evaluate the operability of the DST (Jensen 2002) through the occurrence reporting process. Indications exceeding the "reporting criteria" are reported to the CH2M HILL Project Engineer to be documented in the inspection report (Jensen 2002).

This page intentionally left blank.

6.0 PERFORMANCE DEMONSTRATION TEST

Prior to field use, COGEMA Engineering personnel satisfactorily completed a performance demonstration test (PDT). The test was conducted to qualify personnel, test procedures, and ensure the equipment's ability to detect and size wall thinning, pits, and cracks in a series of test plates with artificial defects. The performance demonstration test was performed on a tank mock-up in the 306E Facility located in the Hanford Site 300 Area. This mock-up also demonstrated the successful deployment and retrieval of the equipment. The PNNL report, "*Report on Performance Demonstration Test – PDT, May 2000,*" (Attachment 3 of *Ultrasonic Inspection Results of Double-Shell Tank 241-AP-108*, Jensen 2000b) provides the details of the complete evaluation of the P-scan system PDT.

This page intentionally left blank.

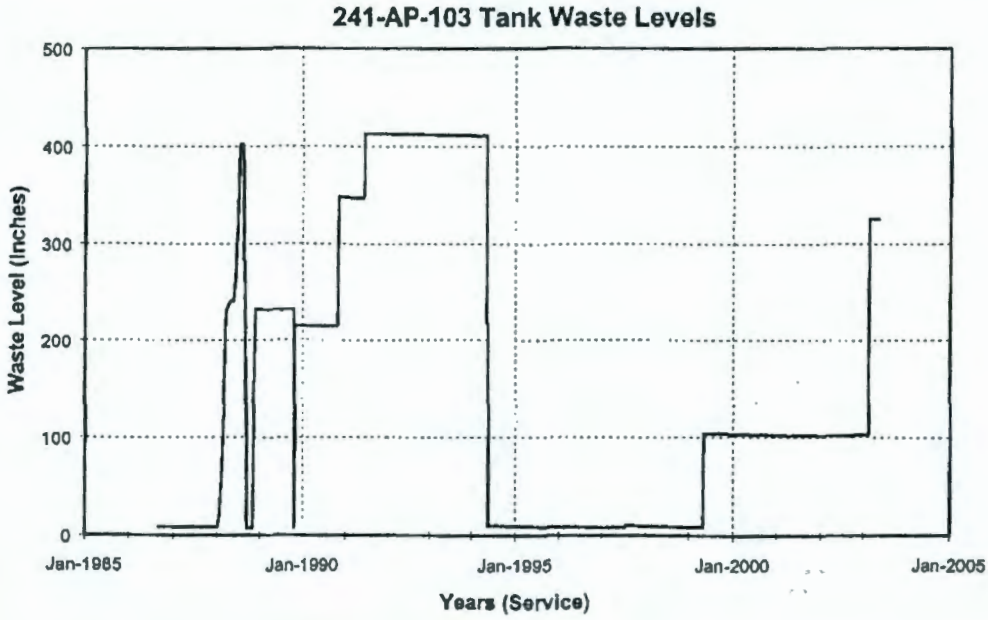
7.0 TANK 241-AP-103 HISTORY

The 241-AP Tank Farm consists of eight DSTs located in the 200 East Area of the Hanford Site. These underground tanks were built from 1983 through 1986, and are 75 feet in diameter with an operating capacity of 1.16 million gallons.

Tank 241-AP-103 entered service in 1986. It began receiving non-complexed waste and continued to receive this waste until May 1990. From June 1990 until March 1994, the tank waste was designated as dilute non-complexed waste (*Supporting Document for the Southeast Quadrant Historical Tank Content Estimate for AP-Tank Farm*, Brevick et al., 1995). It is currently designed for storage of dilute complex waste that is the concentrated product from the 242-A Evaporator process. The tank contains approximately 895,000 gallons of supernatant, equivalent to approximately 325 inches of supernatant (*Waste Tank Summary Report for Month Ending March 31, 2003*, Hanlon 2003).

The waste level history since September 1986 is shown in Figure 7-1, based on data obtained from the Tank Waste Information Network System (TWINS)[1].

Figure 7-1. Waste Level History of Double-Shell Tank 241-AP-103.



Since January 1988, when the first waste transfer into the tank was made, the minimum recorded waste level was approximately 7.7 inches (September - October 1988, and again in October

[1] TWINS, http://twins.pnl.gov:8001/twins.htm, queried 05/16/2003 [Data Source: Measurements, SACS, Surface Level, Tank Name AP-103, All Measurement Date values]

1989). The maximum recorded waste level was approximately 413 inches, occurring from June to October, 1991. During the period from June 1991 to May 1994, the level remained relatively constant between 411 and 413 inches, averaging 412.2 inches. From May 4, 1999 to February 18, 2003, the level had also been relatively constant, averaging 102.7 inches. Since February 22, 2003, the level has been at approximately 325.5 inches.

Recorded temperatures of the tank have ranged from a maximum of 79.8°F in February 2003 to a minimum of 45.9°F in March 1996, based on data obtained from the TWINS[2].

[2] TWINS, http://twins.pnl.gov:8001/twins.htm, queried 05/16/2003 [Data Source: Measurements, SACS, Tank Temperature Readings, Tank Name AP-103, All Measurement Date values]

8.0 GENERAL REQUIREMENTS AND INSPECTION SCOPE

FY 2003 Contract Number 16449 specifies that the contractor provide (among others) the following deliverables to the Double-Shell Tank Integrity Project (DSTIP) organization:

- The contractor shall provide AP-103 NDE Support and Data Analysis
- The contractor shall prepare recommended engineering reports and studies as directed by the DSTIP project leads

The areas on the primary tank that were identified for UT inspection in the engineering task plan (Jensen 2002b) are described below.

Primary Tank Wall and Welds:

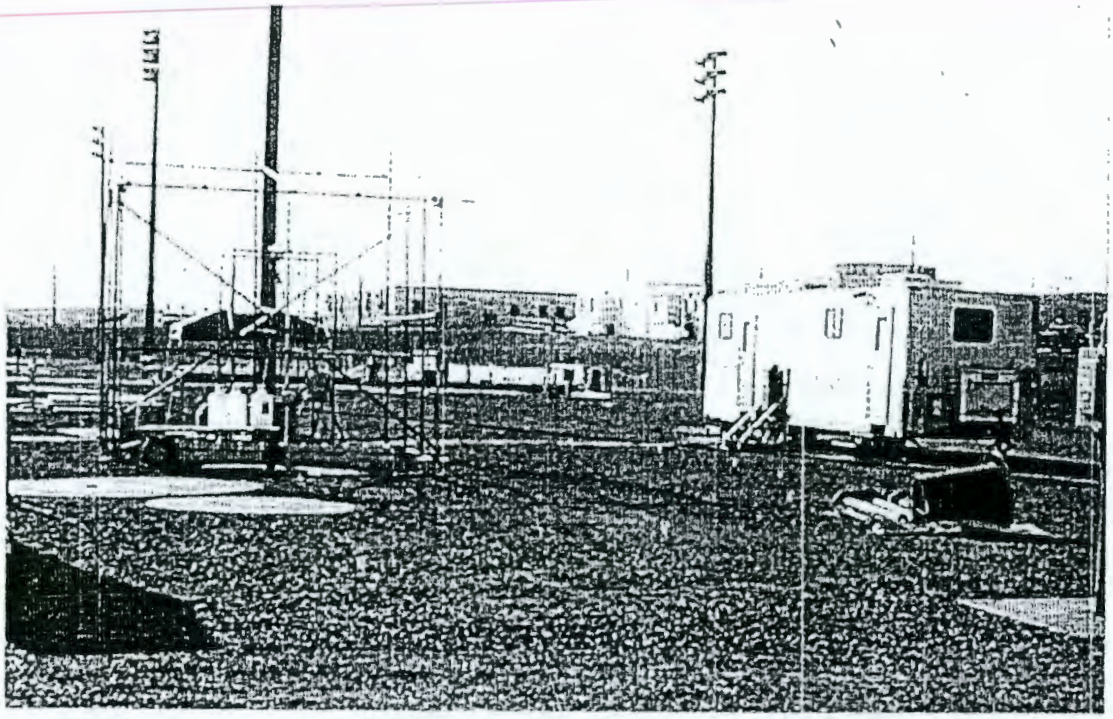
- A vertical strip (approximately 30 inches wide by 35 feet long) of the primary wall between the upper haunch transition and the lower knuckle. The vertical strip may be comprised of one or more strips whose total width is 30 inches.
- Twenty feet of the circumferential weld joining the cylinder to the lower knuckle. One vertical weld joining the lowest shell course plates (about 10 feet of weld), and one vertical weld joining the next to the lowest shell course plates (about 10 feet of weld). A minimum of twenty (20) feet of vertical weld shall be examined.

This page intentionally left blank.

9.0 EQUIPMENT SETUP AT AP TANK FARM

Prior to performing the actual inspection, the riser (number 031, 24 inch) shield plug was removed, and a temporary cover and riser extension were secured to the riser. A portable enclosure was installed over the riser to provide the means for deploying the UT equipment and protecting the operators from the weather. An electric chain hoist, mounted to the roof frame, was used for maneuvering the equipment into position. The control center trailer was set up inside the AP Tank Farm's boundary fence, and the control cables were run along the ground to the equipment located at the riser. A typical tank farm setup for the AP-Farm is shown in Figure 9-1.

Figure 9-1. Field Set-Up at Riser for Double-Shell Tank on AP-Farm



This page intentionally left blank.

10.0 INSPECTION RESULTS

Tank 241-AP-103 was fabricated from carbon steel plate. The primary tank's exterior surface varies from mill scale to coatings of various degrees of rust caused by in-service corrosion of carbon steel. A description of the plates is as follows with the location of the plates as shown in Figure 10-1 (*Tank Cross Section 241-AP Tanks*, Braun-Hanford 1986).

Primary knuckle (top) – Connects dome of tank to side-wall

Primary wall – Consists of (from top to bottom)
Plate #1 – approximately 7 feet 8 inch tall, 1/2 inch nominal thickness
Plate #2 – approximately 7 feet 8 inch tall, 1/2 inch nominal thickness
Plate #3 – approximately 7 feet 8 inch tall, 9/16 inch nominal thickness
Plate #4 – approximately 9 feet tall, 3/4 inch nominal thickness
Plate #5 – approximately 2 feet tall, 7/8 inch nominal thickness

Primary knuckle (bottom) – Approximately 15/16 inch nominal thickness. Connects sidewall of tank to primary tank bottom.

The crawler was deployed through the 24 inch diameter annulus inspection Riser 031 on the west side of tank 241-AP-103 for examinations of the primary wall and vertical and horizontal welds. All tank welds examined were in the "as-welded" condition. The various scan paths for the crawler are shown in Figure 10-1, along with other pertinent tank information.

The UT data were examined by COGEMA Engineering's Level III certified inspector, and by Limited Level II certified inspectors. The Limited Level II inspectors were "P-Scan Limited", indicating that they are qualified to collect and examine the data, but are not qualified to interpret the data.

The following pages contain tables that present summary and detailed wall thickness data, which were derived from the COGEMA "Automated Ultrasonic Thickness Data Report Sheets". The inspection data sheets, the transducer calibration sheets, the original tank wall scan map, and an interpretation of the data by COGEMA Engineering's Level III qualified inspector are included in Attachment 2.

Tables 10-1 through 10-4 show the measured minimum wall thickness values and are displayed in a summarized form by wall plates, vertical plate welds, and horizontal knuckle weld. Although the data are reported to three significant figures, the accuracy of the wall thickness data, based on the results of the performance demonstration test, is 0.012 inch root-mean-square (RMS).

Figure 10-1. Schematic of UT Scan Paths on West Side of Tank 241-AP-103 Wall (via Riser 031)

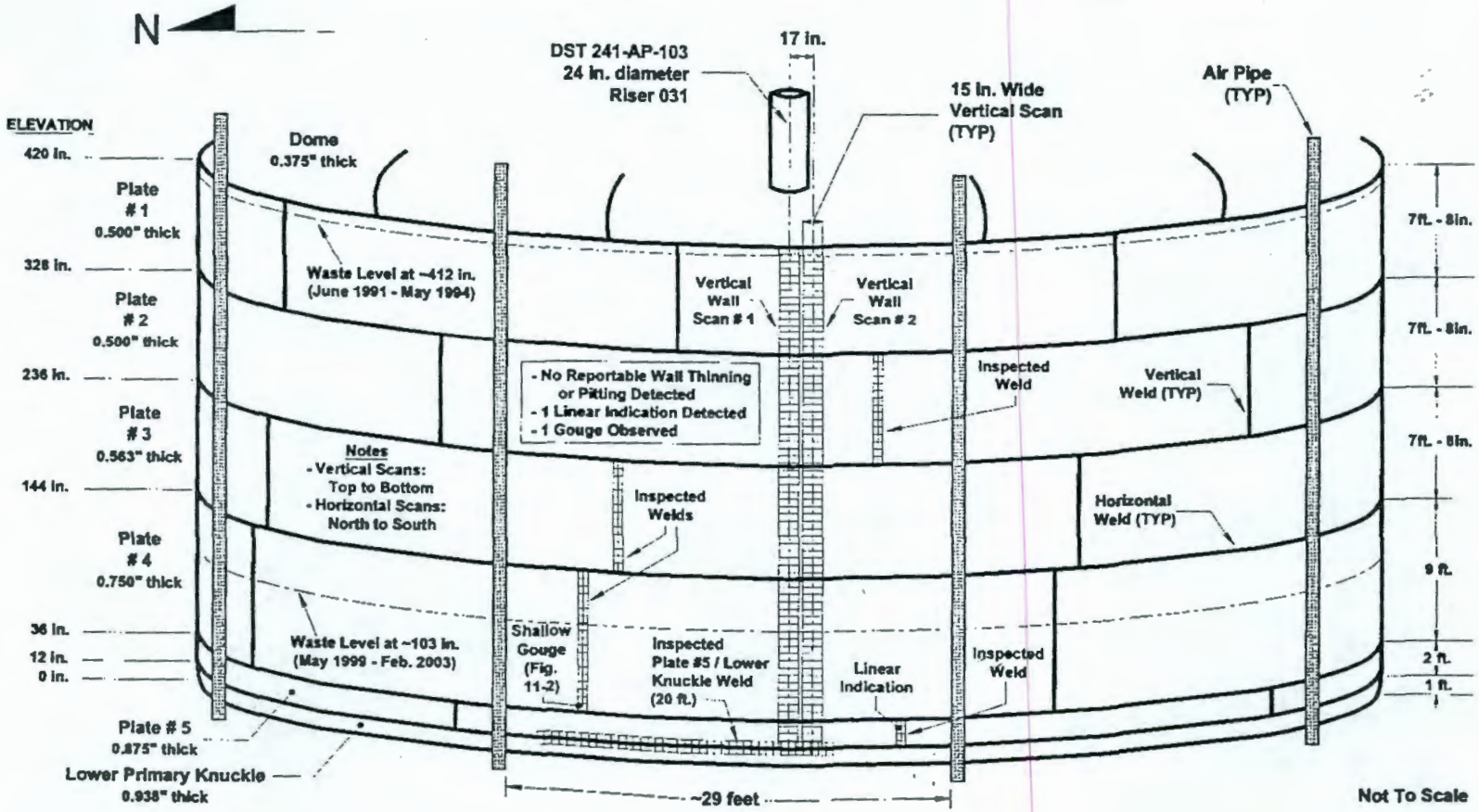


Table 10-1. Summary of Primary Tank Wall Scan 1 (via Riser 031)

Plate Description	Elevation of Wall Scan (inches)	Wall Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Plate #1	416 to 332.3	83.7	0.500	0.491	98.2%
Plate #2	327 to 239.4	87.6	0.500	0.482	96.4%
Plate #3	235 to 146.8	88.2	0.563	0.550	97.7%
Plate #4	143 to 37.7	105.3	0.750	0.739	98.5%
Plate #5	35 to 14.2	20.8	0.875	0.869	99.3%

[1] All scan widths were 15 inches.

Table 10-2. Summary of Primary Tank Wall Scan 2 (via Riser 031)

Plate Description	Elevation of Wall Scan (inches)	Wall Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Plate #1	419 to 335.9	83.1	0.500	0.486	97.2%
Plate #2	327 to 239.8	87.2	0.500	0.471	94.2%
Plate #3	235 to 146.4	88.6	0.563	0.554	98.4%
Plate #4	143 to 38	105	0.750	0.737	98.3%
Plate #5	35 to 14.3	20.7	0.875	0.866	99.0%

[1] All scan widths were 15 inches.

Table 10-3. Summary of Primary Tank Vertical Weld Scans (via Riser 031)

Weld Description	Elevation of Weld Scan (inches)	Weld Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches) [2]		Scan Minimum % of Nominal [2]	
				North	South	North	South
Vertical Weld Plate #2	327 to 237.4	89.6	0.500	0.473	0.501	94.6%	100.2%
Vertical Weld Plate #3	235 to 144.6	90.4	0.563	0.541		96.1%	
Vertical Weld Plate #4	143 to 37.5	105.5 [3]	0.750	0.737		98.3%	
Vertical Weld Plate #5	35 to 13.4	21.6 [4]	0.875	0.844		96.5%	

[1] Scan widths were 11.2 - 11.6 inches.

[2] "North" and "South" indicate the north and south sides of the Pate #2 vertical weld respectively. The south plate was significantly thicker than the north plate, so the thickness measurements were reported separately instead of averaged together.

[3] Gouge observed in the weld heat-affected zone, measuring 1.42 inches in length.

[4] Linear indication detected in the weld heat-affected zone, measuring 2.92 inches in length.

Table 10-4. Summary of Plate #5 / Knuckle Horizontal Weld Scans (via Riser 031)

Weld Description	Vertical Location of Weld Scan	Weld Scan Distance (inches) [1]	Design Nominal (inches)	Measured Minimum (inches)	Scan Minimum % of Nominal
Horizontal Weld Plate #5 to Knuckle, Plate-side	From ~1 in. to ~5 in. above Plate #5 / Knuckle Weld	240.0	0.875	0.838	95.8%
Horizontal Weld Plate #5 to Knuckle, Knuckle-side	From ~1 in. to ~5 in. below Plate #5 / Knuckle Weld	240.0	0.938	0.887	94.6%

[1] Scan widths were 9.8 – 10.0 inches.

Tables 10-5 through 10-14 contain the detailed data for wall scans as presented in 12 inch long by 15 inch wide connecting scans. The detailed data for vertical and horizontal welds are presented in 12 inch long by 9.8 to 11.6 inch wide scans in Tables 10-15 through 10-21.

Table 10-5. Primary Tank Vertical Wall Scan 1 - Plate 1 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 1" (Page Att. 2-3)	416	0 – 12 [1]	0.500	0.507	0.491
	404	12 – 24	0.500	0.510	0.494
	392	24 – 36	0.500	0.511	0.497
	380	36 – 48	0.500	0.513	0.500
	368	48 – 60	0.500	0.513	0.506
	356	60 – 72	0.500	0.513	0.504
	344	72 – 83.7	0.500	0.511	0.501

[1] Scan start was 4 inches below the centerline of the first horizontal weld, and centerline of 24 inch Riser 031; Scan width was 15 inches.

Table 10-6. Primary Tank Vertical Wall Scan 1 - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 2" (Page Att. 2-5)	327	0 – 12 [1]	0.500	0.500	0.495
	315	12 – 24	0.500	0.501	0.497
	303	24 – 36	0.500	0.502	0.498
	291	36 – 48	0.500	0.502	0.488
	279	48 – 60	0.500	0.502	0.495
	267	60 – 72	0.500	0.501	0.484
	255	72 – 84	0.500	0.500	0.482
	243	84 – 87.6	0.500	0.499	0.483

[1] Scan start was 1 inch below the centerline of the second horizontal weld, and centerline of 24 inch Riser 031; Scan width was 15 inches.

Table 10-7. Primary Tank Vertical Wall Scan 1 - Plate 3 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 3" (Page Att. 2-7)	235	0 – 12 [1]	0.563	0.578	0.559
	223	12 – 24	0.563	0.581	0.552
	211	24 – 36	0.563	0.585	0.572
	199	36 – 48	0.563	0.585	0.581
	187	48 – 60	0.563	0.585	0.570
	175	60 – 72	0.563	0.583	0.571
	163	72 – 84	0.563	0.581	0.566
	151	84 – 88.2	0.563	0.580	0.550

[1] Scan start was 1 inch below the centerline of the third horizontal weld, and centerline of 24 inch Riser 031; Scan width was 15 inches.

Table 10-8. Primary Tank Vertical Wall Scan 1 - Plate 4 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 0°s / Plate 4" (Page Att. 2-9)	143	0 – 12 [1]	0.750	0.770	0.763
	131	12 – 24	0.750	0.773	0.769
	119	24 – 36	0.750	0.775	0.772
	107	36 – 48	0.750	0.775	0.770
	95	48 – 60	0.750	0.773	0.757
	83	60 – 72	0.750	0.771	0.766
	71	72 – 84	0.750	0.767	0.750
	59	84 – 96	0.750	0.764	0.757
	47	96 – 105.3	0.750	0.758	0.739

[1] Scan start was 1 inch below the centerline of the fourth horizontal weld, and centerline of 24 inch Riser 031; Scan width was 15 inches.

Table 10-9. Primary Tank Vertical Wall Scan 1 - Plate 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / Plate 5" (Page Att. 2-11)	35	0 – 12 [1]	0.875	0.875	0.871
	23	12 – 20.8	0.875	0.877	0.869

[1] Scan start was 1 inch below the centerline of the fifth horizontal weld, and centerline of 24 inch Riser 031; Scan width was 15 inches.

