3

# ENGINEERING DATA TRANSMITTAL

1. EDT 822001
1A. Page 1 of

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|---|---|---|
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# ULTRASONIC INSPECTION RESULTS FOR DOUBLE-SHELL TANK 241-AN-104 - FY 2005

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U.S. Department of Energy Contract DE-AC27-99RL14047

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Abstract: This report documents the ultrasonic examination of DST 241-AN-104. There were no reportable indications of wall thinning, pitting or cracking in the plates. The greatest thinning was 2.2% or 0.011 inches in Plate 3 (0.5 inch nominal). There were no reportable cracking, pitting or thinning indications in the weld heat affected zones examined. The greatest thinning in the weld heat affected zone was 7.4% or 0.037 inches in the vertical weld in Plate 3.



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# ULTRASONIC INSPECTION RESULTS FOR DOUBLE-SHELL TANK 241-AN-104 – FY 2005

**C.E. Jensen**

CH2M HILL Hanford Group, Inc.

Date Published
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# Ultrasonic Inspection Results for Double-Shell Tank 241-AN-104 – FY 2005

August 2005

Prepared by:

G. T. McDonald
COGEMA Engineering Corporation

Prepared for:

C. E. Jensen
CH2M HILL Hanford Group Inc.

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## CONTENTS



## ATTACHMENTS

## FIGURES

## TABLES

## TERMS

| | |
|---|---|
| AATT | Absolute Arrival Time Technique |
| ASME | American Society of Mechanical Engineers |
| CH2M HILL | CH2M HILL Hanford Group, Inc. |
| CHAMPS | Computerized History and Maintenance Planning System |
| COGEMA Engineering | COGEMA Engineering Corporation |
| dB | Decibel |
| DSC | Distance Sensitivity Calibration |
| DST | Double-shell tank |
| DSTIP | Double-Shell Tank Integrity Project |
| EPRI | Electric Power Research Institute |
| FSH | Full Screen Height |
| FY | Fiscal Year |
| HAZ | Heat-Affected Zone |
| IIW | International Institute of Welding |
| MHz | Megahertz |
| NDE | Nondestructive Examination |
| PDT | Performance Demonstration Test |
| PNNL | Pacific Northwest National Laboratory |
| RATT | Relative Arrival Time Technique |
| 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 (WDOE) 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. In 2003, the Administrative Orders were incorporated into the Hanford Federal Facility Agreement and Consent Order, Milestones Series M-48. Milestone M-48-13 requires examination by September 30, 2005, of four DSTs not previously examined. This report documents the required ultrasonic examination of double-shell tank 241-AN-104, completed in the fourth quarter of FY 2005.

## Methodology

The primary tank wall examinations consisted of two parallel 15 to 17-inch wide strips, ~33 feet in length (scanned vertically), a horizontal 17 inch by 240 inch strip encompassing the historical liquid-air interface. The primary wall vertical examinations were looking for wall thinning, cracking, and pitting in the tank wall. The weld heat affected zones (HAZ) examined included 25.1 linear feet of vertical welds joining plates 2 through plate 5, and ~21 linear feet of the horizontal plate #5 to knuckle weld (see figure 10-1). The primary tank lower knuckle and four air slots were examined using the P-scan system.

The ultrasonic examinations were carried out in accordance with American Society of Mechanical Engineers (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 (PDT) administered by Pacific Northwest National Laboratories.

The accuracy of the PDT measurements was required to be within 0.020 inches for wall thinning, 0.050 inches for pitting, and 0.10 inches for cracking (per RPP-22571 *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2005*, Jensen 2005). The PDT revealed that the examiners met this requirement (section 6.0).

## Results

There was no reportable wall thinning detected in any of the plate areas examined (reportable wall thinning is defined as greater than 10% below nominal). The primary wall vertical scans yielded an overall average ((scan 1 + scan 2)/2) wall thickness value of 104% of nominal. The overall average ((scan 1 + scan 2)/2) minimum wall thickness value was 99.6% of nominal. Of

the 12 inch long vertical wall plate scans yielding minimum thicknesses falling below the nominal values, the greatest deviation was 2.2% below the nominal (Plate #3, Scan 1). There were no reportable pitting indications nor any crack-like indications detected in any of the wall plates.

There were no areas of reportable wall thinning, cracking, or pit-like indications detected during the primary tank horizontal wall scan of the historical liquid-air interface.

The average horizontal wall thickness value was 106.7% of nominal for the liquid-air interface scan. The average minimum horizontal wall thickness value was 101.2% of nominal. Of the 12 inch long horizontal wall plate scans yielding minimum thicknesses falling below the nominal value (0.500 inches), the greatest deviation was 0.4% below the nominal.

There were no areas of reportable wall thinning, no crack-like indications, nor reportable pitting indications detected in any of the weld HAZ. This included the primary tank vertical weld scans, and the primary tank lower knuckle-to-shell horizontal weld scan. The average HAZ thickness value was 102.9% of nominal for the vertical weld HAZ, and 104.7% of nominal for the horizontal knuckle/plate weld HAZ. The average minimum HAZ thickness value detected was 97.1% of nominal for the vertical welds HAZ, and 101.3% of nominal for the horizontal weld HAZ. Of the 12 inch long HAZ scans yielding minimum thicknesses falling below the nominal values, the greatest deviation was 7.4% below nominal for the vertical welds HAZ, and 2.6% of nominal for the horizontal weld HAZ.

The examination of the primary tank lower knuckle revealed no areas of reportable thinning, pitting, or crack-like indications. The knuckle examination included a horizontal strip of the knuckle wall, and four vertical strips of the wall aligned with four different air slots. The average wall thickness detected was 108.1% of nominal for the horizontal scan, and 110.9% of nominal for the vertical scans. The average minimum wall thickness detected was 103.7% of nominal for the horizontal scan, and 109% of nominal for the vertical scans.

All of the areas of the knuckle that were examined had minimum thicknesses that exceeded the nominal thickness of 0.875 inches.

## Conclusions

Based on the results of this examination (no reportable indications), the material condition of DST 241-AN-104 is satisfactory for continued operation.

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

Double-Shell Tanks Inspected Through August 2005

| Double-Shell Tank | Inspection Year (FY) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| AN-101 | | | | | | x | | | |
| AN-102 | | | | | x | | | | |
| AN-103 | | | | | | | | | x |
| AN-104 | | | | | | | | | x |
| AN-105 | | | x | | | (1) | | | |
| AN-106 | | | x | | | | | | |
| AN-107 | | x | | | | | | | |
| AP-101 | | | | | | | x (3) | | |
| AP-102 | | | | | | | | | x |
| AP-103 | | | | | | | x (4) | | |
| AP-104 | | | | | | | | x | (1) |
| AP-105 | | | | | | | x | | |
| AP-106 | | | | | | | | | 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 | (1) | | |
| AY-102 | | | x | | | | | | |
| AZ-101 | | | x | | | | | | |
| AZ-102 | | | | | | | x (3) | | |
| SY-101 | | | | | | | | x | |
| SY-102 | | | | | | | | x | |
| SY-103 | | | | | | | | x | |

(1) Limited scope reexamination.
(2) Linear indication evaluated.
(3) Includes primary knuckle Synthetic Aperture Focusing Technique (T-SAFT) examination.
(4) Linear indication detected; A follow-up inspection determined that it is a small area of incomplete fusion.
(5) Primary knuckle T-SAFT examination only.

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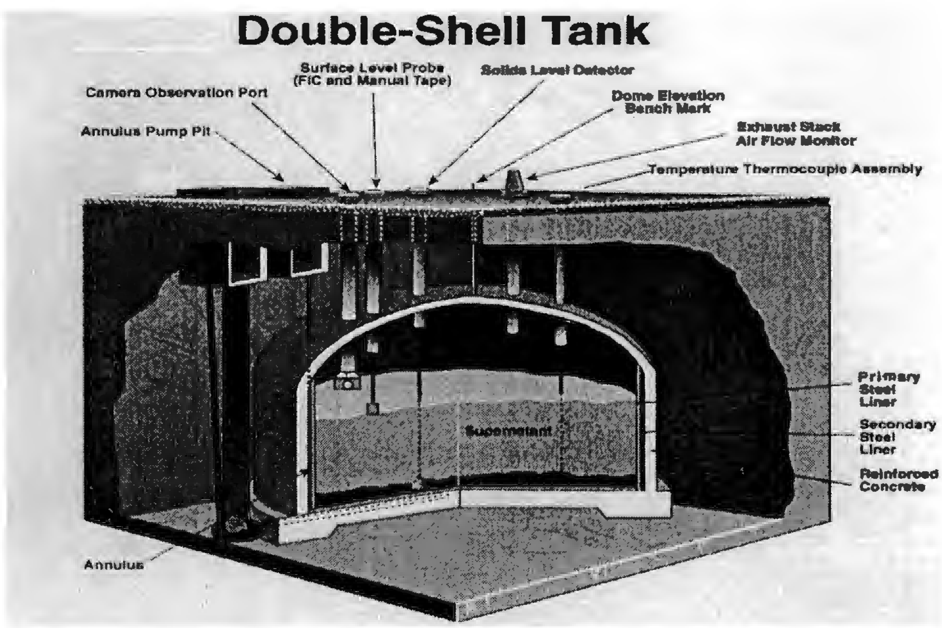
# 1.0 INTRODUCTION

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). In 2003, the WDOE Administrative Order (Silver 2000) was incorporated into the Hanford Federal Facility Agreement and Consent Order Milestone Series M-48 (HFFACO 2003), requiring examination during each FY through FY 2005 of four DSTs not previously examined. Based on the results of the above listed eight DST inspections and per the Milestone Series M-48 (HFFACO 2003), engineering task plans were prepared for ultrasonic DST inspections scheduled for the subsequent fiscal years.

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). These DSTs were examined per Engineering Task Plan RPP-6839 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2001*, Jensen 2000a).

In FY 2002, UT inspections were performed on four more DSTs: 241-AN-101, 241-AW-102, 241-AW-104, and 241-AW-106. Also in FY 2002, a more extensive examination of 241-AY-101 was performed, and an 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. These DSTs were examined per RPP-7869 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2002*, Jensen 2002), and 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).

In FY 2003, UT inspections were performed on four more DSTs: 241-AP-101, 241-AP-103, 241-AP-105, and 241-AZ-102. Also, a primary tank lower 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. In addition, a supplementary, limited scope examination of the tank 241-AY-101 secondary tank wall was completed. These DSTs were examined per RPP-11832 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2003*, Jensen 2002b).

In FY 2004, UT inspections were performed on four more DSTs: 241-SY-101, 241-SY-102, 241-SY-103, and 241-AP-104. A limited scope examination of tank 241-AN-105 originally planned for FY 2004 was deferred until FY 2005. These DSTs were examined per RPP-17750 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2004*, Jensen 2003).

In FY 2005, UT inspections were planned on four more DSTs: 241-AN-103, 241-AN-104, 241-AP-102, and 241-AP-106. Limited scope examinations of tanks 241-AN-101, 241-AN-105, 241-AP-104 and 241-SY-101 were also planned for FY 2005. These DSTs were to be examined per RPP-22571 (*Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks - FY2005*, Jensen 2005).

DST 241-AN-104 was the fourth of the four tanks selected for standard inspection in FY 2005 (tanks 241-AN-103, 241-AP-102, and 241-AP-106 examinations have been completed). Inspection of tank 241-AN-104 was completed in the fourth quarter of FY 2005, 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 to report the inspection results. Examination of 241-AN-104 was performed with UT equipment provided by CH2M HILL Hanford Group, Inc. (CH2M HILL).

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## 2.0 OBJECTIVE AND SCOPE

This report describes the inspection system, evaluates the inspection results, and documents findings with conclusions and recommendations. The inspections described in this report include the primary tank wall, the liquid/air interface, the vertical weld Heat Affected Zones (HAZ), the primary knuckle, and the horizontal cylinder/knuckle weld HAZ.

The inspections were conducted in accordance with the criteria and scope set forth in RPP-RPT-22571 (Jensen 2005) for the FY 2005 UT inspection of DST 241-AN-104.

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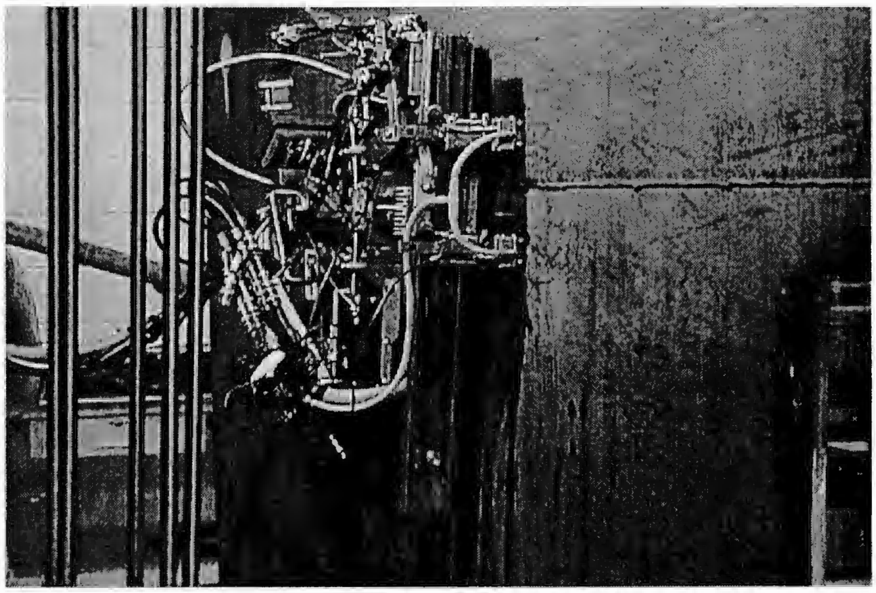
## 3.0 INSPECTION EQUIPMENT DESCRIPTION

**Crawler / Scanning Bridge Systems** – The crawler is a remotely controlled device that delivers the ultrasonic transducers to the tank walls. The crawler used during most P-scan imaging weighs approximately 35 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 crawler is deployed through a 24 inch annulus inspection riser using customized deployment tools. The P-scan tank wall 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 all transducers at a rate needed to maintain an acceptable signal.

**Deployment Tools** – A deployment tool was specifically designed to insert and retrieve each 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 or to the secondary tank floor. The scanner is then driven onto the surface or the tank floor. 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.

**Data Acquisition Control Center** – A tent-like structure was used to house the crawler controls, video monitors, and data collection and evaluation hardware. The tent was located outside the AN Tank Farm boundary fence.

## 4.0 UT INSPECTION DESCRIPTION

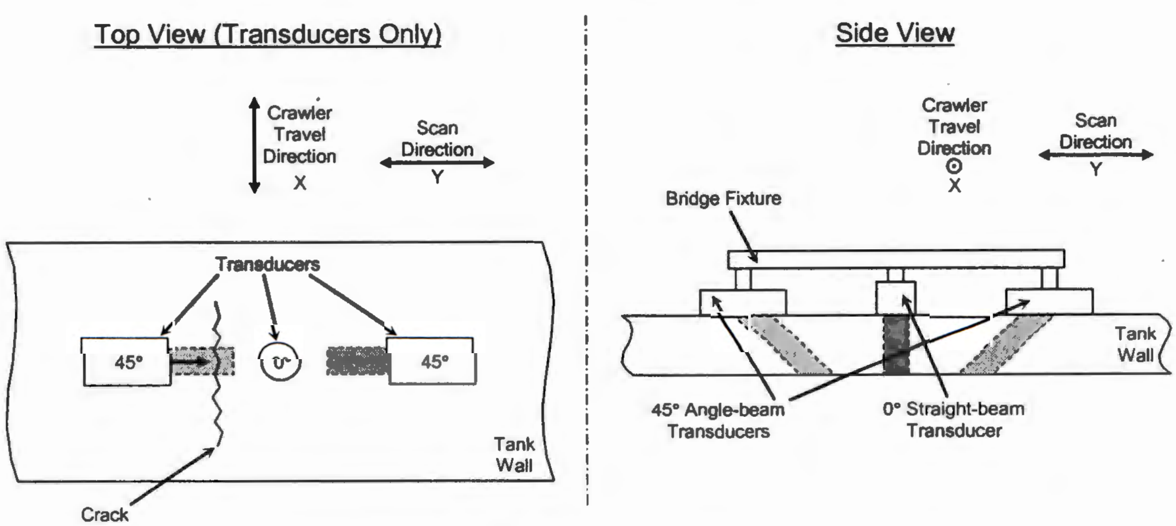
The following is the description of the data collection methodology:

Tank inspection was performed under Computerized History and Maintenance Planning System (CHAMPS) work package number 2E-04-02395. All work steps, guidelines, procedures, personnel responsibilities, and protocol for the inspection (Jensen 2005) were included in the subject work package. The COGEMA Engineering procedure that establishes the methods, equipment and requirements for the UT measurements and flaw detection is *Automated Ultrasonic Examination For Corrosion And Cracking*, COGEMA-SVUT-INS-007.3 (Attachment 1).

**<u>P-scan Crawler for Tank Walls and Knuckle</u>** - A 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 026 to perform the vertical wall scans, the horizontal wall scans, the knuckle wall scans, and the vertical and horizontal weld scans.

The P-scan crawler inspects the primary tank wall using one dual-element 0° transducer to detect wall thinning and corrosion pitting, and two 45° shear-wave transducers to detect cracking transverse to the scanning direction. This examination setup is illustrated in the Figure 4-1 schematic.

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

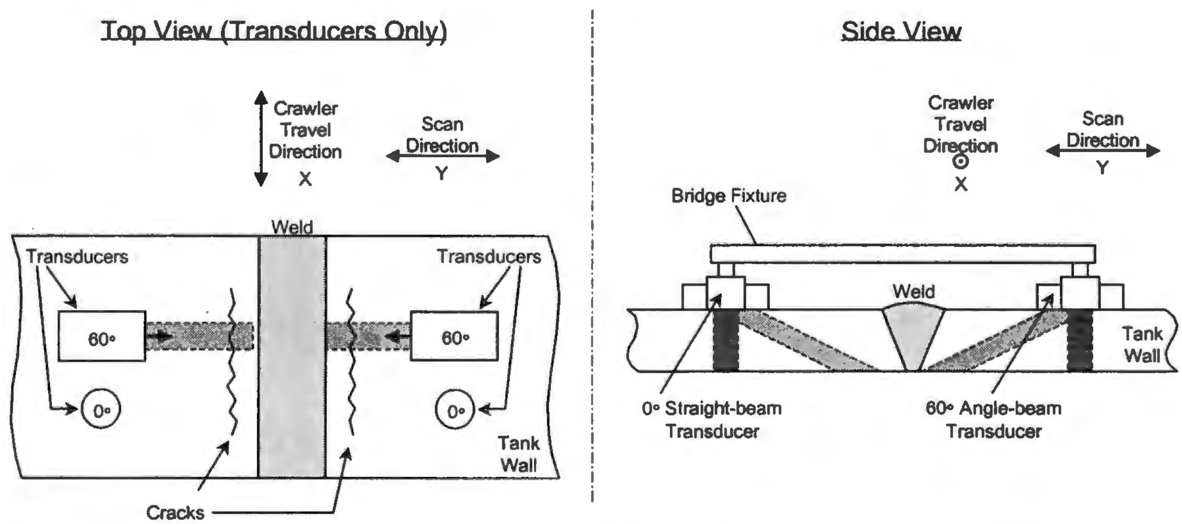



**Vertical Wall Inspection Setup** – Uses two 45° Transducers and one 0° Transducer (Inspect for Wall Thinning, Pitting and Axial Cracks)

Note that the examination of the welds and HAZ actually consist of angle beam examinations in the HAZ. The welds are not directly examined since the physical configuration does not permit transducer placement on the weld. This physical configuration is the weld crown. The DSTs were not designed or fabricated for in-service inspection, and therefore the weld crowns were not prepared for examination.

To detect cracks parallel to the weld, a 60° shear-wave transducer was directed toward the weld and a dual-element 0° transducer is also included to detect wall thinning and corrosion pitting (Figure 4-2). The examination of the HAZ using 60° angle beams will provide some coverage of the actual weld to the inside surface. For example, in a previous UT examination, a "lack of fusion" in a weld was identified (*Ultrasonic Inspection Results for Double-Shell Tank 241-AP-103*, Jensen 2003a).

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)

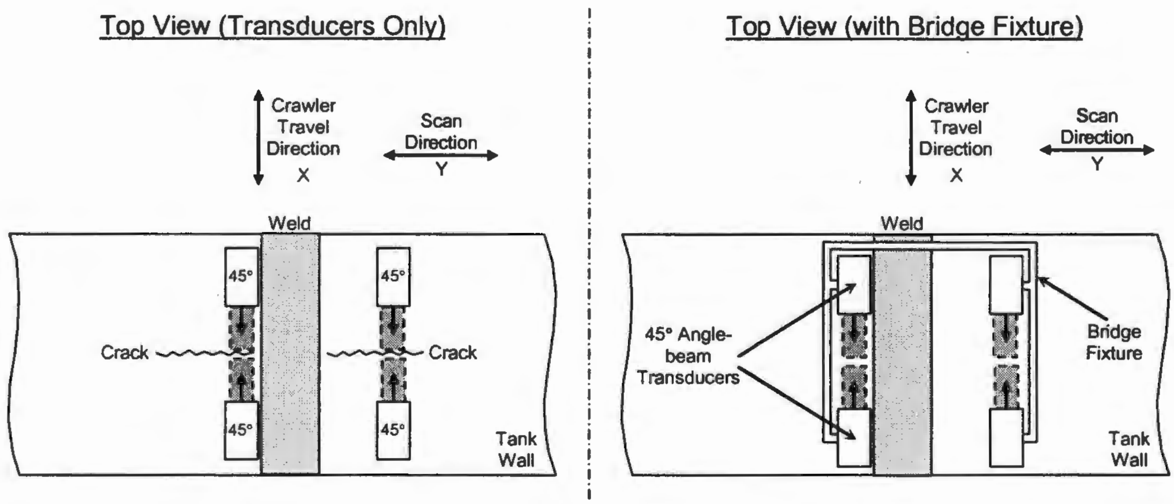
To detect cracks oriented perpendicular to welds, two opposing 45° shear-wave transducers were directed parallel to the weld. Welds were examined from both sides of the weld crown (Figure 4-3). Note that weld and weld examination refer to the UT examination of the HAZ.

A special extension arm was attached to the crawler to inspect the primary tank knuckle region. Two 45° shear-wave transducers were attached to the end of the arm to detect cracking transverse to the scanning direction (Figure 4-4). To detect wall thinning and corrosion pitting in the knuckle region, one dual-element 0° transducer was attached to the arm (Figure 4-5).

The setup in Figure 4-5 is used to examine extended, continuous lengths of the primary lower knuckle (typically 20 feet), but interference between the transducer and the insulating concrete pad below the knuckle restricts the examination region to the upper 11 to 12 inches of the knuckle. To inspect lower portions of the knuckle (within a few inches of the tank bottom plate weld), the P-scan transducer can be lined up with air slots in the insulating concrete, permitting approximately 1 inch wide scans in the selected slots (Figure 4-6).

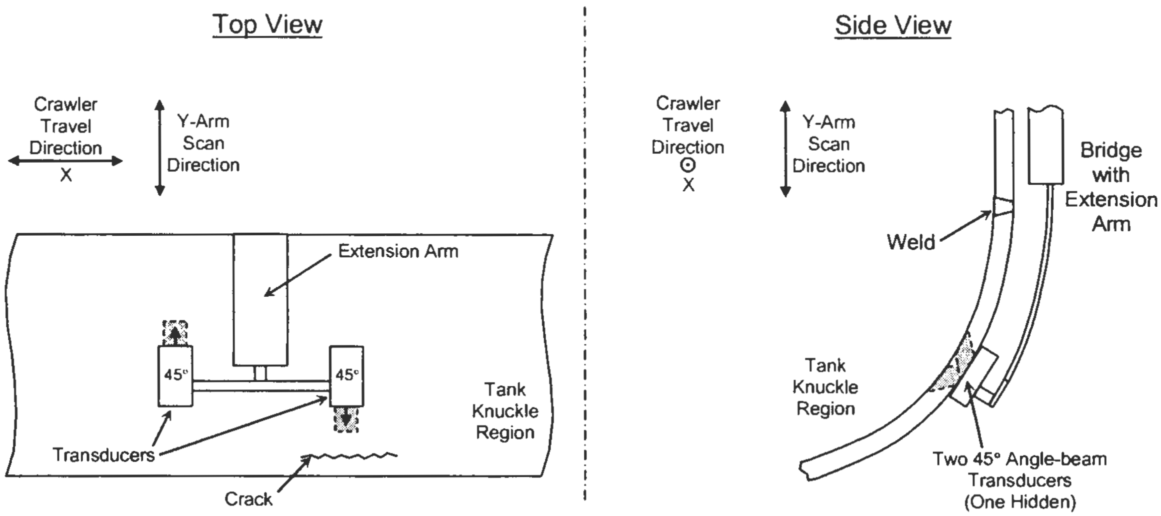
Data and images from the P-scan system were returned to a nearby control center located outside the tank farm fence. The control center contained the crawler controls, video monitors, and data collection and evaluation software and hardware. The UT inspector continuously monitored the signals for reportable indications. The entire inspection was viewed by a camera and lighting system deployed through an adjacent riser.

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



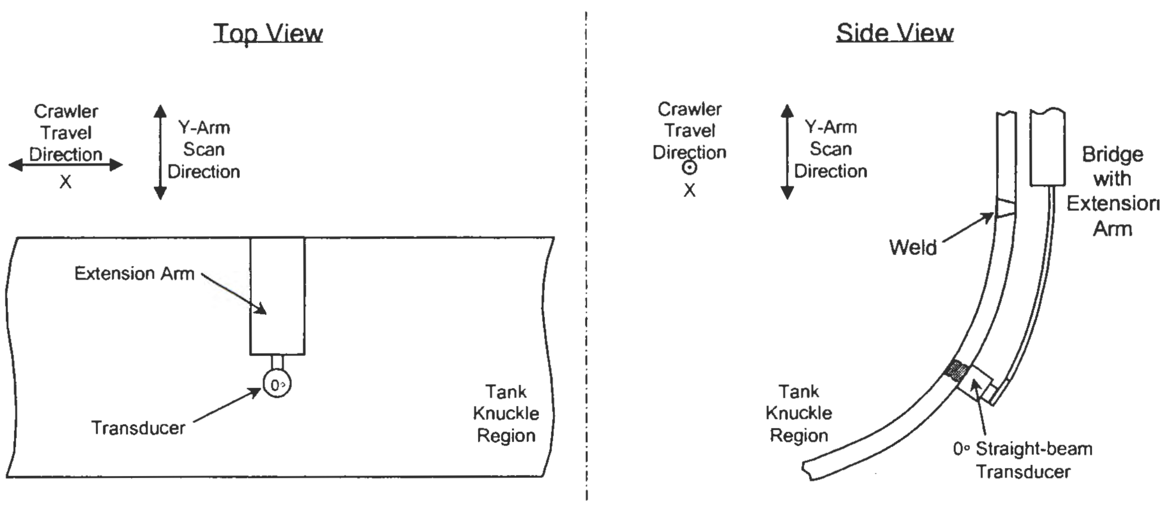

**Second Pass of Vertical and Horizontal Weld Inspection** – Uses four 45° Transducers (Inspect for HAZ Cracks Perpendicular to the Weld)

Figure 4-4. Schematic of UT Setup for Inspection of Cracks at Knuckle



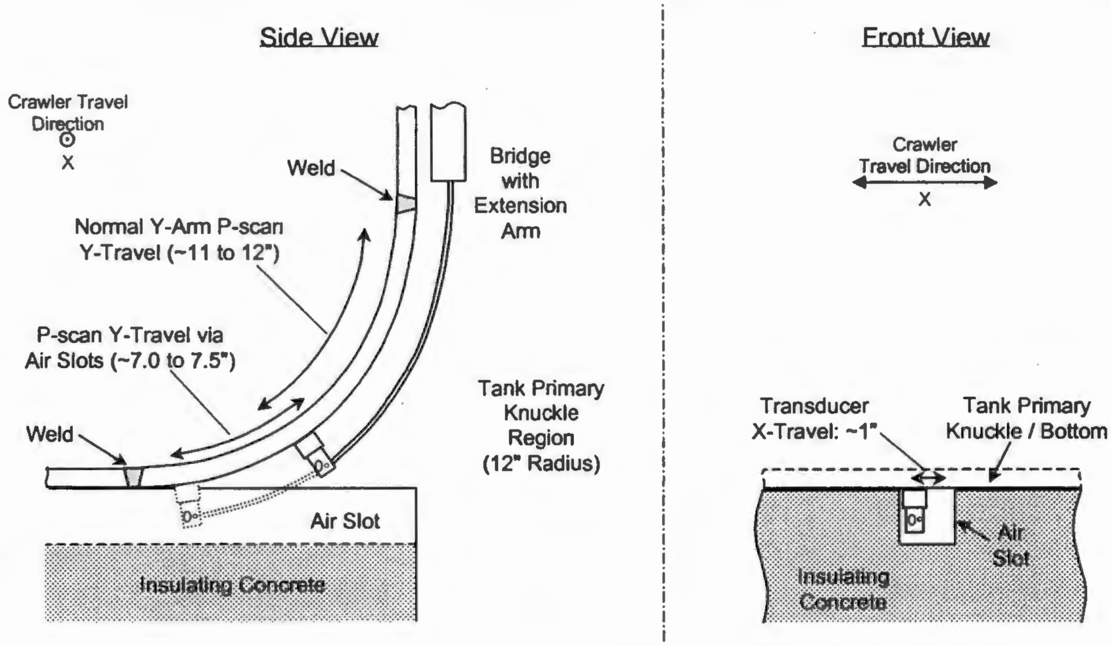

**First Pass of Knuckle Inspection Setup** – Uses two 45° Transducers
(Inspect for Horizontal Knuckle Cracks)

Figure 4-5. Schematic of UT Setup for Inspection of Wall Thinning at Knuckle




**Second Pass of Knuckle Inspection Setup** – Uses one 0° Transducer
(Inspect for Wall Thinning)

Figure 4-6. Schematic of UT Setup for Inspection of Wall Thinning at Knuckle via Air Slots




**Setup for P-scan Primary Knuckle Inspection via Air Slots** –
Uses one 0° Transducer (Inspect for Wall Thinning & Pitting)

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## 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 2005) 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 2005).

