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JAN 13 1995 20 ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 607641

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) TWRS Safety Special Projects		4. Related EDT No: N/A	
5. Proj/Prog/Dept/Div: SY-101 Mitigation		6. Cog/Proj Engr: M. Gimera/71140		7. Purchase Order No: N/A	
8. Originator Remarks: Transmittal of WHC-SD-WM-ATP-122 for approval and release.				9. Equip/Component No: N/A	
				10. System/Bldg/Facility: 241-SY-101	
				12. Major Assm Dwg No: N/A	
				13. Permit No. N/A	
11. Receiver Remarks:				14. Required Response Date: 1-95	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev No.	(E) Title or Description of Data Transmitted	Impact Level	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-WM-ATP-122		0	Void Fraction Instrument Software	Q	1, 2	1	
				Version 1.1 Acceptance Test				
				Procedure				

16. KEY		
Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 see MRP 5.43 and EP-1.7	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										(G)	(H)
(See Impact Level for required signatures)											
Reason	Disp	(j) Name	(k) Signature	(L) Date	(M) MSIN	(j) Name	(k) Signature	(L) Date	(M) MSIN	Reason	Disp
1	1	Cog./Proj. Eng M Gimera	<i>Michael Gimera</i>	1/13/95	L7-05						
1	1	Cog./Proj. Eng. Mgr. RE Bauer	<i>RE Bauer</i>	1/13/95	L6-37						
1	1	QA ML McElroy	<i>M. L. McElroy</i>	1-13-95	S1-57						
		Safety									

18. Signature of EDT Originator <i>Michael Gimera</i> Date: 1/13/95		19. Authorized Representative for Receiving Organization Date:		20. Cognizant/Project Engineer's Manager <i>RE Bauer</i> Date: 1/13/95		21. DOE APPROVAL (if required) Ltr No. _____ ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-ATP-122, REV. 0

Document Title: VOID FRACTION INSTRUMENT SOFTWARE, VERSION 1.1,
ACCEPTANCE TEST PROCEDURE

Release Date: 1/13/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Chris Willingham

C. Willingham

1/13/95

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SUPPORTING DOCUMENT		1. Total Pages 13
2. Title Void Fraction Instrument Software, Version 1.1, Acceptance Test Procedure	3. Number WHC-SD-WM-ATP-122	4. Rev No. 0
5. Key Words Void Fraction 101-SY Instrumentation	6. Author Name: M. Simera Signature Organization/Charge Code 71140/N2BH3	
7. Abstract Provides the plan and procedures for the acceptance test of changes that result in Version 1.1 of void fraction software. The void fraction instrument measures gas by volume in waste storage tanks.		
8. RELEASE STAMP <div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 10px auto;"> OFFICIAL RELEASE BY WHC DATE JAN 13 1995 </div>		

**VOID FRACTION INSTRUMENT
SOFTWARE VERSION 1.1
ACCEPTANCE TEST PROCEDURE**

IMPACT LEVEL Q

**Issued by
TWRS Safety Programs Engineering Support
January 1995**

Westinghouse Hanford Company

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SOFTWARE ACCEPTANCE TEST PROCEDURE FOR VOID FRACTION INSTRUMENT CHANGES

1. INTRODUCTION

1.1. BACKGROUND

The void fraction instrument was designed and built to measure the amount of gas in various locations within large waste tanks at Hanford. Gas is measured as a percentage of volume.

The operation of this instrument took place at Tank 101-SY on December 21, 1994. As a result of this operation several additional features were requested to enhance the use of the instrument. These features are described in WHC-SD-WM-CSRS-020, Rev. 1, "Software Requirements Specification for Tank 101-SY Void Fraction Instrument." and summarized below:

- The Record Data sequence switch is to record data continuously to file at ten second intervals while the switch is asserted. Previously it only recorded one set of data each time the switch was asserted.
- An adjust Level Gauge sequence switch has been added to compensate for removing an impact limiter. The removal of an impact limiter changed the level gauge reference point. To compensate for this, the switch is asserted prior to removing the impact limiter. After the limiter is removed the switch is de-asserted and the elevation readout value is restored to the elevation value at the time the switch was asserted. When the impact limiter is replaced this switch will need to be used again.
- An approximation of the void fraction is calculated during a test cycle and displayed on the front panel. Two readouts are provided; one for the first pressurization and another for the second pressurization. These values are intended only as a reference to the operator to identify areas of interest in the tank.