Table 10-10. Primary Tank Vertical Wall Scan 2 - Plate 1 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 1" (Page Att. 2-13)	419	0 – 12 [1]	0.500	0.506	0.486
	407	12 – 24	0.500	0.508	0.503
	395	24 – 36	0.500	0.510	0.503
	383	36 – 48	0.500	0.510	0.499
	371	48 – 60	0.500	0.510	0.505
	359	60 – 72	0.500	0.507	0.503
	347	72 – 83.1	0.500	0.505	0.499

[1] Scan start was 1 inch below the centerline of the first horizontal weld, and 17 inches south of Scan 1, centerline to centerline; Scan width was 15 inches.

Table 10-11. Primary Tank Vertical Wall Scan 2 - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 2 & Plate 2A" (Page Att. 2-15)	327	0 – 12 (1)	0.500	0.490	0.486
	315	12 – 24	0.500	0.492	0.481
	303	24 – 30.1	0.500	0.492	0.481
	297	0 – 12 (2)	0.500	0.492	0.488
	285	12 – 24	0.500	0.494	0.478
	273	24 – 36	0.500	0.494	0.477
	261	36 – 48	0.500	0.492	0.475
	249	48 – 57.2	0.500	0.490	0.471

(1) Scan start was 1 inch below the centerline of the second horizontal weld, and 17 inches south of Scan 1, centerline to centerline; Scan width was 15 inches.

(2) Start of scan is @ 30.0 inches of previous scan; Scan width was 15 inches.

Table 10-12. Primary Tank Vertical Wall Scan 2 - Plate 3 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches) (1)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 3 & 3A" (Page Att. 2-17)	235	0 – 12 (1)	0.563	0.580	0.554
	223	12 – 24	0.563	0.585	0.556
	211	24 – 36	0.563	0.585	0.572
	199	36 – 44.5	0.563	0.586	0.579
	190.6	0 – 12 (2)	0.563	0.585	0.578
	178.6	12 – 24	0.563	0.582	0.570
	166.6	24 – 36	0.563	0.580	0.576
	154.6	36 – 44.2	0.563	0.579	0.565

(1) Scan start was 1 inch below the centerline of the third horizontal weld, and 17 inches south of Scan 1, centerline to centerline; Scan width was 15 inches.

(2) Start of scan is @ 44.4 inches of previous scan; Scan width was 15 inches.

Table 10-13. Primary Tank Vertical Wall Scan 2 - Plate 4 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 4 & 4A & 4B" (Page Att. 2-19)	143	0 – 12 (1)	0.750	0.765	0.750
	131	12 – 24	0.750	0.770	0.757
	119	24 – 30.8	0.750	0.772	0.767
	112.3	0 – 12 (2)	0.750	0.772	0.767
	100.3	12 – 15.6	0.750	0.771	0.765
	96.8	0 – 12 (3)	0.750	0.770	0.764
	84.8	12 – 24	0.750	0.770	0.761
	72.8	24 – 36	0.750	0.765	0.760
	60.8	36 – 48	0.750	0.761	0.753
	48.8	48 – 58.8	0.750	0.755	0.737

(1) Scan start was 1 inch below the centerline of the third horizontal weld, and 17 inches south of Scan 1, centerline to centerline; Scan width was 15 inches.

(2) Start of scan is @ 30.7 inches of previous scan; Scan width was 15 inches.

(3) Start of scan is @ 15.5 inches of previous scan; Scan width was 15 inches.

Table 10-14. Primary Tank Vertical Wall Scan 2 - Plate 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Wall Scan (inches)	Vertical Location of Wall Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Wall / 2nd / Plate 5" (Page Att. 2-21)	35	0 – 12 (1)	0.875	0.876	0.866
	23	12 – 20.7	0.875	0.877	0.868

(1) Scan start was 1 inch below the centerline of the fifth horizontal weld, and 17 inches south of Scan 1, centerline to centerline; Scan width was 15 inches.

Table 10-15. Primary Tank Vertical Wall Weld Scan - Plate 2 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches) [2]		Measured Minimum (inches) [2]	
				North	South	North	South
Scan "Vert. Weld / Plate 2" (Pages Att. 2-23 & Att. 2-24)	327	0 – 12 [1]	0.500	0.495	0.525	0.473	0.510
	315	12 – 24	0.500	0.495	0.528	0.474	0.520
	303	24 – 36	0.500	0.496	0.525	0.483	0.519
	291	36 – 48	0.500	0.496	0.521	0.490	0.519
	279	48 – 60	0.500	0.496	0.520	0.473	0.512
	267	60 – 72	0.500	0.496	0.519	0.482	0.514
	255	72 – 84	0.500	0.495	0.513	0.484	0.501
	243	84 – 89.6	0.500	0.490	0.510	0.483	0.502

[1] Scan start was 1 inch below the centerline of the second horizontal weld; Scan width was 11.2 inches.

[2] "North" and "South" indicate the north and south sides of the vertical weld respectively. The south plate was significantly thicker than the north plate, so the thickness measurements were reported separately instead of averaged together.

Table 10-16. Primary Tank Vertical Wall Weld Scan - Plate 3 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 3" (Page Att. 2-27)	235	0 – 12 [1]	0.563	0.560	0.544
	223	12 – 24	0.563	0.560	0.541
	211	24 – 36	0.563	0.565	0.559
	199	36 – 48	0.563	0.565	0.549
	187	48 – 60	0.563	0.567	0.549
	175	60 – 72	0.563	0.568	0.550
	163	72 – 84	0.563	0.569	0.561
	151	84 – 90.4	0.563	0.570	0.558

[1] Scan start was 1 inch below the centerline of the third horizontal weld; Scan width was 11.6 inches.

Table 10-17. Primary Tank Vertical Wall Weld Scan - Plate 4 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 4" (Page Att. 2-30)	143	0 – 12 [1]	0.750	0.770	0.752
	131	12 – 24	0.750	0.770	0.748
	119	24 – 36	0.750	0.780	0.751
	107	36 – 48	0.750	0.770	0.751
	95	48 – 60	0.750	0.775	0.754
	83	60 – 72	0.750	0.770	0.754
	71	72 – 84	0.750	0.770	0.760
	59	84 – 96	0.750	0.765	0.754
	47	96 – 105.5	0.750	0.765	0.737

[1] Scan start was 1 inch below the centerline of the fourth horizontal weld; Scan width was 11.3 inches.

Table 10-18. Primary Tank Vertical Wall Weld Scan - Plate 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Start of Weld Scan (inches)	Vertical Location of Weld Scan (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Vert. Weld / Plate 5" (Page Att. 2-34)	35	0 – 12 [1]	0.875	0.865	0.852
	23	12 – 21.6	0.875	0.862	0.844

[1] Scan start was 1 inch below the centerline of the fifth horizontal weld; Scan width was 11.4 inches.

Table 10-19. Primary Tank Vertical Wall Weld Scan Flaws - Plates 4 and 5 (via Riser 031)

Scan I.D. Number (Data Sheets)	Flaw Description	X_1 (inches)	X_2 (inches)	Length (inches)	Width [1] (inches)	Remarks
Scan "Plate 4 / Gouge A" (Page Att. 2-33)	Gouge	1.95	3.37	1.42	-0.150	Shallow O.D. gouge < 0.100"; Not a crack-like indication; No extension through wall.
Scan "Vert. Weld / Plate 5" (Page Att. 2-35)	Linear Indication	5.18	8.1	2.92	-2.03	Indeterminate whether the indication was inner-diameter connected or if it was in the weld; Additional evaluation required.

[1] Y-coordinate value.

Table 10-20. Primary Tank Horizontal Weld - Plate 5 to Knuckle Scan, Plate Side (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Horizontal Weld Scan (inches)	Horizontal Location of Weld Scan, Plate Side (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Horz. Weld / Knuckle" (Page Att. 2-37)	From ~1 in. to ~4.9 in. above Plate #5 / Knuckle Weld	0 – 12 [1]	0.875	0.869	0.854
		12 – 24	0.875	0.870	0.864
		24 – 36	0.875	0.870	0.852
		36 – 48	0.875	0.870	0.859
		48 – 60	0.875	0.870	0.864
		60 – 72	0.875	0.870	0.862
		72 – 84	0.875	0.870	0.865
		84 – 96	0.875	0.870	0.864
		96 – 108	0.875	0.870	0.863
		108 - 120	0.875	0.870	0.862
Scan "Horz. Weld / KnuckleA" (Page Att. 2-39)	From ~1 in. to ~5.0 in. above Plate #5 / Knuckle Weld	0 – 12 [2]	0.875	0.856	0.852
		12 – 24	0.875	0.854	0.852
		24 – 36	0.875	0.854	0.852
		36 – 48	0.875	0.854	0.852
		48 – 60	0.875	0.853	0.847
		60 – 72	0.875	0.853	0.850
		72 – 84	0.875	0.853	0.851
		84 – 96	0.875	0.851	0.844
		96 – 108	0.875	0.850	0.846
		108 - 120	0.875	0.848	0.838

[1] Start of scan @ next to the air tube south of 24 inch riser; Scan width was 9.8 inches.

[2] Start of scan @ end of scan Horz. Weld / Knuckle; Scan width was 10.0 inches.

Table 10-21. Primary Tank Horizontal Weld - Plate 5 to Knuckle Scan, Knuckle Side (via Riser 031)

Scan I.D. Number (Data Sheets)	Elevation of Horizontal Weld Scan (inches)	Horizontal Location of Weld Scan, Knuckle Side (inches)	Design Nominal (inches)	Measured Average (inches)	Measured Minimum (inches)
Scan "Horz. Weld / Knuckle" (Page Att. 2-38)	From ~1 in. to ~4.9 in. below Plate #5 / Knuckle Weld	0 – 12 [1]	0.938	0.937	0.919
		12 – 24	0.938	0.935	0.901
		24 – 36	0.938	0.938	0.929
		36 – 48	0.938	0.940	0.926
		48 – 60	0.938	0.945	0.929
		60 – 72	0.938	0.948	0.924
		72 – 84	0.938	0.950	0.923
		84 – 96	0.938	0.948	0.919
		96 – 108	0.938	0.950	0.941
		108 - 120	0.938	0.950	0.901
Scan "Horz. Weld / KnuckleA" (Page Att. 2-40)	From ~1 in. to ~5.0 in. below Plate #5 / Knuckle Weld	0 – 12 [2]	0.938	0.940	0.927
		12 – 24	0.938	0.937	0.887
		24 – 36	0.938	0.935	0.922
		36 – 48	0.938	0.935	0.921
		48 – 60	0.938	0.934	0.914
		60 – 72	0.938	0.934	0.920
		72 – 84	0.938	0.935	0.928
		84 – 96	0.938	0.935	0.916
		96 – 108	0.938	0.936	0.926
		108 - 120	0.938	0.938	0.906

[1] Start of scan @ next to the air tube south of 24 inch riser; Scan width was 9.8 inches.

[2] Start of scan @ end of scan Horz. Weld / Knuckle; Scan width was 10.0 inches.

This page intentionally left blank

11.0 EVALUATION OF INSPECTION RESULTS

The results from the inspection of tank 241-AP-103 are evaluated and compared with results of all other tank ultrasonic inspections.

11.1 TANK 241-AP-103 UT DATA EVALUATION

The UT P-scan data were interpreted by W. H. Nelson, COGEMA Engineering's Level III certified inspector, and J. B. Elder, an independent Level III certified NDE Inspector. Mr. Elder independently evaluated the P-scan raw data and concurred with COGEMA Engineering's interpretation (Attachment 2). The P-scan data have also been evaluated by PNNL as a third party review. Their results and conclusions were found to be consistent with those described in this report. Their P-scan data review is *Ultrasonic Examination Of Double-Shell Tank 241-AP-103 Examination Completed April 2003*, PNNL report number PNNL-14300, Rev. 0 (Attachment 3).

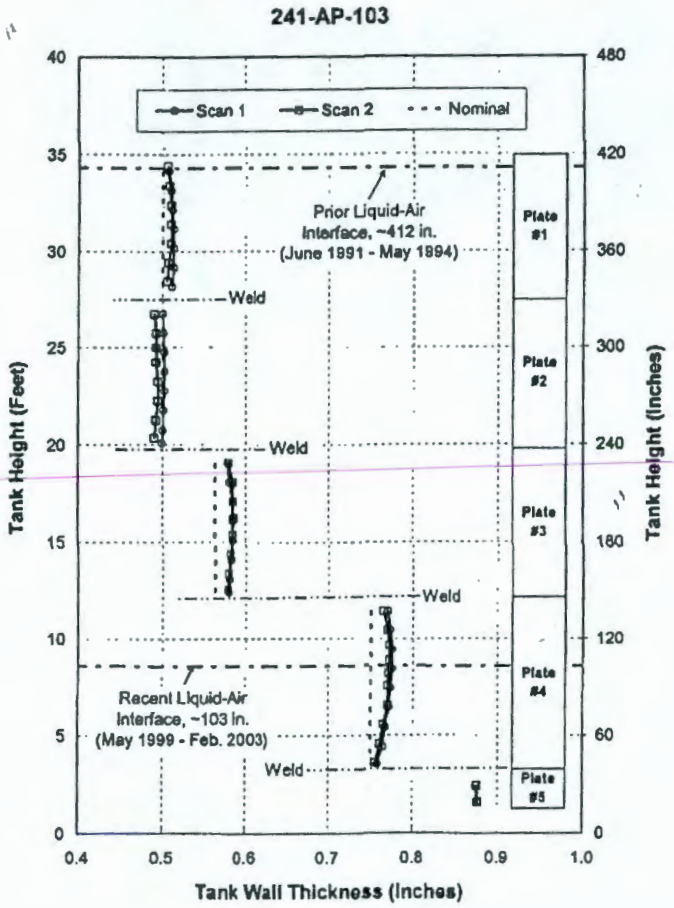
The results of the tank 241-AP-103 UT inspection of the primary tank vertical walls indicated no reportable wall thinning, no pit-like indications, and no cracking. However, inspections of the weld heat-affected zones resulted in the observation of a gouge and the detection of a linear indication, both of which are discussed in more detail below.

Figure 11-1 shows the "as-found" average thickness measurements of the primary tank vertical walls generated from the Inspection Data Sheets (Attachment 2). Each wall thickness measurement plotted on Figure 11-1 is the average of all data collected over a 12 inch long by 15 inch wide scan area. Areas of interest for tank 241-AP-103 are the vapor space above the current liquid waste, the current liquid-vapor interface, the liquid region, and any additional historical liquid-vapor interface regions. From May 1999 to February 2002, the liquid waste level was at approximately 103 inches (8.6 feet); and during the period from June 1991 to May 1994, the level remained relatively constant at approximately 412 inches (34.3 feet). There is no evidence of any significant general thinning in any of these regions.

The UT data show that the primary tank average wall thickness values generally exceeded the nominal values specified in the design documents (the exception being scan 2 on Plate #2, which was, on average, 0.008 inches below the nominal value). The UT data, when compared to construction specifications, drawings, standards, and codes (*241-AP Double-Shell Tanks Integrity Assessment Report*, Jensen 1999), reveal that the as-found condition of the tank plates and welds are all within the allowable design limits. A summary of the results associated with the areas examined is presented below.

Primary Tank Wall: Two vertical strips encompassing Plates #1 through #5 were examined. The overall average wall thickness for each plate vertical scan varied by a maximum of 0.016 inches from plate to plate (for same nominal-thickness plates). The overall average wall thickness varied by as much as 0.009 inches within the same plate. All overall plate wall averages encompassing both scans were between 0.004 inches less than to 0.018 inches greater than their nominal plate thickness values. No reportable wall thinning, pitting indications or crack-like indications were found.

Figure 11-1. Scan Data Average Wall Thickness Compared to Nominal Plate Thickness



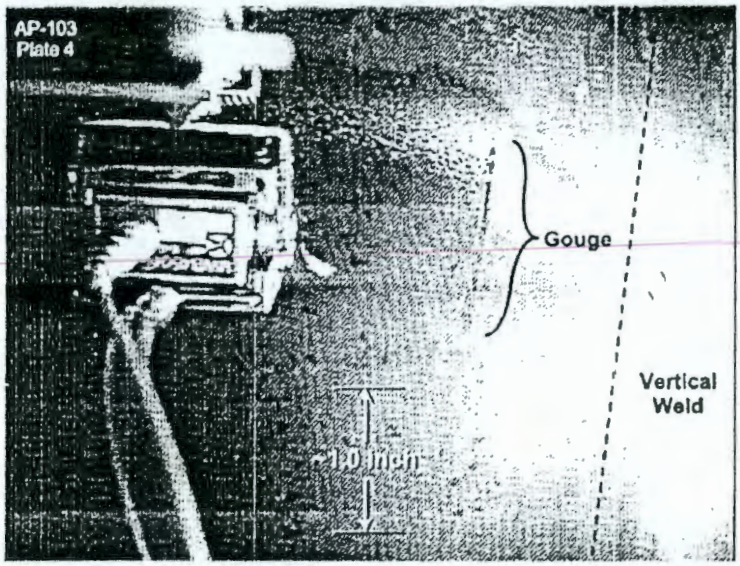
Primary Tank Welds: One vertical weld in each of the four lower Plates #2 through #5 was examined. There were no reportable wall thinning nor reportable pitting indications detected in any of the weld heat-affected zones. The plate walls adjacent to the welds averaged 0.012 inches less than to 0.021 inches greater than their nominal plate thickness values.

There was one linear indication detected in the weld heat-affected zone of the Plate #5 vertical weld (refer to the Figure 10-1 schematic for approximate location). The linear indication measured 2.92 inches in length, but further analyses were inconclusive regarding specifics of the indication. It was indeterminate whether it was an inner-diameter (ID) connected linear indication or if it was in the weld.

A follow-up inspection using different available techniques and evaluation methods will be required to more precisely characterize the linear indication. Based on the results of the follow-up inspection, it may then be established if the linear indication is in the weld, if it is ID connected, and if it is a reportable indication (depth exceeding 0.100 inches). At that time, an assessment regarding the integrity of the tank can be made and a decision regarding subsequent inspection intervals can be formulated.

Also, during the course of the UT weld examinations, the inspector observed a small gouge on an area of Plate #4, just above the Plate #4 / Plate #5 horizontal weld and approximately 1 inch north of the vertical weld (see Figure 10-1). The area depicting the gouge, captured from the inspection video, is shown in Figure 11-2.

Figure 11-2. Gouge Adjacent to a Plate #4 Vertical Weld on Double-Shell Tank 241-AP-103



The gouge is approximately 1.42 inches long. A review of the UT scan data for the area revealed that the gouge is shallow (less than 0.100 inches), it is not a crack-like indication, and it does not extend through the wall. The gouge was most likely caused during tank construction activities. The gouge does not appear to pose any threat to the tank integrity, based on the tank wall thickness measurements and the lack of any detectable cracks in the vicinity of the gouge. Nevertheless, it is recommended that this area be monitored during subsequent tank inspections.

Primary Tank Knuckle-to-Shell Weld: Twenty feet of the horizontal knuckle-to-shell weld were examined. No crack-like indications were found. There were also no reportable wall thinning or pitting indications found. The plate walls adjacent to the weld averaged 0.014 inches less than (plate side) to 0.002 inches greater than (knuckle side) than their nominal plate thickness values.

11.2 DST ULTRASONIC INSPECTION DATA RESULTS COMPARISON

The following Tables 11-1 and 11-2 provide a summary of primary tank vertical wall inspection results and a comparison of primary tank wall thinning.

Table 11-1 reports the inspection results chronologically according to fiscal year (October 1 through September 30).

Table 11-1. Double-Shell Tanks Chronological Inspection Results Findings

Tank	Inspection Year (FY)	Reportable Plate Crack Indication	Reportable Plate Pitting	Reportable Plate Thinning	Reportable Weld Thinning, Pitting or Cracking
AW-103	1997	None	None	None	None
AN-107	1998	None	None	None	None
AN-106	1999	None	None	None	None
AN-105	1999	None	None	Two very minute areas of a plate (20% maximum reduction in thickness) [a]	None
AZ-101	1999	None	None	One area of a plate (11.4% maximum reduction in thickness)	None
AY-102	1999	None	None	None	None
AP-107	2000	None	None	None	None
AP-108	2000	None	None	Two minute areas of a plate (13.8% maximum reduction in thickness).	None [b]
AW-101	2001	None	None	A pit like indication in a very minute area of a plate (16% maximum reduction in thickness).	None
AW-105	2001	None	None	None	None
AY-101	2001	None	Pit-like indication at historical liquid-air interface	Some pit-like indications identified as thinning	Three areas of 10% wall thinning in vertical welds
AN-102	2001	None	None	One minute area of a plate (11% maximum reduction in thickness)	None
AN-101	2002	None	None	One small area of a plate (12 % maximum reduction in thickness)	Four local areas near vertical welds (14% maximum reduction in thickness)

(Cont. on next page)

Table 11-1. (Cont.) Double-Shell Tanks Chronological Inspection Results Findings

Tank	Inspection Year (FY)	Reportable Plate Crack Indication	Reportable Plate Pitting	Reportable Plate Thinning	Reportable Weld Thinning, Pitting or Cracking
AW-106	2002	None	None	One small area	10.4% maximum reduction in thickness
AY-101	2002	Not Investigated	None	72 areas of >10% wall thinning, most in the historical liquid-air interface in Plate #2 (20.2% maximum reduction in thickness)	Not Investigated
AW-104	2002	None	None	None	None
AW-102	2002 & 2003 [c]	None	None	None	None
AN-105	2002	None	None	None	Not Investigated
AP-101	2003	None	None	None	None
AP-105	2003	None	None	None	None
AP-103	2003	None	None	None	TBD [d]

[a] Based on a review of the tank 241-AN-105 data gathering technique in FY 1999, prompted by the FY 2002 results, the FY 1999 wall thinning data is considered questionable.