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## 6.0 PERFORMANCE DEMONSTRATION TESTS

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 Pacific Northwest National Laboratory (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.

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# 7.0 TANK 241-AN-104 HISTORY

The 241-AN Tank Farm consists of seven DSTs located in the 200 East Area of the Hanford Site. These underground tanks were built in 1980 and 1981, and are 75 feet in diameter with an operating capacity of 1.16 million gallons.

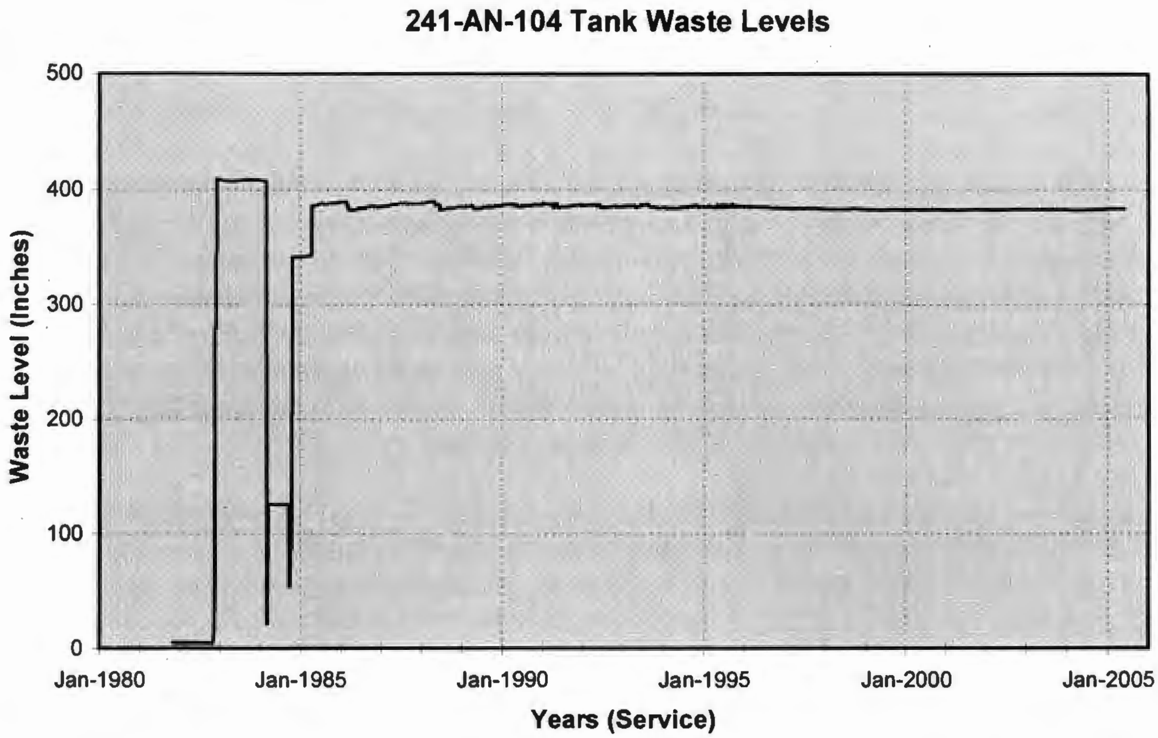
Tank 241-AN-104 entered service in 1982, receiving raw water. The tank received double-shell slurry feed waste from tank 241-AW-102 in the fourth quarter of 1982, and the first quarter of 1984. In the fourth quarter of 1983, the tank received PUREX waste. In the first quarter of 1984, waste was transfered to tanks 241-AZ-102 and 241-AN-105. In the third quarter of 1984, 82 kgal of flush water was added to the tank, and waste was transfered to tank 241-AN-103. From the fourth quarter of 1984 to the second quarter of 1985, the tank received double-shell slurry feed waste from tank 241-AW-102 via the evaporator. The last transfer was a small amount of flush water added in 1996 (Hu 1997).

Tank 241-AN-104 currently contains approximately 1,053,000 gallons of waste equivalent to approximately 384 inches: 608,000 gallons of supernatant (~220 inches), and 445,000 gallons of sludge (~164 inches) The tank is categorized as sound. (*Waste Tank Summary Report for Month Ending May 31, 2005,* Naiknimbalkar 2005).

The waste level history since October 1981 is shown in Figure 7-1, based on data obtained from the Tank Waste Information Network System (TWINS)[1].

[1] TWINS, http://twins.pnl.gov/twins.htm, queried 5/27/05 [Data Source: Measurements, SACS, Surface Level, Tank Name AN-104, All Measurement Date values]

Figure 7-1. Waste Level History of Double-Shell Tank 241-AN-104




Since 1983, the minimum recorded waste level was approximately 21 inches (March 1984), and the maximum recorded waste level was approximately 409 inches (January 1983). During the nineteen year period between January 1986 and May 2005, the waste level remained relatively constant, averaging 384 inches. Since 1995, the average waste level has been 383 inches.

Since 1990, recorded temperatures of the tank have ranged from a maximum of 125°F (August 1993) to a minimum of 62°F (January 2004), and have averaged 94°F. Since 2002, Tank temperatures have averaged 91°F. This is based on data obtained from the TWINS[2].

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[2] TWINS, http://twins.pnl.gov/twins.htm, queried 5/25/05 [Data Source: Measurements, SACS, Tank Temperature Readings, Tank Name AN-104, All Measurement Date values].

## 8.0 GENERAL REQUIREMENTS AND INSPECTION SCOPE

FY 2005 Contract Number 21186, Release 14, specifies that the contractor provide (among others) the following deliverables to the Double-Shell Tank Integrity Project (DSTIP) organization:

- The contractor shall provide AN-104 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 2005) and work package number 2E-04-02395 are described below.

Primary Tank Wall and Welds:

- A vertical strip (approximately 30 to 34 inches wide by 35 feet long) of the primary tank wall between the upper haunch transition and the lower knuckle for pits, cracks, and wall thinning. The vertical strip may be comprised of one or more strips whose total width is 30 inches.
- A horizontal strip (17 inches wide by 20 feet long) centered on the average elevation of the liquid-air interface that existed for five years or longer.
- 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.

Primary Tank Knuckle:

- A strip in the lower knuckle to detect the presence of cracks oriented in the circumferential direction, and for pits and wall thinning. The area to be examined is 20 feet long in the circumferential direction, and in the meridional direction, is from the weld joining the transition plate with the knuckle to the farthest reach of the transducer assembly that is allowed by the tank geometric constraints (using the flexible arm attachment to the existing P-scan system) – supplemented by T-SAFT, if available). The 20 foot dimension is not required to be a continuous length. Examination segments that add up to 20 feet in length are acceptable.

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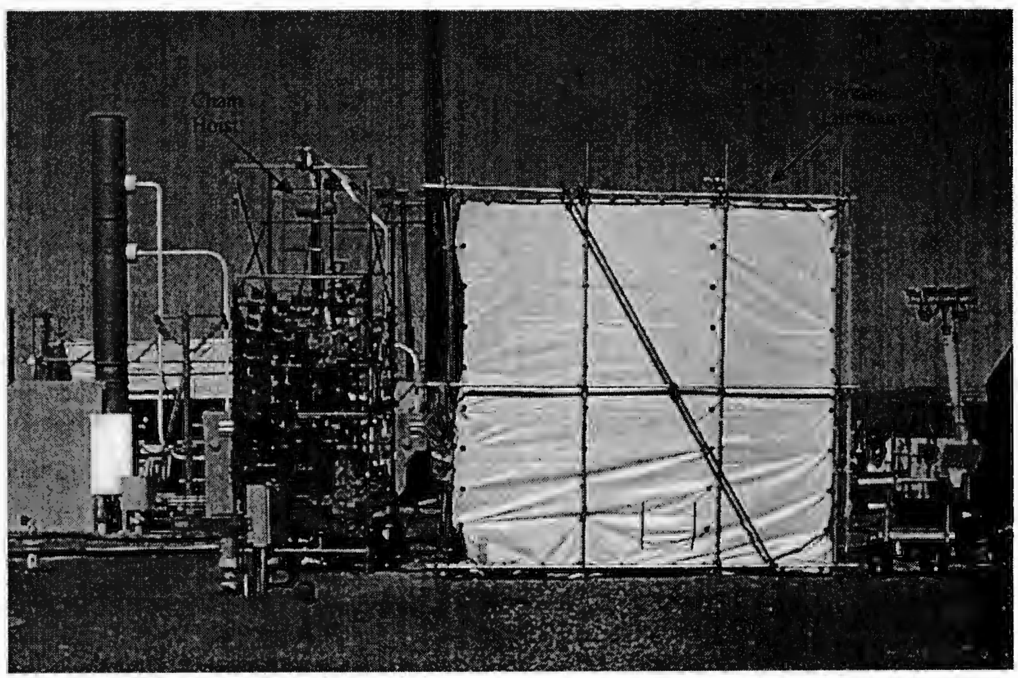
## 9.0 EQUIPMENT SETUP AT AN TANK FARM

Prior to performing the actual inspection, the shield plug was removed from the 24 inch Riser 026, and a temporary cover and riser extension were secured to the riser. A portable enclosure was installed near the riser to provide the means for deploying the UT equipment and protecting the operators from the weather. An electric chain hoist, mounted to scaffolding adjacent to the portable enclosure was used for maneuvering the equipment into position. The control center enclosure was set up outside the AN Tank Farm's boundary fence, and the control cables were run along the ground to the equipment located at the riser. The tank farm setup is shown in Figure 9-1.

Figure 9-1. UT Equipment Arrangement at DST AN-104 7/14/05



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## 10.0 INSPECTION RESULTS

Tank 241-AN-104 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-AN Tanks*, Vitro Hanford 1979).

**Primary Tank Upper Knuckle** – Connects dome of tank to side-wall

**Primary Tank 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, 1/2 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 Tank Lower Knuckle** – Approximately 7/8 inch nominal thickness. Connects sidewall of tank to primary tank bottom.

**Primary Tank Bottom** – Connected to primary tank lower knuckle. The outer three feet is approximately 7/8 inch nominal thickness, transitioning to 1/2 inch nominal thickness.

The P-scan crawler was deployed through the 24 inch diameter annulus inspection Riser 026 at the north side of tank 241-AN-104 for examinations of the primary tank wall, primary knuckle, and vertical and horizontal welds. All tank welds examined were in the "as-welded" condition. The various scan paths for the crawlers are shown in Figure 10-1, along with other pertinent tank information.

Additional P-scan measurements of the primary knuckle were made using the P-scan crawler equipped with a flexible extension arm that was extended into selected air slots in the insulating concrete (Figure 10-2).

The UT P-scan 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 P-scan data, but are not qualified to interpret the data.

Figure 10-1. Schematic of UT Scan Paths on North Side of Tank 241-AN-104 Wall (via Riser 026)

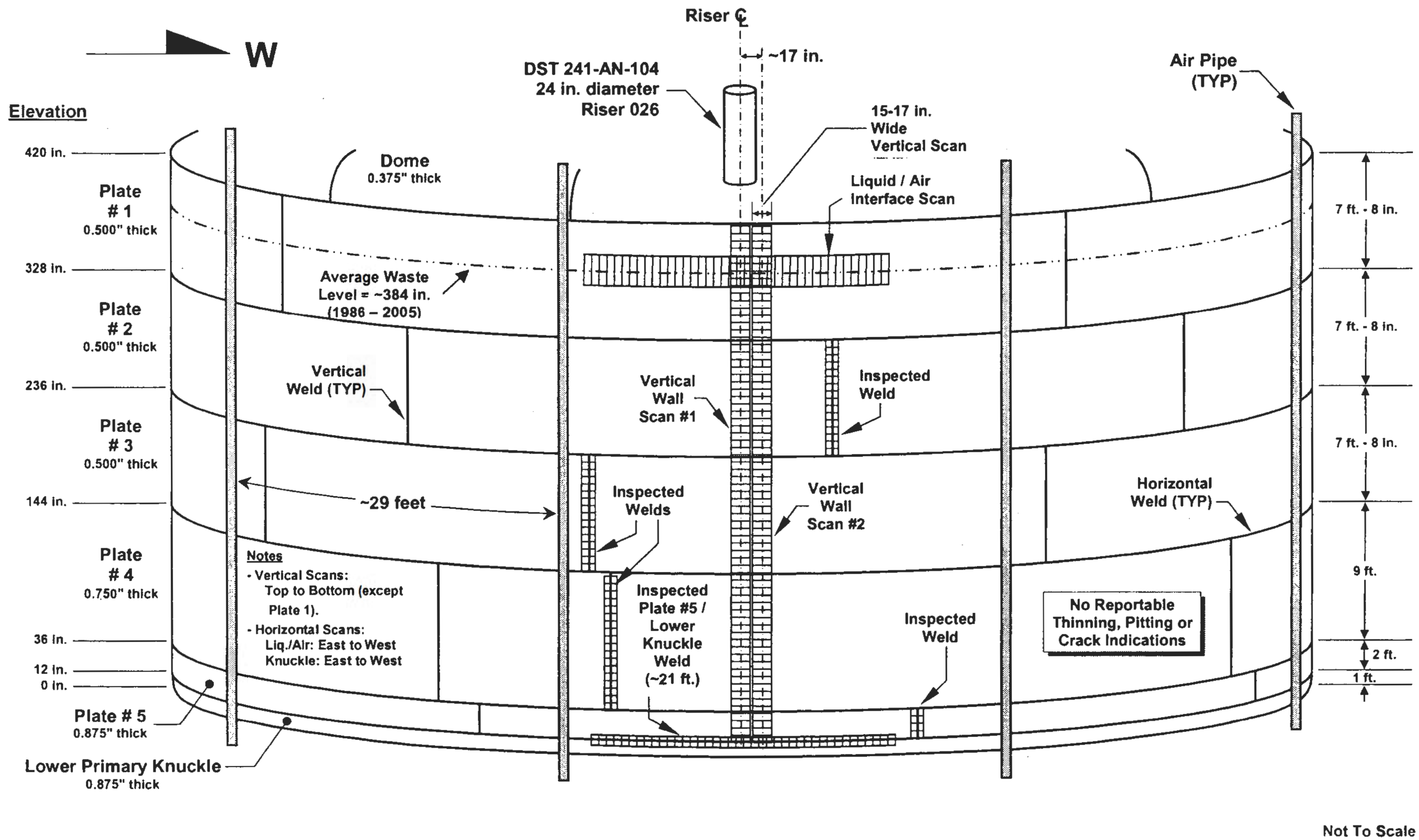
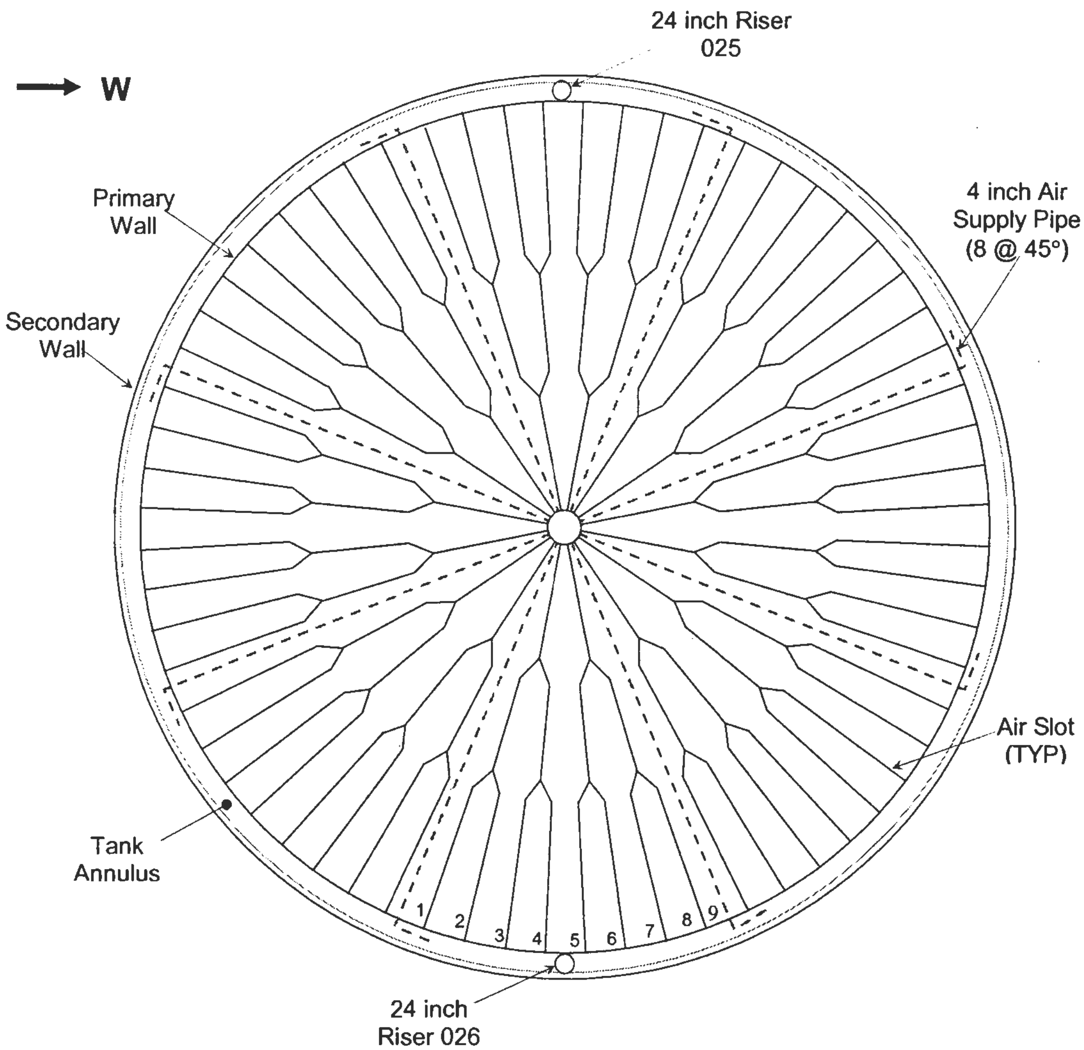


**Figure 10-2. Air Slots Under Tank Bottom of DST 241-AN-104**




| Inspection Method | Air Slot Number | Data Sheet File Name |
|---|---|---|
| P-scan Inspection of Primary Tank Lower Knuckle via Air Slots | 2 | Slot 2 |
| | 7 | Slot 7 |
| | 8 | Slot 8 |
| | 9 | Slot 9 |

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 and weld scan map, and an interpretation of the data by an independent Level III certified NDE Inspector are included in Attachment 2 for the P-scan data.

Tables 10-1 through 10-3 summarize the minimum wall thickness values obtained using the P-scan system on the primary tank walls, which includes the liquid-air interface of Plate #1.

Tables 10-4 and 10-5 summarize the minimum wall thickness values obtained using the P-scan system on the primary tank vertical welds and the primary tank lower 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).

Table 10-1. Summary of Primary Tank Wall Scan 1 (via Riser 026)

| Plate Description | Elevation of Wall Scan (inches) | Wall Scan Distance (inches) (1) | Design Nominal (inches) | Measured Minimum (inches) | Scan Minimum % of Nominal |
|---|---|---|---|---|---|
| Plate #1 | 421.2 to 329 | 92.2 | 0.500 | 0.493 | 98.6% |
| Plate #2 | 327 to 237.1 | 89.9 | 0.500 | 0.499 | 99.8% |
| Plate #3 | 235 to 145.3 | 89.7 | 0.500 | 0.489 | 97.8% |
| Plate #4 | 143 to 37.1 | 105.9 | 0.750 | 0.744 | 99.2% |
| Plate #5 | 35 to 14.11 | 20.89 | 0.875 | 0.859 | 98.2% |

(1) Scan widths were 15-17 inches.

Table 10-2. Summary of Primary Tank Wall Scan 2 (via Riser 026)

| Plate Description | Elevation of Wall Scan (inches) | Wall Scan Distance (inches) [1] | Design Nominal (inches) | Measured Minimum (inches) | Scan Minimum % of Nominal |
|---|---|---|---|---|---|
| Plate #1 | 419.3 to 329 | 90.3 | 0.500 | 0.480 | 96.0% |
| Plate #2 | 327 to 237.6 | 89.4 | 0.500 | 0.499 | 99.8% |
| Plate #3 | 235 to 145.4 | 89.6 | 0.500 | 0.490 | 98.0% |
| Plate #4 | 143 to 37.1 | 105.9 | 0.750 | 0.743 | 99.1% |
| Plate #5 | 35 to 13.8 | 21.2 | 0.875 | 0.857 | 97.9% |

(1) Scan widths were 15-17 inches.

Table 10-3. Summary of Primary Tank Liquid-Air Interface Wall Scan (via Riser 026)

| Plate Description | Elevation of Horizontal Wall Scan (inches) | Wall Scan Distance (inches) [1] | Design Nominal (inches) | Measured Minimum (inches) | Scan Minimum % of Nominal |
|---|---|---|---|---|---|
| Liquid-Air Interface Plate #1 | 381.5 to 398.5 | 249.2 | 0.500 | 0.498 | 99.6% |

(1) Scan width was 17 inches.

Table 10-4. Summary of Primary Tank Vertical Weld Scans (via Riser 026)

| Weld Description | Elevation of Weld Scan (inches) | Weld Scan Distance (inches) (1) | Design Nominal (inches) | Measured Minimum (inches) | Scan Minimum % of Nominal |
|---|---|---|---|---|---|
| Vertical Weld Plate #2 | 327 to 238.6 | 88.4 | 0.500 | 0.478 | 95.6% |
| Vertical Weld Plate #3 | 235 to 145.5 | 89.5 | 0.500 | 0.463 | 92.6% |
| Vertical Weld Plate #4 | 143 to 40.2 | 102.8 | 0.750 | 0.708 | 94.4% |
| Vertical Weld Plate #5 | 35 to 13.7 | 21.3 | 0.875 | 0.859 | 98.2% |

(1) Scan widths were 11.1 – 11.58 inches.

Table 10-5. Summary of Plate #5 / Knuckle Horizontal Weld Scans (via Riser 026)

| 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 #5 Side | From ~1 in. to ~5 in. above Plate #5 / Knuckle Weld | 254 | 0.875 | 0.852 | 97.4% |
| Horizontal Weld Plate #5 to Knuckle, Knuckle Side | From ~1 in. to ~5 in. below Plate #5 / Knuckle Weld | 249.2 | 0.875 | 0.880 | 100.6% |

(1) Scan widths were 9.5 to 10.5 inches

Tables 10-6 through 10-15 contain the detailed data for the primary tank vertical wall scans as presented in 12 inch long by 15 to 17 inch wide connecting scans. Table 10-16 contains the detailed data for the Plate #1 liquid-air interface scan as presented in 12 inch long by 17 inch wide connecting scans.

Table 10-6. Primary Tank Vertical Wall Scan 1 – Plate #1 (via Riser 026)

| 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) | 329 | 0 – 12 [(1)] | 0.500 | 0.525 | 0.504 |
| | 341 | 12 – 24 | 0.500 | 0.530 | 0.498 |
| | 353 | 24 – 36 | 0.500 | 0.530 | 0.493 |
| | 365 | 36 – 48 | 0.500 | 0.530 | 0.508 |
| | 377 | 48 – 60 | 0.500 | 0.530 | 0.509 |
| | 389 | 60 – 72 | 0.500 | 0.530 | 0.502 |
| | 401 | 72 – 84 | 0.500 | 0.530 | 0.499 |
| | 413 | 84 – 92.2 | 0.500 | 0.525 | 0.508 |

[(1)] Scan start was 1 inch above the centerline of the second horizontal weld (scanned from bottom of plate to top of plate), and centerline of 24 inch Riser 026; Scan width was 15 inches.

Table 10-7. Primary Tank Vertical Wall Scan 1 - Plate #2 (via Riser 026)

| 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 / Plate 2" (Page Att. 2-4) | 327 | 0 – 12 [(1)] | 0.500 | 0.525 | 0.499 |
| | 315 | 12 – 24 | 0.500 | 0.525 | 0.499 |
| | 303 | 24 – 36 | 0.500 | 0.525 | 0.504 |
| | 291 | 36 – 48 | 0.500 | 0.525 | 0.503 |
| | 279 | 48 – 60 | 0.500 | 0.525 | 0.499 |
| | 267 | 60 – 72 | 0.500 | 0.525 | 0.503 |
| | 255 | 72 – 84 | 0.500 | 0.525 | 0.499 |
| | 243 | 84 – 89.9 | 0.500 | 0.525 | 0.499 |

[(1)] Scan start was 1 inch below the centerline of the second horizontal weld, and centerline of 24 inch Riser 026; Scan width was 17 inches.

Table 10-8. Primary Tank Vertical Wall Scan 1 - Plate #3 (via Riser 026)

| 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 / Plate 3" (Page Att. 2-5) | 235 | 0 – 12 [(1)] | 0.500 | 0.515 | 0.489 |
| | 223 | 12 – 24 | 0.500 | 0.520 | 0.493 |
| | 211 | 24 – 36 | 0.500 | 0.525 | 0.498 |
| | 199 | 36 – 48 | 0.500 | 0.525 | 0.503 |
| | 187 | 48 – 60 | 0.500 | 0.525 | 0.503 |
| | 175 | 60 – 72 | 0.500 | 0.530 | 0.509 |
| | 163 | 72 – 84 | 0.500 | 0.530 | 0.497 |
| | 151 | 84 – 89.7 | 0.500 | 0.525 | 0.502 |

[(1)] Scan start was 1 inch below the centerline of the third horizontal weld, and centerline of 24 inch Riser 026; Scan width was 17 inches.

Table 10-9. Primary Tank Vertical Wall Scan 1 – Plate #4 (via Riser 026)

| 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 / Plate 4" (Page Att. 2-6) | 143 | 0 – 12 [(1)] | 0.750 | 0.770 | 0.744 |
| | 131 | 12 – 24 | 0.750 | 0.770 | 0.744 |
| | 119 | 24 – 36 | 0.750 | 0.770 | 0.744 |
| | 107 | 36 – 48 | 0.750 | 0.770 | 0.750 |
| | 95 | 48 – 60 | 0.750 | 0.770 | 0.753 |
| | 83 | 60 – 72 | 0.750 | 0.770 | 0.754 |
| | 71 | 72 – 84 | 0.750 | 0.770 | 0.750 |
| | 59 | 84 – 96 | 0.750 | 0.770 | 0.747 |
| | 47 | 96 – 105.9 | 0.750 | 0.770 | 0.747 |

[(1)] Scan start was 1 inch below the centerline of the fourth horizontal weld, and centerline of 24 inch Riser 026; Scan width was 17 inches.

Table 10-10. Primary Tank Vertical Wall Scan 1 – Plate #5 (via Riser 026)

| 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 / Plate 5" (Page Att. 2-7) | 35 | 0 – 12 [(1)] | 0.875 | 0.890 | 0.864 |
| | 23 | 12 – 20.89 | 0.875 | 0.890 | 0.859 |

[(1)] Scan start was 1 inch below the centerline of the fifth horizontal weld, and centerline of 24 inch Riser 026; Scan width was 15 inches.

Table 10-11. Primary Tank Vertical Wall Scan 2 - Plate #1 (via Riser 026)

| 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) | 329 | 0 – 12 [(1)] | 0.500 | 0.530 | 0.504 |
| | 341 | 12 – 24 | 0.500 | 0.530 | 0.480 |
| | 353 | 24 – 36 | 0.500 | 0.530 | 0.490 |
| | 365 | 36 – 48 | 0.500 | 0.530 | 0.494 |
| | 377 | 48 – 60 | 0.500 | 0.530 | 0.502 |
| | 389 | 60 – 72 | 0.500 | 0.530 | 0.504 |
| | 401 | 72 – 84 | 0.500 | 0.525 | 0.499 |
| | 413 | 84 –90.3 | 0.500 | 0.525 | 0.498 |

[(1)] Scan start was 1 inch above the centerline of the second horizontal weld (scanned from bottom of plate to top of plate), and 17 inches west of Scan 1, centerline to centerline; Scan width was 17 inches.

