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1	RPP-6097	-	0	Operational Test Report	SQ	1	1	1

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

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority G. Tardiff	<i>G. Tardiff</i>	3/23/00	55-05						
		Design Agent N/A				1	1	J.E. Andrews	<i>J.E. Andrews</i>	3/23/00	55-04
1	1	Cog. Eng. D. Bragg	<i>D. Bragg</i>	6/24/00	55-05	1	1	J. Bellomy	<i>J. Bellomy</i>	3/28/00	RI-50
1	1	Cog. Mgr. D. Reberger	<i>D. Reberger</i>	3/24/00	55-13	1	1	D. Stenkamp	<i>D. Stenkamp</i>	3/28/00	RA-58
1	1	QA W. Adams	<i>W. Adams</i>	3/27/00	55-16						
1	1	Safety R. Fogg	<i>R. Fogg</i>	3/27/00	55-12						
		Env. N/A									

18. <i>J.E. Andrews</i> J.E. Andrews Signature of EDT Originator	3/23/00 Date	19. N/A Authorized Representative for Receiving Organization	Date	20. <i>G. Tardiff</i> G. Tardiff Design Authority/ Cognizant Manager	3/27/00 Date	21. DOE APPROVAL (if required) Ctrl No. N/A <input type="radio"/> Approved <input type="radio"/> Approved w/comments <input type="radio"/> Disapproved w/comments
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# Operational Test Report For The 241-AZ-101 Ultrasonic Interface Level Analyzer

JE Andrews, CHG

Richland, WA 99352  
U.S. Department of Energy Contract DE-AC06-96RL13200

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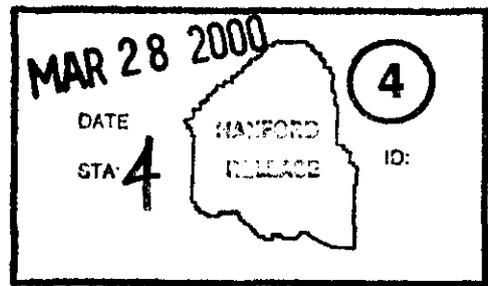
**Abstract:** This document comprises the Operational Test Report for the  
241-AZ-101 Ultrasonic Interface Level Analyzer

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**RPP-6097, Rev 0**

**RPP-6097, Rev 0  
Operational Test Report  
For The  
Ultrasonic Interface Level Analyzer**

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ATTACHMENT 1

COMPLETED COPY OF OTP-260-002

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## 1.0 INTRODUCTION

This document presents the results of Operational Testing of the 241-AZ-101 Ultrasonic Interface Level Analyzers(URSILLAs). Testing of the URSILLAs was performed in accordance with OTP-260-002, "ULTRASONIC INTERFACE LEVEL ANALYZER OPERATIONAL TEST PROCEDURE". The objective of the testing was to verify that all equipment and components functioned as designed following construction completion and turnover to operations.

## 2.0 TEST DESCRIPTION

Testing of the URSILLAs was accomplished in one day. Test procedure OTP-260-002 required one revision prior to testing to incorporate a Procedure Change Authorization (PCA) necessary to facilitate testing. Specific equipment tested by OTP-260-002 included the following:

- Ultrasonic Interface Level Analyzers WST-LY-703  
WST-LY-704  
WST-LY-705
- URSILLA personnel computer and software
- Three URSILLA probes

## 3.0 TEST RESULTS

All testing of the 241-AZ-101 URSILLA systems was completed satisfactorily. No equipment operational or performance deficiencies were identified which would preclude safe operations.

During the course of testing, one test exception was identified. The problem identified on the test exception has been resolved and appropriately closed. The test exception is summarized below.

### **Test Exception 1**

Test exception 1 identified that URSILLA analyzer WST-LY-704 gave a reading significantly different than the other two analyzers. WST-LY-704 gave a reading

of approximately 9.6 feet, whereas the other analyzers gave readings in the two to three foot range as expected. After a thorough Engineering review of the system and data, it was concluded that the system was operating correctly and was sensing an object or layer at the indicated depth. Therefore the system was accepted and no retest was required.

#### **4.0 CONCLUSIONS**

The test procedure is acceptable as written and performed. As a result of testing performed under OTP-260-002, it can be concluded that the URSILLA system is in a state of readiness that will support planned mixer pump test operations.

ATTACHMENT 1  
COMPLETED COPY OF OTP-260-002

**ULTRASONIC INTERFACE LEVEL ANALYZER  
OPERATIONAL TEST PROCEDURE**

<b>Last Full Revision:</b>	A-0	
<b>Release Date:</b>	02-02-2000	
<b>USQ Screening Number:</b>	TF-00-0034 R.0	
<b>Approval Designator:</b>	Q	
<b>Current Modification:</b>	A-1	
<b>USQ Screening Number:</b>	TF-98-1201 Rev 1	
<b>Approval Designator:</b>	N/A	
<b>PCA Incorporated:</b>	ETF-2000-080	
<b>POSITION/ORG</b>	<b>DELEGATE</b>	<b>DATE</b>
LNCO/OPS	<u>Charles W. Peale</u>	<u>03-02-2000</u>
SOM	<u>J. E. Andrews</u>	<u>02-29-2000</u>
Cog. Engineer	<u>Gary Tardiff</u>	<u>03-02-2000</u>
Acceptance Review	<u>L. Ross</u>	<u>03-02-2000</u>
Approval Authority	<u>J.E. Andrews</u>	<u>03-02-2000</u>
<b>Justification:</b> The tank depth reference and depth orientation changed.		
<p>Summary of Changes:</p> <p>Changed "19.0" to "16.1" in steps 5.2.12, 5.3.12, and 5.4.12.</p> <p>Changed "top" to "bottom" in NOTE before steps 5.2.13, 5.3.13, and 5.4.13.</p> <p>Changed "tank bottom" to "sludge level" and "16.1" to "1.5" in NOTE before steps 5.2.16, 5.3.16, and 5.4.16.</p> <p>Changed "top" to "bottom" in NOTE before step 5.5.10.</p> <p>Changed "tank bottom" to "sludge level" in steps 5.5.11 and 5.5.12.</p> <p>Deleted NOTE before step 5.5.13.</p> <p>Changed "16.1" to "1.5" in step 5.5.13.</p> <p>Deleted the word "temporary" in steps 5.2.12, 5.3.12, and 5.4.12.</p>		