[b] Although below reporting criteria at the time, one linear crack-like indication 6 inch long by 0.142 inch deep in a nominal 0.750 inch thick plate was observed. Subsequent examination of tank 241-AP-108 in FY 2002 revealed no change in size.

[c] Primary knuckle examination using T-SAFT conducted in FY 2003.

[d] One linear crack-like indication 2.92 inches long in the weld heat-affected zone of a nominal 0.875 inch thick plate was detected. A follow-up inspection is required to determine if the indication is in the weld, if it is ID connected, and if it is reportable.

The inspection results in Table 11-1 show that the overall condition of the inspected tanks is satisfactory. Defects or minute reportable localized plate thinning may be due to various reasons, such as fabrication defects, construction damage or in-service corrosion.

Wall thickness data gathered from ultrasonic examination of nineteen DSTs were compared to evaluate the degree of wall thinning that may have occurred among the tanks examined. These wall thickness data do not allow a direct calculation of wall thinning, since no measurements were made of original plate thickness values at the time of construction. However, wall thickness data from ultrasonic testing may be compared to the specified nominal plate thickness. This assessment used the minimum wall thickness in each scanning area (generally 12 inch by 15 inch) from the vertical wall scans and then calculated the average for each plate using the minimum thickness values.

Table 11-2 provides a summary of wall thinning, defined as nominal plate thickness minus average minimum plate thickness[3], by nominal plate size, and by DST examined. The negative

[3] Average minimum plate thickness is defined as the average of all the minimum measured thickness values for each scanning area (generally 12 inch by 15 inch) for a given plate size and DST.

values in the table indicate where the average of all minimum values of plate thickness exceeds nominal plate thickness. The Table also provides the calculated average wall thinning and associated standard deviation by DST examined for all nominal plate thickness values, and by nominal plate thickness for all DSTs examined.

Tank 241-AP-103 did not exhibit any significant thinning, with only the 0.500 inch thick Plates #1 & #2 and the 0.875 inch thick Plate #5 minimum values averaging slightly below (0.008 inches and 0.007 inches respectively) the nominal plate thickness values.

Table 11-2. Tank Wall Thinning By Nominal Plate Size

DST	FY Examined	Wall Thinning* By Nominal Plate Size (Inches)						
		0.375"	0.500"	0.5625"	0.750"	0.875"	AVG	STD DEV
AN-101	2002	n/a	0.008	n/a	0.027	0.015	0.013	0.014
AN-102	2001	n/a	0.004	n/a	0.003	0.005	0.004	0.016
AN-105	1999	n/a	0.026	n/a	0.007	0.001	0.019	0.032
AN-105	2002	n/a	0.015	n/a	n/exam.	n/exam.	0.015	0.021
AN-106	1999	n/a	0.006	n/a	0.015	0.012	0.009	0.009
AN-107	1998	n/a	-0.018	n/a	-0.015	0.013	-0.016	0.017
AP-101	2003	n/a	-0.008	-0.003	-0.002	0.010	-0.004	0.008
AP-103	2003	n/a	0.008	-0.004	-0.009	0.007	0.000	0.012
AP-105	2003	n/a	0.004	-0.006	-0.002	0.010	0.000	0.009
AP-107	2000	n/a	-0.011	-0.012	-0.017	-0.013	-0.013	0.008
AP-108	2000	n/a	-0.017	-0.012	-0.011	-0.005	-0.014	0.016
AW-101	2001	n/a	0.008	n/a	0.014	0.020	0.010	0.013
AW-102	2002	n/a	-0.019	n/a	-0.006	0.008	-0.014	0.012
AW-103	1997	n/a	-0.010	n/a	-0.005	0.004	-0.007	0.008
AW-104	2002	n/a	-0.036	n/a	-0.031	-0.007	-0.033	0.011
AW-105	2001	n/a	0.000	n/a	0.008	-0.003	0.002	0.018
AW-106	2002	n/a	-0.004	n/a	0.015	0.000	0.001	0.016
AY-101	2001	-0.011	0.030	n/a	0.018	0.012	0.030	0.029
AY-102	1999	-0.021	0.001	n/a	0.008	n/a	0.000	0.012
AZ-101	1999	0.021	0.027	n/a	0.020	0.003	0.024	0.011
AVG:		-0.006	0.000	-0.008	0.003	0.005		
STD DEV:		0.020	0.023	0.008	0.019	0.012		

* Thinning = nominal plate size – minimum thickness
n/a – not applicable; n/exam. – not examined

12.0 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The findings, conclusions, and recommendations from the UT inspection of DST 241-AP-103 are listed below.

- No reportable wall thinning was detected in any of the plate areas examined. The primary wall vertical scans (Plates #1 through #5) yielded average wall thickness values that generally exceeded the nominal values. Over one-half of the average minimum wall thickness values for the plates exceeded the nominal values. Of the 12 inch long vertical wall plate scans yielding minimums falling below the nominal values, the greatest deviation was 5.8% below the nominal (where reportable wall thinning is defined as greater than 10% below the nominal).

- There was one linear indication detected in the weld heat-affected zone of the Plate #5 - vertical weld. The linear indication measured 2.92 inches in length, but it was indeterminate whether the linear indication was ID connected or if it was in the weld. It is recommended that a follow-up inspection using different available techniques and evaluation methods be performed before the end of FY 2004 to more precisely characterized the linear indication. Based on the results of this follow-up inspection, an assessment regarding the integrity of the tank can be made and a decision regarding subsequent inspection intervals can be formulated (a recent Tank Integrity Assessment Project DST Lifecycle Schedule indicates that tank 241-AP-103 is scheduled for its second UT examination in about nine years).

- The primary tank vertical weld scans (Plates #2 through #5) and the knuckle-to-shell horizontal weld scan (Plate #5 to lower knuckle) yielded overall average wall thickness values that ranged from 0.014 inches below to 0.021 inches above the nominal values. There were no reportable wall thinning indications in any of the heat-affected zones, with the minimum wall thickness values ranging from 5.4% below to 0.2% above the nominal values. In addition, there were no reportable pitting indications detected in any of the weld heat-affected zones.

- A small gouge, 1.42 inches long, was observed on an area of Plate #4, just above the Plate #4 / Plate #5 horizontal weld and approximately 1 inch north of the vertical weld. The gouge does not appear to pose any threat to the tank integrity, based on the tank wall thickness measurements and the lack of any detectable cracks in the vicinity of the gouge. It is recommended that this area be monitored during subsequent tank inspections.

This page intentionally left blank.

13.0 REFERENCES

Bandyopadhyay, K. K., S. Bush, M. Kassir, B. Mather, P. Shewmon, M. Streicher, B. Thompson, D. van Rooyen, and J. Weeks. 1997. *Guidelines for Development of Structural Integrity Programs for DOE High-Level Waste Storage Tanks*, BNL-52527, Brookhaven National Laboratory, Upton, New York.

Braun-Hanford, 1986, *Tank Cross Section 241-AP Tanks*, H-2-90534, Rev. 3, Braun-Hanford Co., Richland, Washington.

Brevick, C. H., L. A. Gaddis and S. D. Consort, 1995, *Supporting Document for the Southeast Quadrant Historical Tank Content Estimate for AP-Tank Farm*, WHC-SD-WM-ER-315, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Hanlon, B. M., 2003, *Waste Tank Summary Report for Month Ending March 31, 2003*, HNF-EP-0182, Rev 180, CH2M HILL Hanford Group, Inc., Richland, Washington.

Jensen, C. E. 1995. *Acceptance Criteria for Non-Destructive Examination of Double-Shell Tanks*, WHC-SD-WM-AP-036, Revision 0, Westinghouse Hanford Company, Richland, Washington.

Jensen, C. E., 1999, *241-AP Double-Shell Tanks Integrity Assessment Report*, HNF-4958, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

Jensen, C. E., 2000, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2000*, RPP-5583, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

Jensen, C. E., 2000a, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2001*, RPP-6839, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

Jensen, C. E., 2000b, *Ultrasonic Inspection Results of Double-Shell Tank 241-AP-108*, RPP-6684, Rev. 0-A, CH2M HILL Hanford Group, Inc., Richland, Washington.

Jensen, C. E., 2002, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2002*, RPP-7869, Rev. 0C, CH2M HILL Hanford Group, Inc., Richland, Washington.

Jensen, C. E., 2002a, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks 241-AP-108, 241-AY-101, and 241-AZ-102 - FY2002*, RPP-8867, Rev. 0B, CH2M HILL Hanford Group, Inc., Richland, Washington.

Jensen, C. E., 2002b, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2003*, RPP-11832, Rev. 0, CH2M HILL Hanford Group, Inc., Richland, Washington.

Leshikar, G. A., 1997, *Final Report - Ultrasonic Examination of Tank 241-AW-103 Walls*, HNF-SD-WM-TRP-282, Rev. 0, SGN Eurisys Services Corporation, Richland, Washington.

Pfluger, D. C., 1999, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks*, HNF-2820, Rev. 2, Lockheed Martin Hanford Corporation, Richland, Washington.

Silver, D., 2000, *Administrative Order No.00NWPKW-1251, Failure to Comply with Major Milestone M-32 of the Tri-Party Agreement*, Washington State Department of Ecology, Olympia, Washington.

ATTACHMENT 1

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

(COGEMA Engineering Corporation
Procedure COGEMA-SVUT-INS-007.3, Rev. 1)

UNCONTROLLED COPY

This page intentionally left blank.

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

1.0 PURPOSE

This procedure establishes the method, equipment, and requirements for automated, direct contact ultrasonic (UT) straight-beam, thickness measurements, angle beam flaw detection, and sizing in carbon steel waste storage tanks utilizing the "P-scan" ultrasonic imaging system.

2.0 SCOPE

2.1 Requirements

The requirements herein are applicable to weld inspection, crack detection, sizing, wall thickness measurement, and the detection of wall thinning conditions, such as pitting, erosion, and corrosion in double shell tanks from 0.100 inches to 1.0 inches in thickness. At least one side must be accessible and the component surface to be measured must be parallel with the opposite surface. The requirements are also applicable to the automated UT detection and depth sizing of surface connected planar flaws.

2.2 Scanning

Scanning is performed using remotely controlled automatic scanners.

2.3 Examinations

Examinations shall be performed from inside the annulus of the double shell tanks.

2.4 Instructions

This procedure provides the instructions for the use of Tip Diffraction Techniques including the Absolute Arrival Time Technique (AATT), and the Relative Arrival Time Technique (RATT), for the sizing of planar flaws.

2.5 Methodology

The methodology in this procedure meets the requirements as addressed in Reference 4.1 as applicable to meet the requirements for inspection of double shell tanks.

3.0 RESPONSIBILITIES

Only certified Level II or Level III ultrasonic examiners shall interpret data to determine whether it represents relevant or non-relevant indication in accordance with the applicable specification.

Level III ultrasonic examiners shall review all data collected prior to issuing a final report.

4.0 REFERENCES

4.1 ASME Boiler & Pressure Vessel Code, Section V, Article 4, 1995 Edition.

4.2 COGEMA SV-CP-PRC-014, Qualification and Certification OF NDE Personnel.

4.3 COGEMA SVAD-PRC-001, Nondestructive Examination Administrative Procedure.

4.4 COGEMA SVUT-PRC-007, Ultrasonic Examination Procedure.

4.5 FORCE Institutes, P-scan System 4 Instruction Manual

5.0 PERSONNEL REQUIREMENTS

5.1 Personnel Qualifications

Personnel performing or supervising data acquisition or performing data analysis to the requirements of this procedure shall be qualified and certified to at least level II in ultrasonics in accordance with reference 4.2 or equivalent. In addition, they shall be trained in techniques for sizing stress corrosion cracking/planar flaws.

5.2 Certification Level

Personnel performing review for final acceptance of examination data shall be certified to at least level II in ultrasonics in accordance with reference 4.2 or equivalent.

5.3 Support Personnel

Personnel, whose responsibilities are limited to set-up, tear down, and track or scanner operation need not be certified. Such personnel shall possess sufficient knowledge of the equipment to satisfy the Level III examiner.

6.0 EQUIPMENT

6.1 Ultrasonic Instrument/Examination System

The P-scan computerized pulse-echo ultrasonic inspection system shall be used. The system shall be equipped with a stepped gain control in units of 1dB with a dynamic range of at least 115 dB, capable of generating and receiving frequencies in the range of 0.5 to 15 MHz. The following components may be used:

PS-4	P-scan processor
Analysis computer	Off-line data analysis with P-scan analysis software
Digital Controller, WSC-2S, or other approved scan controller	Automatic scanner controller
AWS-5, AWS5-D, RUTI*	Automatic P-scan scanner
Pump	Couplant pump for P-scan system

*Remote Ultrasonic Inspection (RUTI) system

6.2 Transducers

Straight-beam and angle-beam transducers with single or dual elements, with or without delay tips, may be used, provided they can be attached to and manipulated by the scanner, and can be adequately coupled to the test item with a resultant backwall signal response of at least a 2 to 1 signal-to-noise ratio. Sizes and frequencies shall be as specified for the following applications:

6.2.1 For high sensitivity applications such as the detection of pitting, erosion or corrosion, transducer sizes in the range of 1/4 inch to 1/2 inch, with a frequency in the range of 4.0 to 10 MHz, shall be used.

6.2.2 For weld inspection, detection and sizing of planar flaws that are open to the surface, angle beam transducers with a nominal angle of 45 degrees with an element size in the range of 1/4 inch to 1/2 inch, with a frequency in the range of 4.0 to 10 MHz, shall be used. Where interference from weld geometry prevents examination of the required volume with a 45-degree a 60-degree angle may be substituted.

6.2.3 Transducers of other angles, element sizes, modes of propagation, or frequencies outside the above ranges may be used to suit other required examination techniques.

6.3 Cables

6.3.1 Cables of any compatible type and number of connectors may be used for examination. The length shall be limited to 400 feet, or less where signal

degradation occurs. The same cables shall be used for calibration and examination.

6.3.2 The scanner control cable for analog scanners shall be limited to 330 feet maximum. Digitally controlled scanners shall have a maximum cable length as stipulated by the manufacture's recommendation.

6.4 Couplant

6.4.1 Site approved water should be used as couplant for the examination.

6.4.2 Couplant application should be accomplished by means of an automatic couplant delivery system whenever possible. Care should be taken to use only as much water as required, as excess water in the annulus is undesirable.

6.5 User Calibration Blocks

6.5.1 For general thickness measurements, or the detection of pitting, erosion, or corrosion, user calibration blocks shall be made of an acoustically similar material as that being measured. A standard step block with 0.1 inch or greater increments encompassing the nominal thickness to be measured shall be used.

6.5.2 For weld inspection, crack detection and sizing measurements, user calibration blocks shall be made of an acoustically similar material as that being measured. A standard notched block with 0.1 inch or greater increments encompassing the nominal thickness to be measured shall be used.

6.6 Reference Blocks

Reference blocks (e.g., Rompas, IIW, DSC) utilized for beam angle exit point determination or screen width calibration shall be of similar material composition as the component under examination.

6.7 Pulse Repetition Rate

The repetition rates are set at rates such that signal wrap-around does not occur. In addition, the rates are sufficient to pulse the transducer at least six times within the time necessary to move one-half the transducer dimension parallel to the scan direction at maximum scanning speed.

7.0 CALIBRATION

7.1 Verification of Instrument Linearity

Instrument alignment verification for screen height and amplitude control should be performed within three (3) months prior to use of the instrument or at the beginning and end of each outage period, whichever is less. Instrument linearity verification is independent of transducer or scanner characteristics. Verification with one transducer/scanner combination is valid for any other combination. The due date for alignment verification shall be recorded on the calibration sheet.

7.2 System Parameters

The system parameters used for calibration and examination should be established as outlined in Reference 4.5 as required. The system should be operated in the T-SCAN program for thickness mapping and zero degree inspection and in the P-SCAN program for crack detection, weld inspection and/or additional evaluation.

7.3 General Requirements

7.3.1 Calibration shall include the complete ultrasonic examination system. Any change in transducers, wedges, couplants, cables, instruments, recording devices, scanners, power source, or any other parts of the examination system shall be cause for system calibration check.

7.3.2 If a secondary ultrasonic system is to be used, it must be calibrated before the inspection is started and not removed from the examination system during the inspection or recalibration will be required.

7.3.3 System calibration checks and final calibration for instrument sensitivity and sweep range shall be performed on the same block used for initial calibration using at least one reflector. These checks shall be performed:

a) At the start and finish of each series of examinations.
b) At intervals not to exceed 16 hours.
c) When there is a change as described in 7.3.1.
d) If the examiner suspects a malfunction.

7.3.4 If the horizontal sweep, thickness, or "Z" positions have changed more than 5 percent of the nominal thickness, void all examinations performed after the last valid calibration verification, and reexamine the voided areas.

7.3.5 Calibration checks may be performed on either a reference block or the basic calibration block, but must include a check of the entire examination system. Calibration checks may be accomplished by static or dynamic calibration.

7.3.6 Simulated calibration checks may be used in lieu of calibration checks where the spread of contamination or serious time constraints would result from performing a standard calibration check. Simulated calibration will use blocks, cables, or transducers of similar types and lengths as those used for testing and will be documented on the calibration data sheet. A baseline, simulated calibration shall be performed immediately after performing the initial calibration, or after a calibration check where the entire examination system is utilized. The initial simulated calibration check values are independent of the values obtained utilizing the entire examination system. The established tolerance applies to the subsequent simulated calibration checks.

7.3.7 During calibration, the temperature of the calibration block should be within 25 degrees of the ambient inspection temperature.

7.4 Calibration Process for Thickness Mapping / T-scan

The basic process for calibration is the same for thickness mapping (T-scan), weld inspection, flaw detection, and sizing. The calibration reflectors for straight beam are the backwall reflections from a step wedge. The reflectors for angle beam transducers are the notch base and tips from a notched block. The calibration process is as follows:

7.4.1 Select and connect the appropriate transducer(s), input the parameters, including thickness, frequency, index delay, gates, inspection method(s), and velocity. Apply the couplant to the applicable points on the calibration standard. (Select a sufficiently thin step for detection of unexpected low reading or pits and a step greater than the maximum thickness expected).

7.4.2 Place the transducer(s) on the calibration step nearest to the nominal thickness of the item to be examined. Adjust the gain control to produce a reflection of 80% full screen height (FSH). Input this gain level as the reference level. Obtain a response from the other calibration points, and verify that they produce an acceptable signal. Initial calibration accuracy

will be within +/- 0.010". in T-scan. Perform steps 7.4.1 and 7.4.2 for each physical transducer being used.

7.4.3 Position the transducer to produce a response from the smaller of the two (2) steps to be used for calibration. Using the scan menu, collect a reading from that step. The transducer may be removed from the scanner and remain stationary "static" while the scanner is manipulated to make a larger indication on the screen.

7.4.4 Position the transducer on the thicker step and collect data from that step. Using the level control, measure the thickness from each step. Adjust the system to read the correct thickness with index delay and velocity if needed.

7.4.5 Repeat these steps as required until the system is accurately measuring the thickness over the entire inspection range with each transducer/active inspection. During initial calibration, all intermediate steps within the inspection range should be confirmed.

7.4.6 The vital parameters used for the calibration shall be identical to the inspection parameters with the exceptions of file name(s), X, Y and Z ranges, reference level compensations, thickness, gates or comment parameters which may be adjusted as required.

7.4.7 At a minimum, readings from the thinnest and thickest calibration reflectors shall be recorded for each applicable transducer on the Automated Ultrasonic Thickness Calibration Sheet (Attachment 4).

7.5 Calibration Process for Weld Inspection / Crack Detection / P-scan

7.5.1 Select and connect the appropriate transducer(s), input the parameters, including thickness, frequency, index delay, gates, inspection method(s), and velocity. Apply the couplant to the applicable points on the calibration standard. The 5%T notch on a 1" thick plate should be used to obtain the reference level.

7.5.2 Manipulate the transducer to receive the maximum response from the reference notch. Adjust the gain control to produce a reflection of 80% full screen height (FSH). Input this value as the reference level. Obtain a response from the calibration reflector and verify that the response is within +/- 2dB.

7.5.3 Position the transducer to produce a response from the reference reflector. Using the scan menu, collect data from that notch. The transducer may be removed from the scanner and remain stationary "static" while the scanner is manipulated to make an indication on the screen.

7.5.4 Use the level control to determine the peak amplitude and the position of the indication at the peak amplitude. Use index delay and velocity (if required) to adjust the system to plot the reflectors in the appropriate positions. The ID notch should plot on the ID at or near the peak amplitude.

7.5.5 Repeat steps 7.5.2 through 7.5.3 as required for each transducer until the system is calibrated.

7.5.6 The vital parameters used for the calibration shall be identical to the inspection parameters with the exceptions of file name(s), X, Y and Z ranges, reference level compensations, thickness, gates or comment parameters which may be adjusted as required.

7.5.7 The calibration reflector(s) and response shall be recorded for each applicable transducer on the Automated Ultrasonic P-Scan Calibration Sheet (Attachment 7).

7.6 Sizing Calibration for Tip Diffraction Techniques (AATT, RATT)

a) Select an appropriate transducer.

b) Select a sizing calibration block of similar thickness and material containing at least two notches of known depths.

c) For the AATT technique, set at least two gates, to cover the entire area of interest. The first gate in the first leg, ending just before the ID. Position the transducer on the calibration block. Alternately peak the shallow and deep signals from the notch tips (see Attachment 6). Using the index delay and velocity controls, adjust the system until the system correctly reads the remaining ligament with the "Z" cursor.

d) For the RATT technique, the system mode should be set to A-SCAN. Manipulate the transducer until signals are obtained from the shallow notch tip and the notch base simultaneously (see Figure 2, Attachment 6). Using the index delay and velocity, adjust the distance between the two signals to read the actual reflector depth in inches. Repeat the same process on the deep

notch. Alternate this procedure until the screen/system represents a desirable linear depth screen in inches.

e) Save the calibration, and record this data on the Automated Ultrasonic P-Scan Calibration Sheet (Attachment 7).