Table 10-12. Primary Tank Vertical Wall Scan 2 – Plate #2 (via Riser 026)

| 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" (Page Att. 2-14) | 327 | 0 – 12 (1) | 0.500 | 0.525 | 0.499 |
| | 315 | 12 – 24 | 0.500 | 0.525 | 0.502 |
| | 303 | 24 – 36 | 0.500 | 0.525 | 0.501 |
| | 291 | 36 – 48 | 0.500 | 0.525 | 0.503 |
| | 279 | 48 – 60 | 0.500 | 0.530 | 0.503 |
| | 267 | 60 – 72 | 0.500 | 0.530 | 0.507 |
| | 255 | 72 – 84 | 0.500 | 0.525 | 0.501 |
| | 243 | 84 – 8947 | 0.500 | 0.525 | 0.503 |

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

Table 10-13. Primary Tank Vertical Wall Scan 2 - Plate #3 (via Riser 026)

| 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 3" (Page Att. 2-15) | 235 | 0 – 12 (1) | 0.500 | 0.515 | 0.494 |
| | 223 | 12 – 24 | 0.500 | 0.520 | 0.496 |
| | 211 | 24 – 36 | 0.500 | 0.525 | 0.499 |
| | 199 | 36 – 48 | 0.500 | 0.525 | 0.490 |
| | 187 | 48 – 60 | 0.500 | 0.525 | 0.500 |
| | 175 | 60 – 72 | 0.500 | 0.525 | 0.503 |
| | 163 | 72 – 84 | 0.500 | 0.525 | 0.501 |
| | 151 | 84 – 89.6 | 0.500 | 0.525 | 0.490 |

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

Table 10-14. Primary Tank Vertical Wall Scan 2 - Plate #4 (via Riser 026)

| 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" (Page Att. 2-16) | 143 | 0 – 12 (1) | 0.750 | 0.765 | 0.744 |
| | 131 | 12 – 24 | 0.750 | 0.765 | 0.743 |
| | 119 | 24 – 36 | 0.750 | 0.770 | 0.746 |
| | 107 | 36 – 48 | 0.750 | 0.770 | 0.749 |
| | 95 | 48 – 60 | 0.750 | 0.770 | 0.752 |
| | 83 | 60 – 72 | 0.750 | 0.770 | 0.753 |
| | 71 | 72 – 84 | 0.750 | 0.775 | 0.744 |
| | 59 | 84 – 96 | 0.750 | 0.775 | 0.751 |
| | 47 | 96 – 105.9 | 0.750 | 0.775 | 0.754 |

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

Table 10-15. Primary Tank Vertical Wall Scan 2 - Plate #5 (via Riser 026)

| 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. 2-17) | 35 | 0 – 12 (1) | 0.875 | 0.890 | 0.857 |
| | 23 | 12 – 21.2 | 0.875 | 0.885 | 0.858 |

(1) Scan start was 1 inch below the centerline of the fifth horizontal weld, and 17 inches west of Scan 1, centerline to centerline; Scan width was 115 inches.

Table 10-16. Primary Tank Wall Historical Liquid-Air Interface Scan – Plate #1 (via Riser 026)

| Scan I.D. Number (Data Sheets) | Elevation of Horizontal Wall Scan (inches) | Horizontal Location of Wall Scan (inches) | Design Nominal (inches) | Measured Average (inches) | Measured Minimum (inches) |
|---|---|---|---|---|---|
| Liquid / Air A (Page Att. 2-23) | 381.5 To 398.5 | 0 – 12 [(1)] | 0.500 | 0.530 | 0.501 |
| | | 12 – 24 | 0.500 | 0.530 | 0.503 |
| | | 24 – 36 | 0.500 | 0.530 | 0.498 |
| | | 36 – 37.28 | 0.500 | 0.530 | 0.511 |
| Liquid / Air B (Page Att. 2-24) | 381.5 to 398.5 | 0 – 12 [(2)] | 0.500 | 0.530 | 0.501 |
| | | 12 – 21.7 | 0.500 | 0.530 | 0.505 |
| Liquid / Air C (Page Att. 2-25) | 381.5 To 398.5 | 0 – 12 [(3)] | 0.500 | 0.535 | 0.508 |
| | | 12 – 24 | 0.500 | 0.535 | 0.510 |
| | | 24 – 36 | 0.500 | 0.535 | 0.503 |
| | | 36 – 48 | 0.500 | 0.535 | 0.511 |
| | | 48 – 60 | 0.500 | 0.535 | 0.510 |
| | | 60 – 72 | 0.500 | 0.535 | 0.511 |
| | | 72 – 84 | 0.500 | 0.535 | 0.513 |
| | | 84 – 96 | 0.500 | 0.535 | 0.504 |
| | | 96 – 108 | 0.500 | 0.535 | 0.514 |
| | | 108 – 120 | 0.500 | 0.535 | 0.505 |
| Liquid / Air D (Page Att. 2-26) | 381.5 To 398.5 | 0 – 12 [(4)] | 0.500 | 0.535 | 0.503 |
| | | 12 – 24 | 0.500 | 0.535 | 0.509 |
| | | 24 – 36 | 0.500 | 0.535 | 0.506 |
| | | 36 – 48 | 0.500 | 0.535 | 0.504 |
| | | 48 – 60 | 0.500 | 0.535 | 0.500 |
| | | 60 - 72 | 0.500 | 0.535 | 0.504 |

[(1)] Start of scan @ east air line; Scan width was 17 inches.

[(2)] Start of scan @ end of Liquid / Air A; Scan width was 17 inches.

[(3)] Start of scan @ end of Liquid / Air B; Scan width was 17 inches.

[(4)] Start of scan @ end of Liquid / Air C; Scan width was 17 inches.

Table 10-17. Primary Tank Vertical Wall Weld Scan - Plate #2 (via Riser 026)

| 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 2" (Page Att. 2-27) | 327 | 0 – 12 [(1)] | 0.500 | 0.520 | 0.478 |
| | 315 | 12 – 24 | 0.500 | 0.520 | 0.482 |
| | 303 | 24 – 36 | 0.500 | 0.520 | 0.481 |
| | 291 | 36 – 48 | 0.500 | 0.520 | 0.487 |
| | 279 | 48 – 60 | 0.500 | 0.520 | 0.488 |
| | 267 | 60 – 72 | 0.500 | 0.520 | 0.482 |
| | 255 | 72 – 84 | 0.500 | 0.520 | 0.478 |
| | 243 | 84 – 88.4 | 0.500 | 0.520 | 0.482 |

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

Table 10-18. Primary Tank Vertical Wall Weld Scan - Plate #3 (via Riser 026)

| 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. 2-28) | 235 | 0 – 12 [(1)] | 0.5625 | 0.520 | 0.485 |
| | 223 | 12 – 24 | 0.5625 | 0.520 | 0.482 |
| | 211 | 24 – 36 | 0.5625 | 0.520 | 0.480 |
| | 199 | 36 – 48 | 0.5625 | 0.520 | 0.487 |
| | 187 | 48 – 60 | 0.5625 | 0.520 | 0.487 |
| | 175 | 60 – 72 | 0.5625 | 0.520 | 0.485 |
| | 163 | 72 – 84 | 0.5625 | 0.520 | 0.463 |
| | 151 | 84 – 88.6 | 0.5625 | 0.520 | 0.486 |

[(1)] Scan start was 1 inch below the centerline of the third horizontal weld; Scan width was 11.44 inches.

Table 10-19. Primary Tank Vertical Wall Weld Scan - Plate #4 (via Riser 026)

| 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. 2-29) | 143 | 0 – 12 (1) | 0.750 | 0.760 | 0.708 |
| | 131 | 12 – 24 | 0.750 | 0.755 | 0.733 |
| | 119 | 24 – 36 | 0.750 | 0.755 | 0.731 |
| | 107 | 36 – 48 | 0.750 | 0.750 | 0.735 |
| | 95 | 48 – 60 | 0.750 | 0.755 | 0.731 |
| | 83 | 60 – 72 | 0.750 | 0.755 | 0.729 |
| | 71 | 72 – 84 | 0.750 | 0.755 | 0.730 |
| | 59 | 84 – 96 | 0.750 | 0.755 | 0.731 |
| | 47 | 96 – 102.8 | 0.750 | 0.760 | 0.738 |

(1) Scan start was 1 inch below the centerline of the fourth horizontal weld; Scan width was 11.58 inches.

Table 10-20. Primary Tank Vertical Wall Weld Scan - Plate #5 (via Riser 026)

| 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. 2-30) | 35 | 0 – 12 (1) | 0.875 | 0.900 | 0.867 |
| | 23 | 12 – 21.3 | 0.875 | 0.900 | 0.859 |

(1) Scan start was 1 inch below the centerline of the fifth horizontal weld; Scan width was 11.1 inches.

Table 10-21. Primary Tank Horizontal Weld - Plate #5 to Knuckle Scan, Plate #5 Side (via Riser 026)

| Scan I.D. Number (Data Sheets) | Elevation of Horizontal Weld Scan (inches) | Horizontal Location of Weld Scan, Plate #5 Side (inches) | Design Nominal (inches) | Measured Average (inches) | Measured Minimum (inches) |
|---|---|---|---|---|---|
| Scan "Horiz. Weld / Knuckle" (Page Att. 2-40) | From ~1 in. To 5.25 in. Above Plate #5 / Knuckle Weld | 0 – 12 [(1)] | 0.875 | 0.900 | 0.867 |
| | | 12 – 24 | 0.875 | 0.900 | 0.868 |
| | | 24 – 36 | 0.875 | 0.900 | 0.873 |
| | | 36 – 48 | 0.875 | 0.900 | 0.874 |
| | | 48 – 60 | 0.875 | 0.900 | 0.871 |
| | | 60 – 64.8 | 0.875 | 0.900 | 0.871 |
| Scan "Horiz. Weld / Knuckle A" (Page Att. 2-41) | From ~1 in. To 5.2 in. Above Plate #5 / Knuckle Weld | 0 – 12 [(2)] | 0.875 | 0.900 | 0.868 |
| | | 12 – 24 | 0.875 | 0.900 | 0.869 |
| | | 24 – 36 | 0.875 | 0.895 | 0.859 |
| | | 36 – 48 | 0.875 | 0.890 | 0.863 |
| | | 48 – 60 | 0.875 | 0.890 | 0.862 |
| | | 60 – 72 | 0.875 | 0.890 | 0.862 |
| | | 72 – 84 | 0.875 | 0.890 | 0.861 |
| | | 84 – 96 | 0.875 | 0.890 | 0.861 |
| | | 96 – 96.6 | 0.875 | 0.890 | 0.876 |
| Scan "Horiz. Weld / Knuckle B" (Page Att. 2-42) | From ~1 in. To 4.75 in. Above Plate #5 / Knuckle Weld | 0 - 12 [(3)] | 0.875 | 0.890 | 0.861 |
| | | 12 – 24 | 0.875 | 0.885 | 0.852 |
| | | 24 – 36 | 0.875 | 0.910 | 0.878 |
| | | 36 – 48 | 0.875 | 0.910 | 0.884 |
| | | 48 – 60 | 0.875 | 0.910 | 0.887 |
| | | 60 – 72 | 0.875 | 0.910 | 0.876 |
| | | 72 – 84 | 0.875 | 0.910 | 0.881 |
| | | 84 – 92.63 | 0.875 | 0.910 | 0.877 |

(1) Start of scan west of weld attachment, west of east air line; scan width was 10.5 inches.
(2) Start of scan @ end of scan Horz. Weld / Knuckle; Scan width was 10.4 inches.
(3) Start of scan @ west side of weld attachment, west of 24" riser; Scan width was 9.5 inches.

Table 10-22. Primary Tank Horizontal Weld - Plate #5 to Knuckle Scan, Knuckle Side (via Riser 026)

| 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 "Horiz. Weld / Knuckle" (Page Att. 2-43) | From ~1 in. To 5.25 in. Below Plate #5 / Knuckle Weld | 0 – 12 [(1)] | 0.875 | 0.925 | 0.898 |
| | | 12 – 24 | 0.875 | 0.925 | 0.901 |
| | | 24 – 36 | 0.875 | 0.925 | 0.903 |
| | | 36 – 48 | 0.875 | 0.925 | 0.889 |
| | | 48 – 60 | 0.875 | 0.925 | 0.920 |
| Scan "Horiz. Weld / Knuckle A" (Page Att. 2-44) | From ~1 in. To 5.2 in. Below Plate #5 / Knuckle Weld | 0 – 12 [(2)] | 0.875 | 0.930 | 0.906 |
| | | 12 – 24 | 0.875 | 0.930 | 0.902 |
| | | 24 – 36 | 0.875 | 0.930 | 0.895 |
| | | 36 – 48 | 0.875 | 0.930 | 0.893 |
| | | 48 – 60 | 0.875 | 0.930 | 0.890 |
| | | 60 – 72 | 0.875 | 0.925 | 0.882 |
| | | 72 – 84 | 0.875 | 0.930 | 0.895 |
| | | 84 – 96 | 0.875 | 0.925 | 0.880 |
| | | 96 – 96.6 | 0.875 | 0.925 | 0.896 |
| Scan "Horiz. Weld / Knuckle B" (Page Att. 2-45) | From ~1 in. To 4.75 in. Below Plate #5 / Knuckle Weld | 0 - 12 [(3)] | 0.875 | 0.925 | 0.892 |
| | | 12 – 24 | 0.875 | 0.955 | 0.922 |
| | | 24 – 36 | 0.875 | 0.950 | 0.913 |
| | | 36 – 48 | 0.875 | 0.950 | 0.916 |
| | | 48 – 60 | 0.875 | 0.950 | 0.910 |
| | | 60 – 72 | 0.875 | 0.940 | 0.907 |
| | | 72 – 84 | 0.875 | 0.945 | 0.917 |
| | | 84 – 92.63 | 0.875 | 0.925 | 0.913 |

(1) Start of scan west of weld attachment, west of east air line; scan width was 10.5 inches.

(2) Start of scan @ end of scan Horz. Weld / Knuckle; Scan width was 10.4 inches.

(3) Start of scan @ west side of weld attachment, west of 24" riser; Scan width was 9.5 inches.

Table 10-23. Primary Tank Lower Knuckle Scan Using The P-scan System (via Riser 026)

| Scan I.D. Number (Data Sheets) | Vertical Location of Horizontal Knuckle Scan | Horizontal Location of Knuckle Scan (inches) | Design Nominal (inches) | Measured Average (inches) | Measured Minimum (inches) |
|---|---|---|---|---|---|
| Scan "Y-Arm / Knuckle" (Page Att. 2-52) | From 2 in. to 9.8 in. below Plate #5 / Knuckle Weld | 0 – 12 [(1)] | 0.875 | 0.950 | 0.917 |
| | | 12 – 24 | 0.875 | 0.945 | 0.902 |
| | | 24 – 36 | 0.875 | 0.945 | 0.909 |
| | | 36 – 48 | 0.875 | 0.955 | 0.919 |
| | | 48 – 60 | 0.875 | 0.955 | 0.912 |
| | | 60 – 72 | 0.875 | 0.955 | 0.920 |
| | | 72 – 84 | 0.875 | 0.950 | 0.910 |
| | | 84 – 96 | 0.875 | 0.940 | 0.903 |
| | | 96 – 108 | 0.875 | 0.940 | 0.906 |
| | | 108 – 120 | 0.875 | 0.940 | 0.900 |
| Scan "Y-Arm / Knuckle A" (Page Att. 2-53) | From 2 in. to 9.8 in. below Plate #5 / Knuckle Weld | 0 – 12 [(2)] | 0.875 | 0.940 | 0.910 |
| | | 12 - 24 | 0.875 | 0.940 | 0.893 |
| | | 24 – 36 | 0.875 | 0.935 | 0.902 |
| | | 36 – 47.1 | 0.875 | 0.935 | 0.885 |
| Scan "Y-Arm / Knuckle B" (Page Att. 2-54) | From 2 in. to 10.4 in. below Plate #5 / Knuckle Weld | 0 – 12 [(3)] | 0.875 | 0.920 | 0.878 |
| | | 12 – 22.89 | 0.875 | 0.920 | 0.883 |
| Scan "Y-Arm / Knuckle C" (Page Att. 2-55) | From 2 in. to 10.3 in. below Plate #5 / Knuckle Weld | 0 – 12 [(4)] | 0.875 | 0.960 | 0.929 |
| | | 12 - 24 | 0.875 | 0.955 | 0.920 |
| | | 24 - 36 | 0.875 | 0.965 | 0.923 |
| | | 36 - 48 | 0.875 | 0.965 | 0.920 |
| | | 48 – 60.06 | 0.875 | 0.960 | 0.914 |

(1) Start of scan @ east air line; Scan width was 9.8 inches.
(2) Start of scan @ end of scan knuckle; Scan width was 9.8 inches.
(3) Start of scan @ end of weld attachment, west of 24 inch riser; Scan width was 10.4 inches.
(4) Start of scan @ vert. weld, west of weld attachment, west of 24 inch riser; Scan width was 10.3 inches

Table 10-24. Primary Tank Lower Knuckle Scan Using the P-scan System in Air Slots (via Riser 026)

| Scan I.D. Number (Data Sheets) | Vertical Location of Knuckle Scan in Slot | Vertical Y-Travel of Knuckle Scan in Slot (inches) | Design Nominal (inches) | Measured Average (inches) | Measured Minimum (inches) |
|---|---|---|---|---|---|
| Scan "Y-Arm / Slot 2" (Page Att. 2-58) | Exact starting positions not determined, but approximately 10 to 12 inches below the Plate #5 / Knuckle Weld; Scans overlap areas examined in continuous scans (see Table 10-23) | 6.65 (1) | 0.875 | 0.960 | 0.947 |
| Scan "Y-Arm / Slot 7" (Page Att. 2-59) | | 6.65 (2) | 0.875 | 0.975 | 0.955 |
| Scan "Y-Arm / Slot 8" (Page Att. 2-60) | | 6.65 (3) | 0.875 | 0.975 | 0.960 |
| Scan "Y-Arm / Slot 9" (Page Att. 2-61) | | 6.65 (4) | 0.875 | 0.970 | 0.954 |

(1) Horizontal x-travel of scan in slot was 0.725 inches.

(2) Horizontal x-travel of scan in slot was 1.04 inches.

(3) Horizontal x-travel of scan in slot was 1.04 inches.

(4) Horizontal x-travel of scan in slot was 1.036 inches.

# 11.0 EVALUATION OF INSPECTION RESULTS

The results from the inspection of tank 241-AN-104 are evaluated and compared with results of all other tank ultrasonic inspections.

## 11.1 TANK 241-AN-104 UT DATA EVALUATION

The UT P-scan data were interpreted by W. H. Nelson, COGEMA Engineering's Level III certified inspector. The P-scan data were also examined by 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-AN-104 - Examination Completed August 2005*, PNNL report number PNNL-15343, Rev. 0 (Attachment 3).

The results of the tank 241-AN-104 UT inspections indicated no reportable wall thinning, no pit-like indications, and no cracking in any of the areas examined. Figure 11-1 illustrates all of the "as-found" average wall thickness measurements of the primary tank vertical wall scans generated from the P-scan Inspection Data Sheets (Attachment 2). Each measurement plotted on Figure 11-1 is the average of all data collected over a 12 inch long by 17 inch wide scan area. Areas of interest for tank 241-AN-104 are the vapor space above the liquid waste, the historical liquid-vapor interface (approximately 384 inches), and the liquid region.

The overall average wall thickness measurements for the walls and weld HAZs are tabulated in Table 11-1. The UT data show that the primary tank average wall thickness values exceed the nominal values specified in the design documents. The UT data, when compared to construction specifications, drawings, standards, and codes (*241-AN 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 parallel strips, each ~33 feet long and 17 inches wide, encompassing Plate #1 through Plate #5 were examined. The average ((scan 1 + scan 2)/2) plate wall thicknesses ranged from 101.6% of nominal (plate #5), to 105.8% of nominal (plate #1). The overall average plate wall thickness (of the 5 plates) was 104% of nominal. The average ((scan 1 + scan 2)/2) minimum wall thickness values detected ranged from 98.2% of nominal (Plate #5) to 100.3% of nominal (Plate #2). The overall average minimum plate wall thickness was 99.6% of nominal. Of the 12 inch long vertical wall plate scans yielding minimum thicknesses falling below the nominal values, the greatest thickness deviation was 2.2% below the nominal (Plate #3, Scan 1). 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

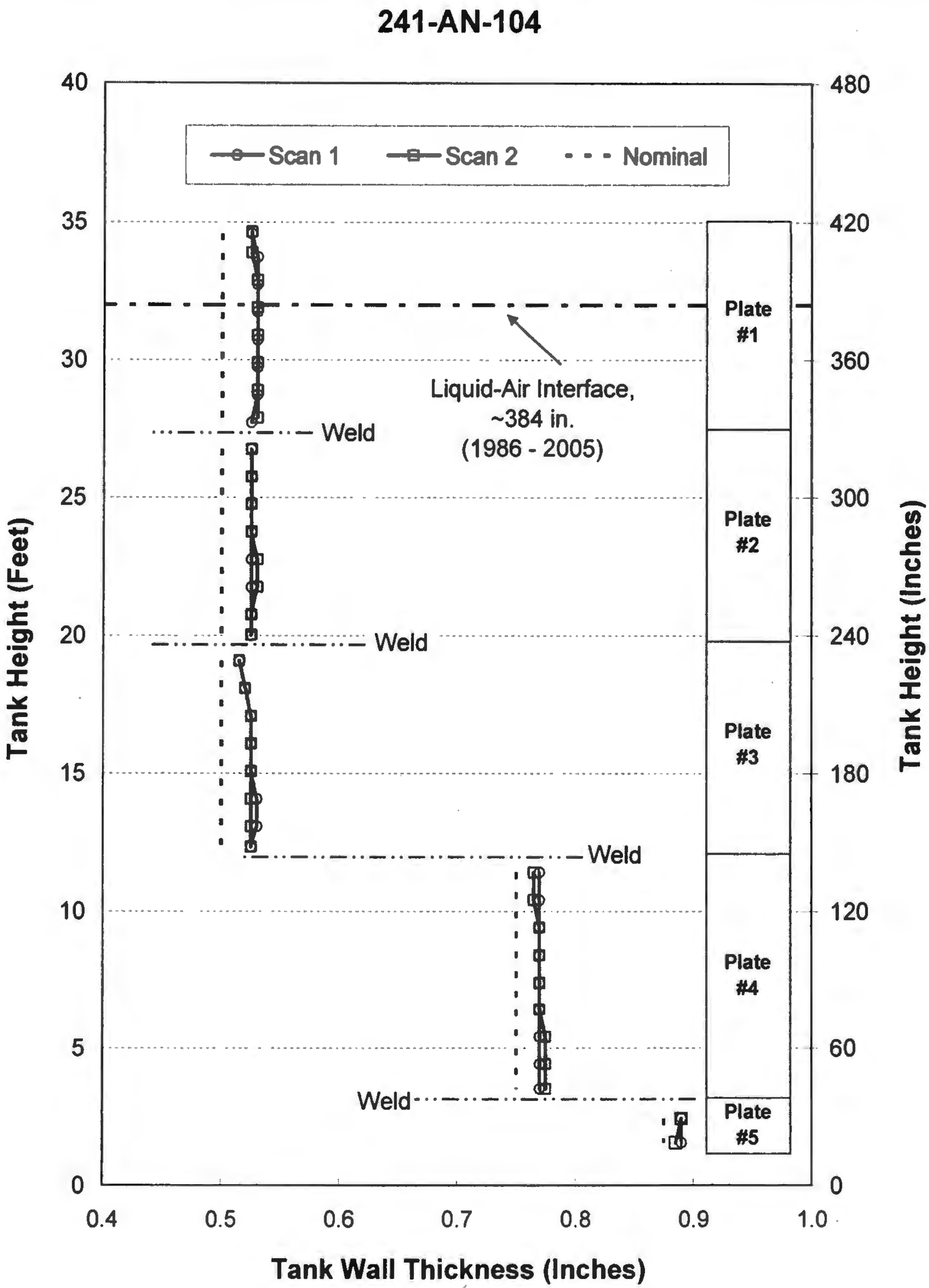


Table 11-1. Average Tank Wall Thickness Values

| Scan Description | Scan Location | Scan 1 Average (inches) | Scan 2 Average (inches) | Average Thickness (inches) | Nominal Thickness (inches) | Average minus Nominal (inches) |
|---|---|---|---|---|---|---|
| Vertical Wall Scans (1) | Plate #1 | 0.5288 | 0.5288 | 0.5288 | 0.500 | + 0.029 |
| | Plate #2 | 0.5250 | 0.5250 | 0.5250 | 0.500 | + 0.025 |
| | Plate #3 | 0.5244 | 0.5231 | 0.5238 | 0.500 | + 0.024 |
| | Plate #4 | 0.7700 | 0.7706 | 0.7703 | 0.750 | + 0.020 |
| | Plate #5 | 0.8900 | 0.8875 | 0.8888 | 0.875 | + 0.014 |
| Liquid / Air Interface | Plate #1 | 0.5336 | n/a (2) | 0.5336 | 0.500 | + 0.034 |
| Primary Lower Knuckle | Knuckle | 0.9462 | n/a | 0..9462 | 0.875 | + 0.071 |
| Vertical Welds | Plate #2 | 0.5200 | n/a | 0.5200 | 0.500 | + 0.020 |
| | Plate #3 | 0.5200 | n/a | 0.5200 | 0.500 | + 0.020 |
| | Plate #4 | 0.7556 | n/a | 0.7556 | 0.750 | + 0.006 |
| | Plate #5 | 0.900 | n/a | 0.900 | 0.875 | + 0.025 |
| Primary Lower Knuckle Weld | Plate #5 Side | 0.8987 | n/a | 0.8987 | 0.875 | + 0.024 |
| | Knuckle Side | 0.9327 | n/a | 0.9327 | 0.875 | + 0.058 |

(1) Scan 1 and Scan 2 were on the same plate, unless otherwise noted.

(2) n/a – not applicable (only one scan performed)

**Primary Tank Wall Historical Liquid-Air Interface:** A horizontal strip (~21 feet long by 17 inches wide) encompassing the Plate #1 historical liquid-air interface (384 inch level) was examined. The average wall thickness detected during the liquid-air scan was 106.7% of nominal, in good agreement with the 105.8% reported above for the plate #1 vertical wall scan. The average minimum plate thickness value detected was 101.2% of nominal. Of the 12 inch long horizontal interface scans yielding minimum thicknesses falling below the nominal (0.500 inches), the greatest deviation was 0.4% below nominal. No reportable thinning, pitting or crack-like indications were found.

**Primary Tank Vertical Welds:** One vertical weld in each of the four plates #2 through #5 was examined. The average thicknesses of the plate walls adjacent to the welds ranged from 100.8% of the nominal plate thickness (plate #4 HAZ), to 104.0% of nominal (plate #2 HAZ). The overall average thickness of the four vertical weld HAZs was 102.9% of the nominal plate thickness values. The average minimum thickness of the plate walls adjacent to the welds ranged from 96.4% of nominal (Plate #3 HAZ) to 98.6% of nominal (Plate #5 HAZ). The overall average minimum thickness of the four vertical weld HAZs was 97.1% of nominal. Of the 12 inch long vertical weld scans yielding minimum thicknesses falling below the nominal, the greatest deviation was 7.4% below nominal (Plate #3 HAZ). No crack-like indications were found. There were also no reportable wall thinning or pitting indications found.

**Primary Tank Knuckle-to-Shell Weld:** A 20.89 foot long region of the horizontal knuckle-to-shell weld was examined. No crack-like indications were found. There were also no reportable wall thinning or pitting indications found. The average thickness of the horizontal knuckle-to-plate#5 weld HAZ ranged from 102.7% of nominal (plate-side scan), to 106.6% of nominal (Knuckle-side scan). The overall average thickness of the horizontal weld HAZ was 104.7% of nominal. The average minimum thickness of the horizontal weld HAZ ranged from 97.3% of nominal for the plate-side scan, to 102.9% of nominal for the knuckle-side scan. The overall average minimum thickness of the horizontal weld HAZ was 101.3% of nominal. Of the 12 inch long horizontal weld scans yielding minimum thicknesses falling below the nominal, the greatest deviation was 2.6% below nominal (plate-side scan).

**Lower Primary Knuckle Wall:** A horizontal strip (20.8 feet long by approximately 10 inches wide) along the lower primary knuckle was examined using the P-scan system. The average thickness was found to be 108.1% of nominal. The average of the minimum thicknesses detected was 103.7% of nominal.

Four vertical strips, aligned with four different air slots, along the lower knuckle were examined using the P-scan system. Each strip was approximately 7 inches long by ~0.9 inches wide. The average thickness found during the vertical scans was 110.9% of nominal. The average of the minimum thicknesses detected was 109% of nominal.