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TEST EXECUTION SHEET

DATE: 3/2/00	DOCUMENT NUMBER:
DOCUMENT TITLE: URSTILLA OPERATIONAL TEST PROCEDURE	
TEST PERSONNEL (PRINT NAMES)	
TEST DIRECTOR: JE Andrews	AUTHORIZED INSPECTOR: David Frey
TEST ENGINEER: Dan Stenkamp	RECORDER: JE Andrews
TEST EXECUTION	
TEST DIRECTOR SIGNATURE/DATE: JE Andrews 3/2/00	TEST ENGINEER SIGNATURE/DATE: Dan Stenkamp 3/2/00
	RECORDER SIGNATURE/DATE: JE Andrews 3/2/00
APPROVAL AND ACCEPTANCE OF TEST RESULTS	
WITHOUT EXCEPTION ___ (✓)	WITH EXCEPTIONS RESOLVED ✓ (✓)
	WITH EXCEPTIONS REMAINING ___ (✓)
TEST DIRECTOR SIGNATURE/DATE: JE Andrews 3/23/00	PROJECT MANAGER SIGNATURE/DATE: Dan P. Kim 3/24/00
TEST ENGINEER SIGNATURE/DATE: D.M. Stenkamp 3/23/00	QUALITY ASSURANCE SIGNATURE/DATE: W.H. Adams 3/23/00
AUTHORIZED INSPECTOR SIGNATURE/DATE: D. Enloe FH-AI 3/23/00	DESIGN AUTHORITY SIGNATURE/DATE: Daryn Smith 3/23/00

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## 1.0 PURPOSE AND SCOPE

### 1.1 PURPOSE

The purpose of this procedure is to test the ability of the Ultrasonic Interface Level Analyzer (URSILLA), Instrument Assemblies to perform data collection functions per design specifications.

### 1.2 SCOPE

This Operational Test Procedure will test the functional components, and the ability to collect data with a STAND-ALONE software system.

## 2.0 INFORMATION

### 2.1 TERMS AND DEFINITIONS

Tank Depth - Distance between sensor and the bottom of the waste tank.

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## 2.2 RESPONSIBILITIES

- 2.2.1 Test Engineer is responsible for the following:
- Preparing and issuing an Operational Test Report for the approved, accepted and completed Test Procedure.
  - Ensuring all preparations for this Test have been completed
  - Support Test Director and Test Personnel with the technical information and support necessary to complete this procedure.
- 2.2.2 Test Director has the option to assign a designated Recorder to fulfill the following recording criteria.
- Record, check off, initial, enter N/A, and ensure verification signatures are obtained as each step and section completes.
- 2.2.3 Operation Personnel are responsible for operating the equipment per the Test Engineer and Test directors direction.
- 2.2.4 QC Inspector is responsible for witnessing test execution and signing the completed sections of the test.
- 2.2.5 The Authorized Inspector is responsible for the following:
- Witnessing test execution
  - Approval and signature of acceptance upon completion of this procedure.

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## 2.2 RESPONSIBILITIES (cont.)

2.2.6 Test Director is responsible for the following:

- The safe, efficient, and productive performance of the test
- Coordination of all testing activities
- Scheduling and conducting a pre-job meeting with test participants
- Notification of the persons performing and witnessing the test prior to the start of testing
- Notification of all involved test personnel when a change is made in the testing schedule
- Act as liaison between the participants involved with the testing
- Stopping any test or section which may cause damage to the system
- Obtaining revisions to the Test Procedure, to comply with authorized field changes or to accommodate existing field conditions
- Taking actions to resolve exceptions to the Test Procedure
- Signing the Operational Test Procedure Exception Record when a test exception has been resolved
- Evaluating recorded data, discrepancies, and exceptions
- Signing Test Execution Sheet when this Test Procedure has been performed
- Signing Exception Record when a retest to clear an exception has been executed and accepted
- Obtaining required signatures on the Test Procedure Working Copy prior to reproduction and distribution

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## 2.3 REFERENCES

2.3.1 The following documents were used to write or are referenced in this procedure:

- ROYCE instrument Corporation, *Model 2511, Interface Level Analyzer Operators Manual*, New Orleans, La., VIN 0022515, Supplement 041
- ROYCE instrument Corporation, *Model 2511, Interface Level Analyzer Profile Program Instructions*, New Orleans, La. VIN 0022515, Supplement 041
- Witwer, K. S., 1995a, *Status on Royce Interface Level Detector*, Internal Memo to G. T. Maclean, May 3, 1995
- Witwer, K. S., 1995b, *Current Status and Results of Royce Ultrasonic Sensor Testing*, Memo to G. T. Maclean, September 19, 1995
- Witwer, K. S., 1999, *Report on Testing of the Royce Interface Level Analyzer*, HNF-3782, Rev. 0, February 25, 1999, Numatec Hanford Company, Richland, Washington.

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## 2.4 GENERAL INFORMATION

### VENDOR INFORMATION

The Royce Instrument Corporation Model 2511 Interface Level Analyzer (URSILLA) system uses an ultrasonic ranging technique (SONAR) to measure sludge depths in holding tanks. Three Ultrasonic Interface Level Analyzer instrument assemblies provided by the W-151 project are planned to be used during mixer pump testing to provide data for determining sludge mobilization effectiveness of the mixer pumps and sludge settling rates.

The Royce Instrument Corporation Model 2511 Interface Level Analyzer system consists of three main components - a sensor unit, an analyzer unit, and a data acquisition system. The system uses an ultrasonic ranging technique (SONAR) to measure the depth of sludge blanket interfaces within holding tanks. A small sensor mounted on the end of a 3/4" diameter pipe is placed just under the surface of the liquid. An ultrasonic signal is sent and received through the sensor and forwarded by coaxial cable to the analyzer unit. The analyzer unit processes the information and provides a visual readout of the sludge/liquid interface layer(s) and/or tank bottom position. Specifics of the operation of the components are given below.

### Sensor Unit

The sensing unit, Model 25MRA, is a 2" diameter by 3" long probe with a 1/4" thick outer shell made of carbon fiber/epoxy composite material. A piezoelectric crystal within the sensing unit acts as both a transmitter and receiver or "transceiver". Short, 212 hz bursts of ultrasonic energy transmitted from the crystal travel in a narrow beam towards the tank bottom and any resulting echoes are received in the same crystal.