8.0 EXAMINATION

8.1 Surface Condition

8.1.1 The surface from which measurements are to be taken should be free of loose scale, unbonded coating, heavy oxidation, weld spatter, or other material which may interfere with movement of the transducer or the transmission of sound into the material.

8.1.2 A surface finish of 250 RMS or better should be provided. The requesting organization must approve the use of any base material preparation process, which may reduce the thickness below the allowable tolerance.

8.2 Extent of Examination

The location of the areas to be measured and/or the number of scans to be performed shall be designated by the applicable work instructions. The location, scan numbers, and reference points of all scans shall be recorded on the applicable data sheets. See attachment 1 for minimum examination volume and beam direction for weld inspection.

NOTE: Additional scan areas will not require revision to this procedure.

8.3 Flaw Location

When performing examinations to detect planar flaws, angle beam transducers shall be used. Calibration is performed as in Section 7.5. All angle beam examinations shall be performed in P-scan.

8.4 Ultrasonic Measurement

User calibration shall have been completed per the applicable requirements of Section 7.0 prior to performing any of the examinations.

8.4.1 The amplitude of the first back reflection obtained from the item to be examined shall be adjusted as necessary using the Transfer Correction to

maintain approximately the same amplitude as that used for calibration. The dB value obtained with straight beam transducer should be recorded on the report. This value should be considered during analysis of P-scan angle beam data also.

8.4.2 Transducer overlap between passes shall be a minimum of 50% of the element size. Scanning speed shall not exceed 6 inches per second.

8.4.3 Should measurements be observed larger or smaller than the range calibrated for in Section 6.0, check the calibration for accuracy in the encountered thickness range. If the calibration is accurate in this range, amend the calibration sheet and continue the examination. If the calibration is not within the tolerance allowed in the spec, then recalibrate and rescan all areas where readings were encountered outside the originally calibrated range.

8.5 Limitations and Precautions

8.5.1 Care must be taken to ensure the transducer face is flush with the examination surface during scanning.

8.5.2 When it is necessary to determine the origin of mid-wall indications, a 4MHz shear wave transducer(s) may be used in the P-Scan program to detect pit openings or perpendicular connections between laminar indications.

8.6 Recording

Upon completion of each scan area, the data file(s) shall be recorded on a disk. All measurements within the predetermined gated area are stored, along with the text information with each file.

8.7 General Sizing Guidelines

8.7.1 It is recognized that, of the methods of sizing described in this procedure, no one technique is completely accurate in sizing all flaws in all thicknesses. By using complementary methods, however, a realistic approximation of the flaw depth can be obtained.

8.7.2 The method of sizing pits is primarily utilizing a zero degree dual element transducer. The 45-degree shear wave transducers may be used to confirm qualitatively the depth of the pit.

8.7.3 When sizing crack-like indications, the entire flawed area shall be scanned with the imaging mode. The entire flaw length shall be evaluated. It is recommended that A-Scans be recorded at the deepest location of the flaw. The primary technique for sizing crack-like indications is the high frequency, 45 degree shear wave transducer utilizing the Absolute Arrival Time Technique (AATT). The dual element, straight beam may be used as a complimentary technique.

8.7.4 Additional sizing technique sequences may be utilized if the primary techniques identified prove to be indeterminable.

8.8 Sizing with Tip Diffraction Techniques (AATT, RATT)

8.8.1 The AATT technique uses shear waves to obtain a diffracted echo (satellite pulse) from the flaw tip (see Figure 1 Attachment 6). The RATT technique uses shear wave reflected signals from both the flaw tip and the flaw base (see Figure 2 Attachment 6). Both techniques can be utilized using the same transducer.

a) AATT Technique

Locate the deepest extremity of the flaw and maximize the signal from the flaw tip. The distance to the flaw tip represents the remaining material ligament from the outside surface. To determine the relative through wall flaw depth, subtract this dimension from the local material wall thickness.

b) RATT Technique

Locate the deepest extremity of the flaw, and obtain a signal from the flaw base. Manipulate the transducer until the doublet (flaw base and tip signal appearing simultaneously) is observed. These signals do not have to be peaked, as the doublet separation directly indicates the relative through wall depth. To determine remaining material ligament, subtract the relative through wall depth measurement from the local material wall thickness.

8.8.2 Other sizing techniques or variations to the techniques may be used with the approval of the UT Level III. Such approval, signature and a

description of the technique shall be recorded in the "Remarks" column on the Ultrasonic Sizing Calibration Sheet (Attachment 7).

9.0 EVALUATION

9.1 Relevant Indications

Relevant indications including pitting, thinning and crack-like indications along with the minimum thickness reading in the area of interest shall be recorded and used for evaluation per Paragraph 9.2.

9.1.1 P-scan data shall be evaluated to a sensitivity of 20% reference level (-14dB). All crack-like indications are recordable regardless of amplitude.

9.1.2 T-scan data shall be evaluated utilizing all available images to detect and evaluate indications.

9.1.3 Reportable indications shall be evaluated by Level III personnel prior to final report submittal.

9.2 Reporting/Special Criteria

Reporting and special notification criteria are noted in Section 9.8.

9.3 Statistical Information

The statistical information (Minimum and Mean thickness) provided under "Setup" pages 1 & 2 of the post-processing software should be reported for each "Part" of a given scan location. Where data noise invalidates these values, the analyst should determine the values using the level control.

9.4 Printouts

Printouts should be made in accordance with the customer's request. In absence of further direction, both the merged set-up pages and the merged image, adjusted to show the minimum thickness, shall be printed at a level that best shows the wear patterns or at Nominal T - 12.5%, whichever provides the most useful information. P-scan data should be printed with the level control set at 20% reference level (-14dB).

9.5 Recording Crack Size

9.5.1 All flaw sizing data acquired should be used to determine the flaw depth. This data shall be reported individually for each flaw and shall include all data necessary to achieve the best accuracy of flaw depth.

9.5.2 If, during sizing, a flaw length other than that reported during the detection examination is measured, or other discrepant conditions occur, record the corrected lengths, locations. or distances on the Ultrasonic P-scan Data Report (Attachment 8) in the spaces provided.

9.5.3 If, during sizing, the area is determined not to be flawed, and the resultant reflector(s) is due to component/weld geometry or metallurgical structure, the true origin (e.g., root, mismatch, etc.) shall be documented and substantiated on the Ultrasonic P-scan Data Report.

9.6 Scanning Limitations

Record all limitations due to weld configurations, obstructions, single side access restrictions, etc., in the remarks section on the applicable Ultrasonic Data Report. Details as to specific length or area in relation to L (X) and/or W (Y) reference points should be recorded.

9.7 Flaw Evaluation

Reportable indications shall be evaluated by Level III personnel prior to final report submittal.

9.8 Reporting Levels

All indications which meet or exceed the following conditions shall be reported to the project cognizant engineer.

a) Pit depth exceeds 25% of the wall thickness.

b) Wall thinning exceeds 10% of the wall thickness.

c) Surface crack depths exceeding 0.18 inches.

10.0 REPORTS

10.1 Thickness Data Reports

An Automated Ultrasonic Thickness Data Report (Attachment 3) shall be prepared for each examination or series of examinations performed. This report shall include identity of equipment, the thickness measurements obtained, and should be referenced to the calibration sheet.

10.2 Calibration Reports

An Automated Ultrasonic Examination Calibration Sheet (Attachment 4) shall be prepared for each examination or series of examinations performed. This report shall include the materials and equipment used for examination.

10.3 Sketch Sheets

An Automated Ultrasonic Examination Sketch Sheet (Attachment 5) should be prepared for each examination or series of examinations performed. This report should include identity of scanning equipment and a sketch of the component or item examined, identifying scan locations, including dimensions, reference points, and grid locations, where applicable.

10.4 Sizing Data Reports

An Ultrasonic Sizing Data Report (Attachment 8) shall be completed only when cracking is detected. Each report shall be related to the applicable Automated Ultrasonic Examination Calibration Sheet(s).

10.5 Cover Sheets

Whenever several locations are being examined on the same conponent an Automated Ultrasonic Examination Report Cover Sheet (Attachment 1) and an Automated Ultrasonic Thickness Report Summary Sheet (Attachment 2) should be completed.

10.6 Final Reports

Final reports are to be distributed and maintained in accordance with the applicable contract.

11.0 ATTACHMENTS

11.1 Attachment 1: Examination Volume, Minimum Beam Directions and Extent of Examination

11.2 Attachment 2: Sample Automated Ultrasonic Thickness Data Report

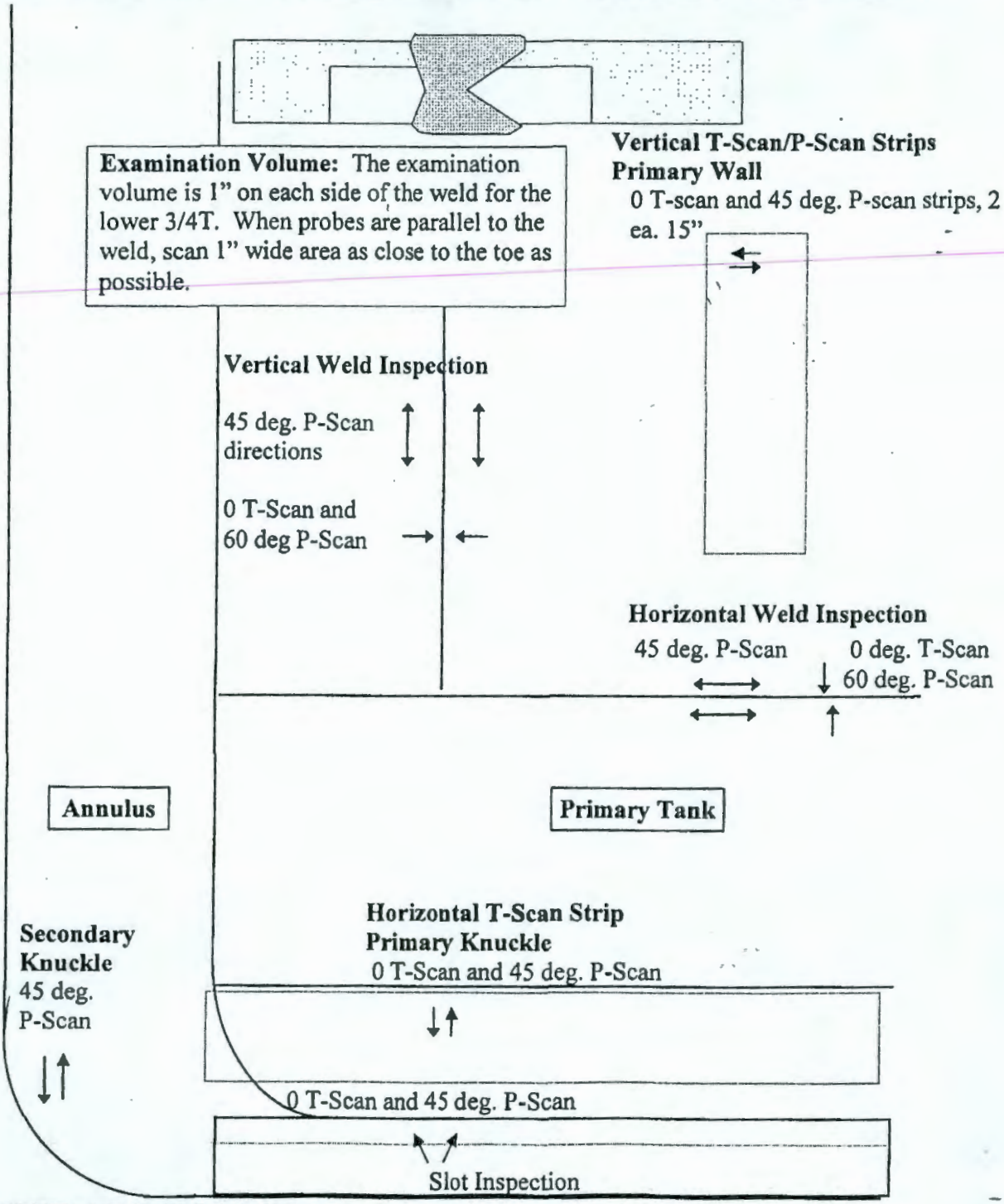
11.3 Attachment 3: Sample Automated Ultrasonic Thickness Calibration Sheet

11.4 Attachment 4: Figure 1: Absolute Arrival Time Technique (AATT)
Figure 2: Relative Arrival Time Technique (RATT).

11.5 Attachment 5: Sample P-scan Calibration Data Sheet

11.6 Attachment 6: Sample Ultrasonic P-scan Data Report

Attachment 1: Examination Volume, Minimum Beam Directions and Extent of Examination



Attachment 1 (continued): Extent of Examination

Primary Tank Wall

Vertical Strips - Examine a vertical strip 30" x 35 feet long of the primary wall between the upper haunch transition and the lower knuckle for pits, cracks and wall thinning. Axial cracks on the tank inner wall surface shall be detected and sized. The vertical strip may be comprised of one or more strips whose total width is equal to 30 inches.

Weld Areas - Examine 20 feet of horizontal weld area (heat affected zone), at tank to knuckle weld. Examine one ~10 foot section of vertical weld joining the lowest shell course plates and one ~10 foot section of vertical weld joining the next to lowest shell course plates. Axial and circumferential cracks on the tank inner surface shall be detected and sized.

Primary Tank Knuckle

Examine 20 feet of the primary tank lower knuckle in the circumferential direction to detect and size cracking in the circumferential direction and to detect pits and wall thinning. The area to be examined is from the weld joining the transition plate with the knuckle to the furthest reach of the transducer assembly that is allowed by geometric constraints.

Secondary Tank

Secondary Tank Lower Knuckle – Examine a 20 foot length of the secondary tank knuckle over the entire area of the knuckle for the presence of circumferential cracks.

Secondary Tank Bottom – Examine the secondary tank bottom over an area of 10 ft^2 to detect and measure thickness and pits.

Primary Tank Bottom

Examine the primary tank bottom for pits, wall thinning and cracks oriented in the circumferential direction (perpendicular to the air channels) in 16 air channels. The tank bottom is to be examined for a distance of 12 feet towards the tank center, starting seven inches inboard of the outside radius of the tank cylindrical section. The primary tank bottom scan head is designed to examine the accessible area in the air channel in one pass through the channel.

COGEMA ENGINEERING CORP.

COGEMA-SVUT-INS-007.3, Rev. 1
UNCONTROLLED COPY

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 2: Sample Automated Ultrasonic Thickness Data Report

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

LOCATION	SYSTEM	EXAM START	EXAM END	JOB #
COMPONENT ID		EXAMINATION SURFACE ☐ OD ☐ ID ☐ PAINTED		NOM. THICKNESS
CONFIGURATION	TO	CALIBRATED RANGE		TEMP °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED		REF. LEVEL CORRECTION (TRANS. CORR) _____ DB -		
PROCEDURE	REV	MATERIAL TYPE ☐ SS ☐ CS OTHER _____		CONDITION
FILE NAME/ITEM#		TRANSDUCER ☐ DUAL ☐ SGL ☐ 0DEG ☐ ANGLE _____		
X_0 REF. POINT (L_0)	Y_0 REF. POINT (W_0)	SCAN WIDTH		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	COMMENTS
SUMMARY								

REMARKS _____

Examiner	Analyst	Reviewer	Page
_____	_____	_____	
Level ___ Date_____	Level ___ Date_____	Level ___ Date_____	___ of ___

COGEMA ENGINEERING CORP.

COGEMA-SVUT-INS-007.3, Rev. 1
UNCONTROLLED COPY

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 3: Sample Automated Ultrasonic Thickness Calibration Sheet

4/00	AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET	

LOCATION	SYSTEM	CALIBRATION BLOCK	
PROCEDURE		THICKNESS	MATERIAL
UT SYSTEM	SERIAL #	REFERENCE BLOCK	
SOFTWARE VERSION	REV.	THICKNESS	MATERIAL
LINEARITY DUE DATE		REFERENCE BLOCK TEMP °F	PYRO SN.
SCANNER TYPE	SERIAL #	COUPLANT	BATCH #
SCANNER CABLE		CABLE LENGTH	CABLE #
SIGNAL CABLE		CABLE LENGTH	CABLE #

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ.	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1									
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE									
TIME									
REFLECTOR									
CH. 1	THK.1								
	THK. 2								
CH. 2	THK.1								
	THK. 2								
CH. 3	THK.1								
	THK. 2								
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS_____

Examiner	Examiner	Reviewer	
_____	_____	_____	
LEVEL ___ DATE_____	Level ___ Date_____	Level ___ Date_____	

Attachment 4: Absolute Arrival Time Technique (AATT) & Relative Arrival Time Technique (RATT)

Figure 1. Absolute Arrival Time Technique

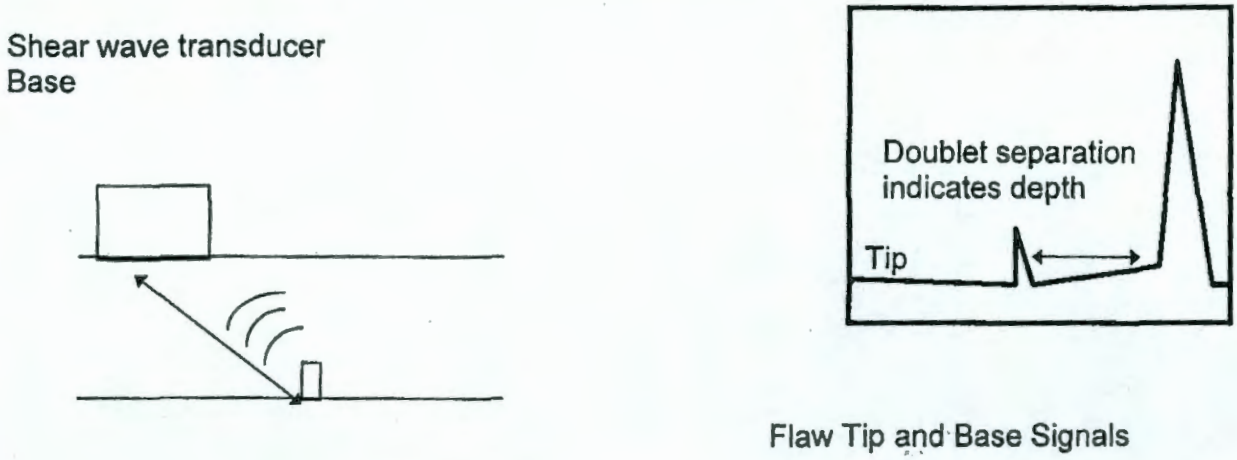


Figure 2. Relative Arrival Time Technique

COGEMA ENGINEERING CORP.

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 5: Sample P-scan Calibration Sheet

4/00	AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET	

LOCATION	SYSTEM	CALIBRATION BLOCK	
PROCEDURE		THICKNESS	MATERIAL
UT SYSTEM	SERIAL #	REFERENCE BLOCK	
SOFTWARE VERSION	REV.	THICKNESS	MATERIAL
LINEARITY DUE DATE		REFERENCE BLOCK TEMP °F	PYRO SN.
SCANNER TYPE	SERIAL #	COUPLANT	BATCH #
SCANNER CABLE		CABLE LENGTH	CABLE #
SIGNAL CABLE		CABLE LENGTH	CABLE #

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ.	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1									
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS						
DATE								
TIME								
REFLECTOR / ORRIENTATION								
CH. 1	AMPLITUDE							
	LOCATION							
CH. 2	AMPLITUDE							
	LOCATION							
CH. 3	AMPLITUDE							
	LOCATION							
CH. 4	AMPLITUDE							
	LOCATION							
FILE #								
EXAMINER								

REMARKS_____

Examiner	Examiner	Reviewer	Page
_____ Level ___ Date_____	_____ Level ___ Date_____	_____ Level ___ Date_____	___ of ___

COGEMA ENGINEERING CORP.

COGEMA-SVUT-INS-007.3, Rev. 1
UNCONTROLLED COPY

AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 6: Sample P-scan Data Report

4/00	ULTRASONIC P-SCAN DATA REPORT			
LOCATION	SYSTEM	EXAM START	EXAM END	JOB #
COMPONENT ID		EXAMINATION SURFACE ☐ OD ☐ ID ☐ PAINTED		CONDITION
CONFIGURATION	TO	CALIBRATED RANGE		TEMP °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED		REF. LEVEL CORRECTION (TRANS. CORR) _____ DB		
PROCEDURE	REV	MATERIAL TYPE ☐ SS ☐ CS OTHER _____		
FILE NAME/ITEM#		TRANSDUCER ☐ DUAL ☐ SGL ☐ 0DEG ☐ ANGLE _____		
X_o REF. POINT (L_o)	Y_o REF. POINT (W_o)	SCAN WIDTH		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

Examiner	Analyst	Reviewer	Page
Level ___ Date_____	Level ___ Date_____	Level ___ Date_____	___ of ___

ATTACHMENT 2

COGEMA "AUTOMATED ULTRASONIC THICKNESS DATA REPORT SHEETS"

This page intentionally left blank.