All of the knuckle areas that were examined had minimum thicknesses that exceeded the nominal thickness of 0.875 inches. There were no reportable thinning, pitting, or crack-like indications found during the lower knuckle examination.

## 11.2 DST ULTRASONIC INSPECTION DATA RESULTS COMPARISON

The following Tables 11-2 and 11-3 provide a summary of primary tank vertical wall inspection results and a comparison of primary tank wall thinning.

Table 11-2 reports the inspection results chronologically according to fiscal year (October 1 through September 30).

Table 11-2. 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 11-2. (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 | None [(d)] |
| AZ-102 | 2003 | None | None | Six small areas in the vicinity of the liquid-air interface in Plate #2 (13.2% to 17.8% maximum reduction in thickness) | Three small areas of wall thinning near the Plate #1 vertical weld (10.9% to 16.8% maximum reduction in thickness) |
| SY-103 | 2004 | None | None | Six small areas in the Plate #1 Vapor Space (10.4% to 12.8% maximum reduction in thickness) | None |
| SY-101 | 2004 | None | None | Numerous areas in the vicinity of the historical liquid-air interface on Plate #1 (10.4% to 18.4% maximum reduction in thickness) | Numerous areas in Plate #1 and two areas in Plate #2 (10.6% to 17.3% maximum reduction in thickness) |
| SY-102 | 2004 | None | None | Numerous areas in Plate #1 (10.1% to 12.5% maximum reduction in thickness) | One small area in Plate #1 (10.7% maximum reduction in thickness) |

(Cont. on next page)

Table 11-2. (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 |
|---|---|---|---|---|---|
| AP-104 | 2004 | None | None | None | None |
| AP-106 | 2005 | None | None | None | None |
| AP-104 | 2005 [e] | Not Investigated | None | None | Not Investigated |
| AP-102 | 2005 | None | None | Two areas of plate #2 (14% maximum reduction in Thickness). | Five areas of thinning in the HAZ of plate #4 (13% maximum reduction in thickness). |
| AN-103 | 2005 | None | None | None | None |
| AN-104 | 2005 | None | None | None | None |

[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 determined that the indication is a small area of incomplete fusion that is not open to either surface of the tank.

[e] Primary tank upper knuckle examination only.

The inspection results in Table 11-2 show that the overall condition of the inspected tanks is satisfactory. Wall thickness data gathered from ultrasonic examination of twenty-seven 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 thicknesses at the time of construction. However, wall thickness data from ultrasonic testing may be compared to the specified nominal plate thickness.

Table 11-3 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 data used the minimum wall thickness in each scanning area (generally 12 inches by 15 inches) from the vertical wall scans and then calculated the average for each plate using the minimum thickness values. The negative 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 thicknesses, and by nominal plate thickness for all DSTs examined.

Tank 241-AN-104 did not exhibit any significant thinning.

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

Table 11-3. 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-103 | 2005 | n/a | 0.026 | n/a | 0.007 | 0.001 | 0.019 | 0.032 |
| AN-104 | 2005 | n/a | 0.000 | n/a | 0.002 | 0.016 | 0.002 | 0.006 |
| 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-102 | 2005 | n/a | 0.029 | 0.056 | 0.040 | 0.065 | 0.040 | 0.024 |
| AP-103 | 2003 | n/a | 0.008 | -0.004 | -0.009 | 0.007 | 0.000 | 0.012 |
| AP-104 | 2004 | n/a | -0.006 | -0.016 | -0.016 | 0.011 | -0.010 | 0.014 |
| AP-105 | 2003 | n/a | 0.004 | -0.006 | -0.002 | 0.010 | 0.000 | 0.009 |
| AP-106 | 2005 | n/a | -0.007 | 0.006 | -0.012 | 0.012 | -0.004 | 0.012 |
| 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 |
| AZ-102 | 2003 | 0.017 | 0.007 | n/a | -0.011 | -0.004 | 0.002 | 0.019 |
| SY-101 | 2004 | 0.056 | 0.009 | n/a | 0.026 | -0.030 | 0.015 | 0.020 |
| SY-102 | 2004 | 0.042 | 0.007 | n/a | 0.009 | 0.031 | 0.012 | 0.014 |
| SY-103 | 2004 | 0.041 | 0.008 | n/a | 0.019 | -0.022 | 0.012 | 0.015 |
| AVG: | | 0.021 | 0.002 | 0.001 | 0.005 | 0.007 | | |
| STD DEV: | | 0.028 | 0.022 | 0.023 | 0.020 | 0.019 | | |

* 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-AN-104 are listed below.

Primary Tank Walls

- There were no areas of reportable wall thinning, pitting, or crack-like indications detected during the primary tank vertical wall scans.
- The primary wall vertical scans yielded an overall average ((scan 1 + scan 2)/2) wall thickness value of 104% of nominal. The overall average ((scan 1 + scan 2)/2) minimum wall thickness value was 99.6% of nominal. Of the 12 inch long vertical wall plate scans yielding minimum thicknesses falling below the nominal values, the greatest deviation was 2.2% below the nominal (Plate #3, Scan 2).

Liquid / Air Interface

- There were no areas of reportable wall thinning, pitting, or crack-like indications detected during the primary tank horizontal wall scan of the historical liquid-air interface.
- The overall average horizontal wall scan thickness value detected was 106.7% of nominal. The average minimum horizontal wall thickness values detected was 101.2% of nominal. Of the 12 inch long horizontal wall plate scans yielding minimum thicknesses falling below the nominal value (0.500 inches), the greatest deviation was 0.4% below the nominal.

Primary Tank Welds

- There were no areas of reportable wall thinning, pitting, or crack-like indications detected during the primary tank weld HAZ scans.
- The primary tank vertical weld scans (plate #2 through #5) and the knuckle-to-shell horizontal weld scan (plate #5 to lower knuckle) yielded overall average wall thickness values that were 102.9% of nominal for the vertical walls HAZ, and 104.7% of nominal for the horizontal knuckle/plate weld HAZ. The overall average minimum weld HAZ thickness value detected was 97% of nominal for the vertical welds HAZ, and 101.3% of nominal for the horizontal weld HAZ. Of the 12 inch long HAZ scans yielding minimum thicknesses falling below the nominal values, the greatest deviation was 7.4% below nominal (plate #3) for the vertical welds HAZ, and 2.6% of nominal (plate-side scan) for the horizontal weld HAZ.

Primary Tank Lower Knuckle

- There were no areas of reportable wall thinning, pitting, or crack-like indications detected during the primary tank lower knuckle scans.
- The knuckle examination included a horizontal strip of the knuckle wall, and four vertical strips of the wall aligned with four different air slots. The average wall thickness detected was 108.1% of nominal for the horizontal scan, and 110.9% of nominal for the vertical scans. The average minimum wall thickness detected was 103.7% of nominal for the horizontal scan, and 109% of nominal for the vertical scans.
- All of the areas of the knuckle that were examined had minimum thicknesses that exceeded the nominal thickness of 0.875 inches.

Conclusions

- Based on the results of this examination (no reportable indications), the material condition of DST 241-AN-104 is satisfactory for continued operation.

Recommendations

- According to a recent Tank Integrity Assessment Project DST Lifecycle Schedule, tank 241-AN-104 is scheduled for its second, standard UT examination in about ten years. Based on the results of this UT examination, it is recommended that this schedule be maintained – there is no reason to perform any near-term follow-up inspections on this tank. Following the second UT examination, inspection parameters such as wall thinning rates can be calculated and used to better quantify and evaluate any continual wall thinning or degradation.

  A visual examination of tank 241-AN-104 is scheduled in FY 2010 that will include visually examining the internal primary tank wall.

FY 2006 Activities

- The Hanford Federal Facility Agreement and Consent Order Milestone M-48-15 requires the re-examination (by September 30, 2007) of six DSTs that have been previously examined. Accordingly, DSTs AN-107, AW-103, and AY-102 are scheduled for UT re-examination in FY 2006.

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## ATTACHMENT 1

## AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

**(COGEMA Engineering Corporation**
**Procedure COGEMA-SVUT-INS-007.3, Rev. 2**
**Effective: December 16, 2003)**

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# AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

## 1.0 PURPOSE

This procedure establishes the method, equipment, and requirements for automated, direct contact ultrasonic test (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 inch 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 Test Instrument (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°, with an element size in the range of 1/4 inch to 1/2 inch, and 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° transducer, a 60° 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, personnel, 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 %** 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 Fahrenheit 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 1.00" calibration step and 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 0.300" calibration step, and verify that it produces an acceptable signal. Other thickness ranges may be used for system calibration. Initial calibration accuracy will be within +/- 0.010" in T-scan. Record reading on the Automated Ultrasonic Thickness Calibration Sheet (Attachment 1).

7.4.3 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 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 Repeat step 7.5.2 as required for each transducer until the system is calibrated.

7.5.4 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.

7.6 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 Figure 1, Attachment 2). 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 2). 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 3).

## 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 4 for minimum examination volume and beam direction for weld inspection.

<u>**NOTE**</u>: 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 Transducer overlap between passes shall be a minimum of <u>**50%**</u> of the element size. Scanning speed shall not exceed <u>**6 inches**</u> per second.

8.4.2 Should measurements be observed larger or smaller than the calibration range, 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 <u>not</u> 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 0° dual element transducer. The 45° 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° 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 2). The RATT technique uses shear wave reflected signals from both the flaw tip and the flaw base (see Figure 2, Attachment 2). 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 Ill. Such approval, signature and a description of the technique shall be recorded in the "Remarks" column on the Automated Ultrasonic P-Scan Calibration Sheet (Attachment 3).

## 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 - **10.0%**, 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 Automated Ultrasonic P-scan Data Report (Attachment 5) 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 0.100 inches.

## 10.0 REPORTS

### 10.1 Thickness Data Reports

An Automated Ultrasonic Thickness Data Report (Attachment 6) 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 Thickness Calibration Sheet (Attachment 1), and an Automated Ultrasonic P-Scan Calibration Sheet (Attachment 3) shall be prepared for each examination or series of examinations performed. These reports shall include the materials and equipment used for examination.

### 10.3 Sketch Sheets

Automated Ultrasonic Examination Sketch Sheet(s) (Attachments 7 and/or 8) should be prepared for each examination or series of examinations performed. These reports should include 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 Automated Ultrasonic P-Scan Data Report (Attachment 5) shall be completed only when cracking is detected. Each report shall be related to the applicable Automated Ultrasonic Examination Calibration Sheet(s).

### 10.5 Final Reports

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

## 11.0 ATTACHMENTS

Attachment 1: Sample Automated Ultrasonic Thickness Calibration Sheet

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

Attachment 3: Sample Automated Ultrasonic P-scan Calibration Sheet

Attachment 4: Examination Volume, Minimum Beam Directions and Extent of Examination

Attachment 5: Sample Automated Ultrasonic P-scan Data Report

Attachment 6: Sample Automated Ultrasonic Thickness Data Report

Attachment 7: Automated Ultrasonic Examination Sketch Sheet – Tank Walls and Knuckles

Attachment 8: Automated Ultrasonic Examination Sketch Sheet – Tank Bottom

## AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 1: Sample Automated Ultrasonic Thickness Calibration Sheet

| AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET | Job # | Riser # |
|---|---|---|

| | | | |
|---|---|---|---|
| Location: | System: | Calibration Block: | |
| Procedure: | Rev. | Thickness: | Material: |
| UT System: | Serial No. | Reference Block: | |
| Software Version: | Rev. | Thickness: | Material: |
| Linearity Due Date: | | Reference Block Temp: °F | |
| Scanner Type: | Serial No. | Couplant: | Batch No. |
| Scanner Cable: | | Cable Length: Feet | |
| Signal Cable: | | Cable Length: Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | |
| EXAMINER: | | | | | | | | | |

Remarks:

| Examiner: | Examiner: | Reviewer: |
|---|---|---|
| ____________________ | ____________________ | ____________________ |
| Level: ____ Date: ____________ | Level: ____ Date: ____________ | Level: ____ Date: ____________ |

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Attachment 2: Absolute Arrival Time Technique (AATT) & Relative Arrival Time Technique (RATT)

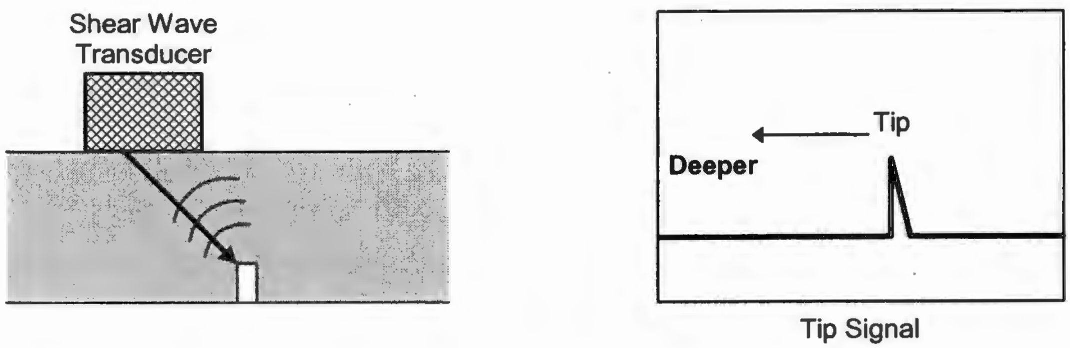


**Figure 1.** Absolute Arrival Time Technique

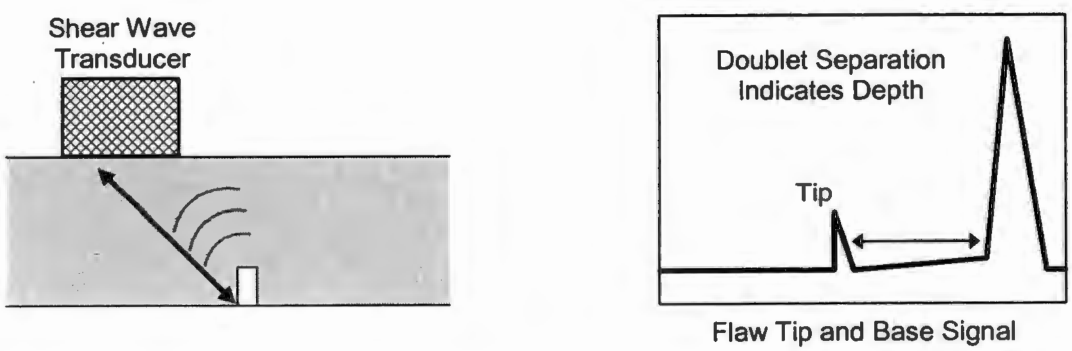


**Figure 2.** Relative Arrival Time Technique

## AUTOMATED ULTRASONIC EXAMINATION FOR CORROSION AND CRACKING

Attachment 3: Sample Automated Ultrasonic P-scan Calibration Sheet

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # | Riser # |
|---|---|---|---|
| Location: | System: | Calibration Block: | |
| Procedure: | Rev. | Thickness: | Material: |
| UT System: | Serial No. | Reference Block: | |
| Software Version: | Rev. | Thickness: | Material: |
| Linearity Due Date: | | Reference Block Temp: °F | |
| Scanner Type: | Serial No. | Couplant: | Batch No. |
| Scanner Cable: | | Cable Length: Feet | |
| Signal Cable: | | Cable Length: Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | | | | | | | | |
| TIME: | | | | | | | | | |
| REFLECTOR / ORIENTATION: | | | | | | | | | |
| CH. 1 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 2 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 3 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 4 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| EXAMINER: | | | | | | | | | |

Remarks:

| Examiner: | Examiner: | Reviewer: |
|---|---|---|
| ______________________ | ______________________ | ______________________ |
| Level: ____ Date: __________ | Level: ____ Date: __________ | Level: ____ Date: __________ |

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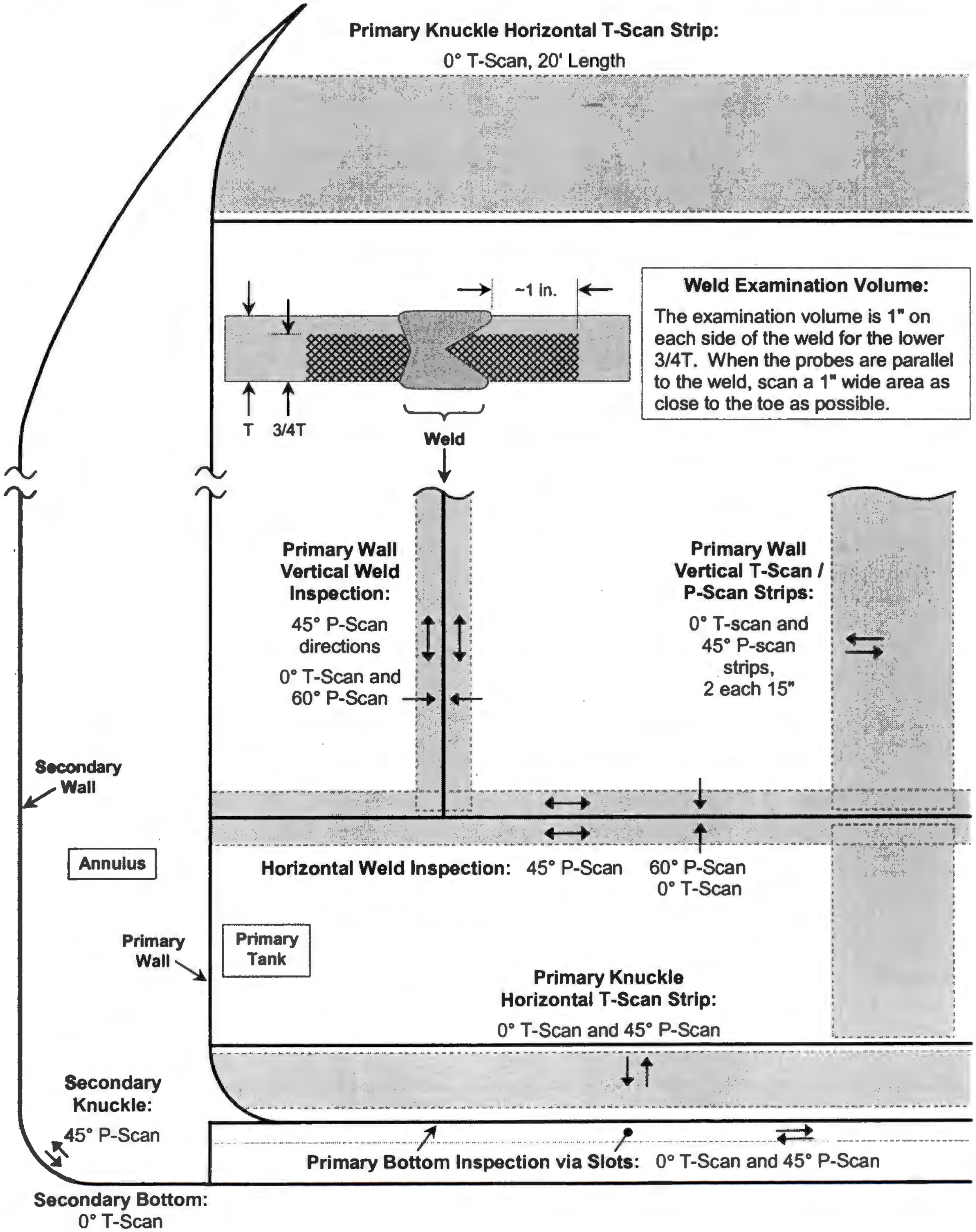
Attachment 4: Examination Volume, Minimum Beam Directions and Extent of Examination



Attachment 4 (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 Knuckles**

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. Examine 20 feet of the primary tank upper knuckle in the circumferential direction to detect pits and wall thinning. The areas to be examined are from the welds joining the transition plates with the knuckles 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.

Attachment 5: Sample Automated Ultrasonic P-scan Data Report

## AUTOMATED ULTRASONIC P-SCAN DATA REPORT

| | | | |
|---|---|---|---|
| Job # | | Riser # | |
| Location: | System: | Exam Start: | Exam End: |
| Component ID: | | Examination Surface: ☐ OD ☐ ID ☐ PAINTED | Nominal Thickness: |
| Configuration: TO | | Calibrated Range: TO | Temp: °F |
| Total Length Examined: | Scan Width: | Ref. Level Correction (Trans. Corr): ____ DB | |
| Procedure: | Rev. | Material Type: ☐ SS ☐ CS OTHER: ______ | Condition: |
| File Name / Item #: | | Transducer: ☐ DUAL ☐ SGL ☐ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): | | | |
| $Y_O$ Ref. Point ($W_O$): | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

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|---|---|---|---|
| Examiner: ____________ Level: ____ | Examiner: ____________ Date: ________ | Analyst: ____________ Level: ____ | Reviewer: ____________ Level: ____ |

*Rev. Dec. 03, 2003*

Attachment 6: Sample Automated Ultrasonic Thickness Data Report

**AUTOMATED ULTRASONIC THICKNESS DATA REPORT**

| | | |
|---|---|---|
| | Job # | Riser # |
| Location: | Exam Start: | Exam End: |
| Component ID: | Examination Surface: ☐ OD ☐ ID ☐ PAINTED | Nominal Thickness: |
| Configuration: TO | Calibrated Range: TO | Temp: °F |
| Total Length Examined: / Scan Width: | Ref. Level Correction (Trans. Corr.): ____ DB | |
| Procedure: / Rev | Material Type: ☐ SS ☐ CS OTHER: ______ | Condition: |
| File Name: | Transducer: ☐ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): | | |
| $Y_O$ Ref. Point ($W_O$): | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
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Remarks:

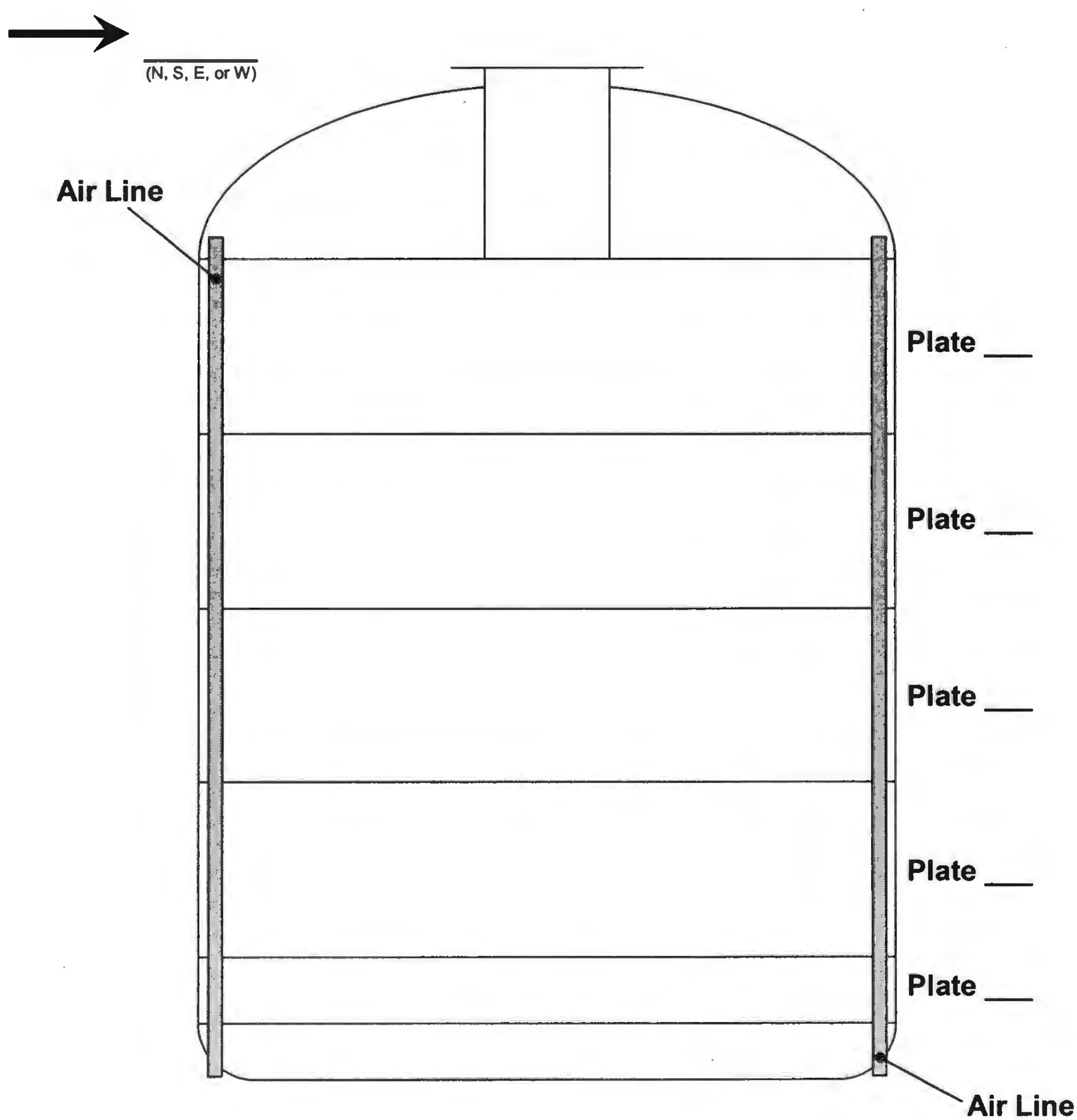
| Examiner: | Examiner: | Analyst: | Reviewer: |
|---|---|---|---|
| ________ | ________ | ________ | ________ |
| Level: ____ | Date: ________ | Level: ____ | Level: ____ |

*Rev. Dec. 03, 2003*

Attachment 7: Automated Ultrasonic Examination Sketch Sheet – Tank Walls and Knuckles

**Tank 241-_____**

**Riser ___**

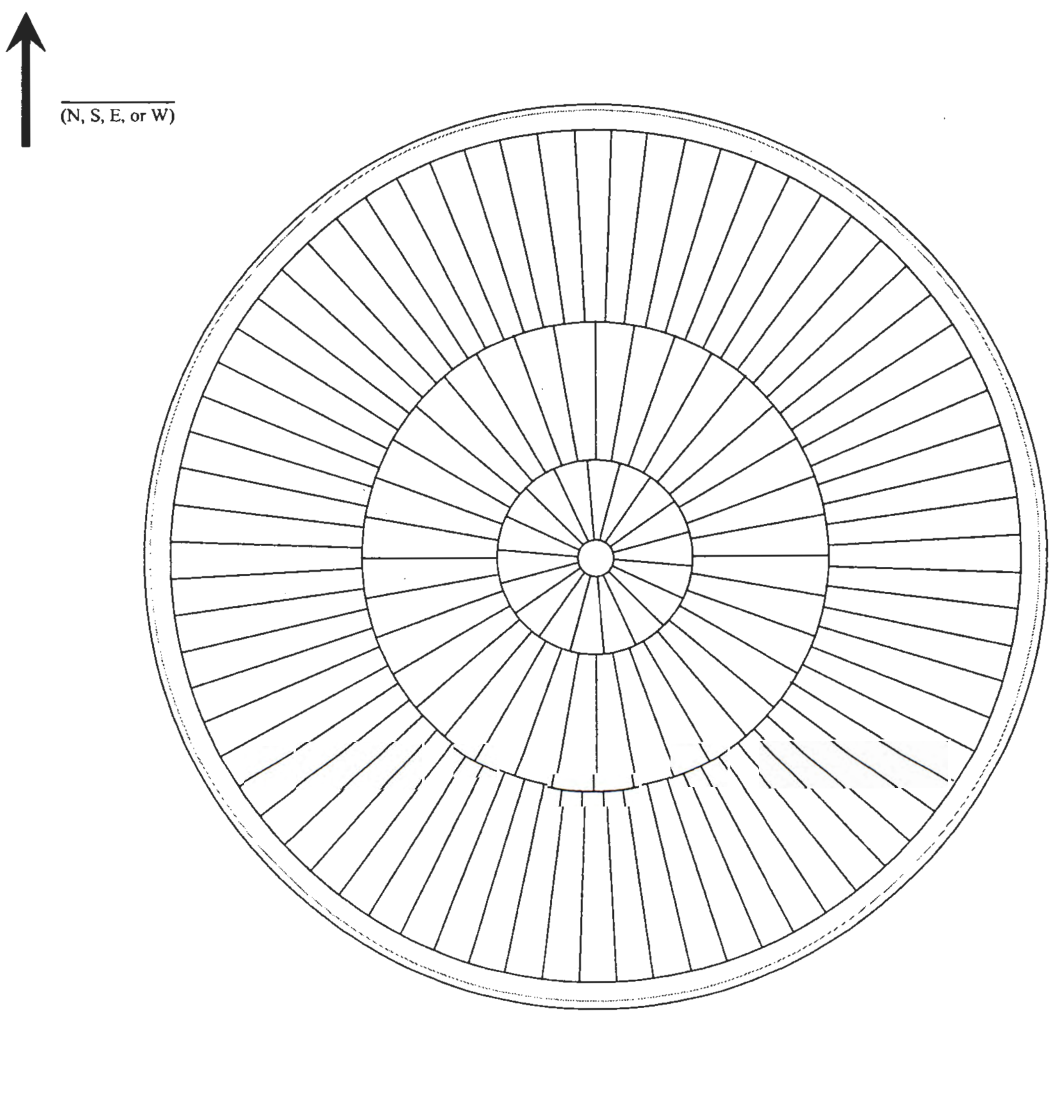


Attachment 8: Automated Ultrasonic Examination Sketch Sheet – Tank Bottom

**Tank 241-_____**

**Typical Air Channels Under Tank Bottom**

***Note:*** ***Flow Path Geometry and Number of Channels Differ from Tank to Tank***



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# ATTACHMENT 2

# COGEMA "AUTOMATED ULTRASONIC THICKNESS DATA REPORT SHEETS"

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| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 06/23/05 0855 | Exam End: 2020 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 92.2" / Scan Width: 15" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WALL/PLATE1 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_0$ Ref. Point ($L_0$): 1" above bottom horiz. weld, scanned up | | |
| $Y_0$ Ref. Point ($W_0$): Center line of 24" riser | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .525" | .504" | | .535" |
| 12-24 | | | | | .530" | .498" | | .535" |
| 24-36 | | | | | .530" | .493" | | .535" |
| 36-48 | | | | | .530" | .508" | | .535" |
| 48-60 | | | | | .530" | .509" | | .535" |
| 60-72 | | | | | .530" | .502" | | .535" |
| 72-84 | | | | | .530" | .499" | | .535" |
| 84-92.2 | | | | | .525" | .508" | | .535" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| WDPurdy | ______ | WHNelson | [N1] |
| Level: II Date: 06/23/05 | Date: ______ | Level: III Date: 08/09/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/13/05 0813 | Exam End: 1430 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 89.9" | Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: VERT.WALL/PLATE2 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): 1" below horiz. weld | | | |
| $Y_O$ Ref. Point ($W_O$): center line of 24" riser | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .525" | .499" | | .535" |
| 12-24 | | | | | .525" | .499" | | .535" |
| 24-36 | | | | | .525" | .504" | | .535" |
| 36-48 | | | | | .525" | .503" | | .535" |
| 48-60 | | | | | .525" | .499" | | .535" |
| 60-72 | | | | | .525" | .503" | | .535" |
| 72-84 | | | | | .525" | .499" | | .535" |
| 84-89.9 | | | | | .525" | .499" | | .535" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| *(signature)* | | *(signature)* | [N1] |
| Level: III Date: 07/13/05 | Date: | Level: III Date: 08/08/05 | Level: III Date: |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/18/05 0903 | Exam End: 2046 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 89.7" | Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WALL/PLATE3 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_0$ Ref. Point ($L_0$): 1" below horiz. weld | | | |
| $Y_0$ Ref. Point ($W_0$): center line of 24" riser | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .515" | .489" | | .530" |
| 12-24 | | | | | .520" | .493" | | .535" |
| 24-36 | | | | | .525" | .498" | | .535" |
| 36-48 | | | | | .525" | .503" | | .535" |
| 48-60 | | | | | .525" | .503" | | .535" |
| 60-72 | | | | | .530" | .509" | | .535" |
| 72-84 | | | | | .530" | .497" | | .535" |
| 84-89.7 | | | | | .525" | .502" | | .535" |
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Remarks:

Peak Data

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/18/05 | Date: ________ | Level: III Date: 08/08/05 | Level: III Date: ________ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 Rev. Dec. 03, 2003

# AUTOMATED ULTRASONIC THICKNESS DATA REPORT

| | | |
|---|---|---|
| **AUTOMATED ULTRASONIC THICKNESS DATA REPORT** | Job #: 04-41 | Riser #: 26 |
| Location: 200 EAST TANK FARM | Exam Start: 07/18/05 0903 | Exam End: 2046 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .750" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 105.9" / Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: VERT.WALL/PLATE4 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_0$ Ref. Point ($L_0$): 1" below horiz. weld

$Y_0$ Ref. Point ($W_0$): center line of 24" riser

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .770" | .744" | | .780" |
| 12-24 | | | | | .770" | .744" | | .780" |
| 24-36 | | | | | .770" | .744" | | .780" |
| 36-48 | | | | | .770" | .750" | | .780" |
| 48-60 | | | | | .770" | .753" | | .780" |
| 60-72 | | | | | .770" | .754" | | .780" |
| 72-84 | | | | | .770" | .750" | | .780" |
| 84-96 | | | | | .770" | .747" | | .780" |
| 96-105.9 | | | | | .770" | .747" | | .780" |
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Remarks:

Peak Data

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | | (signature) | [N1] |
| Level: III Date: 07/18/05 | Date: ____ | Level: III Date: 08/08/05 | Level: III Date: ____ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 06/27/05 1420 | Exam End: 2047 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 20.89" | Scan Width: 15" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WALL/PLATE 5 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): 1" above bottom horiz. weld, scanned up | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of 24" riser | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .890" | .864" | | .905" |
| 12-20.89 | | | | | .890" | .859" | | .905" |

Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | W H Nelson | [N1] |
| Level: II Date: 06/27/05 | Date: ________ | Level: III Date: 08/09/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 06/23/05 0905 | Exam End: 2025 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 92.1" | Scan Width: 15" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WALL/PLATE 1 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |

$X_O$ Ref. Point ($L_O$): Started @ bottom horiz.,1" above weld and scanned up

$Y_O$ Ref. Point ($W_O$): Center line of 24"riser

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | ________ | W H Nelson | [N1] |
| Level: II Date: 06/23/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/13/05 0809 | Exam End: 1436 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 89.8" | Scan Width: 17" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WALL/PLATE 2 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_0$ Ref. Point ($L_0$): Started @ 1" below horiz. weld | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of 24"riser | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/13/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

# AUTOMATED ULTRASONIC P-SCAN DATA REPORT

| | |
|---|---|
| Job # | 04-41 |
| Riser # | 26 |
| Location: | 200 EAST TANK FARM |
| System: | PSP-4 |
| Exam Start: | 07/18/05 0916 |
| Exam End: | 2051 |
| Component ID: | 104-AN |
| Examination Surface: | ☒ OD ☐ ID ☐ PAINTED |
| Nominal Thickness: | 0.5000" |
| Configuration: | PLATE TO PLATE |
| Calibrated Range: | 0" TO 1.414" |
| Temp: | AMB °F |
| Total Length Examined: | 89.6" |
| Scan Width: | 17" |
| Ref. Level Correction (Trans. Corr): | 0 DB |
| Procedure: | COGEMA SVUT-INS-007.3 |
| Rev. | 2 |
| Material Type: | ☐ SS ☒ CS OTHER: ____ |
| Condition: | N/A |
| File Name / Item #: | VERT.WALL/PLATE 3 |
| Transducer: | ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° |
| $X_O$ Ref. Point ($L_O$): | Started @ 1" below horiz. weld |
| $Y_O$ Ref. Point ($W_O$): | Center line of 24"riser |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

## INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/18/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

# AUTOMATED ULTRASONIC P-SCAN DATA REPORT

| | | | |
|---|---|---|---|
| **AUTOMATED ULTRASONIC P-SCAN DATA REPORT** | | Job #: 04-41 | Riser #: 26 |
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/18/05 0916 | Exam End: 2051 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.7500" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2.12" | Temp: AMB °F |
| Total Length Examined: 106.1" | Scan Width: 17" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WALL/PLATE 4 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ 1" below horiz. weld | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of 24"riser | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

## INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/18/05 | Date: ____ | Level: III Date: 08/23/05 | Level: III Date: ____ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 06/27/05 0916 | Exam End: 2051 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 20.8" | Scan Width: 15" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WALL/PLATE 5 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_0$ Ref. Point ($L_0$): Started @ 1" below horiz. weld | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of 24"riser | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| WDPurdy | ______ | WHNelson | [N1] |
| Level: II Date: 06/27/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/19/05 0815 | Exam End: 1430 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 90.3" / Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: VERT.WALL/2ND/PLATE1 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ___ ° | |
| $X_O$ Ref. Point ($L_O$): 1" above bottom horiz. weld, scanned up | | |
| $Y_O$ Ref. Point ($W_O$): 17" from center line of first pass | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .530" | .504" | | .535" |
| 12-24 | | | | | .530" | .480" | | .535" |
| 24-36 | | | | | .530" | .490" | | .535" |
| 36-48 | | | | | .530" | .494" | | .535" |
| 48-60 | | | | | .530" | .502" | | .535" |
| 60-72 | | | | | .530" | .504" | | .535" |
| 72-84 | | | | | .525" | .499" | | .535" |
| 84-90.3 | | | | | .525" | .498" | | .535" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/19/05 | Date: ____ | Level: III Date: 08/08/05 | Level: III Date: ____ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|

| | | | |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/21/05 0743 | Exam End: 1350 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 89.4" | Scan Width: 15" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ___ | Condition: N/A |
| File Name: VERT.WALL/2ND/PLATE2 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ___ ° | |

$X_O$ Ref. Point ($L_O$): 1" below horiz. weld

$Y_O$ Ref. Point ($W_O$): 17" from center line of first pass

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .525" | .499" | | .535" |
| 12-24 | | | | | .525" | .502" | | .535" |
| 24-36 | | | | | .525" | .501" | | .535" |
| 36-48 | | | | | .525" | .503" | | .535" |
| 48-60 | | | | | .530" | .503" | | .535" |
| 60-72 | | | | | .530" | .507" | | .535" |
| 72-84 | | | | | .525" | .501" | | .535" |
| 84-89.4 | | | | | .525" | .503" | | .535" |

Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | W H Nelson (signature) | [N1] |
| Level: II Date: 07/21/05 | Date: ____ | Level: III Date: 08/09/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

## AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Job #: 04-41
Riser #: 26

Location: 200 EAST TANK FARM
Exam Start: 07/20/05 0835
Exam End: 2016

Component ID: 104-AN
Examination Surface: ☒ OD ☐ ID ☐ PAINTED
Nominal Thickness: .500"

Configuration: PLATE TO
Calibrated Range: 0.3" TO 1.0"
Temp: AMB °F

Total Length Examined: 89.6"
Scan Width: 17"
Ref. Level Correction (Trans. Corr.): 0 DB

Procedure: COGEMA SVUT-INS-007.3
Rev: 2
Material Type: ☐ SS ☒ CS OTHER: ______
Condition: N/A

File Name: VERT.WALL/2ND/PLATE3
Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ °

$X_0$ Ref. Point ($L_0$): 1" below horiz. weld

$Y_0$ Ref. Point ($W_0$): 17" from center line of first pass

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .515" | .494" | | .530" |
| 12-24 | | | | | .520" | .496" | | .535" |
| 24-36 | | | | | .525" | .499" | | .535" |
| 36-48 | | | | | .525" | .490" | | .535" |
| 48-60 | | | | | .525" | .500" | | .535" |
| 60-72 | | | | | .525" | .503" | | .535" |
| 72-84 | | | | | .525" | .501" | | .535" |
| 84-89.6 | | | | | .525" | .490" | | .535" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | ______ | (signature) | [N1] |
| Level: III Date: 07/20/05 | Date: ______ | Level: III Date: 08/08/05 | Level: III Date: ______ |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* — *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/20/05 0835 | Exam End: 2016 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .750" |
| Configuration: PLATE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 105.9" | Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WALL/2ND/PLATE4 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): 1" below horiz. weld | | | |
| $Y_O$ Ref. Point ($W_O$): 17" from center line of first pass | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .765" | .744" | | .780" |
| 12-24 | | | | | .765" | .743" | | .780" |
| 24-36 | | | | | .770" | .746" | | .780" |
| 36-48 | | | | | .770" | .749" | | .780" |
| 48-60 | | | | | .770" | .752" | | .780" |
| 60-72 | | | | | .770" | .753" | | .780" |
| 72-84 | | | | | .775" | .744" | | .780" |
| 84-96 | | | | | .775" | .751" | | .780" |
| 96-105.9 | | | | | .775" | .754" | | .780" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W H Nelson | | W H Nelson | [N1] |
| Level: III Date: 07/20/05 | Date: ________ | Level: III Date: 08/08/05 | Level: III Date: ________ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 06/27/05 1420 | Exam End: 2047 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 21.2" Scan Width: 15" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WALL/2ND/PLATE 5 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): 1" below horiz. weld | | |
| $Y_O$ Ref. Point ($W_O$): 17" from center line of 1st pass | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .890" | .857" | | .905" |
| 12-21.2 | | | | | .885" | .858" | | .905" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | W H Nelson | [N1] |
| Level: II Date: 06/27/05 | Date: ______ | Level: III Date: 08/11/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

# AUTOMATED ULTRASONIC P-SCAN DATA REPORT

| | | | |
|---|---|---|---|
| **AUTOMATED ULTRASONIC P-SCAN DATA REPORT** | | Job # 04-41 | Riser # 26 |
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/19/05 0820 | Exam End: 1433 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 90.2" | Scan Width: 17" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WALL/2ND/PLATE1 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ 1" above horiz. weld, scanned up | | | |
| $Y_O$ Ref. Point ($W_O$): 17" from center line of first pass to center line of second pass | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | | (signature) | [N1] |
| Level: III Date: 07/19/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/21/05 0750 | Exam End: 1356 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 89.3" | Scan Width: 15" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WALL/2ND/PLATE 2 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_0$ Ref. Point ($L_0$): Started @ 1" below horiz. weld | | | |
| $Y_0$ Ref. Point ($W_0$): 17" from center line of first pass to center line of second pass | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| WDPurdy | | WHNelson | [N1] |
| Level: II Date: 07/21/05 | Date: ____ | Level: III Date: 08/23/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | | | Job # 04-41 | Riser # 26 |
|---|---|---|---|---|---|
| Location: 200 EAST TANK FARM | | System: PSP-4 | | Exam Start: 07/20/05 0845 | Exam End: 2019 |
| Component ID: 104-AN | | | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 86.6" | | Scan Width: 17" | | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | | | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WALL/2ND/PLATE 3 | | | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ 1" below horiz. weld | | | | | |
| $Y_O$ Ref. Point ($W_O$): 17" from center line of first pass to center line of second pass | | | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/20/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/21/05 0819 | Exam End: 1400 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.7500" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2.12" | Temp: AMB °F |
| Total Length Examined: 105.8" | Scan Width: 17" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WALL/2$^{ND}$/PLATE 4 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ 1" below horiz. weld | | | |
| $Y_O$ Ref. Point ($W_O$): 17" from center line of first pass to center line of second pass | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/21/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 06/27/05 1435 | Exam End: 2053 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 20.9" | Scan Width: 15" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WALL/2ND/PLATE 5 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_o$ Ref. Point ($L_o$): Started @ 1" below horiz. weld | | | |
| $Y_o$ Ref. Point ($W_o$): 17" from center line of first pass to center line of second pass | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | W H Nelson (signature) | [N1] |
| Level: II Date: 06/27/05 | Date: ____ | Level: III Date: 08/23/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

| **AUTOMATED ULTRASONIC THICKNESS DATA REPORT** | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/12/05 1335 | Exam End: 1942 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 37.28" / Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: LIQUID / AIR A | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ___ ° | |
| $X_O$ Ref. Point ($L_O$): start at east air line | | |
| $Y_O$ Ref. Point ($W_O$): center line of scanner @ 30" below top horiz. weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .530" | .501" | | .535" |
| 12-24 | | | | | .530" | .503" | | .535" |
| 24-36 | | | | | .530" | .498" | | .535" |
| 36-37.28 | | | | | .530" | .511" | | .535" |

Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W H Nelson (signature) | | W H Nelson (signature) | [N1] |
| Level: III Date: 07/12/05 | Date: ______ | Level: III Date: 08/08/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|

| | |
|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/12/05 1335 |
| | Exam End: 1942 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED |
| | Nominal Thickness: .500" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" |
| | Temp: AMB °F |
| Total Length Examined: 21.7" | Scan Width: 17" |
| Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 |
| Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: LIQUID / AIR B | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° |
| $X_o$ Ref. Point ($L_o$): liquid/air B started at end of A | |
| $Y_o$ Ref. Point ($W_o$): center line of scanner @ 30" below top horiz. weld | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .530" | .501" | | .535" |
| 12-21.7 | | | | | .530" | .505" | | .535" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | ________ | (signature) | [N1] |
| Level: III Date: 07/12/05 | Date: ________ | Level: III Date: 08/08/05 | Level: III Date: ________ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/14/05 0956 | Exam End: 2224 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 120" / Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: LIQUID / AIR C | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_0$ Ref. Point ($L_0$): liquid/air C started at end of B | | |
| $Y_0$ Ref. Point ($W_0$): center line of scanner @ 30" below top horiz. weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .535" | .508" | | .540" |
| 12-24 | | | | | .535" | .510" | | .540" |
| 24-36 | | | | | .535" | .503" | | .540" |
| 36-48 | | | | | .535" | .511" | | .540" |
| 48-60 | | | | | .535" | .510" | | .540" |
| 60-72 | | | | | .535" | .511" | | .540" |
| 72-84 | | | | | .535" | .513" | | .540" |
| 84-96 | | | | | .535" | .504" | | .540" |
| 96-108 | | | | | .535" | .514" | | .540" |
| 108-120 | | | | | .535" | .505" | | .540" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: III Date: 07/14/05 | Date: ______ | Level: III Date: 08/09/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/14/05 0956 | Exam End: 2224 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 70.2" / Scan Width: 17" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: LIQUID / AIR D | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_O$ Ref. Point ($L_O$): liquid/air D started at end of C

$Y_O$ Ref. Point ($W_O$): center line of scanner @ 30" below top horiz. weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .535" | .503" | | .545" |
| 12-24 | | | | | .535" | .509" | | .545" |
| 24-36 | | | | | .535" | .506" | | .545" |
| 36-48 | | | | | .535" | .504" | | .545" |
| 48-60 | | | | | .535" | .500" | | .545" |
| 60-70.2 | | | | | .535" | .504" | | .545" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | | (signature) | [N1] |
| Level: III Date: 07/14/05 | Date: | Level: III Date: 08/09/05 | Level: III Date: |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/13/05 0735 | Exam End: 1442 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .500" |
| Configuration: PLATE TO PLATE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 88.4" / Scan Width: 11.3" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WELD/PLATE2 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_o$ Ref. Point ($L_o$): 1" below horiz. weld

$Y_o$ Ref. Point ($W_o$): center line of vert. weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .520" | .478" | | .530" |
| 12-24 | | | | | .520" | .482" | | .530" |
| 24-36 | | | | | .520" | .481" | | .530" |
| 36-48 | | | | | .520" | .487" | | .530" |
| 48-60 | | | | | .520" | .488" | | .530" |
| 60-72 | | | | | .520" | .482" | | .530" |
| 72-84 | | | | | .520" | .478" | | .530" |
| 84-88.4 | | | | | .520" | .482" | | .530" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | | (signature) | [N1] |
| Level: II Date: 07/13/05 | Date: ______ | Level: III Date: 08/15/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

**AUTOMATED ULTRASONIC THICKNESS DATA REPORT**

Job #: 04-41

Riser #: 26

Location: 200 EAST TANK FARM

Exam Start: 07/19/05 0725

Exam End: 1441

Component ID: 104-AN

Examination Surface: ☒ OD ☐ ID ☐ PAINTED

Nominal Thickness: .500"

Configuration: PLATE TO PLATE

Calibrated Range: 0.3" TO 1.0"

Temp: AMB °F

Total Length Examined: 89.5"

Scan Width: 11.44"

Ref. Level Correction (Trans. Corr.): 0 DB

Procedure: COGEMA SVUT-INS-007.3

Rev: 2

Material Type: ☐ SS ☒ CS OTHER: ______

Condition: N/A

File Name: VERT.WELD/PLATE 3

Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ °

$X_0$ Ref. Point ($L_0$): 1" below horiz. weld

$Y_0$ Ref. Point ($W_0$): center line of vert. weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .520" | .485" | | .535" |
| 12-24 | | | | | .520" | .482" | | .535" |
| 24-36 | | | | | .520" | .480" | | .535" |
| 36-48 | | | | | .520" | .487" | | .535" |
| 48-60 | | | | | .520" | .487" | | .535" |
| 60-72 | | | | | .520" | .485" | | .535" |
| 72-84 | | | | | .520" | .463" | | .535" |
| 84-89.5 | | | | | .520" | .486" | | .535" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | WH Nelson (signature) | [N1] |
| Level: II Date: 07/19/05 | Date: ______ | Level: III Date: 08/16/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 Rev. Dec. 03, 2003

## AUTOMATED ULTRASONIC THICKNESS DATA REPORT

| | | |
|---|---|---|
| **AUTOMATED ULTRASONIC THICKNESS DATA REPORT** | Job # 04-41 | Riser # 26 |
| Location: 200 EAST TANK FARM | Exam Start: 07/19/05 0725 | Exam End: 1441 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .750" |
| Configuration: PLATE TO PLATE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 102.8" / Scan Width: 11.58" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: VERT.WELD/PLATE4 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ___ ° | |
| $X_o$ Ref. Point ($L_o$): 1" below horiz. weld | | |
| $Y_o$ Ref. Point ($W_o$): center line of vert. weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .760" | .708" | | .775" |
| 12-24 | | | | | .755" | .733" | | .770" |
| 24-36 | | | | | .755" | .731" | | .770" |
| 36-48 | | | | | .750" | .735" | | .770" |
| 48-60 | | | | | .755" | .731" | | .770" |
| 60-72 | | | | | .755" | .729" | | .770" |
| 72-84 | | | | | .755" | .730" | | .770" |
| 84-96 | | | | | .755" | .731" | | .775" |
| 96-102.8 | | | | | .760" | .738" | | .775" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| | | | |
|---|---|---|---|
| Examiner: W. D. Purdy<br>W D Purdy (signature)<br>Level: II Date: 07/19/05<br>P-Scan Limited | Examiner: ______<br>Date: ______ | Analyst: W. H. Nelson<br>W H Nelson (signature)<br>Level: III Date: 08/15/05 | Reviewer: J. B. Elder<br>[N1]<br>Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| **AUTOMATED ULTRASONIC THICKNESS DATA REPORT** | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/13/05 0735 | Exam End: 1442 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO PLATE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 21.3" / Scan Width: 11.1" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: VERT.WELD/PLATE 5 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): 1" below horiz. weld | | |
| $Y_O$ Ref. Point ($W_O$): center line of vert. weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (In) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .900" | .867" | | .915" |
| 12-21.3 | | | | | .900" | .859" | | .915" |

Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | W H Nelson (signature) | [N1] |
| Level: II Date: 07/13/05 | Date: ____ | Level: III Date: 08/16/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

## AUTOMATED ULTRASONIC P-SCAN DATA REPORT

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|---|---|---|---|
| **AUTOMATED ULTRASONIC P-SCAN DATA REPORT** | | Job # 04-41 | Riser # 26 |
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/13/05 0750 | Exam End: 1452 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2" | Temp: AMB °F |
| Total Length Examined: 86" | Scan Width: 10.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WELD/PLATE 2 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |
| $X_O$ Ref. Point ($L_O$): 1" below horiz. weld | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of weld | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| | | | |
|---|---|---|---|
| Examiner: W. D. Purdy (signature) | Examiner: ______ | Analyst: W. H. Nelson (signature) | Reviewer: J. B. Elder [N1] |
| Level: II Date: 07/13/05 | Date: ______ | Level: III Date: 08/21/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/19/05 0746 | Exam End: 1448 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2" | Temp: AMB °F |
| Total Length Examined: 87" | Scan Width: 11.1" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WELD/PLATE 3 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |
| $X_0$ Ref. Point ($L_0$): 1" below horiz. weld | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

**INDICATION INFORMATION**

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | | (signature) | [N1] |
| Level: II Date: 07/19/05 | Date: ________ | Level: III Date: 08/21/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/19/05 0746 | Exam End: 1448 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.7500" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 3.0" | Temp: AMB °F |
| Total Length Examined: 102.6" | Scan Width: 10.8" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WELD/PLATE 4 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |
| $X_o$ Ref. Point ($L_o$): Started @ 1"below horiz.weld | | | |
| $Y_o$ Ref. Point ($W_o$): Center line of weld | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | WH Nelson | [N1] |
| Level: II Date: 07/19/05 | Date: ____ | Level: III Date: 08/22/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/13/05 0750 | Exam End: 1452 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 3.5" | Temp: AMB °F |
| Total Length Examined: 18.9" | Scan Width: 10.8" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WELD/PLATE 5 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |
| $X_0$ Ref. Point ($L_0$): Started @ 1"below horiz.weld | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | ____ | [signature] | [N1] |
| Level: II Date: 07/13/05 | Date: ____ | Level: III Date: 08/22/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 45.1" | Scan Width: 5.6" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WELD/2ND/PLATE 2 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ 1"below horiz.weld | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of weld | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | ______ | W H Nelson | [N1] |
| Level: II Date: 07/20/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 45" | Scan Width: 5.6" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WELD/2ND/PLATE 2A | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_o$ Ref. Point ($L_o$): Started @ 1"below horiz.weld | | | |
| $Y_o$ Ref. Point ($W_o$): Center line of weld | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | ________ | W H Nelson | [N1] |
| Level: II Date: 07/20/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.5000" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 1.414" | Temp: AMB °F |
| Total Length Examined: 87" | Scan Width: 5.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WELD/2ND/PLATE 3 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ 1"below horiz.weld | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | W H Nelson | [N1] |
| Level: II Date: 07/20/05 | Date: ____ | Level: III Date: 08/23/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

# AUTOMATED ULTRASONIC P-SCAN DATA REPORT

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|---|---|---|---|
| **AUTOMATED ULTRASONIC P-SCAN DATA REPORT** | | Job # 04-41 | Riser # 26 |
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.7500" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2.12" | Temp: AMB °F |
| Total Length Examined: 103.9" | Scan Width: 5.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: VERT.WELD/2ND/PLATE 4 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_0$ Ref. Point ($L_0$): Started @ 1"below horiz.weld | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

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|---|---|---|---|
| Examiner: W. D. Purdy (signature) | Examiner: ________ | Analyst: W. H. Nelson (signature) | Reviewer: J. B. Elder [N1] |
| Level: II Date: 07/20/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 06/30/05 0925 | Exam End: 1305 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO PLATE | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 21.4" | Scan Width: 5.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: VERT.WELD/2ND/PLATE 5 | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_0$ Ref. Point ($L_0$): Started @ 1"below horiz.weld | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | ________ | W H Nelson | [N1] |
| Level: II Date: 06/30/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

## AUTOMATED ULTRASONIC THICKNESS DATA REPORT

Job #: 04-41

Riser #: 26

Location: 200 EAST TANK FARM

Exam Start: 07/18/05 0820

Exam End: 1935

Component ID: 104-AN

Examination Surface: ☒ OD ☐ ID ☐ PAINTED

Nominal Thickness: .875"

Configuration: PLATE TO KNUCKLE

Calibrated Range: 0.3" TO 1.0"

Temp: AMB °F

Total Length Examined: 64.8"

Scan Width: 10.5"

Ref. Level Correction (Trans. Corr.): 0 DB

Procedure: COGEMA SVUT-INS-007.3

Rev 2

Material Type: ☐ SS ☒ CS OTHER: ______

Condition: N/A

File Name: HORIZ.WELD/KNUCKLE

Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ °

$X_O$ Ref. Point ($L_O$): Started west of weld attachment, west of east air line

$Y_O$ Ref. Point ($W_O$): Center line of weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .900" | .867" | | .915" |
| 12-24 | | | | | .900" | .868" | | .915" |
| 24-36 | | | | | .900" | .873" | | .915" |
| 36-48 | | | | | .900" | .874" | | .915" |
| 48-60 | | | | | .900" | .871" | | .915" |
| 60-64.8 | | | | | .900" | .871" | | .915" |
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Remarks:

Plate side only

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | ____________ | W H Nelson | [N1] |
| Level: II Date: 07/18/05 | Date: ________ | Level: III Date: 08/17/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/18/05 0820 | Exam End: 1935 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO KNUCKLE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 96.6" / Scan Width: 10.4" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: HORIZ.WELD/KNUCKLE A | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ___ ° | |
| $X_o$ Ref. Point ($L_o$): Started at end of horiz.weld/knuckle | | |
| $Y_o$ Ref. Point ($W_o$): Center line of weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .900" | .868" | | .915" |
| 12-24 | | | | | .900" | .869" | | .915" |
| 24-36 | | | | | .895" | .859" | | .910" |
| 36-48 | | | | | .890" | .863" | | .910" |
| 48-60 | | | | | .890" | .862" | | .910" |
| 60-72 | | | | | .890" | .862" | | .910" |
| 72-84 | | | | | .890" | .861" | | .910" |
| 84-96 | | | | | .890" | .861" | | .910" |
| 96-96.6 | | | | | .890" | .876" | | .910" |
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Remarks:

Plate side only

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| *W D Purdy* | | *W H Nelson* | [N1] |
| Level: II Date: 07/18/05 | Date: ____ | Level: III Date: 08/17/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/18/05 0820 | Exam End: 1935 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO KNUCKLE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 92.63" / Scan Width: 9.5" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: HORIZ.WELD/KNUCKLE B | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_o$ Ref. Point ($L_o$): Started west of the weld attachment, west of the 24" riser