The outer shell of the sensor is designed to withstand extreme environmental conditions such as high temperatures and very corrosive materials. Testing has also shown that there was no degradation of sensor performance after exposure to  $5 \times 10^6$  RAD of gamma radiation.

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## 2.4 GENERAL INFORMATION (Cont).

### Analyzer Unit

The analyzer unit, Model 2511, measures the time delay and magnitude of the returning signals and stores this information in its memory in the form of a tank profile. The procedure is repeated several times to filter anomalous returns until an average "clean" profile is developed. The analyzer will adjust the power level of the transmitted signal based on the strength of returned signals. Several factors will influence the strength of the returned signals. The analyzer will attempt to adjust the power output to provide a signal return that will be easily distinguishable from the background noise. Once the profile is stored in memory, the analyzer can determine the depth of the interface, the depth of the tank bottom, and the depth of any "fluff" layers suspended above the interface. This information is then displayed both numerically and graphically on the front panel readout, or sent to a remote acquisition system where the same information can be displayed, manipulated and/or stored using vendor supplied software.

### Data Acquisition System

A microcomputer is connected to the analyzer assembly via an RS232 serial interface. Data from the analyzer is then viewed using the software program provided by the vendor. The software enables the user to view and record data from the analyzer to disk as standard American Standard Code For Information Interchange text data. The data can be manipulated using other software such as spreadsheet or other programs.

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## 2.4 GENERAL INFORMATION (Cont).

- 2.4.1 All entries recorded in this procedure shall be made in black ink.
- 2.4.2 Procedural and technical requirement changes must be processed by Procedure Change Authorization in accordance with approved procedures. If a need for such a change is discovered in the course of running the test, the applicable portion of the test shall be stopped, and the test equipment shall be placed in a safe configuration, until the Procedure Change Authorization is approved. However, this does not prevent the running of another portion of the test unaffected by the change.
- 2.4.3 Operational Test steps detailed in individual Tests in Section 5.0 shall be performed sequentially, unless otherwise noted or as directed by the Test Director.
- Individual Test Procedure Sections may be performed out of sequence at the direction of the Test Director, if the intent of the test is not compromised
  - Any step that requires verification of data must also include recording data on the Working Copy.
- 2.4.4 It is the intent to perform this Operational Test Procedure uninterrupted from beginning to end. If testing is terminated due to time constraints at the end of an individual Test Section, the system will be placed in a safe configuration by the Test Director, with concurrence of the Test Engineer, and the terminated test configuration noted in the Operational Test Procedure Performance Log. The test will restart at the next scheduled shift by establishing the noted test configuration, and documenting this in Operational Test Procedure Performance Log.
- 2.4.5 Any non-conformance of the instrumentation, unexpected results or exceptions during testing shall be sequentially numbered and recorded in the Operational Test Procedure Exception Log and on individual Operational Test Procedure Exception Records. Thus, case-by-case resolution, recording, approval, and distribution of each exception will be achieved.

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**2.4 GENERAL INFORMATION (Cont).**

2.4.6 When an exception is identified during testing, initiate an Operational Test Procedure Exception Record in the following manner (an example of a test exception would be when the system, fabricated per the design media, does not perform as expected):

- Number each exception sequentially as it occurs and record it on the Operational Test Procedure Exception Log
- Enter the sequential exception number, date, and a description of the exception on an Operational Test Procedure Exception Record; identify additional detail as required
- Enter the name and/or the organization of the objecting party for each exception in the "Description of Exception" section of the Operational Test Procedure Exception Record
- Enter a description of actions planned to resolve each exception on the Operational Test Procedure Exception Record when such a determination is made.

2.4.7 Resolve test exceptions in the following manner:

- Record the action taken to resolve each exception in the "Resolution of Exception" section of the Operational Test Procedure Exception Record (the action taken does not have to be the same as the recorded planned action)
- When the action taken results in an acceptable retest, initial and date the Correction Approval section of the Exception Sheet
- When the action taken does not result in an acceptable retest, provide a detailed explanation of why the retest action was not acceptable, and what additional plans are required. The explanation may include why the system should be Accepted-As-Is. The NHC Project Engineer then signs and dates the Resolution of Exception section of the Operational Test Procedure Exception Record, and obtains any other approvals required
- Distribute requisite copies of the completed Operational Test Procedure Exception Records to the client at the completion of the Operational Test Procedure.

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**2.4 GENERAL INFORMATION (Cont).**

2.4.8 Upon completion of the Operational Test Procedure, obtain approval of the test performance. Each Test Execution Sheet will stand alone as approval for the system under test. The Operational Test will be complete when all the outstanding tests have been performed and the Operational Test Report is prepared. The test will be approved by checking the proper response, with or without exceptions, on the Test Execution Sheet under the "Approval and Acceptance of Test Results" section of the Test Execution Sheet.

2.4.9 The following steps detail the possible conditions that may exist at the completion of the Operational Test Procedure, and the steps necessary to complete acceptance in those conditions.

2.4.9.1 The completed test may be approved without test exceptions:

- Check applicable space on Test Execution Sheet to show that the Operational Test Procedure has been performed and no exceptions have been recorded
- Appropriate individual Test Performers will sign and date the Test Execution Sheet in the spaces provided
- Distribute requisite copies as directed by the client
- Send the Master Copy of the completed Operational Test Procedure to the client.

2.4.9.2 The completed test may be approved with exceptions resolved:

- Check applicable space on Test Execution Sheet to show that this procedure has been performed with exceptions recorded and resolved
- Appropriate individual Test Performers will sign and date the Test Execution Sheet in the spaces provided
- Distribute requisite copies as directed by the client
- Send the Master Copy of the completed Operational Test Procedure to the client.