ATTACHMENT 3

COGEMA "AUTOMATED ULTRASONIC THICKNESS DATA REPORT SHEETS"

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/27/03 0720	EXAM END: 2210	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO		CALIBRATED RANGE: .3" To 1.0"	TEMP: Amb °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 83.7"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB	
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 1		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG. ☐ ANGLE ____	
X_0 REF. POINT (I_0): 4" below Horz weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 19"	

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.507"	.491"		.515"
12-24					.510"	.494"		.515"
24-36					.511"	.497"		.520"
36-48					.513"	.500"		.520"
48-60					.513"	.506"		.520"
60-72					.513"	.504"		.520"
72-83.7					.511"	.501"		.520"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W Standy	[signature]	(N1)	
Level II Date 1/27/03	Level VII Date 2/9/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST PANE FARM	SYSTEM: PSP-4	EXAM START: 1/27/03 0750	EXAM END: 2215	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 83.7"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT. WALL / PLATE 1		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	N1	
Level II Date 1/27 03	Level III Date 5/13/03	Level ___ Date ___	___ of ___

N1 SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/28/03 0715	EXAM END: 1525	JOB #: 03-4
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: Amb. °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 87.6"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION:
FILE NAME/ITEM#: VERT. WALL / PLATE 2		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.500"	.495"		.510"
12-24					.501"	.497"		.510"
24-36					.502"	.498"		.510"
36-48					.502"	.488"		.510"
48-60					.502"	.495"		.510"
60-72					.501"	.484"		.510"
72-84					.500"	.482"		.510"
84-87.6					.499"	.483"		.505"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 1/28/03	Level III Date 2/9/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J.B Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/28/03 0725	EXAM END: 1535	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 87.5"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: CO GEMA-SVUT-SNJ-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT WALL / PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W Brandy Level II Date 1/28/03 P-Scan Limited	[illegible] Level [illegible] Date 5/13/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/29/03 0750	EXAM END: 2220	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .562"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 88.2"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SV4T-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 3		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz weld.	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.578"	.559"		.590"
12-24					.581"	.552"		.590"
24-36					.585"	.572"		.595"
36-48					.585"	.581"		.595"
48-60					.585"	.570"		.595"
60-72					.583"	.571"		.590"
72-84					.581"	.566"		.590"
84-88.2					.580"	.550"		.590"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 1/29/03	Level III Date 3/4/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/10/03 1400	EXAM END: 1600	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 1.59"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 90.4"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .562"		
FILE NAME/ITEM#: VERT. WALL/45/1st/P3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
[signature] Level II Date 3/10/03	[signature] Level II Date 5/19/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/29/03 0715	EXAM END: 1550	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .750"
CONFIGURATION: PLATE TO		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.3"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WALL/0°s / PLATE 4		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK, R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.770"	.763"		.780"
12-24					.773"	.769"		.780"
24-36					.775"	.772"		.780"
36-48					.775"	.770"		.780"
48-60					.773"	.757"		.780"
60-72					.771"	.766"		.780"
72-84					.767"	.750"		.780"
84-96					.764"	.757"		.775"
96-105.3					.758"	.739"		.770"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D [signature]	[signature]	(N1)	
Level II Date 4/29/03	Level ~~XX~~ Date 5/13/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/5/03 0805	EXAM END: 1915	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 2.12"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.6"		REF. LEVEL CORRECTION (TRANS. CORR): & DB		
PROCEDURE: COGEMA-SVUT-XNS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TUB. .750"		
FILE NAME/ITEM#: VERT WALL/PLATE 4		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W J Purdy	[signature]	(N1)	
Level II Date 2/5/03	Level ☒ Date 2/4/03	Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J.B. LEWER.

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/4/03 0750	EXAM END: 1400	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.8"		REF. LEVEL CORRECTION (TRANS. CORR): 8 DB		
PROCEDURE: COGEMA-SVHT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WALL / PLATE 5		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below HORZ weld	Y_0 REF. POINT (W_0): ℄ of 24" Riser	SCAN WIDTH: 15"		

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.875"	.871"		.885"
12-20.8					.877"	.869"		.885"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 2/4/03	Level III Date 3/4/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/4/03 0800	EXAM END: 1415	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 2.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.8"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☐ CS OTHER TAK. .875"		
FILE NAME/ITEM#: VERT. WALL / PLATE 5		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below 40PZ weld	Y_0 REF. POINT (W_0): ¼ of 24" Riser	SCAN WIDTH: 15"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 2/4/03	Level VI Date 3/4/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/27/03 0720	EXAM END: 2210
			JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"	TEMP: Amb °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 83.1"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB	
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION
FILE NAME/ITEM#: VERT. WALL/2ND PLATE 1		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____	
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): 17" ℄ of 1st Pass To ℄ 2nd Pass.	SCAN WIDTH: 15"	

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.506"	.486"		.515"
12-24					.508"	.503"		.515"
24-36					.510"	.503"		.520"
36-48					.510"	.499"		.515"
48-60					.510"	.505"		.515"
60-72					.507"	.503"		.515"
72-83.1					.505"	.499"		.515"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Rudd	Wesley H Nu	(N1)	
Level II Date 1/27/03	Level VI Date 2/9/03	Level ___ Date ___	___ of ___

P-Scan Limited.

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/27/03 0750	EXAM END: 2215	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: 0" TO 2.00"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 83"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: CO GPMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .500"		
FILE NAME/ITEM#: VERT. WALL/2ND/PLATE 1		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below HORZ Weld	Y_0 REF. POINT (W_0): 17" ℄ of 1st Pass To ℄ of 2nd Pass	SCAN WIDTH: 15"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W Drandy	Wesley H. Nelson	N1	
Level II Date 1/27/03	Level III Date 5/14/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/30/02 0730	EXAM END: 1605	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO		CALIBRATED RANGE: .3" TO 1.0"		TEMP: Amb °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 30.1" / 57.2"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM: VERT. WALL / 2ND / PLATE 2 & PLATE 2A		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_0 REF. POINT (L_0): 1" below HORZ	Y_0 REF. POINT (W_0): 17" CL 1ST PASS TO CL 2ND PASS	SCAN WIDTH: 15"		

	PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
PLATE 2	0-12					.490"	.486"		.505"
	12-24					.492"	.481"		.505"
	24-30.1					.492"	.481"		.505"
PLATE 2A	0-12					.492"	.488"		.505"
	12-24					.494"	.478"		.505"
	24-36					.494"	.477"		.505"
	36-48					.492"	.475"		.505"
	48-57.2					.490"	.471"		.505"
	SUMMARY								

REMARKS

2A STARTED @ 30" OF 2

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 1/30/03	Level III Date 2/9/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST BONE FARM	SYSTEM: PSP-4	EXAM START: 1/30/03 0745	EXAM END: 1615	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 2.00"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 30" & 57.1"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT. WALL / 2ND / PLATE 2 & 2A		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz Weld.	Y_0 REF. POINT (W_0): 7" ℄ of 1st Pass to ℄ of 2nd Pass	SCAN WIDTH: 15"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

2A STARTED @ 30" OF 2

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	N1	
Level II Date 1/30/03	Level III Date 5/14/03	Level ___ Date ___	___ of ___
P-Scan Limited			

N1 SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 1/29/03 0750	EXAM END: 2220	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .562"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"	TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 44.5" & 44.2"		REF. LEVEL CORRECTION (TRANS. CORR): X DB	
PROCEDURE: LOGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION
FILE NAME/ITEM#: VERT. WALL / 2 ND / PLATE 3 & 3A		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____	
X_0 REF. POINT (L_0): 1" below HORZ weld.	Y_0 REF. POINT (W_0): 17" of 1ST PASS TO ℄ of 2ND PASS.	SCAN WIDTH: 15"	

	PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
(3)	0-12					.580"	.554"		.590"
	12-24					.585"	.556"		.595"
	24-36					.585"	.572"		.595"
	36-44.5					.586"	.579"		.595"
(3A)	0-12					.585"	.578"		.595"
	12-24					.582"	.570"		.590"
	24-36					.580"	.576"		.590"
	36-44.2					.579"	.565"		.590"
	SUMMARY								

REMARKS

3A STARTED @ 44.1" OF 3

Examiner	Analyst	Reviewer	Page
W D Rudd	[signature]	(N1)	
Level II Date 1/29/03	Level III Date 3/4/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/11/03 0926	EXAM END: 1515	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO		CALIBRATED RANGE: 0" TO 1.59"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 90.2"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .562"		
FILE NAME/ITEM#: VERT. WALL/45/2ND/P3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below HORZ weld	Y_0 REF. POINT (W_0): 17" ℄ of 1st PASS TO ℄ of 2nd PASS	SCAN WIDTH: 15"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
[signature] Level VA Date 3/11/03	[signature] Level VA Date 5/18/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/5/03 0820	EXAM END: 1930	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .750"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: (1) 58.8" / 30.8" / (2) 15.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER		CONDITION
FILE NAME/ITEM#: VERT. WALL / 2ND / PLATE 4 & 4A & 4B		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE		
X_0 REF. POINT (L_0): 1" below HORZ weld.	Y_0 REF. POINT (W_0): 17 ℄ of 1st PASS TO ℄ of 2nd PASS	SCAN WIDTH: 15"		

	PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
PLATE 4	0-12					.765"	.750"		.775"
	12-24					.770"	.757"		.780"
	24-30.8					.772"	.767"		.780"
PLATE 4A	0-12					.772"	.767"		.780"
	12-15.6					.771"	.765"		.780"
PLATE 4B	0-12					.770"	.764"		.780"
	12-24					.770"	.761"		.780"
	24-36					.765"	.760"		.775"
	36-48					.761"	.753"		.770"
	48-58.8					.755"	.737"		.770"
	SUMMARY								

REMARKS

4A STARTED @ 30.7" OF 4, 4B STARTED @ 15.5" OF 4A

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 3/5/03	Level III Date 4/15/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J.B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST BONE FARM	SYSTEM: PSP-4	EXAM START: 3/5/03 0835	EXAM END: 1940	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 2.12"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 30.7", 15.5", 58.8"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .750		
FILE NAME/ITEM#: VERT. WALL/2ND/PLATE 4, 4A, 4B		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below HORZ weld.	Y_0 REF. POINT (W_0): 17" ℄ of 1st PASS TO ℄ of 2nd PASS	SCAN WIDTH: 15"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

4A STARTED @ 30.7" OF 4, 4B STARTED @ 15.5" OF 4A

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley H Ker	(N1)	
Level II Date 3/5/03	Level III Date 5/20/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/4/03 0750	EXAM END: 1400	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE	TO	CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.7"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SV4T-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WALL/2ND/PLATE 5		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): 17" ℄ of 1st PASS TO ℄ of 2nd PASS	SCAN WIDTH: 15"		

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.876"	.866"		.885"
12-20.7					~~.868"~~ .877"	.868"		.885"
					LWDN 5-27-03			
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 2/4/03	Level VI Date 3/4/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/4/03 0800	EXAM END: 1415	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 2.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 20.9"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK .875"		
FILE NAME/ITEM#: VERT. WALL 2ND/PLATE 5"		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz. Weld	Y_0 REF. POINT (W_0): 17" ℄ of 1ST PASS To ℄ of 2nd PASS	SCAN WIDTH: 15"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W. Purdy	[signature]	(N1)	
Level II Date 2/4/03	Level III Date 5/21/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser# 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/6/03 0755	EXAM END: 1330	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0.3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.6"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION:
FILE NAME/ITEM#: VERT. WELD / PLATE 2		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz Weld.	Y_0 REF. POINT (W_0): CL of Vert Weld.	SCAN WIDTH: 11.2"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.495"	.473"	"	.505"
12-24					.495"	.474"		.505"
24-36					.496"	.483"		.505"
36-48					.496"	.490"		.505"
48-60					.496"	.473"		.505"
60-72					.496"	.482"		.505"
72-84					.495"	.484"		.505"
84-89.6					.490"	.483"		.505"
SUMMARY								

REMARKS

NORTH SIDE OF VERT. WELD (-)

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 2/8/03	Level III Date 3/14/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) Attached Letter From J. B Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/6/03 0755	EXAM END: 1330	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .500"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"	TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.6"		REF. LEVEL CORRECTION (TRANS. CORR): ____ DB	
PROCEDURE: CDGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION
FILE NAME/ITEM#: VERT. WELD / PLATE 2		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____	
X_0 REF. POINT (Lo): 1" below Horz weld.	Y_0 REF. POINT (W/o): ℄ of Vert Weld.	SCAN WIDTH: 11.2"	

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.525"	.510"		.535"
12-24					.528"	.520"		.535"
24-36					.525"	.519"		.535"
36-48					.521"	.519"		.530"
48-60					.520"	.512"		.530"
60-72					.519"	.514"		.530"
72-84					.513"	.501"		.530"
84-89.6					.510"	.502"		.520"
SUMMARY								

REMARKS

SOUTH SIDE OF VERT. WELD (+)

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(NI)	
Level II Date 2/6/03	Level III Date 3/14/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NI) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/6/03 0815	EXAM END: 1340	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" to 2.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 87.1"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .500"		
FILE NAME/ITEM#: VERT. WELD / PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60°		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): ℄ of Vert weld	SCAN WIDTH: 10.7"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATION?

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 2/6/03	Level III Date 5/19/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TRONE FARM	SYSTEM: PSP-4	EXAM START: 3/3/09 0910	EXAM END: 2010	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 1.414"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 87.6"		REF. LEVEL CORRECTION (TRANS. CORR): X DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .500"		
FILE NAME/ITEM#: VERT. WELD/45/PLATE 2		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" below Horz Weld.	Y_0 REF. POINT (W_0): ℄ of Vert weld.	SCAN WIDTH: 10.7"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Nee	(N1)	
Level II Date 3/3/03	Level VII Date 5/14/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/19/03 0810	EXAM END: 1950	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .562"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB. °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 90.4"		REF. LEVEL CORRECTION (TRANS. CORR): X DB		
PROCEDURE: COGEMA-SU4T-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: VERT. WELD / PLATE 3		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz Weld.	Y_0 REF. POINT (W_0): ℄ of Vert Weld.	SCAN WIDTH: 11.6"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.560"	.544"		.570"
12-24					.560"	.541"		.570"
24-36					.565"	.559"		.570"
36-48					.565"	.549"		.575"
48-60					.567"	.549"		.575"
60-72					.568"	.550"		.575"
72-84					.569"	.561"		.575"
84-90.4					.570"	.558"		.575"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy Level II Date 2/19/03 P-Scan Limited.	[signature] Level VII Date 3/4/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/19/03 0820	EXAM END: 2000	JOB #: 41-03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO Plate		CALIBRATED RANGE: 0" TO 2.25"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 88'		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .562"		
FILE NAME/ITEM#: VERT WELD / PLATE 3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60°		
X_0 REF. POINT (L_0): 1" BELOW HORZ. WELD	Y_0 REF. POINT (W_0): ℄ OF WELD	SCAN WIDTH: 11.1"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley [illegible]	(N1)	
Level II Date 2/19/03	Level III Date 5/2/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/3/03 0910	EXAM END: 2010	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 1.59"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 89.4°		REF. LEVEL CORRECTION (TRANS. CORR): ☒ DB		
PROCEDURE: CO GPMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____ THK .562"		
FILE NAME/ITEM#: VERT. WELD/45/PLATE 3		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0)	Y_0 REF. POINT (W_0)	SCAN WIDTH: 10.7"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley H Nelson	N1	
Level II Date 3/3/03	Level III Date 5/13/03	Level ___ Date ___	___ of ___
RScan Limited			

N1 SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/19/03 0810	EXAM END: 1950	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .750"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 105.5"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION:
FILE NAME/ITEM#: VERT. WELD / PLATE 4		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1" below Horz weld	Y_0 REF. POINT (W_0): ℄ of Vert. Weld.	SCAN WIDTH: 11.3"		

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.770"	.752"		.790"
12-24					.770"	.748"		.790"
24-36					.780"	.751"		.790"
36-48					.770"	.751"		.785"
48-60					.775"	.754"		.790"
60-72					.770"	.754"		.785"
72-84					.770"	.760"		.785"
84-96					.765"	.754"		.775"
96-105.5					.765"	.737"		.775"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley H. Nees	(N1)	
Level IV Date 2/19/03	Level IV Date 3/14/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/19/03 0820	EXAM END: 2000	JOB #: 41-03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 3.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 103.1"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .750"		
FILE NAME/ITEM#: VERT. WELD / PLATE 4		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60°		
X_0 REF. POINT (L_0): 1" below Horz Weld	Y_0 REF. POINT (W_0): CL of Vert Weld	SCAN WIDTH: 10.9"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D [signature] Level II Date 2/19/03 P-Scan Limited	[signature] Level III Date 5/19/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J.B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TRANP. FORM	SYSTEM: PSP-4	EXAM START: 3/3/03 0910	EXAM END: 2010	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 2.12"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 70.2" & 37.0"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: CO GEMA-SVUT-IND-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK. .750"		
FILE NAME/ITEM#: VERT. WELD 145 PLATE 4 & 4A		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0)	Y_0 REF. POINT (W_0)	SCAN WIDTH: 10.9"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATIONS
4A STARTED @ 68" OF 4

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D. Nelson	N1	
Level II Date 3/3/03	Level III Date 5/14/03	Level ___ Date ___	___ of ___
P-Scan limited			

N1 SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/6/03 0750	EXAM END: 1030	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO:	CALIBRATED RANGE: 0" TO 4.24"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 3.8"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .750"		
FILE NAME/ITEM#: PLATE 4 / GOUGE A		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0)	Y_0 REF. POINT (W_0): ℄ OF GOUGE	SCAN WIDTH: 8.9"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE
1	—	—	N2	N/A	1.95"	1.42"	3.37"	—	-.150	—	GOUGE O.D.

REMARKS

(N2) SHALLOW O.D. GOUGE <.100", NOT A CRACK LIKE INDICATION, NO EXTENSION THROUGH WALL, NO I.D. CONNECTION.

NO CRACK LIKE INDICATION

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 3/6/03	Level III Date 5/21/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/19/03 0810	EXAM END: 1950	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 21.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-0073	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION:
FILE NAME/ITEM#: VERT. WELD / PLATE 5		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (Lo): 1' below Horz Weld	Y_0 REF. POINT (Wo): ℄ of Vert Weld	SCAN WIDTH: 11.4"		

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX THK.
0-12					.865"	.852"		.880"
12-21.6					.862"	.844"		.870"
SUMMARY								

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley A Nel	(NI)	
Level II Date 2/19/03	Level III Date 3/13/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NI) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/19/03 0820	EXAM END: 2000	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 3.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 19.1"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER THK .875"		
FILE NAME/ITEM#: VERT. WELD / PLATE 5		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60°		
X_o REF. POINT (L_o): 1" below Horz weld	Y_o REF. POINT (W_o): ℄ of Vert. Weld	SCAN WIDTH: 10.7"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE
1				-9dB	5.18	~~3.06~~ 2.92" WAN 5-27-03	8.1		-2.03		N2

REMARKS

N2 INDICATION INDETERMINATE, ON GOING EVALUATION

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley H Nee	N1	
Level II Date 2/19/03	Level III Date 5/20/03	Level ___ Date ___	___ of ___
P-Scan Limited			

N1 SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/24/03 0915	EXAM END: 1305	JOB #: 41.03
COMPONENT ID: 103 - AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO PLATE		CALIBRATED RANGE: 0" TO 2.5"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 21"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TANK, .875"		
FILE NAME/ITEM#: VERT. WELD / 45 / PLATES		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1" BELOW HORIZ. WELD	Y_0 REF. POINT (W_0): ℄ OF WELD	SCAN WIDTH: 10.8"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS
NO CRACK LIKE INDICATION

Examiner	Analyst	Reviewer	Page
W D Hardy	[signature]	(N1)	
Level II Date 2/24/03	Level III Date 5/21/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/25/03 0740	EXAM END: 1345	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB		
PROCEDURE: COGEMA-SVUT-INS-0073	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1st vert weld Knuckle Side North 24" Riser	Y_0 REF. POINT (W_0): CL of Horz Weld.	SCAN WIDTH: 9.8"		

PART # / INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.869"	.854"		.880"
12-24					.870"	.864"		.880"
24-36					.870"	.852"		.880"
36-48					.870"	.859"		.880"
48-60					.870"	.864"		.880"
60-72					.870"	.862"		.880"
72-84					.870"	.865"		.880"
84-96					.870"	.864"		.880"
96-108					.870"	.863"		.880"
108-120					.870"	.862"		.880"
SUMMARY								

REMARKS

PLATE SIDE

Examiner	Analyst	Reviewer	Page
W D Purdy	Wesley D Nee	(N1)	
Level II Date 2/25/03	Level VI Date 3/13/03	Level ___ Date ___	___ of ___
PScan Limited			

(N1) See Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/25/03 0740	EXAM END: 1345	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .937
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"	TEMP: Amb. °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): Ø DB	
PROCEDURE: CDGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____	
X_0 REF. POINT (Lo): 1st vert weld.	Y_0 REF. POINT (Wo): Knuckle side North of 24" ℄ of Horz Weld	SCAN WIDTH: 9.8"	

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.937"	.919"		.945"
12-24					.935"	.901"		.940"
24-36					.938"	.929"		.940"
36-48					.940"	.926"		.945"
48-60					.945"	.929"		.950"
60-72					.948"	.924"		.955"
72-84					.950"	.923"		.955"
84-96					.948"	.919"		.955"
96-108					.950"	.941"		.955"
108-120					.950"	.901"		.955"
SUMMARY								

REMARKS

KNUCKLE SIDE

Examiner	Analyst	Reviewer	Page
W. Rudd	Wesley A. Rhe	(NI)	
Level II Date 2/25/03	Level II Date 3/15/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(NI) See Attached Letter From J. B. Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser # 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 2/20/03 0755	EXAM END: 1430	JOB #: 03-41
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		NOM. THICKNESS: .875"
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: .3" TO 1.0"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____		CONDITION
FILE NAME/ITEM#: HORZ. WELD / KNUCKLE A		TRANSDUCER: ☒ DUAL ☐ SGL ☒ 00EG ☐ ANGLE ____		
X_0 REF. POINT (L_0): 1st vert weld Knuckle Side North of 24" Riser	Y_0 REF. POINT (W_0): % of Horz Weld	SCAN WIDTH: 10"		

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.856"	.852"		.875"
12-24					.854"	.852"		.875"
24-36					.854"	.852"		.865"
36-48					.854"	.852"		.865"
48-60					.853"	.847"		.865"
60-72					.853"	.850"		.865"
72-84					.853"	.851"		.865"
84-96					.851"	.844"		.865"
96-108					.850"	.846"		.865"
108-120					.848"	.838"		.860"
SUMMARY								

REMARKS

PLATE SIDE

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 2/20/03	Level II Date 5/21/03	Level ___ Date ___	___ of ___
P-Scan Limited.			