$Y_o$ Ref. Point ($W_o$): Center line of weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .890" | .861" | | .905" |
| 12-24 | | | | | .885" | .852" | | .905" |
| 24-36 | | | | | .910" | .878" | | .920" |
| 36-48 | | | | | .910" | .884" | | .920" |
| 48-60 | | | | | .910" | .887" | | .920" |
| 60-72 | | | | | .910" | .876" | | .920" |
| 72-84 | | | | | .910" | .881" | | .920" |
| 84-92.63 | | | | | .910" | .877" | | .915" |
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Remarks:

Plate side only

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: II Date: 07/18/05 | Date: ______ | Level: III Date: 08/17/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/18/05 0828 | Exam End: 1940 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO KNUCKLE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 64.8" / Scan Width: 10.5" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: HORIZ.WELD/KNUCKLE | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_O$ Ref. Point ($L_O$): Started west of weld attachment, west of east air line

$Y_O$ Ref. Point ($W_O$): Center line of weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .925" | .898" | | .935" |
| 12-24 | | | | | .925" | .901" | | .935" |
| 24-36 | | | | | .925" | .903" | | .935" |
| 36-48 | | | | | .925" | .889" | | .935" |
| 48-60 | | | | | .925" | .920" | | .935" |
| 60-64.8 | | | | | NO DATA | NO DATA | | NO DATA |

Remarks:

Knuckle side only, no data at 60-64.8 due to surface roughness

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | W H Nelson (signature) | [N1] |
| Level: II Date: 07/18/05 | Date: ________ | Level: III Date: 08/17/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/18/05 0828 | Exam End: 1940 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO KNUCKLE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 96.6" / Scan Width: 10.4" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: HORIZ.WELD/KNUCKLE A | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ___ ° | |
| $X_O$ Ref. Point ($L_O$): Started at end of horiz.weld/knuckle | | |
| $Y_O$ Ref. Point ($W_O$): Center line of weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .930" | .906" | | .945" |
| 12-24 | | | | | .930" | .902" | | .945" |
| 24-36 | | | | | .930" | .895" | | .945" |
| 36-48 | | | | | .930" | .893" | | .945" |
| 48-60 | | | | | .930" | .890" | | .940" |
| 60-72 | | | | | .925" | .882" | | .940" |
| 72-84 | | | | | .930" | .895" | | .940" |
| 84-96 | | | | | .925" | .880" | | .940" |
| 96-96.6 | | | | | .925" | .896" | | .940" |
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Remarks:

Knuckle side only

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | W H Nelson | [N1] |
| Level: II Date: 07/18/05 | Date: ____ | Level: III Date: 08/17/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

## AUTOMATED ULTRASONIC THICKNESS DATA REPORT

| | | |
|---|---|---|
| Job #: 04-41 | Riser #: 26 | |
| Location: 200 EAST TANK FARM | Exam Start: 07/18/05 0828 | Exam End: 1940 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: PLATE TO KNUCKLE | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 92.63" | Scan Width: 9.5" | Ref. Level Correction (Trans. Corr.): 0 DB |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ — Condition: N/A |
| File Name: HORIZ.WELD/KNUCKLE B | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_0$ Ref. Point ($L_0$): Started at west side of weld attachment, west of 24" riser

$Y_0$ Ref. Point ($W_0$): Center line of weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .925" | .892" | | .940" |
| 12-24 | | | | | .955" | .922" | | .960" |
| 24-36 | | | | | .950" | .913" | | .960" |
| 36-48 | | | | | .950" | .916" | | .960" |
| 48-60 | | | | | .950" | .910" | | .960" |
| 60-72 | | | | | .940" | .907" | | .960" |
| 72-84 | | | | | .945" | .917" | | .960" |
| 84-92.63 | | | | | .925" | .913" | | .940" |
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Remarks:

Knuckle side only

[N1] See Attached Letter From J. B. Elder

| | | | |
|---|---|---|---|
| Examiner: W. D. Purdy (signature) | Examiner: | Analyst: W. H. Nelson (signature) | Reviewer: J. B. Elder [N1] |
| Level: II Date: 07/18/05 | Date: ______ | Level: III Date: 08/17/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/18/05 0840 | Exam End: 1945 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO KNUCKLE | | Calibrated Range: 0" TO 3.5" | Temp: AMB °F |
| Total Length Examined: 62.2" | Scan Width: 10.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: HORIZ.WELD/KNUCKLE | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |
| $X_O$ Ref. Point ($L_O$): West of weld attachment, west of the east air line | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | | [N1] |
| Level: II Date: 07/18/05 | Date: | Level: III Date: 08/21/05 | Level: III Date: |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/18/05 0840 | Exam End: 1945 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO KNUCKLE | | Calibrated Range: 0" TO 3.5" | Temp: AMB °F |
| Total Length Examined: 94.24" | Scan Width: 10.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: HORIZ.WELD/KNUCKLE A | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |
| $X_o$ Ref. Point ($L_o$): Started @ end of horiz. weld/ knuckle | | | |
| $Y_o$ Ref. Point ($W_o$): Center line of weld | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | ________ | W H Nelson | [N1] |
| Level: II Date: 07/18/05 | Date: ______ | Level: III Date: 08/21/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/18/05 0840 | Exam End: 1945 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO KNUCKLE | | Calibrated Range: 0" TO 3.5" | Temp: AMB °F |
| Total Length Examined: 90.2" | Scan Width: 10.8" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name / Item #: HORIZ.WELD/KNUCKLE B | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 60° | |

$X_O$ Ref. Point ($L_O$): Started @ west of weld attachment west of 24"riser,at end of horiz. weld/knuckle A

$Y_O$ Ref. Point ($W_O$): Center line of weld

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| WDPurdy | | WHNelson | [N1] |
| Level: II Date: 07/18/05 | Date: ____ | Level: III Date: 08/21/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | | Riser # 26 |
|---|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO KNUCKLE | | Calibrated Range: 0" TO 2.5" | | Temp: AMB °F |
| Total Length Examined: 120" | Scan Width: 5.5" | Ref. Level Correction (Trans. Corr): 0 DB | | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | | Condition: N/A |
| File Name / Item #: HORIZ.WELD/2ND/KNUCKLE | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | | |
| $X_O$ Ref. Point ($L_O$): Started @ weld attachment west of east air line | | | | |
| $Y_O$ Ref. Point ($W_O$): Center line of weld | | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:
No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | | [signature] | [N1] |
| Level: II Date: 7/20/05 | Date: ____ | Level: III Date: 08/23/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

# AUTOMATED ULTRASONIC P-SCAN DATA REPORT

| | | | |
|---|---|---|---|
| Job #: 04-41 | Riser #: 26 | | |
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO KNUCKLE | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 38.3" | Scan Width: 5.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: HORIZ.WELD/2ND/KNUCKLE A | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_o$ Ref. Point ($L_o$): File knuckle A started @ end of knuckle file | | | |
| $Y_o$ Ref. Point ($W_o$): Center line of weld | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

## INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

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|---|---|---|---|
| Examiner: W. D. Purdy (signature) | Examiner: ______ | Analyst: W. H. Nelson (signature) | Reviewer: J. B. Elder [N1] |
| Level: II Date: 7/20/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 07/20/05 0906 | Exam End: 2015 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: PLATE TO KNUCKLE | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 88" | Scan Width: 5.5" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: HORIZ.WELD/2ND/KNUCKLE B | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_0$ Ref. Point ($L_0$): File knuckle B started @ end of knuckle A file | | | |
| $Y_0$ Ref. Point ($W_0$): Center line of weld | | | |

| Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|
| 1 45° SHEAR | | | |
| 2 60° SHEAR | | | |
| 3 AATT | | | |
| 4 DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| WDPurdy (signature) | | WHNelson (signature) | [N1] |
| Level: II Date: 7/20/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* — *Rev. Dec. 03, 2003*

| **AUTOMATED ULTRASONIC THICKNESS DATA REPORT** | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/25/05 0924 | Exam End: 2040 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 120" / Scan Width: 9.8" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: KNUCKLE | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_o$ Ref. Point ($L_o$): Started at east air line | | |
| $Y_o$ Ref. Point ($W_o$): 2" below horiz. weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .950" | .917" | | .975" |
| 12-24 | | | | | .945" | .902" | | .970" |
| 24-36 | | | | | .945" | .909" | | .975" |
| 36-48 | | | | | .955" | .919" | | .975" |
| 48-60 | | | | | .955" | .912" | | .975" |
| 60-72 | | | | | .955" | .920" | | .975" |
| 72-84 | | | | | .950" | .910" | | .970" |
| 84-96 | | | | | .940 | .903" | | .970" |
| 96-108 | | | | | .940" | .906" | | .970" |
| 108-120 | | | | | .940" | .900" | | .970" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| *(signature)* | | *(signature)* | [N1] |
| Level: II Date: 07/25/05 | Date: ________ | Level: III Date: 08/22/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* — *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/25/05 0924 | Exam End: 2040 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 47.1" | Scan Width: 9.8" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: KNUCKLE/A | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): Started at end of knuckle | | | |
| $Y_O$ Ref. Point ($W_O$): 2" below horiz. weld | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .940" | .910" | | .970" |
| 12-24 | | | | | .940" | .893" | | .970" |
| 24-36 | | | | | .935" | .902" | | .965" |
| 36-47.1 | | | | | .935" | .885" | | .965" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| WDPurdy | ____________ | WHNelson | [N1] ____________ |
| Level: II Date: 07/25/05 | Date: ________ | Level: III Date: 08/22/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 08/03/05 0635 | Exam End: 1040 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 22.89" / Scan Width: 10.4" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: KNUCKLE/B | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_o$ Ref. Point ($L_o$): Started at end weld attachment, west of 24" riser | | |
| $Y_o$ Ref. Point ($W_o$): 2" below horiz. weld | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .920" | .878" | | .950" |
| 12-22.89 | | | | | .920" | .883" | | .950" |
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Remarks:

Stop @ first vert. weld west of weld attachment

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | W H Nelson (signature) | [N1] |
| Level: II Date: 08/03/05 | Date: ____ | Level: III Date: 08/22/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6* *Rev. Dec. 03, 2003*

**AUTOMATED ULTRASONIC THICKNESS DATA REPORT**

| | | |
|---|---|---|
| **AUTOMATED ULTRASONIC THICKNESS DATA REPORT** | Job #: 04-41 | Riser #: 26 |
| Location: 200 EAST TANK FARM | Exam Start: 07/28/05 0841 | Exam End: 1412 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 60.06" / Scan Width: 10.3" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ____ | Condition: N/A |
| File Name: KNUCKLE/C | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |

$X_O$ Ref. Point ($L_O$): Started at vert. weld, west of weld attachment, west of 24" riser

$Y_O$ Ref. Point ($W_O$): 2" below horiz. weld

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-12 | | | | | .960" | .929" | | .975" |
| 12-24 | | | | | .955" | .920" | | .975" |
| 24-36 | | | | | .965" | .923" | | .980" |
| 36-48 | | | | | .965" | .920" | | .980" |
| 48-60.06 | | | | | .960" | .914" | | .980" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| | | | |
|---|---|---|---|
| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
| WDPurdy | ____ | WH Nelson | [N1] |
| Level: II Date: 07/28/05 | Date: ____ | Level: III Date: 08/22/05 | Level: III Date: ____ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | | | Job # 04-41 | Riser # 26 |
|---|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | | Exam Start: 08/01/05 0717 | Exam End: 1540 |
| Component ID: 104-AN | | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: KNUCKLE TO | | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 120" | Scan Width: 10.1" | | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: KNUCKLE/45 | | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |
| $X_O$ Ref. Point ($L_O$): Started @ air slot west of east air line | | | | |
| $Y_O$ Ref. Point ($W_O$): 2" below horiz. weld | | | | |

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W. D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy | | W H Nelson | [N1] |
| Level: II Date: 08/01/05 | Date: ________ | Level: III Date: 08/23/05 | Level: III Date: ________ |
| P-Scan Limited | | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5 Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|

| | | | |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: PSP-4 | Exam Start: 08/02/05 0645 | Exam End: 1447 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: 0.8750" |
| Configuration: KNUCKLE TO | | Calibrated Range: 0" TO 2.5" | Temp: AMB °F |
| Total Length Examined: 120" | Scan Width: 10.1" | Ref. Level Correction (Trans. Corr): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name / Item #: KNUCKLE/45 A | | Transducer: ☐ DUAL ☒ SGL ☐ 0 DEG ☒ ANGLE: 45° | |

$X_O$ Ref. Point ($L_O$): Started @ end of knuckle/45 @ 4th air slot west of east air line

$Y_O$ Ref. Point ($W_O$): 2" below horiz. weld

| | Sizing Method | Angle (deg) | Reference Cal. Sheet | Set-Up / File Name |
|---|---|---|---|---|
| 1 | 45° SHEAR | | | |
| 2 | 60° SHEAR | | | |
| 3 | AATT | | | |
| 4 | DUAL 0° | | | |

INDICATION INFORMATION

| Ind. | Method | Weld Side | Depth R. Lig. | Max. Amp. | L1 (in) | Length (in) | L2 (in) | W1 (in) | Width (in) | W2 (in) | Indication Type |
|---|---|---|---|---|---|---|---|---|---|---|---|
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Remarks:

No crack like indications

[N1] See Attached Letter From J. B. Elder

| Examiner: W.D. Purdy | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| W D Purdy (signature) | | W H Nelson (signature) | [N1] |
| Level: II Date: 08/02/05 | Date: ______ | Level: III Date: 08/23/05 | Level: III Date: ______ |
| P-Scan Limited | | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 5* — *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/27/05 0924 | Exam End: 1539 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: .725" | Scan Width: 6.65" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: SLOT 2 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): Started at second air slot , west of east air line | | | |
| $Y_O$ Ref. Point ($W_O$): End of stroke @ knuckle transition from pad | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-.725 | | | | | .960" | .947" | | .975" |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | ______ | [signature] | [N1] |
| Level: III Date: 07/27/05 | Date: ______ | Level: III Date: 08/22/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | | Exam Start: 07/27/05 0924 | Exam End: 1539 |
| Component ID: 104-AN | | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 1.04" | Scan Width: 6.65" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: SLOT 7 | | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): 7th air slot , west of east air line | | | |
| $Y_O$ Ref. Point ($W_O$): End of stroke @ knuckle transition from pad | | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-1.04 | | | | | .975" | .955" | | .990" |
| | | | | | | | | |
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Remarks:

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| [signature] | ______ | [signature] | [N1] ______ |
| Level: III Date: 07/27/05 | Date: ______ | Level: III Date: 08/22/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/27/05 0924 | Exam End: 1539 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 1.04" / Scan Width: 6.65" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: SLOT 8 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_0$ Ref. Point ($L_0$): Started at 8th air slot , west of east air line | | |
| $Y_0$ Ref. Point ($W_0$): End of stroke @ knuckle transition from pad | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-1.04 | | | | | .975" | .960" | | .990" |
| | | | | | | | | |
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Remarks:

Peak data

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| *(signature)* | | *(signature)* | [N1] |
| Level: III Date: 07/27/05 | Date: ______ | Level: III Date: 08/22/05 | Level: III Date: ______ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS DATA REPORT | Job # 04-41 | Riser # 26 |
|---|---|---|
| Location: 200 EAST TANK FARM | Exam Start: 07/27/05 0924 | Exam End: 1539 |
| Component ID: 104-AN | Examination Surface: ☒ OD ☐ ID ☐ PAINTED | Nominal Thickness: .875" |
| Configuration: KNUCKLE TO | Calibrated Range: 0.3" TO 1.0" | Temp: AMB °F |
| Total Length Examined: 1.036" / Scan Width: 6.65" | Ref. Level Correction (Trans. Corr.): 0 DB | |
| Procedure: COGEMA SVUT-INS-007.3 / Rev 2 | Material Type: ☐ SS ☒ CS OTHER: ______ | Condition: N/A |
| File Name: SLOT 9 | Transducer: ☒ DUAL ☐ SGL ☒ 0 DEG ☐ ANGLE: ____ ° | |
| $X_O$ Ref. Point ($L_O$): Started at 9th air slot , west of east air line | | |
| $Y_O$ Ref. Point ($W_O$): End of stroke @ knuckle transition from pad | | |

| Part # / Indication | X Start (in) | X Stop (in) | Y Start (in) | Y Stop (in) | Ave. Thk. (in) | Min. Thk., R. Lig. (in) | Area Reportable | Max. Thk. (in) |
|---|---|---|---|---|---|---|---|---|
| 0-1.036 | | | | | .970" | .954" | | .990" |
| | | | | | | | | |
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Remarks:
Peak data

[N1] See Attached Letter From J. B. Elder

| Examiner: W. H. Nelson | Examiner: | Analyst: W. H. Nelson | Reviewer: J. B. Elder |
|---|---|---|---|
| (signature) | | (signature) | [N1] |
| Level: III Date: 07/27/05 | Date: ________ | Level: III Date: 08/22/05 | Level: III Date: ________ |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 6 — Rev. Dec. 03, 2003

| **AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET** | Job # 04-41 | Riser # 26 |
|---|---|---|

| | | | |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 320 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 9x2MM | 02005 | 0 | |
| 2 | KB | MSEB | 5 | 8x2MM | 01939 | 0 | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| | | INITIAL CALIBRATION | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 06/28/05 | 06/28/05 | 06/28/05 | 06/28/05 | 07/13/05 | 07/13/05 | 07/13/05 | 07/13/05 |
| TIME: | | 0903 | 0908 | 1340 | 1340 | 0735 | 0740 | 1442 | 1445 |
| 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 | .302" | .298" | .298" | .295" | .299" | .299" | .295" | .299" |
| | THK. 2 | 1.00"/0db | 1.00"/0db | .996"/1db | .996"/0db | 1.00"/0db | 1.00"/0db | 1.00"/0db | 1.00"/0db |
| CH. 2 | THK. 1 | .302" | .302" | .298" | .298" | .299" | .299" | .292" | .299" |
| | THK. 2 | 1.00"/0db | 1.00"/0db | .966"/0db | .996"/0db | 1.00"/0db | 1.00"/0db | .993"/0db | 1.00"/-1db |
| CH. 3 | THK. 1 | .302" | .302" | .298" | .298" | .299" | .299" | .295" | .299" |
| | THK. 2 | 1.00"/0db | 1.00"/0db | .996"/0db | .996"/0db | 1.00"/0db | 1.00"/0db | .996"/0db | 1.00"/0db |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WHN | WHN | WHN | WHN | WDP | WDP | WDP | WDP |

Remarks:
CAL.T

| | | |
|---|---|---|
| Examiner: W. D. Purdy<br>WDPurdy<br>Level: II Date: 7/13/2005<br>P-Scan Limited | Examiner: W. H. Nelson<br>WHNelson<br>Level: III Date: 6/28/05 | Reviewer: W. H. Nelson<br>WHNelson<br>Level: III Date: 8/23/05 |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1* — *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET | | Job # 04-41 | | Riser # 26 |
|---|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel | |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A | |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | | |
| Scanner Type: AWS-5d | Serial No. 320 | Couplant: Water | Batch No. N/A | |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 8x2MM | 01997 | 0 | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 06/23/05 | 06/23/05 | 06/27/05 | 06/27/05 | | | | |
| TIME: | | 0855 | 2020 | 1420 | 2047 | | | | |
| REFLECTOR: | | .3"-1.0" | .3"-1.0" | .3"-1.0" | .3"-1.0" | | | | |
| CH. 1 | THK. 1 | ..299" | .299" | .302" | .302" | | | | |
| | THK. 2 | 1.00"/0db | .997"/-1db | 1.00"/0db | 1.001"/0db | | | | |
| CH. 2 | THK. 1 | .299" | .295" | .302" | .302" | | | | |
| | THK. 2 | 1.00"/0db | .997"/-1db | 1.00"/0db | 1.001"/0db | | | | |
| CH. 3 | THK. 1 | .299" | .295" | .302" | .302" | | | | |
| | THK. 2 | 1.00"/0db | .997"/-1db | 1.00"/0db | 1.004"/1db | | | | |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | | | | |

Remarks:
CAL.T1

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W D Purdy (signature) | | (signature) |
| Level: II Date: 6/23 & 27/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1* *Rev. Dec. 03, 2003*

| **AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET** | Job # 04-41 | Riser # 26 |
|---|---|---|

| | | | |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 405 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AGS-2 | Serial No. 401 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 100 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 100 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 8x2MM | 02003 | 0 | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/12/05 | 07/12/05 | 07/13/05 | 07/13/05 | 07/14/05 | 07/14/05 | 07/18/05 | 07/18/05 |
| TIME: | | 1335 | 1942 | 0813 | 1430 | 0956 | 2224 | 0903 | 2046 |
| 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 | .303" | .298" | .303" | .303" | .301" | .301" | .303" | .298" |
| | THK. 2 | 1.00"/0db | .997"/1db | 1.00"/0db | 1.00"/2db | 1.00"/0db | .997"/0db | 1.00"/0db | .997"/-2db |
| CH. 2 | THK. 1 | .303" | .298" | .303" | .303" | .303" | .301" | .303" | .298" |
| | THK. 2 | 1.00"/0db | .997"/1db | 1.00"/0db | 1.00"/2db | 1.00"/0db | .997"/0db | 1.00"/0db | .997"/-2db |
| CH. 3 | THK. 1 | .298" | .297" | .303" | .303" | .298" | .296" | .303" | .298" |
| | THK. 2 | 1.00"/0db | .997"/1db | 1.00"/0db | 1.00"/2db | 1.00"/0db | .997"/0db | 1.00"/0db | .995"/-2db |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WHN | WHN | WHN | WHN | WHN | WHN | WHN | WHN |

Remarks:
CAL.T2

| | | |
|---|---|---|
| Examiner: W. H. Nelson<br>*W.H. Nelson*<br>Level: III Date: 7/12-18/05 | Examiner:<br><br>Level: ____ Date: | Reviewer: W. H. Nelson<br>*W.H. Nelson*<br>Level: III Date: 8/23/05 |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5D | Serial No. 310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 9x2MM | 01997 | 0 | |
| 2 | KB | MSEB | 5 | 8x2MM | 02005 | 0 | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/18/05 | 07/18/05 | 07/18/05 | 07/18/05 | 07/19/05 | 07/19/05 | 07/19/05 | 07/19/05 |
| TIME: | | 0820 | 0828 | 1935 | 1940 | 0725 | 0730 | 1441 | 1443 |
| 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 | .295" | .299" | .303" | .303" | .299" | .303" | .292" | .298" |
| | THK. 2 | 1.00"/0db | 1.00"/0db | 1.00"/2db | .996"/-1db | 1.00"/0db | .1.00"/0db | .993"/1db | .989"/1db |
| CH. 2 | THK. 1 | .295" | .299" | .299" | .299" | .299" | .299" | .292" | .292" |
| | THK. 2 | 1.00"/0db | 1.00"/0db | .996"/2db | .996"/-1db | 1.00"/0db | 1.00"/0db | .993"/1db | .993"/1db |
| CH. 3 | THK. 1 | .295" | .299" | .299" | .295" | .303" | .303" | .299" | .292" |
| | THK. 2 | 1.00"/0db | 1.00"/0db | 1.004"/2db | .993"/-1db | 1.00"/0db | 1.00"/0db | .993"/0db | .993"/1db |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | WDP | WDP | WDP | WDP |

Remarks:
CAL.T3

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W D Purdy | | W H Nelson |
| Level: II Date: 7/18 & 19/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1* *Rev. Dec. 03, 2003*

## AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

| | | | |
|---|---|---|---|
| Job #: 04-41 | Riser #: 26 | | |
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 206 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 10/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5D | Serial No. 309 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 9x2MM | 02005 | 0 | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| | | INITIAL CALIBRATION | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/25/05 | 07/25/05 | 07/26/05 | 07/26/05 | 07/27/05 | 07/27/05 | 07/28/05 | 07/28/05 |
| TIME: | | 0924 | 2040 | 0721 | 1440 | 0924 | 1539 | 0841 | 1412 |
| 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 | .303" | .306" | .303" | .299" | .303" | .295" | .299" | .299" |
| | THK. 2 | 1.00"/0db | 1.004"/-2db | 1.00"/0db | 1.00"/-2db | 1.00"/0db | .1.00"/-2db | 1.00"/0db | .996"/0db |
| CH. 2 | THK. 1 | .303" | .306" | .303" | .303" | .303" | .299" | .299" | .299" |
| | THK. 2 | 1.00"/0db | 1.004"/-1db | 1.00"/0db | 1.00"/-2db | 1.00"/0db | 1.00"/-2db | 1.00"/0db | .996"/-1db |
| CH. 3 | THK. 1 | .299" | .299" | .303" | .303" | .303" | .299" | .299" | .299" |
| | THK. 2 | 1.00"/0db | 1.00"/-1db | 1.00"/0db | 1.004"/-2db | 1.00"/0db | .996"/-2db | 1.00"/0db | 1.00"/-1db |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | WHN | WHN | WDP | WDP |

Remarks:
CAL.T4

| | | |
|---|---|---|
| Examiner: W. D. Purdy | Examiner: W. H. Nelson | Reviewer: W. H. Nelson |
| *W D Purdy* | *W H Nelson* | *W H Nelson* |
| Level: II Date: 7/25-28/05 | Level: III Date: 7/27/05 | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1 — Rev. Dec. 03, 2003

## AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET

| | | | |
|---|---|---|---|
| Job # 04-41 | Riser # 26 | | |
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 405/201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: | Serial No. 401/310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 100 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 100 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 8x2MM | 02003 | 0 | |
| 2 | | | | | | | |
| 3 | *KB | MSEB | 5 | 9x2MM | 02005 | 0 | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/19/05 | 07/19/05 | 07/20/05 | 07/20/05 | 07/21/05 | 07/21/05 | 07/21/05 | 07/21/05 |
| TIME: | | 0815 | 1430 | 0835 | 2016 | 0814 | 1355 | 0743 | 1350 |
| 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 | .303" | .305" | .301" | .303" | .298" | .301" | .302" | .302" |
| | THK. 2 | 1.00"/0db | 1.002"/-1db | 1.00"/0db | 1.005"/-1db | 1.00"/0db | 1.00"/-2db | 1.00"/0db | .991"/0db |
| CH. 2 | THK. 1 | .303" | .305" | .301" | .303" | .301" | .301" | .299" | .302" |
| | THK. 2 | 1.00"/0db | 1.002"/-1db | 1.00"/0db | 1.005"/-1db | 1.00"/0db | 1.00"/-2db | 1.00"/0db | .994"/0db |
| CH. 3 | THK. 1 | .303" | .305" | .301" | .298" | .298" | .301" | .302" | .306" |
| | THK. 2 | 1.00"/0db | 1.005"/-1db | 1.00"/0db | .997"/0db | 1.00"/0db | 1.00"/-2 | 1.00"/0db | .997"/0db |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WHN | WHN | WHN | WHN | WHN | WHN | WDP | WDP |

Remarks:
CAL.T5
*Transducer #02005 used on 7/21/05 by WDP

| | | |
|---|---|---|
| Examiner: W. D. Purdy | Examiner: W. H. Nelson | Reviewer: W. H. Nelson |
| Level: II Date: 7/21/05 | Level: III Date: 7/19-21/05 | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1 | Rev. Dec. 03, 2003

| **AUTOMATED ULTRASONIC THICKNESS CALIBRATION SHEET** | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-004 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 0.3" to 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MSEB | 5 | 8x2MM | 01939 | 0 | |
| 2 | | | | | | | |
| 3 | *KB | MSEB | 5 | 8x2MM | 02005 | 0 | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/14/05 | 07/14/05 | 08/03/05 | 08/03/05 | | | | |
| TIME: | | 0755 | 1857 | 0635 | 1040 | | | | |
| REFLECTOR: | | .3"-1.0" | .3"-1.0" | .3"-1.0" | .3"-1.0" | | | | |
| CH. 1 | THK. 1 | .302" | .299" | .299" | .299" | | | | |
| | THK. 2 | 1.00"/0db | 1.001"2db | 1.00"/0db | .996"/-2db | | | | |
| CH. 2 | THK. 1 | .302" | .299" | .299" | .295" | | | | |
| | THK. 2 | 1.00"/0db | .997"/2db | 1.00"/0db | .993"/-1db | | | | |
| CH. 3 | THK. 1 | .302" | .302" | .299" | .295" | | | | |
| | THK. 2 | 1.00"/0db | 1.001"/2db | 1.00"/0db | .996"/-1db | | | | |
| CH. 4 | THK. 1 | | | | | | | | |
| | THK. 2 | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | | | | |

Remarks:

CAL.T6
*Transducer #02005 used on 8/3/05

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W D Purdy | | WH Nelson |
| Level: II Date: 7/14&8/3/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 1 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 06/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 03242 | 45 | |
| 2 | KB | MWB | 4 | 8x9mm | 03286 | 45 | |
| 3 | *KB | MWB | 4 | 8X9MM | 3132 | 45 | |
| 4 | *KB | MWB | 4 | 8X9MM | 03247 | 45 | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 06/23/05 | 06/23/05 | 06/27/05 | 06/27/05 | 07/21/05 | 07/21/05 | | |
| TIME: | | 0905 | 2025 | 1435 | 2053 | 0750 | 1356 | | |
| REFLECTOR / ORIENTATION: | | .050" Notch | .050" Notch | .050" Notch | .050" Notch | .050" Notch | .050" Notch | | |
| CH. 1 | AMPLITUDE | 80%/0db | 80%/-2db | 80%/0db | 80%/1db | 80%/0db | 80%/-1db | | |
| | LOCATION | 1.414" | 1.414" | 1.414" | 1.404" | 1.414" | 1.414" | | |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/-2db | 80%/0db | 80%/0db | 80%/0db | 80%/2db | | |
| | LOCATION | 1.414" | 1.407" | 1.414" | 1.411" | 1.414" | 1.418" | | |
| CH. 3 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 4 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | WDP | WDP | | |

Remarks:
CAL.P
*Transducer #3132 & 03247 used on7/21/05

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W D Purdy | | W H Nelson |
| Level: II Date: 6/23-27/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 06/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 03333 | 45 | |
| 2 | KB | MWB | 4 | 8x9mm | 03329 | 45 | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/18/05 | 07/18/05 | 07/19/05 | 07/19/05 | 07/20/05 | 07/20/05 | 07/21/05 | 07/21/05 |
| TIME: | | 0916 | 2051 | 0820 | 1433 | 0845 | 2019 | 0819 | 1400 |
| REFLECTOR / ORIENTATION: | | .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 | 1.414" | 1.391" | 1.414" | 1.413" | 1.414" | 1.405" | 1.414" | 1.396" |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/1db | 80%/0db | 80%/1db | 80%/0db | 80%/-1db | 80%/0db | 80%/0db |
| | LOCATION | 1.414" | 1.421" | 1.414" | 1.399" | 1.414" | 1.401" | 1.414" | 1.396" |
| CH. 3 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 4 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| EXAMINER: | | WHN | WHN | WHN | WHN | WHN | WHN | WHN | WHN |

Remarks:
CAL.P1

| Examiner: W. H. Nelson | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| (signature) | | (signature) |
| Level: III Date: 7/18-21/05 | Level: ____ Date: | Level: III Date: 8/23/05 |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # 04-41 | | Riser # 26 | |
|---|---|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | | | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | | Material: Carbon Steel | |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | | | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | | Material: N/A | |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | | | |
| Scanner Type: AWS-5d | Serial No. 310 | Couplant: Water | | Batch No. N/A | |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | | | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | | | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 03334 | 45 | |
| 2 | KB | MWB | 4 | 8x9mm | 3142 | 45 | |
| 3 | KB | MWB | 4 | 8X9MM | 03247 | 45 | |
| 4 | KB | MWB | 4 | 8X9MM | 3140 | 45 | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 06/30/05 | 06/30/05 | | | | | | |
| TIME: | | 0925 | 1305 | | | | | | |
| REFLECTOR / ORIENTATION: | | .050" Notch | .050" Notch | | | | | | |
| CH. 1 | AMPLITUDE | 80%/0db | 80%/0db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/0db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| CH. 3 | AMPLITUDE | 80%/0d | 80%/-1db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| CH. 4 | AMPLITUDE | 80%/0db | 80%/2db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| EXAMINER: | | WDP | WDP | | | | | | |

Remarks:
CAL.P2

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| (signature) | | (signature) |
| Level: II Date: 6/30/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3* — *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 03327 | 45 | |
| 2 | KB | MWB | 4 | 8x9mm | 3132 | 45 | |
| 3 | KB | MWB | 4 | 8X9MM | 03334 | 45 | |
| 4 | KB | MWB | 4 | 8X9MM | 03247 | 45 | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/20/05 | 07/20/05 | | | | | | |
| TIME: | | 0906 | 2015 | | | | | | |
| REFLECTOR / ORIENTATION: | | .050" Notch | .050" Notch | | | | | | |
| CH. 1 | AMPLITUDE | 80%/0db | 80%/0db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/0db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| CH. 3 | AMPLITUDE | 80%/0d | 80%/-2db | | | | | | |
| | LOCATION | 1.414" | 1.414" | | | | | | |
| CH. 4 | AMPLITUDE | 80%/0db | 80%/-1db | | | | | | |
| | LOCATION | 1.414" | 1.405" | | | | | | |
| EXAMINER: | | WDP | WDP | | | | | | |

Remarks:
CAL.P3

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W D Purdy | | WH Nelson |
| Level: II Date: 7/20/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3 — Rev. Dec. 03, 2003

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | Job # 04-41 | Riser # 26 |
|---|---|---|

| | | | |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 405 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AGS-2 | Serial No. 401 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 100 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 100 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 3142 | 45 | |
| 2 | KB | MWB | 4 | 8x9mm | 3140 | 45 | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/13/05 | 07/13/05 | | | | | | |
| TIME: | | 0809 | 1436 | | | | | | |
| REFLECTOR / ORIENTATION: | | .050" Notch | .050" Notch | | | | | | |
| CH. 1 | AMPLITUDE | 80%/0db | 80%/-2db | | | | | | |
| | LOCATION | 1.414" | 1.407" | | | | | | |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/-2db | | | | | | |
| | LOCATION | 1.414" | 1.399" | | | | | | |
| CH. 3 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 4 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| EXAMINER: | | WHN | WHN | | | | | | |

Remarks:
CAL.P4

| Examiner: W. H. Nelson | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W H Nelson (signature) | | W H Nelson (signature) |
| Level: III Date: 7/13/05 | Level: ____ Date: | Level: III Date: 8/23/05 |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 206 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 10/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 309 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 3132 | 45 | |
| 2 | KB | MWB | 4 | 8x9mm | 03333 | 45 | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 08/01/05 | 08/01/05 | 08/02/05 | 08/02/05 | | | | |
| TIME: | | 0717 | 1540 | 0645 | 1447 | | | | |
| REFLECTOR / ORIENTATION: | | .050" Notch | .050" Notch | .050" Notch | .050" Notch | | | | |
| CH. 1 | AMPLITUDE | 80%/0db | 80%/1db | 80%/0db | 80%/2db | | | | |
| | LOCATION | 1.414" | 1.400" | 1.414" | 1.403" | | | | |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/1db | 80%/0db | 80%/0db | | | | |
| | LOCATION | 1.414" | 1.406" | 1.414" | 1.413" | | | | |
| CH. 3 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 4 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | | | | |

Remarks:
CAL.P5

| Examiner: W. D. Purdy | Examiner: | Reviewer: W. H. Nelson |
|---|---|---|
| W D Purdy (signature) | | WH Nelson (signature) |
| Level: II Date: 8/1&2/05 | Level: ____ Date: | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3* *Rev. Dec. 03, 2003*

| AUTOMATED ULTRASONIC P-SCAN CALIBRATION SHEET | | Job # 04-41 | Riser # 26 |
|---|---|---|---|
| Location: 200 EAST TANK FARM | System: 104-AN | Calibration Block: 444-99-30-001/002 | |
| Procedure: COGEMA SVUT-INS-007.3 | Rev. 2 | Thickness: 1.0" | Material: Carbon Steel |
| UT System: PSP-4 | Serial No. 201 | Reference Block: N/A | |
| Software Version: P-SCAN Sys. 4 1.3 | Rev. 2 | Thickness: N/A | Material: N/A |
| Linearity Due Date: 09/30/2005 | | Reference Block Temp: AMB °F | |
| Scanner Type: AWS-5d | Serial No. 310 | Couplant: Water | Batch No. N/A |
| Scanner Cable: COAXIAL | | Cable Length: 80 Feet | |
| Signal Cable: COAXIAL | | Cable Length: 80 Feet | |

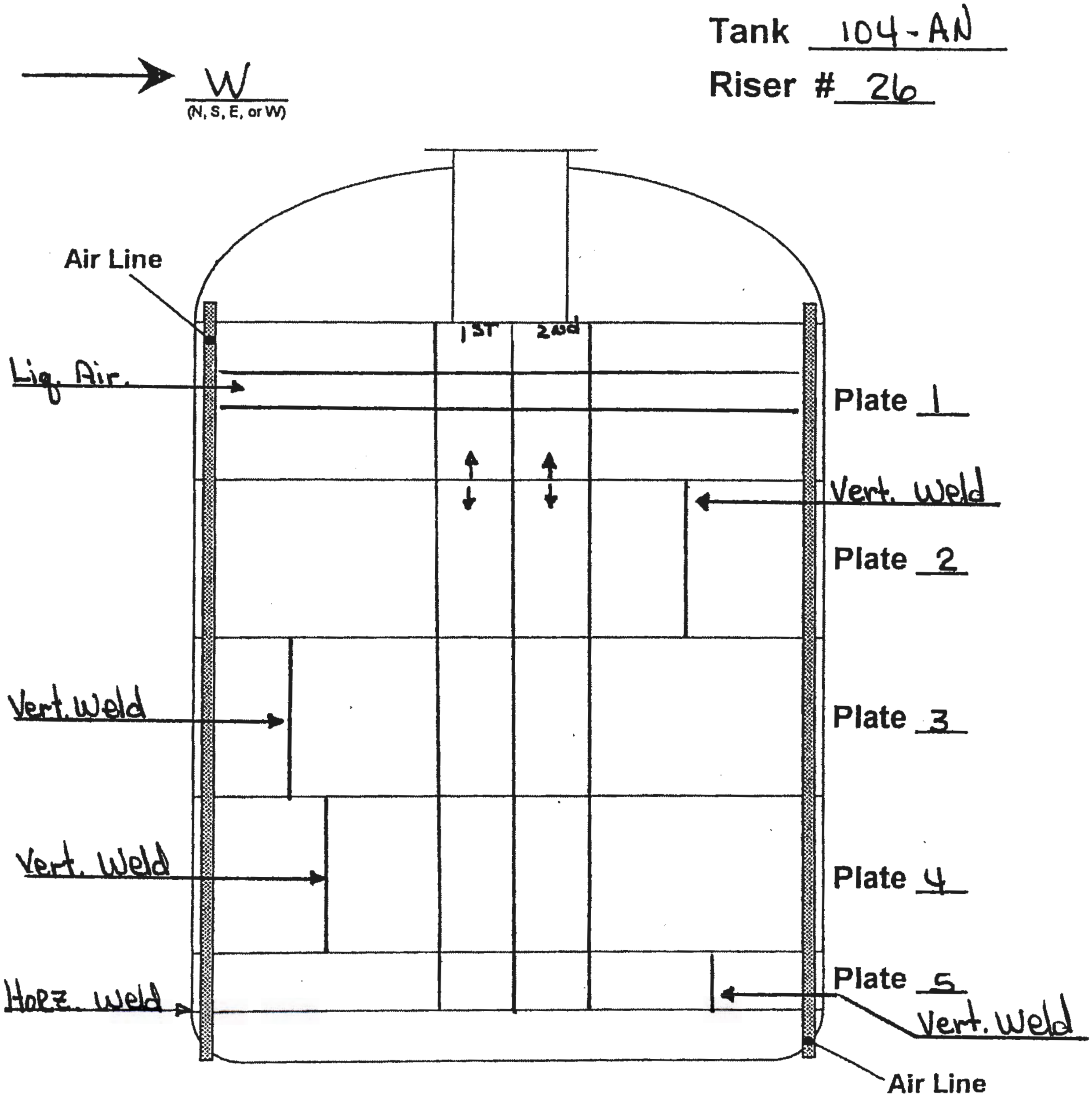
| Channel | Transducer Make | Model | Freq. (MHz) | Size | Serial No. | Angle (deg) Nom. / Act. | Wedge Type |
|---|---|---|---|---|---|---|---|
| 1 | KB | MWB | 4 | 8x9mm | 23200 | 60 | |
| 2 | KB | MWB | 4 | 8x9MM | 21856 | 60 | |
| 3 | | | | | | | |
| 4 | | | | | | | |

| INITIAL CALIBRATION | | | CALIBRATION CHECKS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DATE: | | 07/13/05 | 07/13/05 | 07/18/05 | 07/18/05 | 07/19/05 | 07/19/05 | 06/28/05 | 06/28/05 |
| TIME: | | 0750 | 1452 | 0840 | 1945 | 0746 | 1448 | 0918 | 1343 |
| REFLECTOR / ORIENTATION: | | .050" Notch | .050" Notch | .050" Notch | .050" Notch | .050" Notch | .050" Notch | .050" Notch | .050" Notch |
| CH. 1 | AMPLITUDE | 80%/0db | 80%/0db | 80%/0db | 80%/1db | 80%/0db | 80%/1db | 80%/0db | 80%/1db |
| | LOCATION | 2.00" | 1.985" | 2.00" | 1.990" | 2.00" | 1.985" | 2.00" | 1.989" |
| CH. 2 | AMPLITUDE | 80%/0db | 80%/2db | 80%/0db | 80%/0db | 80%/0db | 80%/1db | 80%/0db | 80%/1db |
| | LOCATION | 2.00" | 1.990" | 2.00" | 1.995" | 2.00" | 1.981" | 2.00" | 1.985" |
| CH. 3 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| CH. 4 | AMPLITUDE | | | | | | | | |
| | LOCATION | | | | | | | | |
| EXAMINER: | | WDP | WDP | WDP | WDP | WDP | WDP | WHN | WHN |

Remarks:
CAL.P6

| Examiner: W. D. Purdy | Examiner: W. H. Nelson | Reviewer: W. H. Nelson |
|---|---|---|
| WDPurdy | WHNelson | WHNelson |
| Level: II Date: 7/13-19/05 | Level: III Date: 6/28/05 | Level: III Date: 8/23/05 |
| P-Scan Limited | | |

*COGEMA-SVUT-INS-007.3, Rev. 2, Attachment 3* *Rev. Dec. 03, 2003*



Tank 104-AN
Riser # 26
W
(N, S, E, or W)
Air Line
Liq. Air.
1ST
2nd
Plate 1
Vert. Weld
Plate 2
Vert. Weld
Plate 3
Vert. Weld
Plate 4
Holz. weld
Plate 5
Vert. Weld
Air Line

**JBNDT**

P.O. Box 360
Jackson, SC. 29831
706.829.1245
email: jbndt @ yahoo.com

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August 22, 2005

COGEMA Engineering Corp.
2425 Stevens Center
Richland, WA. 99352

This letter is to certify that I have reviewed the P-scan automated ultrasonic data from Hanford waste tank 241-AN-104. The data was collected by Mr. Nelson and Mr. Purdy June 23rd. through August 3rd. 2005. The data is acceptable. The data from the vertical walls, vertical welds, horizontal weld, bottom knuckle of the primary wall, liquid to air interface and slots was analyzed to the requirements of COGEMA procedure SVUT-INS-007.3 Revision 2.

There are no reportable indications. No cracking, reportable pitting or thinning was detected in any of the areas examined.

Sincerely,

James B. Elder
ASNT ACCP UT Level III Certificate # 15358
JBNDT, PO Box 360 Jackson, SC. 29831, jbndt@yahoo.com

CC: Mr. W. H. Nelson - COGEMA

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# ATTACHMENT 3

## ULTRASONIC EXAMINATION OF DOUBLE-SHELL TANK 241-AN-104 EXAMINATION COMPLETED AUGUST 2005 (PNNL THIRD PARTY REVIEW)

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PNNL-15343, Rev. 0

# Ultrasonic Examination of Double-Shell Tank 241-AN-104 Examination Completed August 2005

AF Pardini
GJ Posakony

September 2005

Prepared for
the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99352

# Summary

COGEMA Engineering Corporation (COGEMA), under a contract from CH2M Hill Hanford Group (CH2M Hill), has performed an ultrasonic examination of selected portions of Double-Shell Tank 241-AN-104. 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-AN-104 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-22571 (Jensen 2004) 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(s) that describes the results of the COGEMA ultrasonic examinations.

## Examination Results

The results of the examination of Tank 241-AN-104 have been evaluated by PNNL personnel. The ultrasonic examination consisted of two 15-in. wide (on some plates the scan was 17-in. wide) scan paths over the entire height of the tank and the heat-affected zone (HAZ) of four vertical welds and one horizontal weld. The examination also included one horizontal scan path in the liquid/air interface region on Plate #1, examination of the upper portion of the knuckle region, and 4 areas of the lower portion of the knuckle in the air slots. 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 (on some plates the scan was 17-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, #3, #4, and #5.

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 HAZ areas on Plate #5 side or on the knuckle side of the horizontal weld.

### Primary Tank Wall Liquid/Air Interface Horizontal Scan Paths

One 17-in.-wide horizontal scan path was performed on Plate #1. The plate was examined for wall thinning on the primary tank wall. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness.

### Primary Tank Wall Knuckle Scan Paths

The upper portion of the knuckle area was scanned utilizing the Y-arm scanner attached to the AWS-5D crawler. The Y-arm scanned the transducers down around the knuckle approximately 12-in. (from a starting position 2-in. down) from the upper knuckle weld joining Plate #5 to the knuckle. The knuckle was examined for wall thinning, pitting, and cracks oriented circumferentially around the primary tank. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or circumferentially oriented crack-like indications were detected in the upper portion of the knuckle area.

Four small areas on the lower portion of the knuckle area were examined for wall thinning only utilizing the Y-arm scanner in areas accessible through selected air slots. The four areas examined were in air slots designated as Slot2, Slot 7, Slot 8, and Slot 9. There were no areas that exceeded the reportable level of 10% of the nominal thickness.

# Contents

# Figures

# 1.0 Introduction

COGEMA Engineering Corporation (COGEMA), under a contract from CH2M Hill Hanford Group (CH2M Hill), has performed an ultrasonic examination (UT) of selected portions of Double-Shell Tank (DST) 241-AN-104. 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-AN-104 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-22571 (Jensen 2004), 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) and are detected in the inner wall of the tank, 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(s) that describes the results of the COGEMA UT.

# 2.0 Qualified Personnel, Procedures, and Equipment

Under contract from CH2M Hill, 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. Personnel participating in the examinations are to be certified in accordance with American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A, 1992 Edition, and associated documentation is to be provided. The capability of the UT system is to be validated through a performance demonstration test (PDT) on a mock-up simulating the actual DST. The current procedure for the UT is to be based on requirements listed in the American Society for Mechanical Engineers (ASME), Boiler and Pressure Vessel Code Section V, Article 4, *Ultrasonic Examination Methods for Inservice Inspection.*

## 2.1 Personnel Qualifications

The following individuals were qualified and certified to perform UT of the Hanford DST 241-AN-104:

- **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-AN-104. This equipment consists of a Force Institute P-Scan ultrasonic test instrument and a Force Institute AWS-5D and AGS-2 remote-controlled, magnetic-wheel crawlers for examining the primary tank wall. Ultrasonic transducers used for the examinations are commercial off the shelf. The P-Scan ultrasonic system and Y-arm scanner attachment have been qualified through a PDT administered by PNNL. Reference: PNNL-11971, *Final Report- Ultrasonic Examination of Double-Shell Tank 241-AN-107* and letter from PNNL to C.E. Jensen dated September 21, 2001, "Qualification of the Y-Arm Attachment".

## 2.3 Ultrasonic Examination Procedure

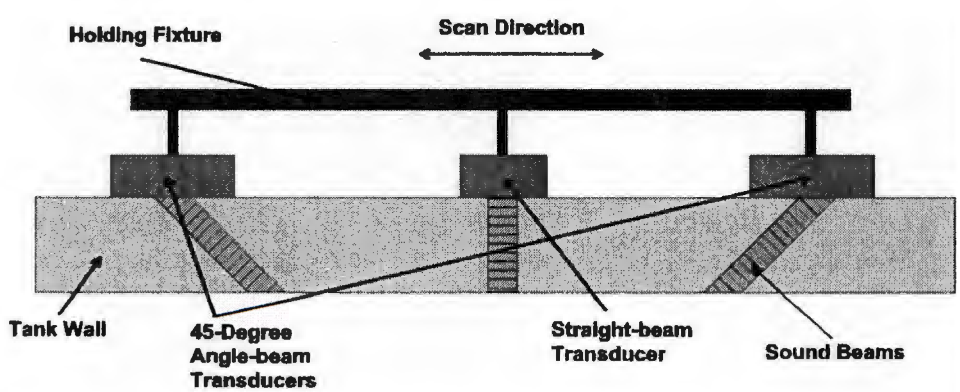
COGEMA has provided the UT procedure for the examination of Tank 241-AN-104. This procedure, COGEMA-SVUT-INS-007.3, Revision 2, outlines the type of UT and mechanical equipment that are to be used as well as the types of transducers. Both straight-beam and angle-beam transducers are used for the examination of the primary tank wall. 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 identifies the specific transducers used and the sensitivity adjustments needed to perform the inspection. The COGEMA UT procedure has been qualified through a Performance Demonstration Test. 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-AN-104 included UT of the primary tank wall, the HAZ of selected welds in the primary tank wall, the upper portion of the knuckle extending axially downward from the upper knuckle weld approximately 12-in., and selected portions of the knuckle in the air slot openings that extended to the lower knuckle weld.

## 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. (new scanner can scan 17-in.) and then index for the next scan. The hard copy provides a permanent record that is used for the subsequent analysis.




**Transducer Specifications:**

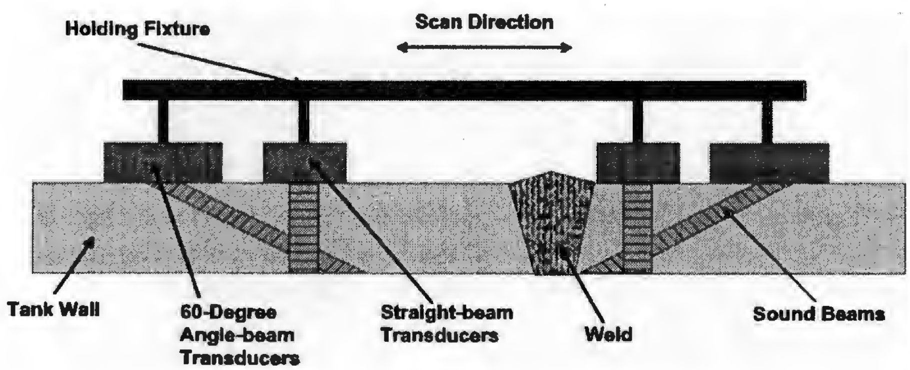
Angle-Beam
Type: MWB-45 04E
Frequency: 4 MHz
Size: 8 X 9 mm
Manufacturer: Krautkramer

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

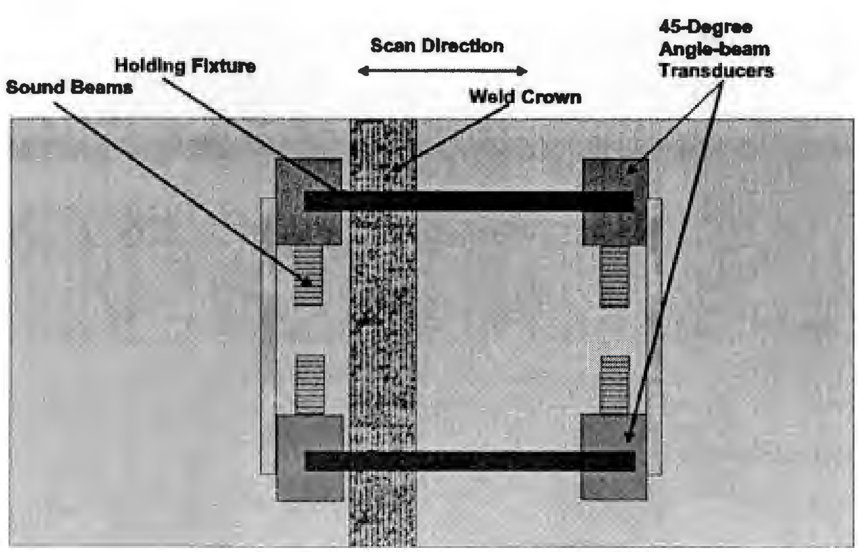
Figure 3.2 is a functional sketch that shows the configurations for examination of the weld zone. The area of interest (HAZ of the weld) is shown as lying adjacent to the weld. Both cracks and pitting may occur in this region. The "A" portion of this sketch shows the 60-degree angle-beam transducers 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.

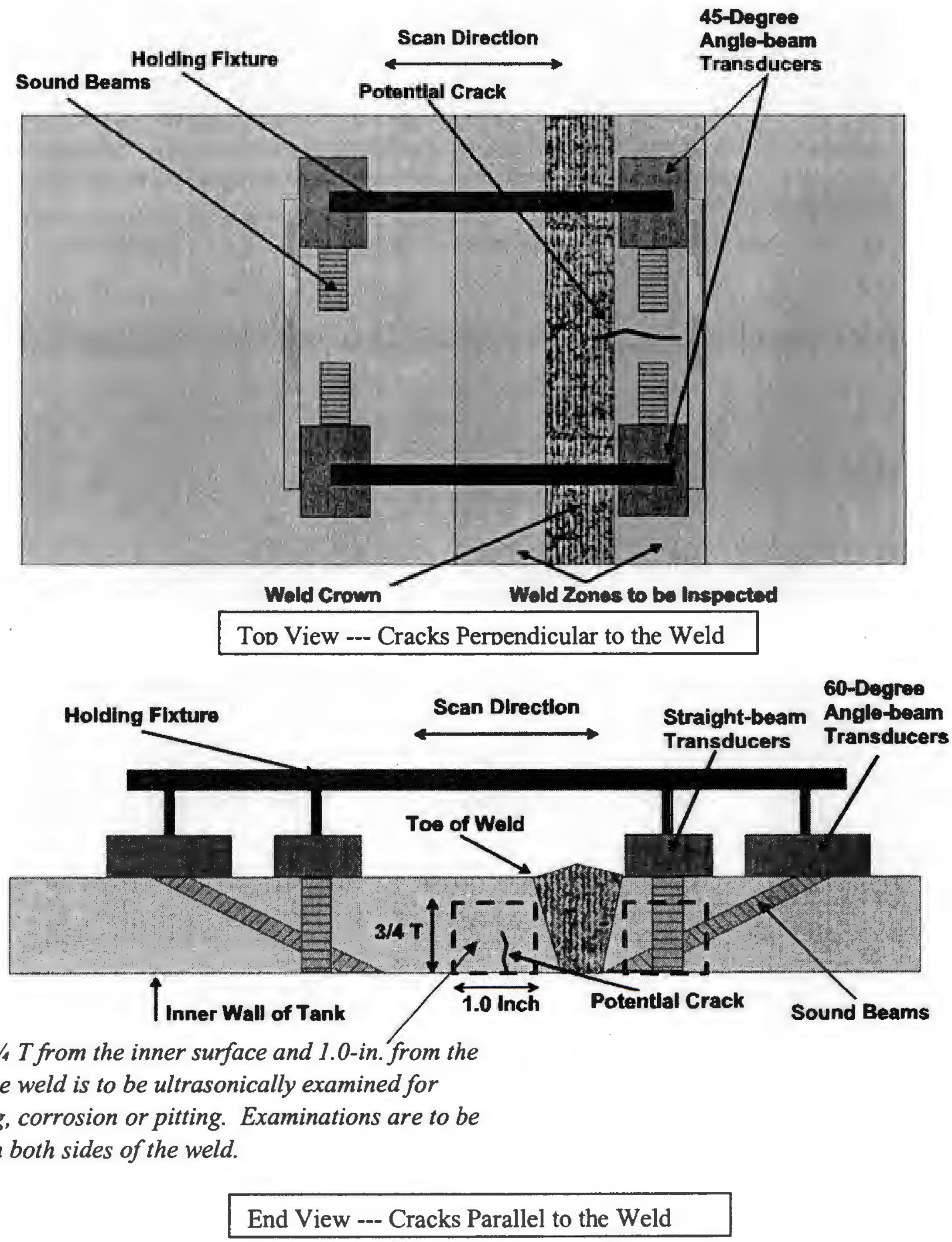



**Figure 3.3. Views of the Weld Zone to be Ultrasonically Examined in the Primary Tank Wall**

## 3.3 Knuckle Area Transducer Configuration

Examination of the knuckle utilizes a modified scanning bridge known as the Y-arm scanner. The Y-arm provides scanning of the transducers directly on the knuckle region. The Y-arm is a special fixture that attaches to the AWS-5D magnetic wheel crawler. Its purpose is to extend the reach of the transducer assembly. This extension allows the transducer assembly to follow the curve of the upper portion of the knuckle below the transition Plate #5 to upper knuckle weld. It is designed to hold the dual 0-degree or two 45-degree transducers in the same configuration as used for the examination of the tank wall. The transducer configuration used for crack detection in this examination was two opposing 45-degree angle-beam transducers that were rotated 90-degrees from the orientation used for the wall crack inspection. This configuration is designed to detect cracks that are in a circumferential direction with respect to the axis of the tank. Figure 3.4 is a sketch showing the area of the section of the knuckle examined using the Y-arm fixture. With the transducer positioned 2-in. below the transition Plate #5 to upper knuckle weld, the scanning bridge was set to scan the transducer downward an additional distance of approximately 12-in. in 0.035-in steps (or as set by the operator). Upon completion of the scan, the bridge was indexed circumferentially 0.035-in. (or as set by the operator) and the scan downward is repeated to obtain a pixel size 0.035-in. x 0.035-in. (or as set by the operator).