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**2.5 RECORDS**

- 2.5.1 All personnel involved in the performance of this test shall sign in Procedure Signature Sheet.
- 2.5.2 Test results shall be recorded. Unless specific data is required, the signature or initials as applicable, of the person accepting the item will be entered in the blank provided to indicate compliance with the stated requirements or the successful completion of the given test step. Errors shall be corrected by crossing out the incorrect data with a single line and the correct response shall be written in the direct vicinity of the original item. The person making the correction shall initial and date the correction. A complete working copy of this procedure and any exception records generated shall be maintained as a permanent record.
- 2.5.3 An Exception Log and Exception Record sheet is attached in the event exceptions to the test are made when the test is being performed. All exceptions to the test are to be dispositioned and agreed to by all witnesses. Actions taken regarding disposition are noted on the exception sheet. During the performance of this test, errors in test may be encountered which require correction or adjustment to complete the test. Such corrections are to be noted in the ATP and listed as an exception.
- 2.5.4 All data obtained in this test procedure is to be maintained by Test Engineer in both hard copy and electronic files.
- 2.5.5 The completed master "Working Copy" of this Operational Test Procedure, Operational test report, the completed "Test Execution Sheet", the completed "Operational Test Procedure Performance Log" and "Operational Test Procedure Exception Log", and all "Test Exception Sheets" generated during performance of this Operational Test Procedure will be kept as permanent records.

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### 3.0 PRECAUTIONS AND LIMITATIONS

#### 3.1 PERSONNEL SAFETY

- 3.1.1 Individuals shall carry out their assigned work in a safe manner to protect themselves, others, and the equipment from undue hazards and to prevent damage to property and environment.
- 3.1.2 Test Director shall assure the safety of all activities within their areas to prevent injury, property damage, or interruption of operation.
- 3.1.3 Any hazard identified during the performance of the procedure shall be reported to the Test Director IMMEDIATELY.
- 3.1.4 A daily pre-job safety briefing will be held with all test participants and documented in the Pre-Job Safety form. (JSA or Pre Job Safety form)
- 3.1.5 Performance of test activities shall always include safety and health aspects as delineated in the Operations Manuals and as directed by the Test Director.

### 4.0 PREREQUISITES

#### 4.1 SPECIAL TOOLS, EQUIPMENT, AND SUPPLIES

- 4.1.1 The following supplies shall be available at the test site:

PROVIDED

- Ultrasonic Interface Level Analyzer Assembly
- Operator personal computer and Monitor
- Computer Cable from personal computer to Analyzer
- Software program

#### 4.2 PERFORMANCE DOCUMENTS

- 4.2.1 The following procedures may be needed to perform this procedure:
  - Vendor Information manuals

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### 4.3 CONDITIONS AND ACTIONS

The following conditions must be met before this Operational Test Procedure (OTP) may commence.

NOTE- All signators on this procedure shall document their signature on Procedure Signature Sheet.

4.3.1 All field testing and inspection of the system or portions of the system to be tested has been completed.

Daniel M. Steinkamp      3/2/00  
 Test Engineer Signature      Date

Daniel M. Steinkamp  
 Test Engineer Print Name

4.3.2 A pre-job briefing has been held, and all participants have been thoroughly briefed on job safety, hazards, and their responsibilities before performing this Operational Test Procedure.

JE Andrews      3/2/08  
 Test Director Signature      Date

JE Andrews  
 Test Director Print Name

4.3.3 Test Director VERIFY Section 4.0 has been COMPLETED by SIGNING below.

JE Andrews      3/2/08  
 Test Director Signature      Date

JE Andrews  
 Test Director Print Name

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**5.2 WST-LY-703 CONFIGURATION AND TESTING**

NOTE - The intent of this section is to test each Ultrasonic Interface Level Analyzer individually. The assemblies not being tested should remain "OFF" during each individual test sequence.

- Test Engineer may choose to change the parameters of the software at any time during this procedure to determine the amount, duration, and frequency of profile data collection. If necessary adjustments to analyzer controls may be performed to optimize graphical display properties.
- When the unit is turned on for the first time, it will be in the alarm condition. A message will appear on the graphic panel that explains that the unit will not operate until the tank depth has been programmed. (If the unit does not give this error message, it means a non-zero tank depth value has already been stored. In this case, only the RUN light will light on the front panel.)
- The following settings are required to be made in the Ultrasonic Interface Level Analyzer enclosure for correct operation.

*ja* 5.2.1 ENSURE the unique number for the Ultrasonic Interface Level Analyzer assembly to be tested, in this section is correct.

Assembly No. WST-LY-703

*ja* 5.2.2 ENSURE the power is "ON" to the assembly being tested.

NOTE - Test Engineer may choose to change the parameters of the software at any time during this procedure to determine the amount, duration, and frequency of profile data collection.

*ja* 5.2.3 ENSURE the software program is running on the Operators Computer.

*ja* 5.2.4 PRESS the "PGM" key to enter the analyzer "program" mode of operation. The unit should display a HELP screen.

NOTE - For purposes of testing the installation, temporary program parameters will be entered to allow verification of connections.

*ja* 5.2.5 PRESS the "NEXT PAGE" key to bring up the "DISPLAY FORMAT" help screen.

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**5.2 WST-LY-703 CONFIGURATION AND TESTING (Cont).**

NOTE - The following step may be modified per Test Director depending on substance of liquid and display parameters as necessary

*ja* 5.2.6 PUSH the UP arrow key to select a value that displays the depth in feet.

*ja* 5.2.7 PRESS the "NEXT PAGE" key again to bring up the "ECHO PROFILE UPDATE RATE" screen.

*ja* 5.2.8 PUSH the applicable arrow keys to select a value of 4 to have the Ultrasonic Interface Level Analyzer average a minute's worth of tank profiles.

*ja* 5.2.9 PRESS the NEXT PAGE key to bring up the "INTERFACE LEVEL AVERAGING CYCLES" screen.

*ja* 5.2.10 PUSH the applicable arrow keys to select a value of 5 to average 5 profile groups.

*ja* 5.2.11 PRESS the PREV PAGE key to scroll back to the "TANK DEPTH" screen.

NOTE - For the purpose of this section "TANK DEPTH" refers to the distance between the sensor and the bottom of the waste tank.

*ja* 5.2.12 ENTER a temporary tank depth of ~~16.1~~19.0 feet.

NOTE - After the following step, the display will go blank for a minute or so while the unit attempts to adjust transmitter power to the condition of the tank. After this delay, an "echo profile" graph will appear in the LCD display. The numbers along the side of the graph indicate the depth in feet from the ~~bottom~~top of the tank. At each depth, the magnitude of the graph indicates the strength of the echo energy that is returning from that spot on the tank. At the very bottom of the graph, the unit will display a message to indicate the transmitter power (GAIN) that is being used to create this graph.