(N1) See Attached Letter From J.B Elder

4/00

AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Riser #31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP4	EXAM START: 2/20/03 0755	EXAM END: 1430
JOB #: 03-41			
COMPONENT ID: 103-AP	EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED	NOM. THICKNESS: .937"	
CONFIGURATION: PLATE TO KNUCKLE	CALIBRATED RANGE: .3" TO 1.0"	TEMP: AMB °F	
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"	REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER ____	CONDITION
FILE NAME/ITEM#: HORZ. WELD/KNUCKLE A	TRANSDUCER: ☒ DUAL ☐ SGL ☒ 0DEG ☐ ANGLE ____		
X_0 REF. POINT (L_0): ℄ Vert Weld	Y_0 REF. POINT (W_0): ℄ of Horz Weld	SCAN WIDTH: 10"	
Knuckle Side North of 24" Riser			

PART #/ INDICATION	X START	X STOP	Y START	Y STOP	AVE. THK.	MIN. THK. R. LIG.	AREA REPORTABLE	MAX. THK.
0-12					.940"	.927"		.950"
12-24					.937	.887		.945
24-36					.935	.922		.945
36-48					.935	.921		.945
48-60					.934	.914		.945
60-72					.934	.920		.945
72-84					.935	.928		.945
84-96					.935	.916		.945
96-108					.936	.926		.945
108-120					.938	.906		.950
SUMMARY								

REMARKS

KNUCKLE SIDE

Examiner	Analyst	Reviewer	Page
W. [illegible]	[illegible]	(N1)	
Level II Date 2/20/03	Level III Date 5/21/03	Level ___ Date ___	___ of ___

P-Scan Limited

(N1) See Attached Letter From J. B. Elder

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 4/24/03 0850	EXAM END: 1345	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 8.75"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 23.41", 105.4"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV:	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .875"/.937"		
FILE NAME/ITEM#: 140 RZ. WELD / 60's & 60's A		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 60°		
X_0 REF. POINT (L_0): 1st Vent Weld Knuckle side North of 24" Elbow	Y_0 REF. POINT (W_0): ℄ of Horz. weld	SCAN WIDTH: 10"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS: NO CRACK LIKE INDICATIONS

Examiner	Analyst	Reviewer	Page
W D Hardy	[signature]	(N1)	
Level II Date 4/24/03	Level III Date 5/2/1	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/4/03 0730	EXAM END: 1430	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE TO KNUCKLE		CALIBRATED RANGE: 0" TO 2.65"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 120"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .875" & .937"		
FILE NAME/ITEM#: HORZ. WELD/45/KNUCKLE		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): 1st AIR SLOT SOUTH OF N. AIR LINE	Y_0 REF. POINT (W_0): ℄ OF HORZ. WELD	SCAN WIDTH: 11.2"		

SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1 45/60 DEGREE SHEAR			
2 AATT			
3 RATT			
4 DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

Examiner	Analyst	Reviewer	Page
W D Purdy	[signature]	(N1)	
Level II Date 3/4/03	Level VI Date 5/21/03	Level ___ Date ___	___ of ___
P-Scan Limited			

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

ULTRASONIC P-SCAN DATA REPORT

RISER 31

LOCATION: 200 EAST TANK FARM	SYSTEM: PSP-4	EXAM START: 3/10/03 0840	EXAM END: 1345	JOB #: 41.03
COMPONENT ID: 103-AP		EXAMINATION SURFACE: ☒ OD ☐ ID ☐ PAINTED		CONDITION:
CONFIGURATION: PLATE	TO: KNUCKLE	CALIBRATED RANGE: 0" TO 2.65"		TEMP: AMB °F
CIRCUMFERENCE/TOTAL LENGTH EXAMINED: 49.2" & 68.6"		REF. LEVEL CORRECTION (TRANS. CORR): 0 DB		
PROCEDURE: COGEMA-SVUT-INS-007.3	REV: 1	MATERIAL TYPE: ☐ SS ☒ CS OTHER TAK. .875" & .937"		
FILE NAME/ITEM#: HORZ. WELD/45°/KNUCKLE A & A1		TRANSDUCER: ☐ DUAL ☒ SGL ☐ 0DEG ☒ ANGLE 45°		
X_0 REF. POINT (L_0): STARTED @ VERT WELD KNUCKLE SIDE, N 7"	Y_0 REF. POINT (W_0): ℄ OF HORZ. WELD	SCAN WIDTH: 8"		

	SIZING METHOD	ANGLE	REFERENCE CAL. SHEET	SET-UP
1	45/60 DEGREE SHEAR			
2	AATT			
3	RATT			
4	DUAL 0 DEGREE			

INDICATION INFORMATION

IND	METHOD	WELD SIDE	DEPTH R. LIG.	MAX AMP	X1	LENGTH	X2	Y1	WIDTH	Y2	INDICATION TYPE

REMARKS

NO CRACK LIKE INDICATIONS

A1 STARTED @ 47" OF A

Examiner	Analyst	Reviewer	Page
[signature] Level III Date 3/10/03	[signature] Level III Date 5/21/03	(N1) Level ___ Date ___	___ of ___

(N1) SEE ATTACHED LETTER FROM J. B. ELDER

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: Step Block 584-99-30-145	
PROCEDURE: CDGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT:	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1	KB	MSEB	5	8x2mm	01938		Ø		DATA SEE SET
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		1/27/03	1/27/03	1/28/03	1/28/03	1/29/03	1/29/03	1/30/03	1/30/03
TIME		0720	2210	0715	1525	0750	2220	0730	1605
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.304	.295	.304	.298	.301	.304	.301	.298
	THK. 2	.999/0dB	.990/1dB	.999/0dB	.996/0dB	.999/0dB	.999/1dB	.999/0dB	.993/0dB
CH. 2	THK.1	.304	.295	.304	.301	.304	.307	.304	.301
	THK. 2	.999/0dB	.990/1dB	.999/0dB	.999/0dB	.999/0dB	1.004/1dB	.999/0dB	.996/1dB
CH. 3	THK.1	.304	.298	.304	.301	.301	.304	.304	.298
	THK. 2	.999/0dB	.993/0dB	.999/0dB	.996/0dB	.999/0dB	1.004/1dB	.999/0dB	.996/1dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy	[signature]	[signature]	___ of ___
Level II Date 1/27-30/03	Level VII Date 5/21/03	Level VII Date 5/21/03	
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: Step Block 584-99-30-145	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-Sd	SERIAL #:	COUPLANT	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1	KB	MSEB	5	8x2mm	01938		Ø		DATA SEE SET
2									
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		2/4/03	2/4/03	2/5/03	2/5/03	3/5/03	3/5/03		
TIME		0750	1400	0750	1905	0820	1930		
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"		
CH. 1	THK.1	.304	.307	.301	.301	.301	.304		
	THK. 2	.999/0dB	.999/0dB	.999/0dB	.999/1dB	.999/0dB	1.002/1dB		
CH. 2	THK.1	.304	.307	.301	.301	.304	.307		
	THK. 2	.999/0dB	1.004/1dB	.999/0dB	.999/0dB	.999/0dB	1.004/1dB		
CH. 3	THK.1	.304	.307	.301	.301	.301	.307		
	THK. 2	.999/0dB	1.002/1dB	.999/0dB	.999/-1dB	.999/0dB	1.004/1dB		
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Pudff Level II Date 2/4-5/03 3/5/03 P-Scan Limited	Level ___ Date ___	Level VII Date 5/21/03	___ of ___

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: Step Block 584-99-30-145	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-Sd	SERIAL #:	COUPLANT:	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1	KB	MSEB	5	8x2mm	01934		Ø		DATA
2.	KB	MSEB	5	8x2mm	01937		Ø		SAFE
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		2/6/03	2/6/03	2/6/03	2/6/03	2/19/03	2/19/03	2/19/03	2/19/03
TIME		0755	0755	1330	1330	0810	0810	1950	1950
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.301	.301	.295	.298	.301	.301	.292	.298
	THK. 2	.999/0dB	.999/0dB	.993/1dB	.996/2dB	.999/0dB	.999/0dB	.987/1dB	.996/1dB
CH. 2	THK.1	.301	.301	.295	.298	.304	.304	.292	.301
	THK. 2	.999/0dB	.999/0dB	.993/1dB	.996/2dB	.999/0dB	.999/0dB	.990/2dB	.996/1dB
CH. 3	THK.1	.301	.301	.295	.301	.301	.301	.292	.298
	THK. 2	.999/0dB	.999/0dB	.993/1dB	.999/2dB	.999/0dB	.999/0dB	.990/2dB	.993/2dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner: W Hardy Level II Date 2/6/19/03 P-Scan Limited	Examiner: _____ Level ___ Date _____	Reviewer: [signature] Level III Date 5/21/03	Page ___ of ___

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: Step Blocks 584-99-30-145	
PROCEDURE: CDGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-Sd	SERIAL #:	COUPLANT	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE DATA SET
1	KB	MSEB	5	8x2mm	01934		Ø		
2	KB	MSEB	5	8x2mm	01937		Ø		
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		2/20/03	2/20/03	2/20/03	2/20/03	2/25/03	2/25/03	2/25/03	2/25/03
TIME		0755	0755	1430	1430	0740	0740	1345	1345
REFLECTOR		.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"	.3"-1.0"
CH. 1	THK.1	.301	.301	.289	.295	.301	.301	.298	.295
	THK. 2	.999/0dB	.999/0dB	.987/0dB	.987/-1dB	.999/0dB	.999/0dB	.996/2dB	.993/1dB
CH. 2	THK.1	.301	.301	.289	.298	.304	.304	.298	.298
	THK. 2	.999/0dB	.999/0dB	.990/2dB	.990/-1dB	.999/0dB	.999/0dB	.996/2dB	.993/1dB
CH. 3	THK.1	.301	.301	.289	.298	.301	.301	.298	.298
	THK. 2	.999/0dB	.999/0dB	.990/2dB	.990/-1dB	.999/0dB	.999/0dB	.999/2dB	.993/1dB
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy		[signature]	___ of ___
Level II Date 2/20+25/03	Level ___ Date ___	Level II Date 5/21/03	
P-Scan Limited.			

4/00

AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

Job # 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: Step Block 584-99-30-145	
PROCEDURE: CDGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: .3" TO 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: N/A
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-Sd	SERIAL #:	COUPLANT	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE	WEDGE TYPE	IMAGE
1	KB	MSEB	5	812mm	01935		Ø		DATA / SEE SET
2									
3									
4									

INITIAL CALIBRATION					CALIBRATION CHECKS				
DATE		4/22/03	4/22/03	4/29/03	4/29/03				
TIME		0810	1600	0715	1550				
REFLECTOR		.3"-1.0"	.3-1.0"	.3"-1.0"	.3"-1.0"				
CH. 1	THK.1	.301	.310	.304	.307				
	THK. 2	.999/0dB	1.002/1dB	.999/0dB	1.002/1dB				
CH. 2	THK.1	.301	.307	.304	.310				
	THK. 2	.999/0dB	1.004/0dB	.999/0dB	1.004/1dB				
CH. 3	THK.1	.301	.307	.304	.310				
	THK. 2	.999/0dB	1.004/1dB	.999/0dB	1.004/1dB				
CH. 4	THK.1								
	THK. 2								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W Dandy		[signature]	___ of ___
Level II Date 4/22+29/03	Level ___ Date ___	Level III Date 5/2/03	
P-Scan Limited.			

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P.Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H2°	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3024		45		DATA SEE SET
2	KB	MWB	4	8x9mm	3127		45		
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		1/27/03	1/27/03	1/28/03	1/28/03	1/29/03	1/29/03	1/30/03	1/30/03
TIME		0750	2215	0725	1535	0755	2230	0745	1615
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch
CH. 1	AMPLITUDE	80%/0dB	80%/1db	80%/0dB	80%/0dB	80%/0dB	80%/-1dB	80%/0dB	80%/1dB
	LOCATION	1.414	1.411	1.414	1.408	1.414	1.414	1.414	1.414
CH. 2	AMPLITUDE	80%/0dB	80%/2dB	80%/0dB	80%/1dB	80%/0dB	80%/-1dB	80%/0dB	80%/-2dB
	LOCATION	1.414	1.411	1.414	1.420	1.414	1.417	1.414	1.414
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy Level II Date 1/27-30/03 P-Scan Limited	Level ___ Date ___	[signature] Level VII Date 5/21/03	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-SCAN SVS 4 1.3	REV. 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM.ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3024		45		DATA SEE SET
2	KB	MWB	4	8x9mm	3137		45		
3									
4									

INITIAL CALIBRATION			CALIBRATION CHECKS						
DATE		2/4/03	2/4/03	2/5/03	2/5/03	3/6/03	3/5/03		
TIME		0800	1415	0805	1915	0835	1940		
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch		
CH. 1	AMPLITUDE	80%/0dB	80%/1dB	80%/0dB	80%/1dB	80%/0dB	80%/0dB		
	LOCATION	1.414	1.414	1.414	1.414	1.414	1.414		
CH. 2	AMPLITUDE	80%/0dB	80%/-2dB	80%/0dB	80%/1dB	80%/0dB	80%/-1dB		
	LOCATION	1.44	1.414	1.414	1.414	1.44	1.414		
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Hardy		[signature]	
Level II Date 2/4 & 5/03	Level ___ Date ___	Level ~~III~~ Date 5/21/03	___ of ___
P-Scan Limited 3/5/03			

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block	584-99-30-146
PROCEDURE: LOGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: PScan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOMJACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3024		45		SEE DATA SET
2	KB	MWB	4	8x9mm	3137		45		
3									
4									

INITIAL CALIBRATION			CALIBRATION CHECKS						
DATE		3/10/03	3/10/03	3/11/03	3/11/03				
TIME		1400	1600	0926	1515				
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch				
CH. 1	AMPLITUDE	80%/0dB	80%/-1dB	80%/0dB	80%/0dB				
	LOCATION	1.414	1.400	1.414	1.411				
CH. 2	AMPLITUDE	80%/0dB	80%/-2dB	80%/0dB	80%/-1dB				
	LOCATION	1.414	1.424	1.414	1.414				
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
[signature] Level III Date 3/10 & 11/03	Level ___ Date ___	Level ___ Date ___	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P.Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM/ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9MM	3140		45		DATA SEE SET
2	KB	MWB	4	8x9MM	3141		45		
3									
4									

INITIAL CALIBRATION			CALIBRATION CHECKS						
DATE		4/30/03	4/30/03						
TIME		0715	1215						
REFLECTOR / ORRIENTATION		.050" notch	.050" notch						
CH. 1	AMPLITUDE	80%/0dB	80%/1.5dB						
	LOCATION	1.414	1.421						
CH. 2	AMPLITUDE	80%/0dB	80%/1.8dB						
	LOCATION	1.414	1.407						
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
[signature] Level III Date 4/30/03	Level ___ Date ___	Level ___ Date ___	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P.Scan SYS 4 1.3	REV. 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM./ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	819mm	3137		45		DATA SEE SET
2	KB	MWB	4	819mm	3127		45		
3	KB	MWB	4	819mm	3024		45		
4	KB	MWB	4	819mm	3121		45		

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		2/26/03	2/26/03	3/3/03	3/3/03	3/4/03	3/4/03	3/10/03	3/10/03
TIME		0915	1305	0910	2010	0730	1430	0840	1345
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch
CH. 1	AMPLITUDE	80%/0dB	80%/1dB	80%/0dB	80%/1dB	80%/0dB	80%/0dB	80%/0dB	80%/2dB
	LOCATION	1.414	1.414	1.414	1.414	1.414	1.414	1.414	1.421
CH. 2	AMPLITUDE	80%/0dB	80%/1dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/-2dB
	LOCATION	1.414	1.414	1.414	1.414	1.414	1.414	1.414	1.424
CH. 3	AMPLITUDE	80%/0dB	80%/2dB	80%/0dB	80%/0dB	80%/0dB	80%/-2dB	80%/0dB	80%/2dB
	LOCATION	1.414	1.411	1.414	1.414	1.414	1.411	1.414	1.421
CH. 4	AMPLITUDE	80%/0dB	80%/-1dB	80%/0dB	80%/1dB	80%/0dB	80%/0dB	80%/0dB	80%/1dB
	LOCATION	1.414	1.408	1.414	1.411	1.414	1.414	1.414	1.424
FILE #									
EXAMINER		WDP	WDP	WDP	WDP	WDP	WDP	WHN	WHN

REMARKS

Examiner	Examiner	Reviewer	Page
W D Purdy	[signature]	[signature]	
Level II Date 2/26-3/4/03	Level III Date 3/10/03	Level III Date 5/21/03	___ of ___
P-Scan Limited			

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P.Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM/ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3107		60		DATA SEE SET
2	KB	MWB	4	8x9mm	3111		60		
3									
4									

INITIAL CALIBRATION		CALIBRATION CHECKS							
DATE		2/6/03	2/6/03	2/19/03	2/19/03	2/20/03	2/20/03	2/25/03	2/25/03
TIME		0815	1340	0820	2000	0810	1410	0755	1345
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch	.050" Notch
CH. 1	AMPLITUDE	80%/0dB	80%/1dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/0dB	80%/1dB
	LOCATION	1.999	1.999	1.999	2.003	1.999	1.999	1.999	1.998
CH. 2	AMPLITUDE	80%/0dB	80%/1dB	80%/0dB	80%/2dB	80%/0dB	80%/1dB	80%/0dB	80%/1dB
	LOCATION	1.999	1.999	1.999	1.987	1.999	1.995	1.999	2.007
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W.D. Purdy Level II Date 2/6-25/03 P.Scan Limited	Level ___ Date ___	[signature] Level VII Date 5/21/03	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block	584-99-30-146
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P.Scan SYS 4 1.3	REV.: 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP.: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM/ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3111		60		DATA SEE SET
2	KB	MWB	4	8x9mm	3107		60		
3									
4									

		INITIAL CALIBRATION	CALIBRATION CHECKS						
DATE		4/24/03	4/24/03						
TIME		0850	1345						
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch						
CH. 1	AMPLITUDE	80%/0dB	80%/0dB						
	LOCATION	1.999	1.999						
CH. 2	AMPLITUDE	80%/0dB	80%/1dB						
	LOCATION	1.999	1.999						
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Rudy Level II Date 4/24/03 P-Scan Limited	Level ___ Date ___	Level III Date 5/21/03	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P.Scan SYS 4 1.3	REV. 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM.ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9mm	3110		60		DAT #
2	KB	MWB	4	8x9 MM	3112		60		SEE SET
3									
4									

INITIAL CALIBRATION			CALIBRATION CHECKS						
DATE		4/30/03	4/30/03						
TIME		1320	1415						
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch						
CH. 1	AMPLITUDE	80%/0dB	80%/2dB						
	LOCATION	2.000	2.025						
CH. 2	AMPLITUDE	80%/0dB	80%/.2dB						
	LOCATION	1.997	1.988						
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
[signature] Level III Date 4/30/03	Level ___ Date ___	Level ___ Date ___	___ of ___