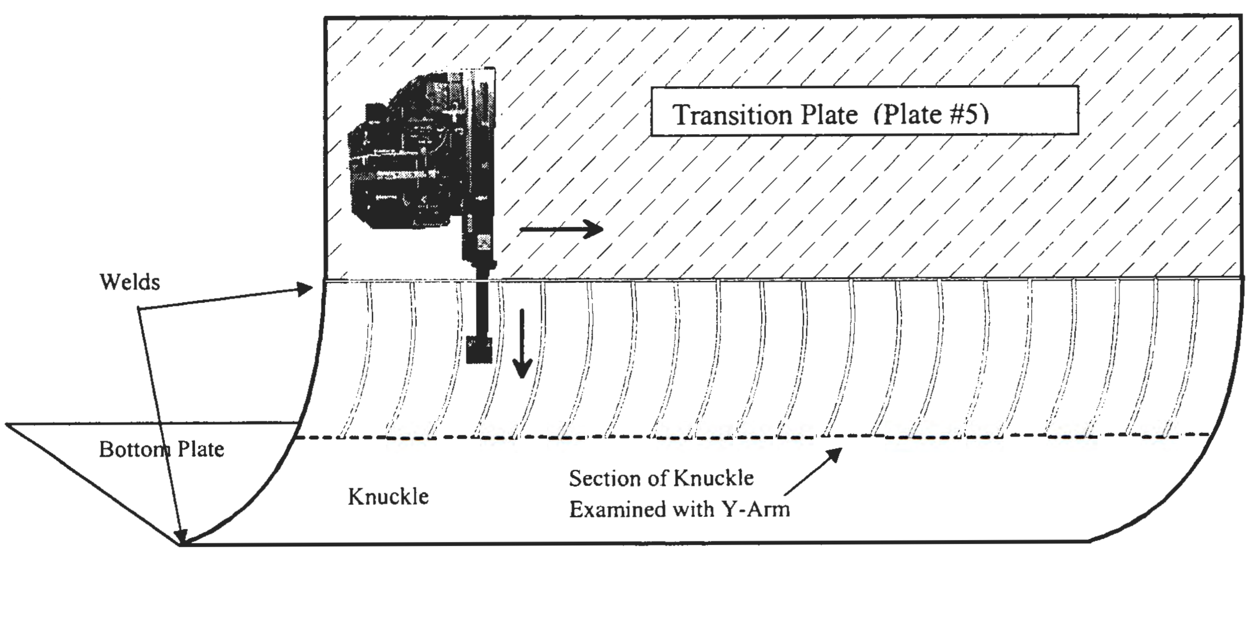



**Figure 3.4**. Sketch of a Section of the Knuckle Examined with the Y-Arm Scanner

Additional Y-arm scanning was done on areas that were accessible in the air slots that extend under the tank in the concrete support foundation. Figure 3.5 provides an end view (looking down the air slot) and Figure 3.6 provides a side view (looking along the circumference of the tank) of the examination of the lower knuckle in the region of the air slots.

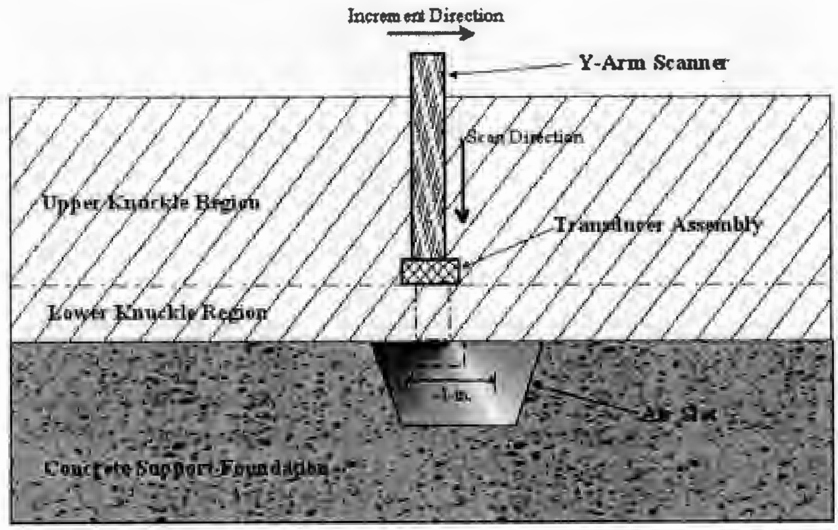



**Figure 3.5.** Lower Knuckle Examination in Air Slot Regions (End View)

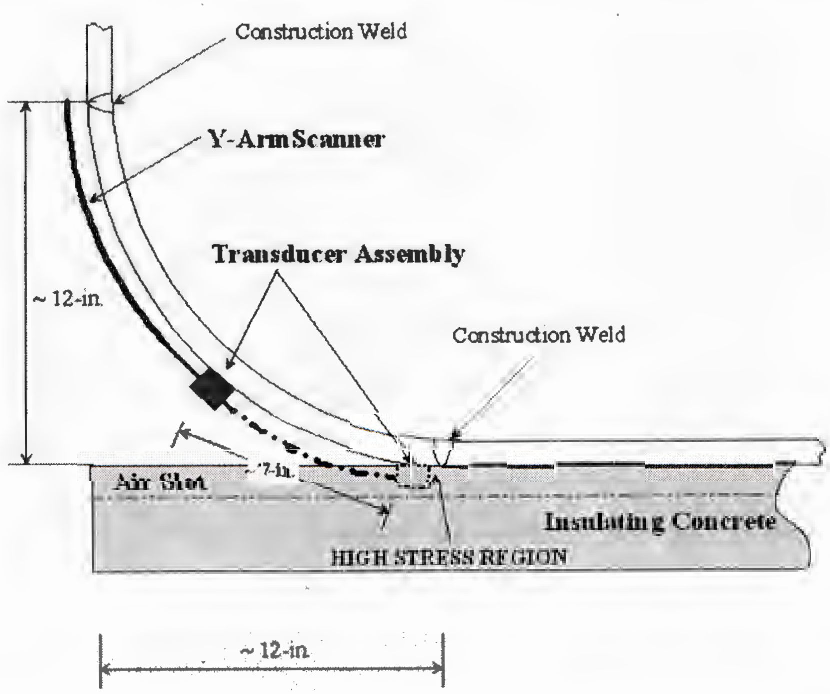
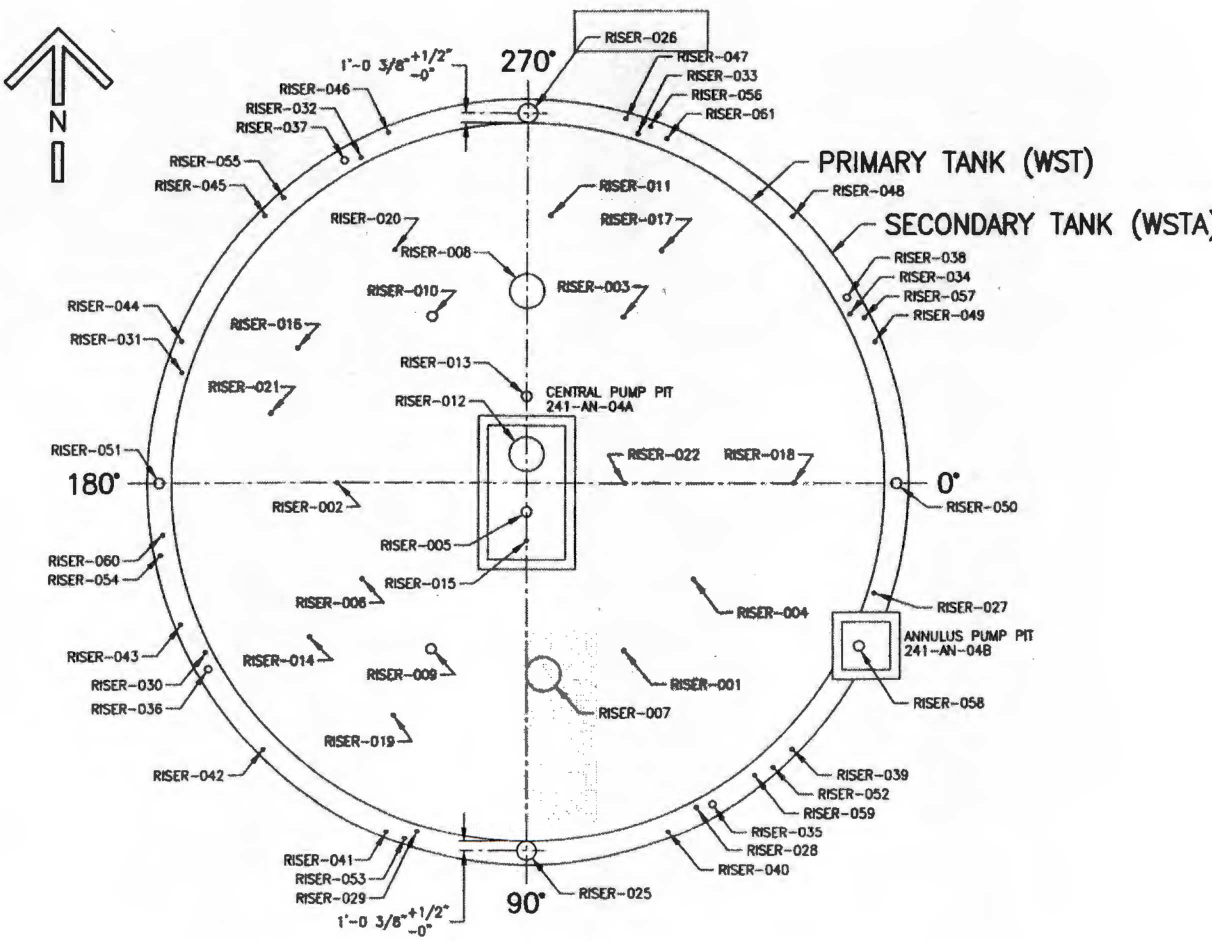



**Figure 3.6.** Lower Knuckle Examination in Air Slot Regions (Side View)

# 4.0 Ultrasonic Examination Location

Tank 241-AN-104 is located in the Hanford 200 East area in AN Tank Farm. The crawler and associated scanner were lowered into the 24-in. riser located on the north side of 241-AN-104 and designated as Riser 26. Figure 4.1 provides a graphic of the location of this riser.




PLAN VIEW TANK 241-AN-104

**Figure 4.1.** UT of 241-AN-104 Riser 26

Figure 4.2 describes the areas on the primary wall of Tank 241-AN-104 that were ultrasonically examined. Two 15-in.-wide (on some plates the scan was 17-in. wide) vertical scan paths were performed on Plates #1, #2, #3, #4, and #5 below the entrance to Riser 26. 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. One additional horizontal scan path was performed in the liquid/air interface region on Plate #1, examination of the upper portion of the knuckle region, and 4 areas of the lower portion of the knuckle in the air slots.

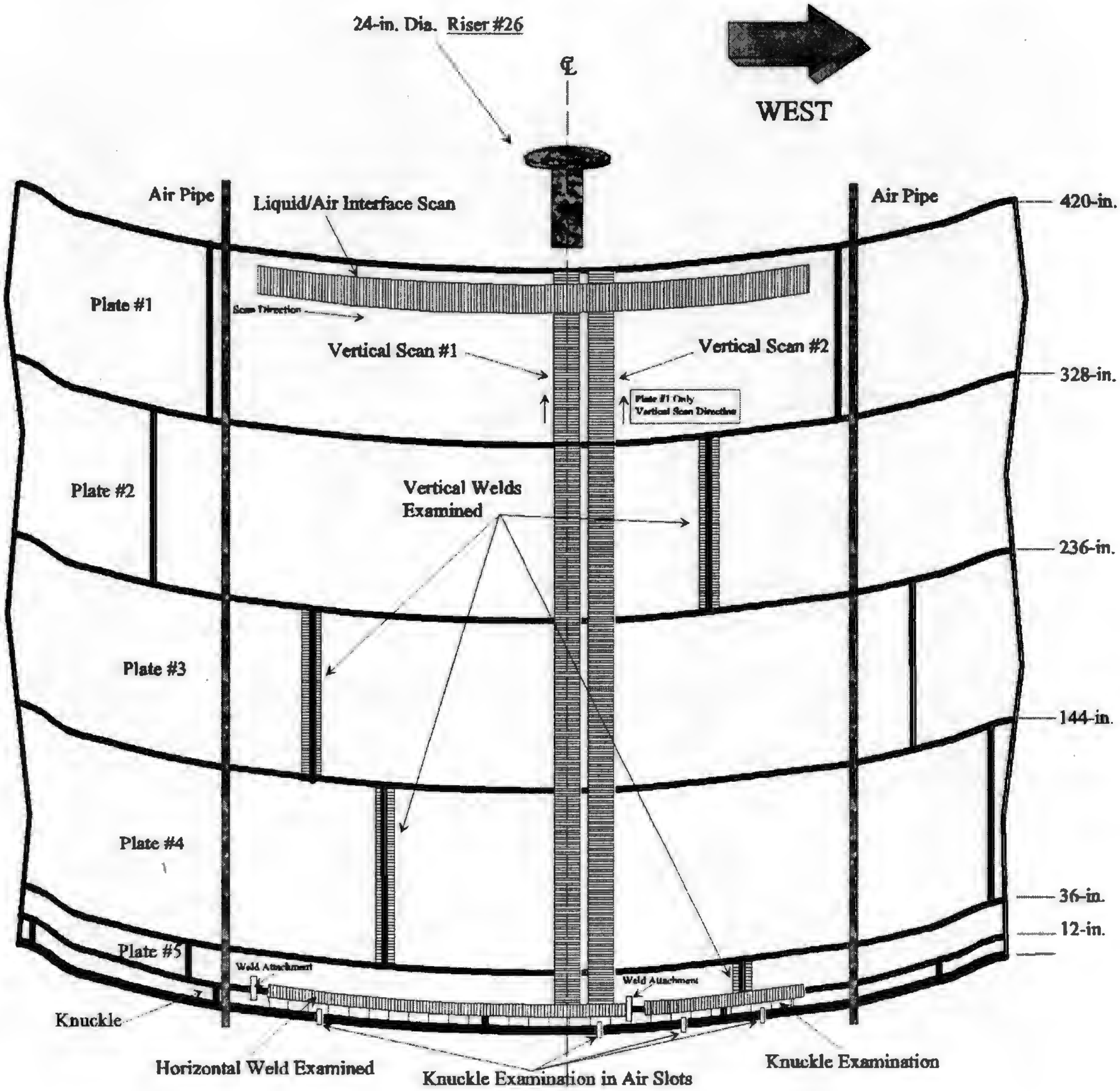



**Figure 4.2**. Sketch of Scan Paths on Tank 241-AN-104

# 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 JBNDT Level III Mr. Jim Elder. The results of the examination of Tank 241-AN-104 are presented in Figures 5.1, 5.2, and 5.3.

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 some plates the scan was 17-in. wide) on Plate #1, #2, #3, #4, and #5 near the centerline of the 24-in. riser. Vertical scan #2 was adjacent to vertical scan #1 and was also 15-in. wide (on some plates the scan was 17-in. wide) on Plate #1, #2, #3, #4, and #5. Vertical scans on Plate #1 were done in the upward direction due to modifications made to the crawler cable attachment. All other plates were done in the downward direction. 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. Weld area exams include approximately 5-in. on each side of the weld. One 17-in. wide horizontal scan path on Plate #1 was performed in the liquid/air interface region. Areas in the figures that show two measurements in the same box are the result of the vertical scan paths overlapping the horizontal scan paths. Figures 5.1 and 5.2 display the minimum readings taken in each 15-in. (17-in. for some plates and the liquid/air interface horizontal scans) wide by 12-in. long area of the scan. In the overlapping areas, both minimum readings from each vertical and horizontal scan paths are given. Two areas on the horizontal weld examination had a weld attachment that limited data acquisition.

Figure 5.3 shows the examination performed on the knuckle of the primary tank wall. The readings distributed around the circumference of the tank knuckle represent the minimum reading in each 12-in. long by 12-in. wide portion extending down around the upper portion of the knuckle. The four areas denoted as Slot 2, Slot 7, Slot 8, and Slot 9, represent small areas that were scanned extending down to the lower portion of the knuckle in the air slots. These scan areas are approximately 1-in. long (increment direction around the circumference of the tank), and 7-in wide (scan direction is down around the knuckle and into the air slot) as shown previously in Section 3 of this report.

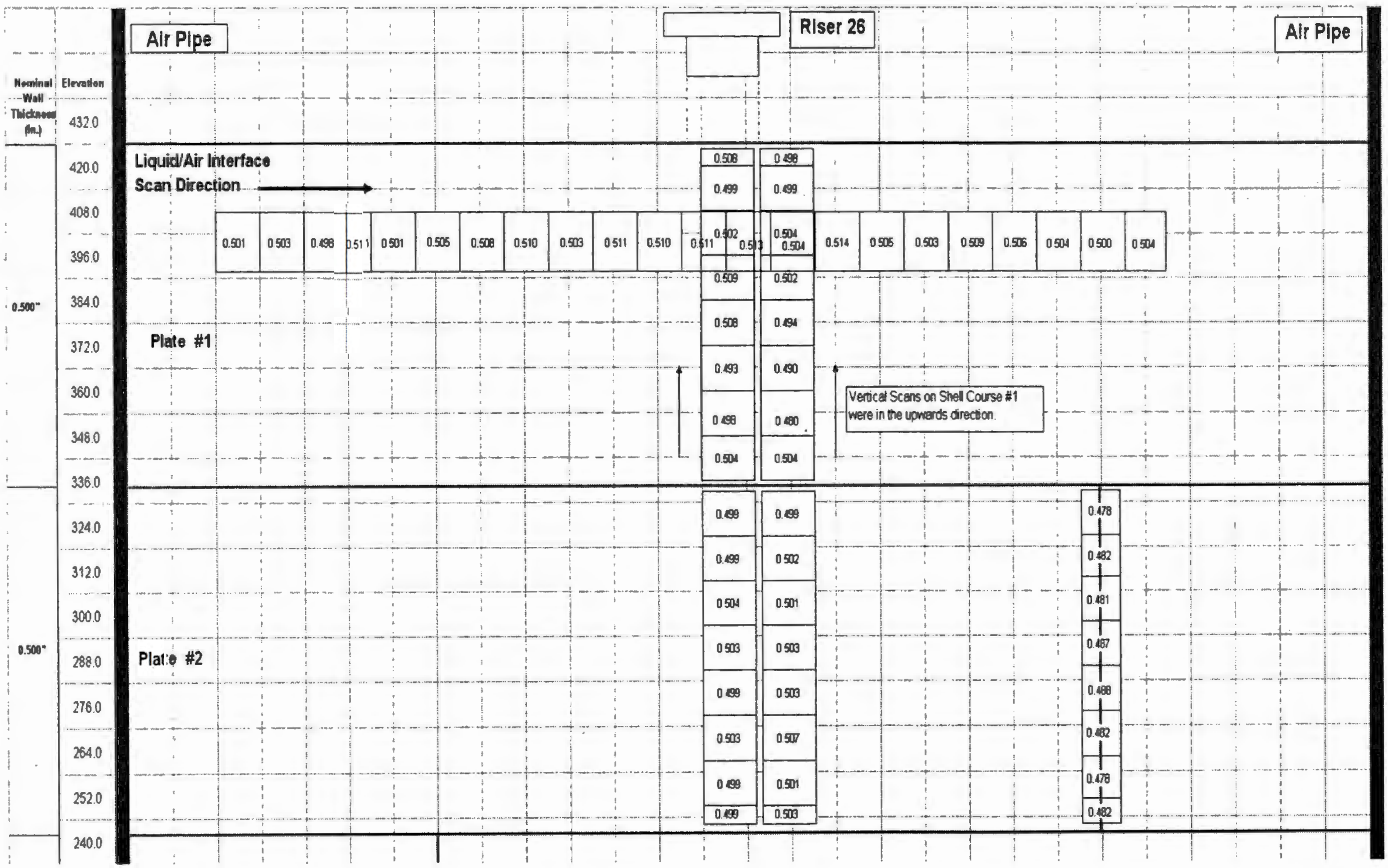



**Figure 5.1**. UT Data from Tank 241-AN-104

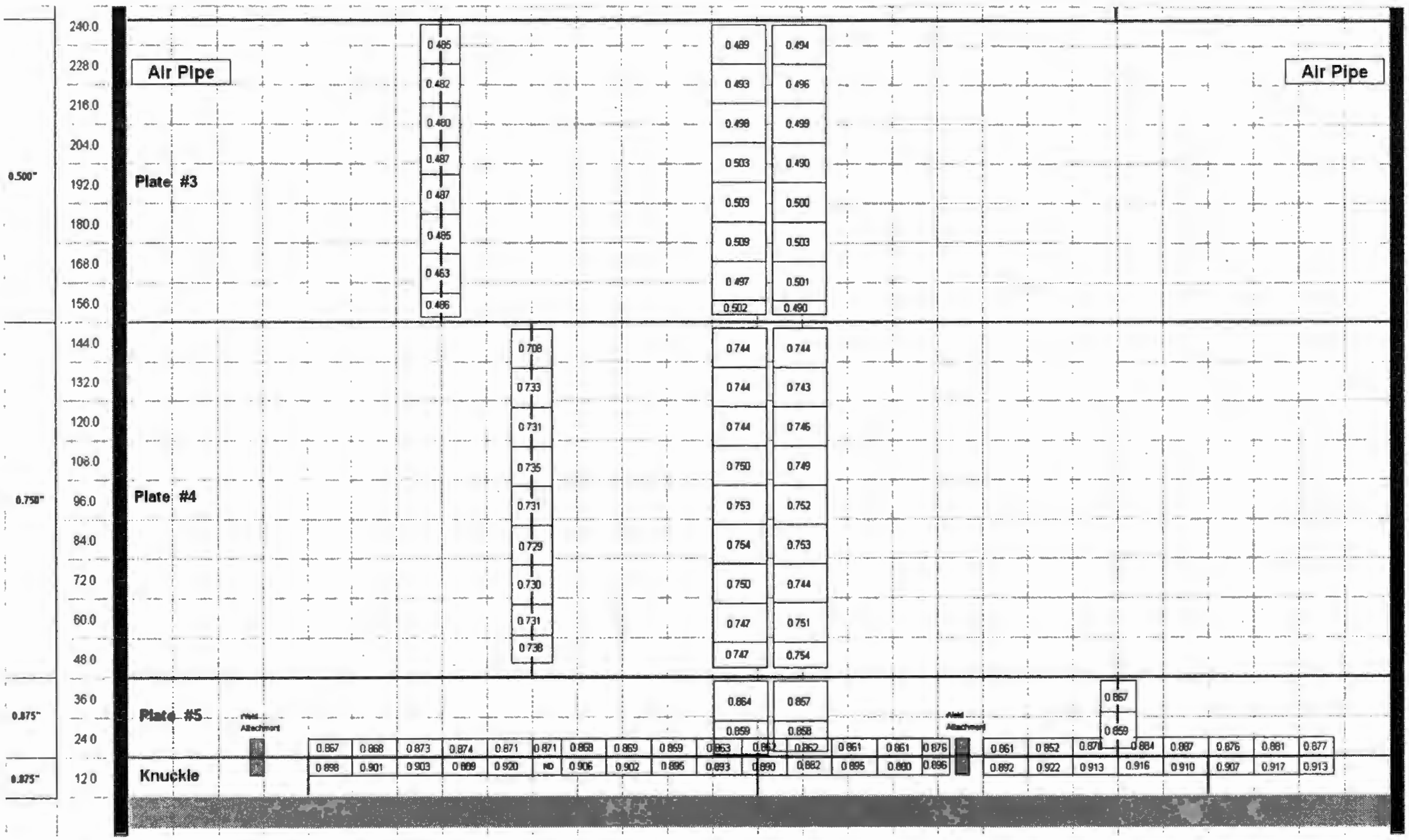



**Figure 5.2.** UT Data from Tank 241-AN-104 cont.

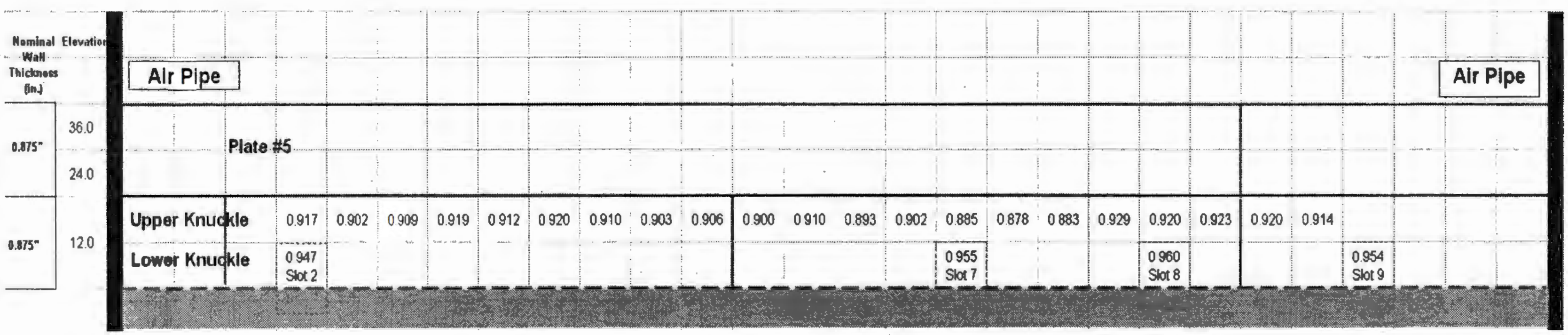



**Figure 5.3**. UT Data from Tank 241-AN-104 cont.

# 6.0 Conclusions

The results of the examination of Tank 241-AN-104 have been evaluated by PNNL personnel. The examination consisted of two 15-in. wide (on some plates the scan was 17-in. wide) scans over the entire height of the tank and the HAZs of 4 vertical welds and 1 horizontal weld. The examination also included one 17-in. wide horizontal scan in the liquid/air interface region on Plate #1, examination of the upper portion of the knuckle region, and 4 areas of the lower portion of the knuckle in the air slots. 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 (on some plates the scan was 17-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 0.480-in., Plate #2 was 0.499-in., and Plate #3 was 0.489-in. The nominal thickness in Plate #4 is 0.750-in. and the minimum thickness in this area was 0.743-in. The nominal thickness in Plate #5 is 0.875-in. and the minimum thickness in this area was 0.857-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 0.478-in. The nominal thickness in Plate #3 is 0.500-in. and the minimum thickness in this weld area was 0.463-in. The nominal thickness in Plate #4 is 0.750-in. and the minimum thickness in this weld area was 0.708-in. The nominal thickness in Plate #5 is 0.875-in. and the minimum thickness in this weld area was 0.859-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, #3, #4, and #5.

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 0.852-in. The minimum thickness in the weld area with nominal thickness of 0.875-in. on the knuckle was 0.880-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.

## 6.3 Primary Tank Wall Liquid/Air Interface Horizontal Scan Paths

One 17-in.-wide horizontal scan path was performed on Plate #1. The plate was examined for wall thinning on the primary tank wall. The results indicated that the minimum thickness in the areas scanned on Plate #1 with nominal thickness of 0.500-in. was 0.498-in. There were no areas of wall thinning that exceeded the reportable level of 10% of the nominal thickness.

## 6.4 Primary Tank Wall Knuckle Scan Paths

The upper portion of the knuckle area was scanned utilizing the Y-arm scanner attached to the AWS-5D crawler. The Y-arm scanned the transducers down around the knuckle approximately 12-in. (from a starting position 2-in. down) from the upper knuckle weld joining Plate #5 to the knuckle. The knuckle was examined for wall thinning, pitting, and cracks oriented circumferentially around the primary tank. The results indicated that the minimum thickness in the approximately 20 circumferential feet of knuckle area examined with nominal thickness of 0.875-in. was 0.878-in. There were no areas that exceeded the reportable level of 10% of the nominal thickness. No pitting or circumferentially oriented crack-like indications were detected in the upper portion of the knuckle area.

Four small areas on the lower portion of the knuckle area were examined for wall thinning only utilizing the Y-arm scanner in areas accessible through selected air slots. The four areas examined were in air slots designated as Slot 2, Slot 7, Slot 8, and Slot 9. The results indicated that the minimum thickness in the lower portion of the knuckle area, with nominal thickness of 0.875-in., in the selected air slots was 0.947-in. There were no areas that exceeded the reportable level of 10% of the nominal thickness.

# 7.0 References

Jensen, C. E., 2004, *Engineering Task Plan for the Ultrasonic Inspection of Hanford Double-Shell Tanks FY2005*, RPP-22571, Rev 0, September 2004, CH2M Hill Hanford Group, Inc., Richland, Washington.

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