*ja* 5.2.13 PRESS the RUN key.

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A1-19

5.2 WST-LY-703 CONFIGURATION AND TESTING (Cont).

NOTE - The graph should show an obvious bump other than the bump on the top. The bump on the very top is ignored in the next step.

Ja 5.2.14 MAKE any necessary adjustments to controls to optimize graphical display properties.

Ja 5.2.15 VERIFY there is at least one obvious bump in the graph.

Test Director Signature: JE Andrews, Date: 3/2/00, Test Director Print Name: JE Andrews

NOTE - In the next step the sludge level tank bottom is expected as a sharp peak in the graph at approximately 1516.1 feet. It may be that the sound cannot penetrate the sludge level and only the sludge level is visible.

Ja 5.2.16 EXAMINE the graph to see if the position of the tank bottom is apparent.

Ja 5.2.17 ENTER the exact tank bottom position IF shown on the graph, to the nearest tenth of a foot. Tank Bottom Position N/A Bottom not Visible feet.

Ja 5.2.18 EXAMINE the graph to determine if a sludge level is appearant.

Ja 5.2.19 RECORD sludge level if visable on graphical display. Sludge level 2.7 feet.

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5.2 WST-LY-703 CONFIGURATION AND TESTING (Cont).

JA 5.2.20 VERIFY that the graphical profile reading is displayed at the Ultrasonic Interface Level Analyzer personal computer monitor.

JE Andrew  
Test Director Signature 3/2/00  
Date  
JE Andrews  
Test Director Print Name

JA 5.2.21 Test Engineer RECORD electronically all profile data taken.

JA 5.2.22 VERIFY that Section 5.2 is COMPLETE by SIGNING below.

Ronald A. Arnold  
QC Signature 3-2-00  
Date

Ronald A. Arnold  
QC Print Name

JE Andrew  
Test Director Signature 3/2/00  
Date

JE Andrews  
Test Director Print Name

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### 5.3 WST-LY-704 CONFIGURATION AND TESTING

- NOTE - The intent of this section is to test each Ultrasonic Interface Level Analyzer individually. The assemblies not being tested should remain "OFF" during each individual test sequence.
- The following settings are required to be made in the Ultrasonic Interface Level Analyzer enclosure for correct operation.
  - When the unit is turned on for the first time, it will be in the alarm condition. A message will appear on the graphic panel that explains that the unit will not operate until the tank depth has been programmed. (If the unit does not give this error message, it means a non-zero tank depth value has already been stored. In this case, only the RUN light will light on the front panel.)

*Ja* 5.3.1 ENSURE the unique number for the Ultrasonic Interface Level Analyzer assembly to be tested, in this section is correct.

Assembly No. WST-LY-704

*Ja* 5.3.2 ENSURE the power is "ON" to the assembly being tested.

NOTE - Test Engineer may choose to change the parameters of the software at any time during this procedure to determine the amount, duration, and frequency of profile data collection.

*Ja* 5.3.3 ENSURE the software program is running on the Operators Computer.

*Ja* 5.3.4 PRESS the "PGM" key to enter the analyzer "program" mode of operation. The unit should display a HELP screen.

NOTE - For purposes of testing the installation, temporary program parameters will be entered to allow verification of connections.

*Ja* 5.3.5 PRESS the "NEXT PAGE" key to bring up the "DISPLAY FORMAT" help screen.

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### 5.3 WST-LY-704 CONFIGURATION AND TESTING (Cont).

NOTE - The following step may be modified per Test Director depending on substance of liquid and display parameters as necessary

- ja* 5.3.6 PUSH the UP arrow key to select a value that displays the depth in feet.
- ja* 5.3.7 PRESS the "NEXT PAGE" key again to bring up the "ECHO PROFILE UPDATE RATE" screen.
- ja* 5.3.8 PUSH the applicable arrow keys to select a value of 4 to have the Ultrasonic Interface Level Analyzer average a minute's worth of tank profiles.
- ja* 5.3.9 PRESS the NEXT PAGE key to bring up the "INTERFACE LEVEL AVERAGING CYCLES" screen.
- ja* 5.3.10 PUSH the applicable arrow keys to select a value of 5 to average 5 profile groups.
- ja* 5.3.11 PRESS the PREV PAGE key to scroll back to the "TANK DEPTH" screen.

NOTE - For the purpose of this section "TANK DEPTH" refers to the distance between the sensor and the bottom of the waste tank.

- ja* 5.3.12 ENTER a temporary tank depth of **6.19.0** feet.

NOTE - After the following step, the display will go blank for a minute or so while the unit attempts to adjust transmitter power to the condition of the tank. After this delay, an "echo profile" graph will appear in the LCD display. The numbers along the side of the graph indicate the depth in feet from the ~~bottom~~<sup>top</sup> of the tank. At each depth, the magnitude of the graph indicates the strength of the echo energy that is returning from that spot on the tank. At the very bottom of the graph, the unit will display a message to indicate the transmitter power (GAIN) that is being used to create this graph.

- ja* 5.3.13 PRESS the RUN key.

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**5.3 WST-LY-704 CONFIGURATION AND TESTING (Cont).**

NOTE - The graph should show an obvious bump other than the bump on the top. The bump on the very top is ignored in the next step.

*ja* 5.3.14 **MAKE** any necessary adjustments to controls to optimize graphical display properties.

*ja* 5.3.15 **VERIFY** there is at least one obvious bump in the graph.

*JE Andrews*                      3/2/00  
 Test Director Signature              Date  
JE Andrews  
 Test Director Print Name

NOTE - In the next step the ~~sludge level tank bottom~~ is expected as a sharp peak in the graph at approximately ~~516.1~~ feet. It may be that the sound cannot penetrate the sludge level and only the sludge level is visible.

*ja* 5.3.16 **EXAMINE** the graph to see if the position of the tank bottom is apparent.

*ja* 5.3.17 **ENTER** the exact tank bottom position IF shown on the graph, to the nearest tenth of a foot.  
 Tank Bottom Position N/A <sup>Bottom not visible</sup> feet.

*ja* 5.3.18 **EXAMINE** the graph to determine if a sludge level is appearant.