4/00

AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET

Job# 03-41

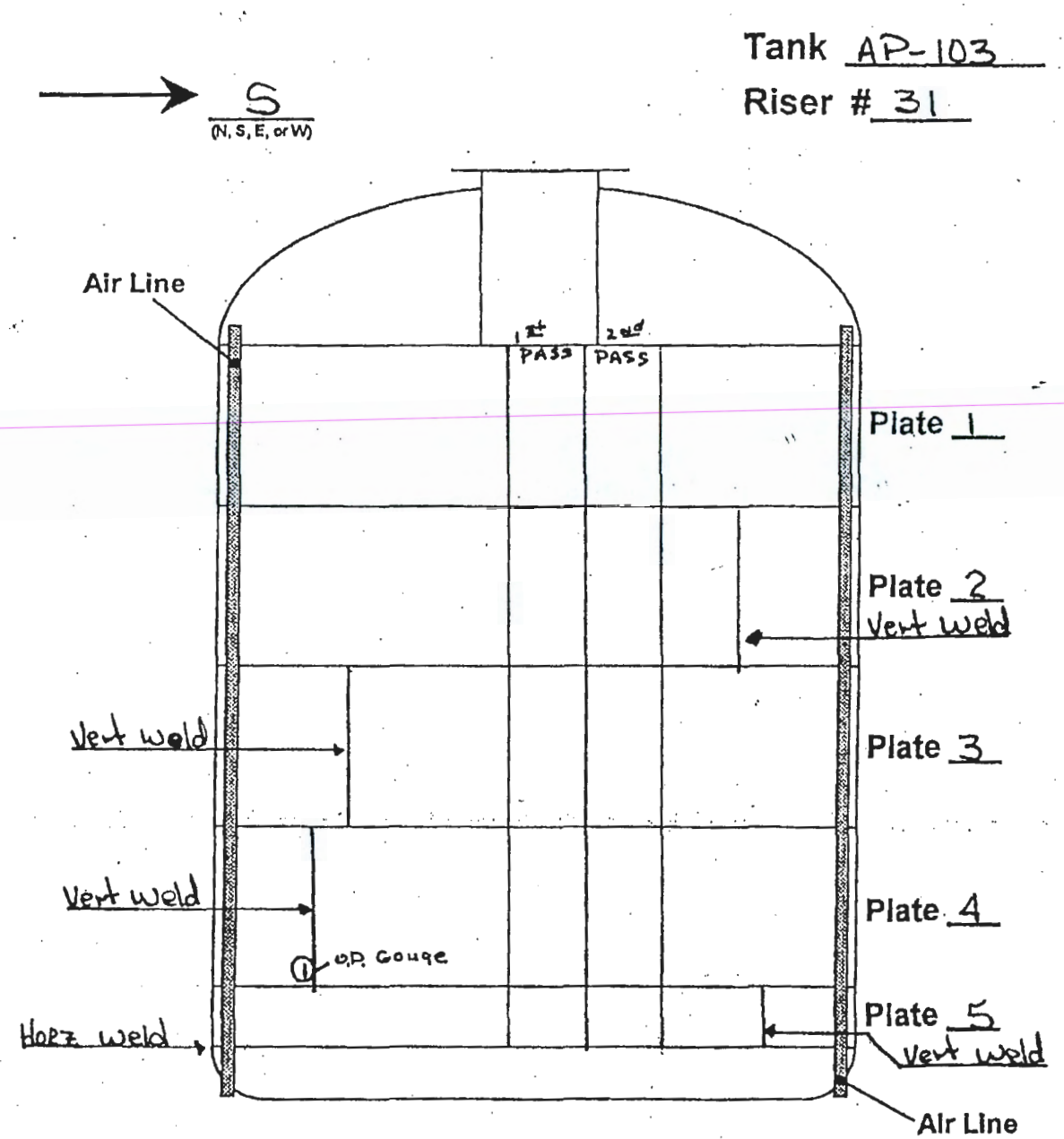
LOCATION: 200 EAST TANK FARM	SYSTEM: AP-103	CALIBRATION BLOCK: NOTCH Block 584-99-30-146	
PROCEDURE: COGEMA-SVUT-INS-007.3 Rev 1		THICKNESS: 1.0"	MATERIAL: C/S
UT SYSTEM: PSP-4	SERIAL #: 206/209	REFERENCE BLOCK: N/A	
SOFTWARE VERSION: P-Scan SYS 4 1.3	REV. 2	THICKNESS: N/A	MATERIAL: NA
LINEARITY DUE DATE: 4/16/03		REFERENCE BLOCK TEMP: Amb °F	PYRO SN.: N/A
SCANNER TYPE: AWS-5d	SERIAL #:	COUPLANT: H_2O	BATCH #: N/A
SCANNER CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A
SIGNAL CABLE: COAX		CABLE LENGTH: 80 FT	CABLE #: N/A

CHANNEL	TRANSDUCER MAKE	MODEL	FREQ. MHZ	SIZE	SERIAL #	GATE EVAL METHOD	ANGLE NOM.ACT.	WEDGE TYPE	IMAGE
1	KB	MWB	4	8x9MM	3024		45		SEE DATA SHEET
2									
3									
4									

INITIAL CALIBRATION			CALIBRATION CHECKS						
DATE		3/6/03	3/6/03						
TIME		0750	1030						
REFLECTOR / ORRIENTATION		.050" Notch	.050" Notch						
CH. 1	AMPLITUDE	80%/0dB	80%/1dB						
	LOCATION	1.414	1.407						
CH. 2	AMPLITUDE								
	LOCATION								
CH. 3	AMPLITUDE								
	LOCATION								
CH. 4	AMPLITUDE								
	LOCATION								
FILE #									
EXAMINER									

REMARKS

Examiner	Examiner	Reviewer	Page
W D Rudy		[signature]	
Level II Date 3/6/03	Level ___ Date ___	Level ___ Date ___	___ of ___
P-Scan Limited			


Tank AP-103
Riser # 31
S
(N, S, E, or W)
Air Line
1st PASS
2nd PASS
Plate 1
Plate 2
Vert weld
Vert weld
Plate 3
Vert weld
Plate 4
O.P. Gauge
Plate 5
Vert weld
Horz weld
Air Line

May 20th. 2003

Mr. Daron Tate
COGEMA Engineering Corp.
2425 Stevens Center
Richland, WA. 99352

This letter is to certify that I have analyzed the P-scan automated ultrasonic data from Hanford waste tank AP 103. The data reviewed for the primary tank wall was collected by Mr. Nelson and Mr. Purdy January 27th. through April 30th. 2003. The data is acceptable. The data from vertical strips, vertical welds, horizontal weld and a OD gouge was analyzed to the requirements of COGEMA procedure SVUT-INS-007.3 Revision 1.

One indication in Vertical Weld 5 is being evaluated.

To date there are no reportable indications. No cracking, reportable pitting or other reportable thinning was detected in any of the areas examined.

Sincerely,

James B. Elder
ASNT UT Level III

CC: Mr. W. H. Nelson - COGEMA

This page intentionally left blank.

ATTACHMENT 3

ULTRASONIC EXAMINATION OF DOUBLE-SHELL TANK 241-AP-103
EXAMINATION COMPLETED APRIL 2003
(PNNL THIRD PARTY REVIEW)

This page intentionally left blank.

PNNL-14300 Rev. 0

Ultrasonic Examination of Double-Shell Tank 241-AP-103 Examination Completed April 2003

AF Pardini
GJ Posakony

June 2003

Prepared for
the U.S. Department of Energy
under Contract DE-AC06-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99352

This page intentionally left blank.

Summary

COGEMA Engineering Corporation (COGEMA), under a contract from CH2M Hill Hanford Group (CH2M Hill), has performed an ultrasonic nondestructive examination of selected portions of Double-Shell Tank 241-AP-103. The purpose of this examination was to provide information that could be used to evaluate the integrity of the wall of the primary tank. The requirements for the ultrasonic examination of Tank 241-AP-103 were to detect, characterize (identify, size, and locate), and record measurements made of any wall thinning, pitting, or cracks that might be present in the wall of the primary tank. Any measurements that exceed the requirements set forth in the Engineering Task Plan (ETP), RPP-11832 (Jensen 2002) and summarized on page 1 of this document, are reported to CH2M Hill and the Pacific Northwest National Laboratory (PNNL) for further evaluation. Under the contract with CH2M Hill, all data is to be recorded on disk and paper copies of all measurements are provided to PNNL for third-party evaluation. PNNL is responsible for preparing a report that describes the results of the COGEMA ultrasonic examinations.

Examination Results

The results of the examination of Tank 241-AP-103 have been evaluated by PNNL personnel. The ultrasonic examination consisted of two 15-in. wide scans over the entire height of the tank and the heat-affected zone (HAZ) of four vertical welds and one horizontal weld. The examination was performed to detect any wall thinning, pitting, or cracking in the primary tank wall.

Primary Tank Wall Vertical Scan Paths

Two 15-in.-wide vertical scan paths were performed on Plates #1, #2, #3, #4, and #5. The plates were examined for wall thinning, pitting, and cracks oriented vertically on the primary tank wall. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness. No pitting or vertical crack-like indications were detected in Plates #1, #2, #3, #4, or #5.

Primary Tank Wall Weld Scan Paths

The HAZ of vertical welds in Plates #2, #3, #4, and #5 were examined for wall thinning, pitting, and cracks oriented either perpendicular or parallel to the weld. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld HAZ areas in Plates #2 and #3. In Plate #4, an outside diameter (O.D.) indication was noted and was reported as a gouge. This indication was not considered a crack-like indication and did not originate on the inside diameter of the primary tank. The gouge was reported as 1.42-in. in length and less than 0.100-in. in depth. In Plate #5, a linear indication 2.92-in. long was reported as an

indeterminate indication. This indication is being investigated and the results will be reported in a later document.

The HAZ of the horizontal weld between Plate #5 and the tank knuckle was examined for wall thinning, pitting and cracks oriented either perpendicular or parallel to the weld. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas on Plate #5 side or on the knuckle side of the horizontal weld.

Contents

1.0 Introduction 1

2.0 Qualified Personnel, Equipment, and Procedure 2

2.1 Personnel Qualifications 2
2.2 Ultrasonic Examination Equipment 3
2.3 Ultrasonic Examination Procedure 3

3.0 Ultrasonic Examination Configuration 4

3.1 Primary Tank Wall Transducer Configuration 4
3.2 Weld Zone Transducer Configuration 5

4.0 Ultrasonic Examination Location 7

5.0 Ultrasonic Examination Results 9

6.0 Conclusions 12

6.1 Primary Tank Wall Vertical Scan Paths 12
6.2 Primary Tank Wall Weld Scan Paths 12

7.0 References 14

Figures

3.1 Transducer Configuration for Examining the Primary Tank Wall 4

3.2 Transducer Configurations for Examination of Weld Zone in the Primary Tank Wall 5

3.3 Views of the Weld Zone to be Ultrasonically Examined in the Primary Tank Wall 6

4.1 UT of 241-AP-103 from Riser 31 7

4.2 Sketch of Scan Paths on Tank 241-AP-103 8

5.1 UT Data from Tank 241-AP-103 10

5.2 UT Data from Tank 241-AP-103 cont. 11

1.0 Introduction

COGEMA Engineering Corporation (COGEMA), under a contract from CH2M Hill Hanford Group (CH2M Hill), has performed an ultrasonic nondestructive examination (UT) of selected portions of Double-Shell Tank (DST) 241-AP-103. The purpose of this examination was to provide information that could be used to evaluate the integrity of the DST. The requirements for the UT of Tank 241-AP-103 were to detect, characterize (identify, size, and locate), and record measurements made of any wall thinning, pitting, or cracks that might be present in the wall of the primary tank. Any measurements that exceed the requirements set forth in the Engineering Task Plan (ETP), RPP-11832 (Jensen 2002), are reported to CH2M Hill and the Pacific Northwest National Laboratory (PNNL) for further evaluation. Specific measurements that are reported include the following:

- Wall thinning that exceeds 10% of the nominal thickness of the plate.
- Pits with depths that exceed 25% of the nominal plate thickness.
- Stress-corrosion cracks that exceed 0.10-in. (through-wall) that are detected in the inner wall of the tank, heat-affected zone (HAZ) of welds, or in the tank knuckle.

The accuracy requirements for ultrasonic measurements for the different types of defects are as follows:

- Wall thinning – measure thickness within ±0.020-in.
- Pits – size depths within ±0.050-in.
- Cracks – size the depth of cracks on the inner wall surfaces within ±0.1-in.
- Location – locate all reportable indications within ±1.0-in.

Under the contract with CH2M Hill, all data is to be recorded on disk and paper copies of all measurements are provided to PNNL for third-party evaluation. PNNL is responsible for preparing a report that describes the results of the COGEMA UT.

2.0 Qualified Personnel, Equipment, and Procedure

Qualification of personnel participating in the DST inspection program, the UT equipment (instrument and mechanical scanning fixture), and the UT procedure that will be used in the examination of the current DST is required by CH2M Hill. Personnel participating in the examinations are to be certified in accordance with the American Society for Nondestructive Testing (ASNT) Guideline SNT-TC-1A-92 and associated documentation is to be provided. The capability of the UT system is to be validated through a performance demonstration test (PDT) administered by PNNL on a mock-up simulating the actual DST. The current procedure for the UT is to be based on the Section V, Article 4, *Boiler and Pressure Vessel Code* defined by the American Society for Mechanical Engineers (ASME).

2.1 Personnel Qualifications

The following individuals were qualified and certified to perform UT of the Hanford DST 241-AP-103:

- **Mr. Wesley Nelson**, ASNT Level III (#LM-1874) in UT, has been identified as COGEMA's UT Level III authority for this project. Mr. Nelson has been certified by COGEMA as a UT Level III in accordance with COGEMA procedure COGEMA-SVCP-PRC-014, latest revision. Further documentation has been provided to establish his qualifications. Reference: Letter from PNNL to C.E. Jensen dated August 22, 2000, "Report on Performance Demonstration Test – PDT, May 2000."

- **Mr. James B. Elder**, ASNT Level III (#JM-1891) in UT, has been contracted by COGEMA to provide peer review of all DST UT data. Mr. Elder has been certified by JBNDT as a UT Level III in accordance with JBNDT written practice JBNDT-WP-1, latest revision. Further documentation has been provided to establish his qualifications. Reference: PNNL-11971, *Final Report - Ultrasonic Examination of Double-Shell Tank 241-AN-107.*

- **Mr. William D. Purdy**, COGEMA UT Level II limited (for P-Scan data acquisition only). Mr. Purdy has been certified in accordance with COGEMA procedure COGEMA-SVCP-PRC-014, latest revision. Further documentation has been provided to establish his qualifications. Reference: Letter from PNNL to C.E. Jensen dated October 5, 2001, "Purdy Performance Demonstration Test (PDT) Report."

2.2 Ultrasonic Examination Equipment

CH2M Hill has provided the UT equipment for the examination of Tank 241-AP-103. This equipment consists of a Force Institute P-Scan ultrasonic test instrument and a Force Institute AWS-5D remote-controlled, magnetic-wheel crawler for examining the primary tank wall. Ultrasonic transducers used for the examinations are commercial off the shelf. The P-Scan ultrasonic system has been qualified through a PDT administered by PNNL. Reference: PNNL-11971, *Final Report- Ultrasonic Examination of Double-Shell Tank 241-AN-107.*

2.3 Ultrasonic Examination Procedure

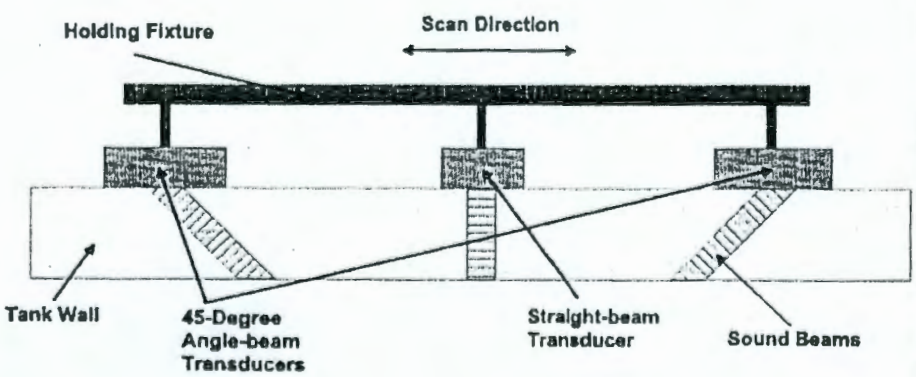
COGEMA has provided the UT procedure for the examination of Tank 241-AP-103. This procedure, COGEMA-SVUT-INS-007.3, Revision 1, outlines the type of UT and mechanical equipment that are to be used as well as the types of transducers. Both straight-beam and angle-beam transducers are used for the examination of the primary tank wall and the HAZ of selected primary tank vertical and horizontal welds. The examination procedures include full documentation on methods for calibration, examination, and reporting. Hard copies of the T-Scan (thickness) and P-Scan (projection or angle beam) views of all areas scanned are made available for analysis. The UT procedure requires the use of specific UT transducers for the different examinations. A calibration performed before and after the examinations insures that each transducer used in the inspection is adjusted and that the entire system is performing correctly. The COGEMA UT procedure has been qualified through a PDT. Reference: PNNL-11971, *Final Report - Ultrasonic Examination of Double-Shell Tank 241-AN-107.*

3.0 Ultrasonic Examination Configuration

COGEMA is required to inspect selected portions of the DSTs which may include the primary and secondary tank walls, the HAZ of the primary tank vertical and horizontal welds, and the tank knuckle and bottoms. The P-Scan system has been configured to perform these examinations and has been performance tested. The examination of Tank 241-AP-103 included UT of the primary tank wall and the HAZ of selected welds in the primary tank wall.

3.1 Primary Tank Wall Transducer Configuration

Figure 3.1 provides an example of the scanning configuration generally used during an examination of the primary tank wall. However, other configurations can be used at the discretion of the COGEMA UT Level III (i.e., 45-degree transducers can be removed for simple wall thickness measurements). The functional diagram in Figure 3.1 shows one straight-beam and two angle-beam transducers ganged together for examining the primary tank wall. The straight beam is designed to detect and record wall thinning and pits, and the angle beams are designed to detect and record any cracking that may be present. These transducers are attached to the scanning bridge and they all move together. Information is captured every 0.035-in. (or as set by the NDE inspector) as the assembly is scanned across a line. At the end of each scan the fixture is indexed 0.035-in. (or as set by the NDE inspector) and the scan is repeated. The mechanical scanning fixture is designed to scan a maximum of 15-in. and then index for the next scan. The hard copy provides a permanent record that is used for the subsequent analysis.



Transducer Specifications:

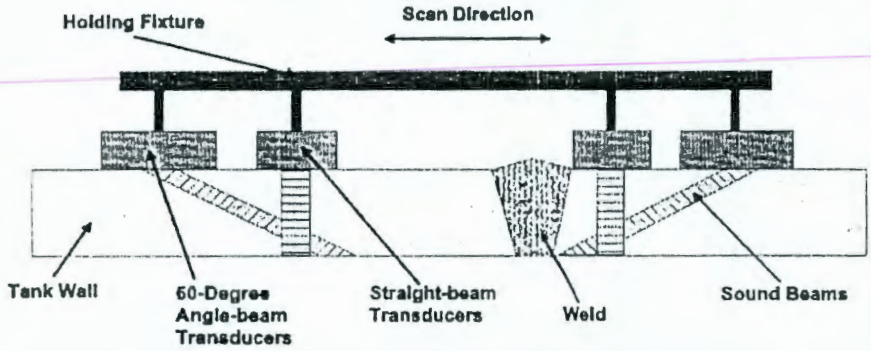
Angle-Beam
Type: MWB-45 04E
Frequency: 4 MHz
Size: 8 X 9 mm
Manufacturer: Krautkramer

Straight-Beam
Type: MSEB 5B
Frequency: 5 MHz
Size: Dual - 2 X 8 mm
Manufacturer: Krautkramer

Figure 3.1. Transducer Configuration for Examining the Primary Tank Wall

3.2 Weld Zone Transducer Configuration

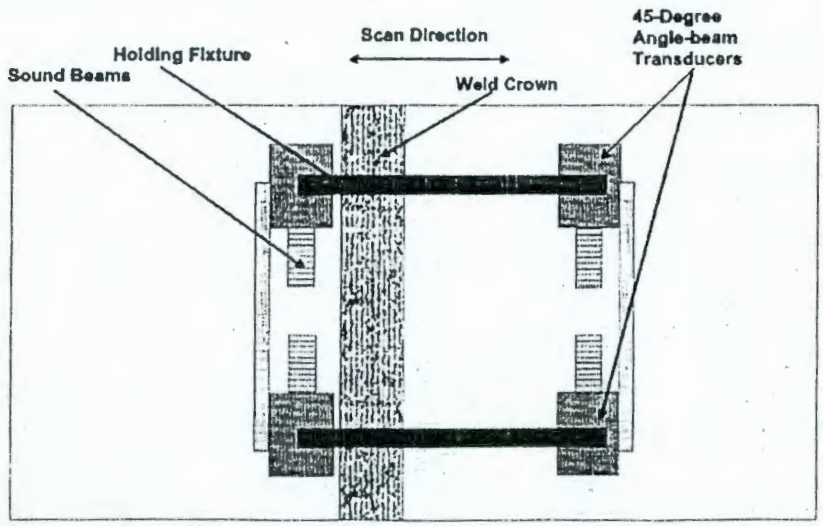
Figure 3.2 is a functional sketch that shows the configurations for examination of the weld zone. The area of interest (HAZ of the weld) is shown as lying adjacent to the weld. Both cracks and pitting may occur in this region. The "A" portion of this sketch shows the 60-degree angle-beam transducers used for detecting cracks parallel to the weld. The straight-beam transducers in this sketch are used for detecting and recording any pitting or wall thinning that may be present. All transducers are ganged together. The scanning distance traveled is limited to a total of approximately 5.0-in. The sketch titled "B" shows the arrangement for detecting cracks that may lie perpendicular to the weld. Four 45-degree, angle-beam transducers are used for this inspection. Again the transducers are ganged together but the scan is limited to a total of approximately 4.0-in. The weld zone requirements are shown in Figure 3.3. The scan protocol, data capture, and index are the same for examining other weld areas in the tank.