*ja* 5.3.19 **RECORD** sludge level if visable on graphical display.  
 Sludge level 6.6 feet.

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**5.3 WST-LY-704 CONFIGURATION AND TESTING (Cont).**

*ja* 5.3.20 **VERIFY** that the graphical profile reading is displayed at the Ultrasonic Interface Level Analyzer personal computer monitor.

*JE Andrews*                      3/2/00  
Test Director Signature                      Date  
JE Andrews  
Test Director Print Name

*ja* 5.3.21 **Test Engineer RECORD** electronically all profile data taken.

*ja* 5.3.22 **VERIFY** that Section 5.3 is **COMPLETE** by **SIGNING** below.

*Amel A. Arzoo*                      3-2-00  
QC Signature                      Date

RONALD A. ARZOOT  
QC Print Name

*JE Andrews*                      3/2/00  
Test Director Signature                      Date  
JE Andrews  
Test Director Print Name

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## 5.4 WST-LY-705 CONFIGURATION AND TESTING

- NOTE - The intent of this section is to test each Ultrasonic Interface Level Analyzer individually. The assemblies not being tested should remain "OFF" during each individual test sequence.
- The following settings are required to be made in the Ultrasonic Interface Level Analyzer enclosure for correct operation.
  - When the unit is turned on for the first time, it will be in the alarm condition. A message will appear on the graphic panel that explains that the unit will not operate until the tank depth has been programmed. (If the unit does not give this error message, it means a non-zero tank depth value has already been stored. In this case, only the RUN light will light on the front panel.)

*ja* 5.4.1 ENSURE the unique number for the Ultrasonic Interface Level Analyzer assembly to be tested, in this section is correct.

Assembly No. WST-LY-705

*ja* 5.4.2 ENSURE the power is "ON" to the assembly being tested.

NOTE - Test Engineer may choose to change the parameters of the software at any time during this procedure to determine the amount, duration, and frequency of profile data collection.

*ja* 5.4.3 ENSURE the software program is running on the Operators Computer.

*ja* 5.4.4 PRESS the "PGM" key to enter the analyzer "program" mode of operation. The unit should display a HELP screen.

NOTE - For purposes of testing the installation, temporary program parameters will be entered to allow verification of connections.

*ja* 5.4.5 PRESS the "NEXT PAGE" key to bring up the "DISPLAY FORMAT" help screen.

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## 5.4 WST-LY-705 CONFIGURATION AND TESTING (Cont).

NOTE - The following step may be modified per Test Director depending on substance of liquid and display parameters as necessary

- ja* 5.4.6 PUSH the UP arrow key to select a value that displays the depth in feet.
- ja* 5.4.7 PRESS the "NEXT PAGE" key again to bring up the "ECHO PROFILE UPDATE RATE" screen.
- ja* 5.4.8 PUSH the applicable arrow keys to select a value of 4 to have the Ultrasonic Interface Level Analyzer average a minute's worth of tank profiles.
- ja* 5.4.9 PRESS the NEXT PAGE key to bring up the "INTERFACE LEVEL AVERAGING CYCLES" screen.
- ja* 5.4.10 PUSH the applicable arrow keys to select a value of 5 to average 5 profile groups.
- ja* 5.4.11 PRESS the PREV PAGE key to scroll back to the "TANK DEPTH" screen.

NOTE - For the purpose of this section "TANK DEPTH" refers to the distance between the sensor and the bottom of the waste tank.

- ja* 5.4.12 ENTER a temporary tank depth of ~~16~~ 19.0 feet.

NOTE - After the following step, the display will go blank for a minute or so while the unit attempts to adjust transmitter power to the condition of the tank. After this delay, an "echo profile" graph will appear in the LCD display. The numbers along the side of the graph indicate the depth in feet from the ~~bottom~~ top of the tank. At each depth, the magnitude of the graph indicates the strength of the echo energy that is returning from that spot on the tank. At the very bottom of the graph, the unit will display a message to indicate the transmitter power (GAIN) that is being used to create this graph.

- ja* 5.4.13 PRESS the RUN key.

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**5.4 WST-LY-705 CONFIGURATION AND TESTING (Cont).**

NOTE - The graph should show an obvious bump other than the bump on the top. The bump on the very top is ignored in the next step.

*ja* 5.4.14 **MAKE** any necessary adjustments to controls to optimize graphical display properties.

*ja* 5.4.15 **VERIFY** there is at least one obvious bump in the graph.

*JE Andrews*                      3/2/00  
 Test Director Signature              Date  
SE Andrews  
 Test Director Print Name

NOTE - In the next step the ~~sludge level tank bottom~~ is expected as a sharp peak in the graph at approximately ~~16.1~~ feet. It may be that the sound cannot penetrate the sludge level and only the sludge level is visible.

*ja* 5.4.16 **EXAMINE** the graph to see if the position of the tank bottom is apparent.

*ju* 5.4.17 **ENTER** the exact tank bottom position IF shown on the graph, to the nearest tenth of a foot.  
 Tank Bottom Position N/A feet. *Bottom not visible*

*ja* 5.4.18 **EXAMINE** the graph to determine if a sludge level is appearant.

*ja* 5.4.19 **RECORD** sludge level if visible on graphical display.  
 Sludge level 2.7 feet.

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5.4 WST-LY-705 CONFIGURATION AND TESTING (Cont).

5.4.20 VERIFY that the graphical profile reading is displayed at the Ultrasonic Interface Level Analyzer personal computer monitor.

Test Director Signature: [Signature] Date: 3/2/00
Test Director Print Name: J E Andrews

5.4.21 Test Engineer RECORD electronically and all profile data taken.

5.4.22 VERIFY that Section 5.4 is COMPLETE by SIGNING below.

QC Signature: [Signature] Date: 3-2-00

QC Print Name: RONALD A. ARNOLD

Test Director Signature: [Signature] Date: 3/2/00

Test Director Print Name: J E Andrews

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## 5.5 SIMULTANEOUS DATA COLLECTION

NOTE - It is permissible to go from assembly to assembly at any time during this section, to determine if data may be collected simultaneously from all three assemblies.

*ja* 5.5.1 ENSURE the power is "ON" to ALL three assemblies being tested.

*ja* 5.5.2 PRESS the "PGM" key to enter the analyzer "program" mode of operation. The unit should display a HELP screen.

*ja* 5.5.3 PRESS the "NEXT PAGE" key to bring up the "DISPLAY FORMAT" help screen.

NOTE - The following step may be modified per Test Director depending on substance of liquid and display parameters as necessary

*ja* 5.5.4 PUSH the UP arrow key to select a value that displays the depth in feet.

*ja* 5.5.5 PRESS the "NEXT PAGE" key again to bring up the "ECHO PROFILE UPDATE RATE" screen.

*ja* 5.5.6 PUSH the applicable arrow keys to select a value of 4 to have the Ultrasonic Interface Level Analyzer average a minute's worth of tank profiles.

*ja* 5.5.7 PRESS the NEXT PAGE key to bring up the "INTERFACE LEVEL AVERAGING CYCLES" screen.

*ja* 5.5.8 PUSH the applicable arrow keys to select a value of 5 to average 5 profile groups.

*ji* 5.5.9 PRESS the PREV PAGE key to scroll back to the "TANK DEPTH" screen.

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**5.5 SIMULTANEOUS DATA COLLECTION (Cont).**

NOTE - For the purpose of this section "TANK DEPTH" refers to the distance between the sensor and the bottom of the waste tank.

- After the following step, the display will go blank for a minute or so while the unit attempts to adjust transmitter power to the condition of the tank. After this delay, an "echo profile" graph will appear in the LCD display. The numbers along the side of the graph indicate the depth in feet from the ~~bottom~~ top of the tank. At each depth, the magnitude of the graph indicates the strength of the echo energy that is returning from that spot on the tank. At the very bottom of the graph, the unit will display a message to indicate the transmitter power (GAIN) that is being used to create this graph.

JA 5.5.10 PRESS the RUN key.

JA 5.5.11 EXAMINE the graphs of all three assemblies to see if the position of the ~~sludge level~~ tank bottom is apparent.

JA 5.5.12 ENTER the exact ~~sludge level~~ tank bottom positions IF shown on the graphs to the nearest tenth of a foot .

WST-LY-703 Tank Bottom Position 2.7 feet.

WST-LY-704 Tank Bottom Position 9.6 feet.

WST-LY-705 Tank Bottom Position 2.2 feet.

~~NOTE - The following step may be N/A if tank bottom does not appear on graphical display.~~

JA 5.5.13 COMPARE the readings from each Ultrasonic Interface Level Analyzer AND

VERIFY they read approximately ~~1.5~~ 16.1 each.

*see test exception #1 and resolution jadrews 3/22/00*

\_\_\_\_\_  
Test Director Signature

\_\_\_\_\_  
Date

JEFF ANDREWS

\_\_\_\_\_  
Test Director Print Name

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**5.5 SIMULTANEOUS DATA COLLECTION (Cont).**

Ja 5.5.14 **VERIFY** that the Sludge Level graphical profile readings are displayed at the Ultrasonic Interface Level Analyzer personal computer monitor.

<u>JE Andrews</u> Test Director Signature	<u>3/2/00</u> Date
<u>JE Andrews</u> Test Director Print Name	

Ja 5.5.15 Test Engineer **RECORD** electronically all profile data taken.

Ja 5.5.16 **VERIFY** that Section 5.5 is **COMPLETE** by **SIGNING** below.

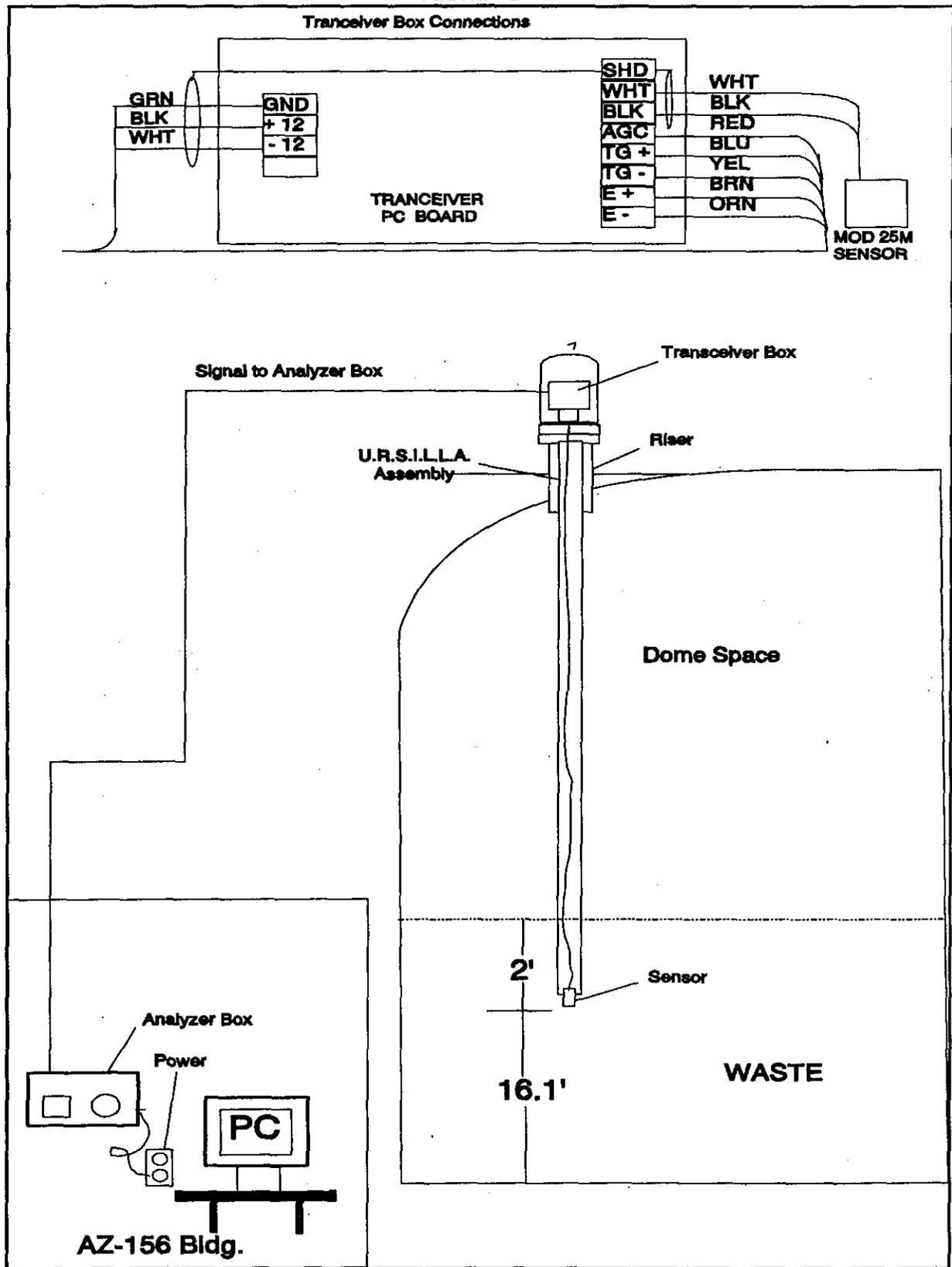
<u>Ronald A. Arndt</u> QC Signature	<u>3-23-00</u> Date
<u>Ronald A. ARNDT</u> QC Print Name	
WORK PERFORMED ON 3-2-00 RA 3-23-00	