A. Configuration for pitting and cracks parallel to weld

Transducer Specifications:
Angle-Beam
Type: MWB-60 04E
Frequency: 4 MHz
Size: 8 X 9 mm
Manufacturer: Krautkramer

Straight-Beam
Type: MSEB 5B
Frequency: 5 MHz
Size: Dual - 2 X 8 mm
Manufacturer: Krautkramer

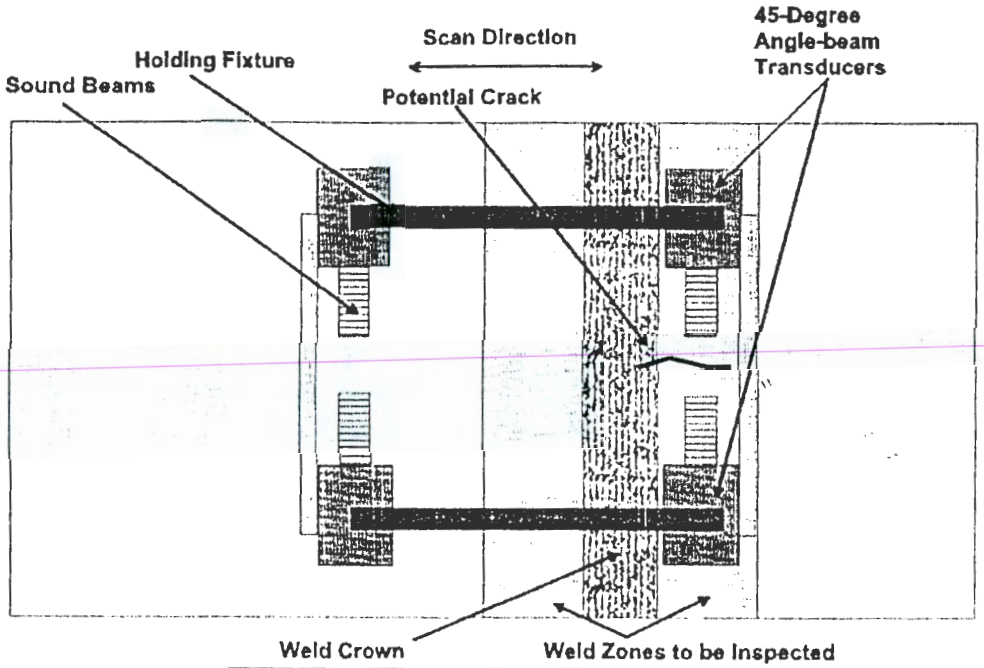


B. Configuration for cracks perpendicular to weld

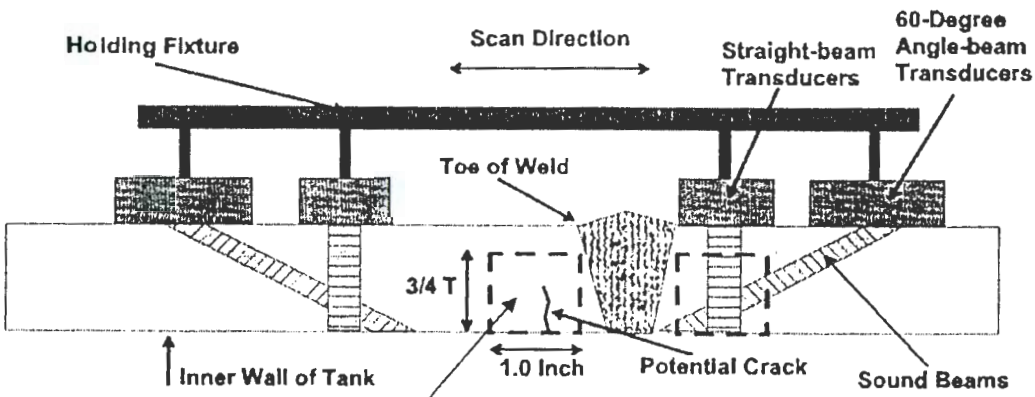
Transducer Specifications:
Angle-Beam
Type: MWB-45 04E
Frequency: 4 MHz
Size: 8 X 9 mm
Manufacturer: Krautkramer

Figure 3.2. Transducer Configurations for Examination of Weld Zone in the Primary Tank Wall

In the HAZ, the requirement for characterizing cracks that lie perpendicular or parallel to welds in the primary tank wall is described in Figure 3.3. The HAZs are located on either side of the weld and defined as being within 1-in. of the toe of the weld and on the inner three-quarters of the thickness (3/4T) of the plate. These zones are considered most likely to experience stress-corrosion cracking.



Top View --- Cracks Perpendicular to the Weld



A zone ¾ T from the inner surface and 1.0-in. from the toe of the weld is to be ultrasonically examined for cracking, corrosion or pitting. Examinations are to be made on both sides of the weld.

End View --- Cracks Parallel to the Weld

Figure 3.3. Views of the Weld Zone to be Ultrasonically Examined in the Primary Tank Wall

4.0 Ultrasonic Examination Location

Tank 241-AP-103 is located in the Hanford 200 East area in AP Tank Farm. The crawler and associated scanner that hold the transducers were lowered into the 24-in. riser located on the west side of 241-AP-103 and designated as Riser 31. Riser 31 was originally called out as Riser 6 West. Figure 4.1 provides a graphic of the location of this riser.

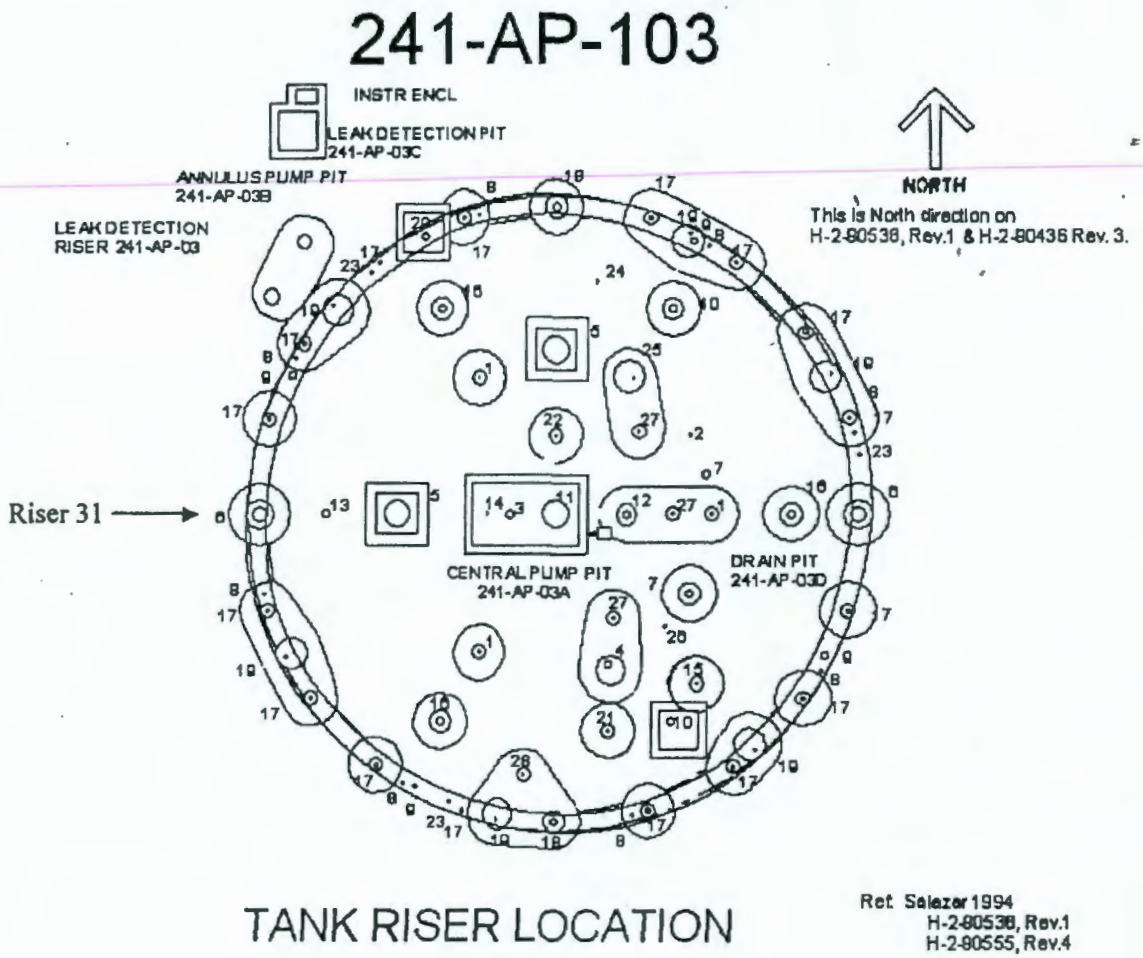


Figure 4.1. UT of 241-AP-103 from Riser 31

Figure 4.2 describes the areas on the primary wall of Tank 241-AP-103 that were ultrasonically examined. Two 15-in.-wide vertical scan paths were performed on Plates #1, #2, #3, #4, and #5 below the entrance to Riser 31. Vertical weld HAZ examinations were done on Plates #2, #3, #4, and #5, and the horizontal weld HAZ examination was done on the transition Plate #5 to knuckle weld.

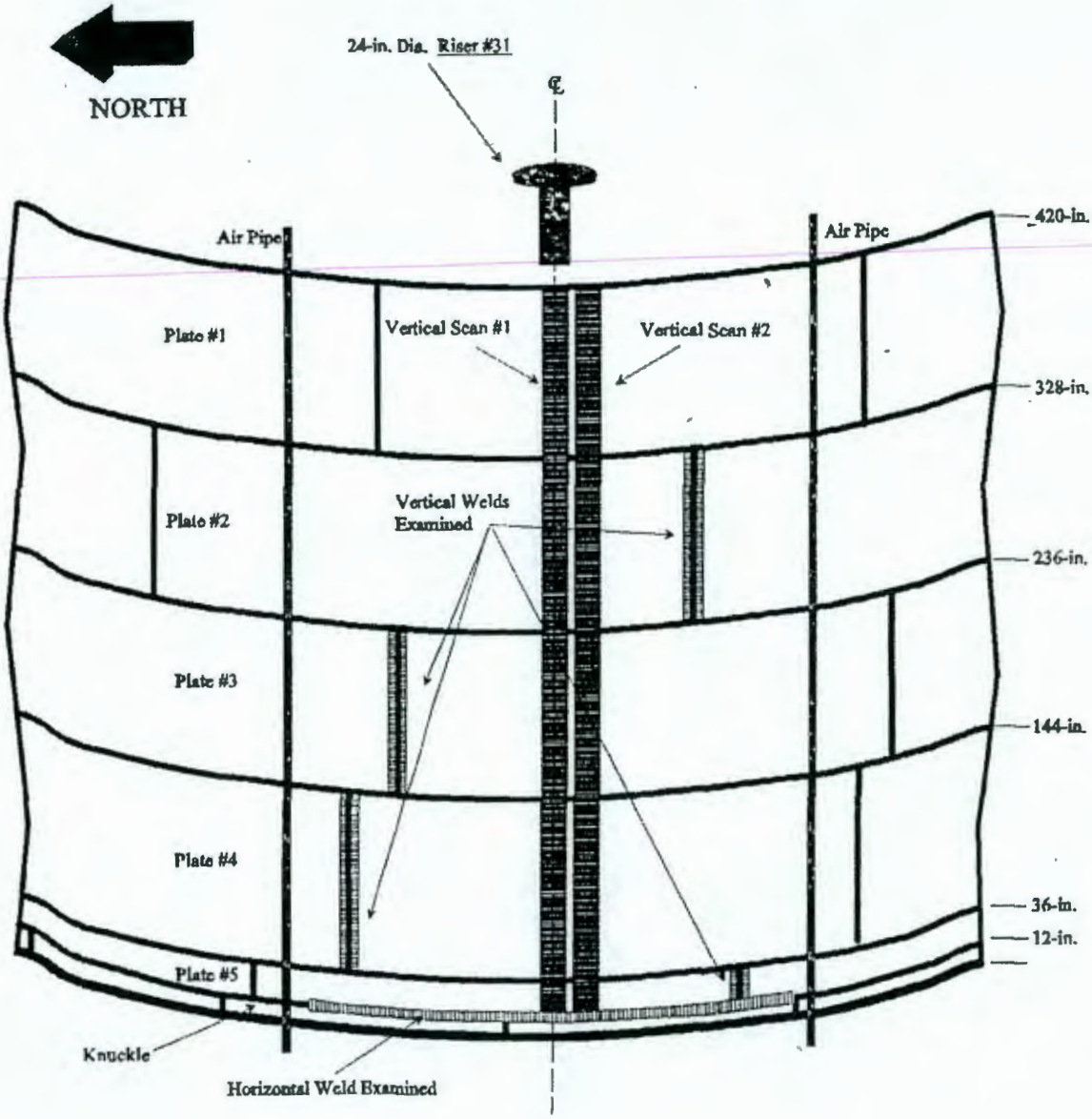


Figure 4.2. Sketch of Scan Paths on Tank 241-AP-103

5.0 Ultrasonic Examination Results

COGEMA has provided detailed reports including T-Scan and P-Scan hard copies of all areas that were ultrasonically examined to PNNL for third-party review. The data was analyzed by COGEMA Level III Mr. Wes Nelson and peer reviewed by JBNDT Level III Mr. Jim Elder. The results of the examination of Tank 241-AP-103 are presented in Figures 5.1 and 5.2.

Figures 5.1 and 5.2 show the wall thickness examination results for the primary tank wall and the HAZs of both vertical and horizontal welds. The examination consisted of two vertical paths beneath the 24-in. diameter riser. Vertical scan #1 was 15-in. wide on Plates #1, #2, #3, #4, and #5 and started directly below the centerline of the 24-in. riser. Vertical scan #2 was adjacent to vertical scan #1 and was also 15-in. wide on Plates #1, #2, #3, #4, and #5. The HAZs of vertical welds in Plates #2, #3, #4, and #5 were examined and the HAZ in the horizontal weld between Plate #5 and the knuckle section was also examined. Areas in the figures that show two measurements in the same box are the result of the vertical scan paths overlapping the horizontal HAZ scan paths. Figures 5.1 and 5.2 display the minimum readings taken in each 15-in. wide by 12-in. long area of the scan. In the overlapping areas, both minimum readings from each of vertical and horizontal scan paths are given. The highlighted area in Plate #4 shows where the O.D. gouge was reported. The highlighted area in Plate #5 shows where the linear indication that is being further investigated was reported.

Nominal Wall Thickness (in.)	Elevation	Air Pipe			Riser 31			Air Pipe
	432.0							
	420.0		0.491	0.486				
	408.0		0.494	0.503				
	396.0		0.497	0.503				
0.500"	384.0	Plate #1	0.500	0.499				
	372.0		0.506	0.505				
	360.0		0.504	0.503				
	348.0		0.501	0.499				
	336.0							
	324.0		0.495	0.486	0.473	0.510		
	312.0		0.497	0.481	0.474	0.520		
	300.0	Plate #2	0.498	0.481	0.483	0.519		
0.500"	288.0		0.488	0.488	0.490	0.519		
	276.0		0.495	0.478	0.473	0.512		
	264.0		0.484	0.477	0.482	0.514		
	252.0		0.482	0.475	0.484	0.501		
	240.0		0.483	0.471	0.483	0.502		

Figure 5.1. UT Data from Tank 241-AP-103

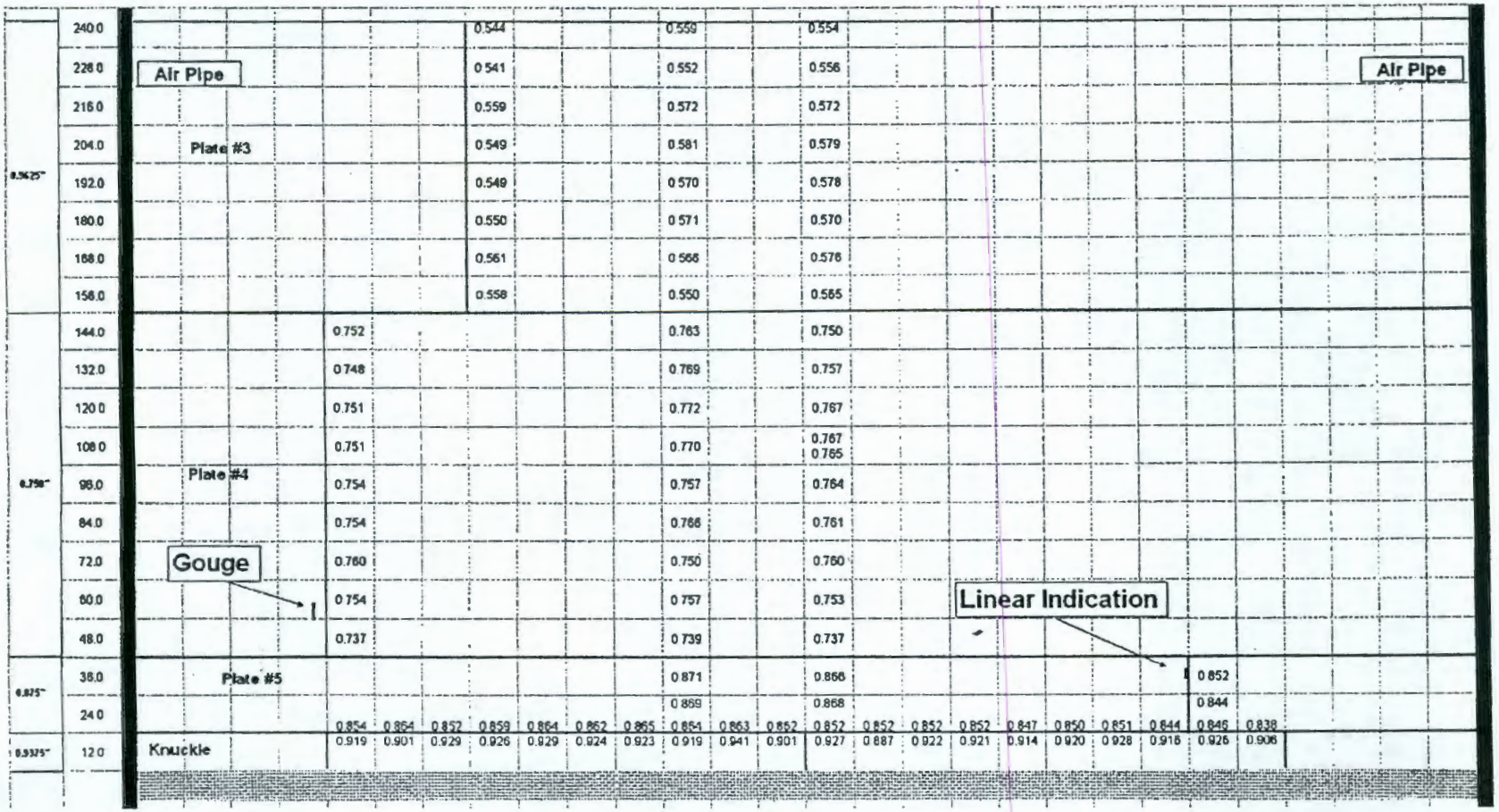


Figure 5.2 UT Data from Tank 241-AP-103 cont.

6.0 Conclusions

The results of the examination of Tank 241-AP-103 have been evaluated by PNNL personnel. The examination consisted of two 15-in. wide scans over the entire height of the tank and the HAZs of 4 vertical welds and 1 horizontal weld. The examination was performed to detect any wall thinning, pitting, or cracking in the primary tank wall.

6.1 Primary Tank Wall Vertical Scan Paths

Two 15-in.-wide scan paths were performed on Plates #1, #2, #3, #4, and #5. The plates were examined for wall thinning, pitting, and cracks oriented vertically on the primary tank wall. The results indicated that the minimum thicknesses in the areas scanned with nominal thickness of 0.500-in. were as follows; Plate #1 was 0.486-in. and Plate #2 was 0.471-in. The nominal thickness in Plate #3 is 0.5625-in. and the minimum thickness in this area was 0.550-in. The nominal thickness in Plate #4 is 0.750-in. and the minimum thickness in this area was 0.737-in. The nominal thickness in Plate #5 is 0.875-in. and the minimum thickness in this area was 0.866-in. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness. No pitting or vertical crack-like indications were detected in Plates #1, #2, #3, #4, or #5.

6.2 Primary Tank Wall Weld Scan Paths

The HAZ of vertical welds in Plates #2, #3, #4, and #5 were examined for wall thinning, pitting and cracks oriented either perpendicular or parallel to the weld. The results indicated that the minimum thicknesses in the weld areas scanned were as follows: The nominal thickness of Plate #2 is 0.500-in. and the minimum thickness in this weld area was 0.473-in. The nominal thickness in Plate #3 is 0.5625-in. and the minimum thickness in this weld area was 0.541-in. The nominal thickness in Plate #4 is 0.750-in. and the minimum thickness in this weld area was 0.737-in. The nominal thickness in Plate #5 is 0.875-in. and the minimum thickness in this weld area was 0.844-in. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas in Plates #2 and #3. In Plate #4, an outside diameter (O.D.) indication was noted and was reported as a gouge. This indication was not considered a crack-like indication and did not originate on the inside diameter of the primary tank. The indication is located on the north side of the vertical weld in Plate #4 near the bottom of the plate. The gouge was reported as 1.42-in. in length and less than 0.100-in. in depth. In Plate #5, a linear indication 2.92-in. long was reported as an indeterminate indication. This indication is located approximately 6-in. below the horizontal weld between Plate #4 and Plate #5 and adjacent to (north) the vertical weld. This indication is being investigated and the results will be reported in a later document.

The HAZ of the horizontal weld between Plate #5 and the tank knuckle was examined for wall thinning, pitting and cracks oriented either perpendicular or parallel to the weld. The results indicated that the minimum thickness in the weld area with nominal thickness of 0.875-in. on Plate #5 was 0.838-in. The minimum thickness in the weld area with nominal thickness of 0.9375-in. on the knuckle was 0.887-in. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness. No pitting or crack-like indications were detected in the weld areas on Plate #5 side or on the knuckle side of the horizontal weld.

7.0 References

Jensen, C. E., 2002, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks FY2003*, RPP-11832, Rev 0, September 2002, CH2M Hill Hanford Group, Inc., Richland, Washington.

Distribution

No. of
Copies

Offsite

4 DOE/Office of Scientific and
Technical Information &
Information Release

1 DOE Office of Science and
Technology
Kurt Gerdes
1154 Cloverleaf Building
19901 Germantown Road
Germantown, MD 20874-1290

Onsite

4 **Hanford Site**

J. L. Castleberry (1)	R3-76
G. P. Duncan (1)	R3-76
C. E. Jensen (2)	R3-76

10 **Pacific Northwest National Laboratory**

M. T. Anderson (1)	K5-26
J. W. Brothers (1)	K7-15
L. O. Casazza (1)	K5-26
A. F. Pardini (6)	K5-26
G. J. Posakony (1)	K5-26

This page intentionally left blank.