<u>JE Andrews</u> Test Director Signature	<u>3/23/00</u> Date
<u>JE Andrews</u> Test Director Print Name	

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FIGURE 1



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### OPERATIONAL TEST PROCEDURE PERFORMANCE LOG

This page may be reproduced as necessary. Page 1 of 1

OTP PERFORMANCE EVENT	DATE	INITIALS
1300 Conducted Pre-job, Commenced OTP	3/2/00	JF
1430 Identified test exception on step 5.5.13. Analyzer WST-LY-704 did not read approximately 1.5'. It gave a reading of approximately 9.6'.		
<i>No further entries JF 3/2/00</i>		

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**OPERATIONAL TEST PROCEDURE EXCEPTION RECORD**

This page may be reproduced as necessary. Page 1 of 1

OTP STEP NUMBER: <i>5.5.13</i>	OTP EXCEPTION LOG#: <i>1</i>
DESCRIPTION OF EXCEPTION: <i>Analyzer WST-LY-704 does not read <math>\approx</math> 1.5'</i>	
NAME / ORGANIZATION OF INITIATOR: <i>Jeff Andrews / Ops</i>	
DATE OF EXCEPTION: <i>3/2/00</i>	
RESOLUTION OF EXCEPTION: <i>See attached sheet</i>	
DATE OF RESOLUTION: <i>3/14/00</i>	
TEST DIRECTOR SIGNATURE: <i>J. Andrews</i>	DATE: <i>3/14/00</i>
TEST ENGINEER SIGNATURE: <i>DM Stenkamp</i>	DATE: <i>3/23/00</i>
QUALITY ASSURANCE SIGNATURE: <i>W. Adams</i>	DATE: <i>3/23/00</i>

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OTP-260-002 EXCEPTION #1

RESOLUTION OF EXCEPTION, DISCUSSION

THE PURPOSE OF STEP 5.5.13 OF THE OTP WAS TO VERIFY THAT EACH OF THE THREE UNITS MEASURED APPROXIMATELY THE SAME DEPTH OF SLUDGE AT THE BOTTOM OF THE TANK. ALTHOUGH THE SLUDGE LEVEL IS NOT CONSISTENT ACROSS THE BOTTOM OF THE TANK, THE DEPTH WAS NOT EXPECTED TO VARY GREATLY FROM ONE PORTION OF THE TANK TO ANOTHER. DURING TESTING THE PROBE LOCATED AT RISER 16C (WST-LY-704), NEAR THE MIDDLE OF THE TANK DISPLAYED AN INTERFACE LEVEL AT ABOUT 9.6 FEET ABOVE THE BOTTOM OF THE TANK. THIS WAS QUITE DIFFERENT THAN THE LEVELS INDICATED BY THE OTHER TWO UNITS. TO TRY TO VERIFY POSSIBLE PROBLEMS WITH THE EQUIPMENT AT RISER 16C, THE PROBE FOR RISER 13A(WST-LY-705), WAS CONNECTED TO THE LEVEL ANALYZER OF WST-LY-704 AND VERIFIED THAT THE TWO SYSTEMS WERE CONSISTENT. DURING THE TESTING OF THE AIR LIFT CIRCULATORS, WHICH INTENTIONALLY DISTURBED THE WASTE, THE TWO UNITS WERE AGAIN COMPARED AND REACTED CONSISTENTLY. WITH ALL DATA AND POSSIBILITIES EVALUATED IT WAS CONCLUDED THAT THE SYSTEM WAS OPERATING CORRECTLY AND THAT THERE MUST BE AN OBJECT OR SUBSTANCE LAYER IN THE MIDDLE OF THE TANK, REFLECTING THE SIGNAL BACK TO THE SENSOR, WHICH THE SENSOR WOULD SEE AS A SLUDGE INTERFACE LEVEL.

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**PROCEDURE HISTORY SIGNATURE SHEET**

<b>Last Full Revision:</b>	A-0	
<b>Release Date:</b>	02-02-2000	
<b>USQ Screening Number:</b>	TF-00-0034 R.0	
<b>Approval Designator:</b>	Q	
<b>Current Modification:</b>	A-0	
<b>USQ Screening Number:</b>	TF-00-0034 R.0	
<b>Approval Designator:</b>	Q	
<b>PCA Incorporated:</b>	N/A	
<b>POSITION/ORG</b>	<b>DELEGATE</b>	<b>DATE</b>
LNPO	<u>Vicki Miller</u>	<u>01-28-2000</u>
SOM	<u>Rich Gutierrez</u>	<u>01-25-2000</u>
Rad Con	<u>DJ Foust</u>	<u>01-28-2000</u>
ECO	<u>T.A. Dillhoff</u>	<u>01-28-2000</u>
QA	<u>W.L.Adams</u>	<u>02-02-2000</u>
Cog. Engineer	<u>David Bragg</u>	<u>01-31-2000</u>
Acceptance Review	<u>David W. VanDyke</u>	<u>02-02-2000</u>
Approval Authority	<u>J.H. Bryce</u>	<u>02-02-2000</u>
<b>Justification: New Procedure</b>		
<b>Summary of Changes: N/A</b>		

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