1.2. PURPOSE

This document presents both a test plan and acceptance test procedure for testing the software that was developed to operate the void fraction instrument in Tank 101-SY. Together with the forthcoming acceptance test report, this document satisfies the requirements in EP 4.1, "Design Verification Requirements." The selected method of design verification is qualification testing.

1.3. SCOPE

The testing described in this document covers the changes that result in version 1.1 of the software that controls and acquires data for the void fraction instrument. The changes summarized in Section 1.1 are software changes only.

1.4. DEFINITIONS AND ABBREVIATIONS

ATP Acceptance Test Procedure

EP Standard Engineering Practice (WHC-CM-6-1)

SRS Software Requirements Specification

2. SOFTWARE TEST PLAN

The software acceptance test will test the features of the software described in WHC-SD-WM-CSRS-020, Rev. 1, "Software Requirements Specification for 101-SY Void Fraction Instrument," herein referred to as the SRS. The test will test every software change described in the SRS. These changes are listed in Section 2.2, "Features to be Tested".

2.1. PERSONNEL REQUIREMENTS

Each organization participating in the conduct of this test will designate personnel to assume the responsibilities and duties as defined herein for their respective roles. The names and signatures of these people shall be provided to the Test Engineer for listing on the Test Engineer's copy of the Test Data Sheet prior to the performance of any part of this test.

2.1.1. Test Engineer

The Test Engineer's responsibilities are as follows:

- Notify all interested parties when a change is made in the testing schedule.
- Record exceptions and test steps which are not performed.
- Notify the Test Performer of exceptions when the exception is made.

2.1.2. Test Performer

The Test Performer's responsibilities are as follows:

- Verify instruments are in current calibration.
- Perform the test as described in this document.

- Stop any test which, in the judgment of the Test Performer, may cause damage to the system or present an unsafe condition.
- Coordinate efforts with all other assigned test personnel.
- Observe tests and record test data (if any).

2.1.3. QA Witness

The QA Witness shall observe the testing and provide a signature that the test procedures were followed and results were accurately recorded on the data sheets. The Quality Assurance organization may delegate their witness responsibility.

2.1.4. Other Witnesses

No further witnesses are required during testing. Interested observers will be allowed.

2.2. FEATURES TO BE TESTED

This section lists each of the software features that will be tested.

Figure 1: Void Fraction Instrument Front Panel

2.2.1. Adjust Elevation Readout

The void fraction instrument is raised and lowered in a tank riser with a crane. As a safety precaution, impact limiters are used to protect the riser from possible damage. During operation it becomes necessary to add or remove impact limiters. Since the top of the impact limiter serves as a reference for the level gauge, the elevation data can be affected.

To compensate for adding or removing an impact limiter, the Adjust Level Gauge switch is added to the software front panel. When this switch is asserted (set in the on position), the elevation value is stored to memory. The impact limiter is then added or removed changing the elevation readout. When the impact limiter change is finished, the switch is returned to the off position and the elevation readout will revert to the stored value.

2.2.2. Record Data Control

The Record Data switch was provided in the original version of the software. Its purpose was to record all values from the front panel to a file. Subsequent uses of this switch within the same day were appended to the same file.

This control is changed to continuously record information to the file while the switch is asserted. The recording is done a ten second intervals.

2.2.4. Void Fraction Readout

Two indicators are added to the front panel. These indicators are labeled 1st Void and 2nd Void . They provided a digital readout of the void in percent when performing a test cycle.

When a test cycle is initiated, both values are set to zero. After the first pressurization is complete the 1st Void indicator is updated. This happens before presenting a dialog box that offers the chance to repressurize the system. If the system is repressurized, the 2nd Void indicator is updated when the second pressurization is complete. These values stay on the front panel until a new test cycle is started.

3. ACCEPTANCE TEST PROCEDURE

This section provides the instructions to perform acceptance testing on the void fraction instrument software.

3.1. INSTRUCTION SECTION

In this section references are made to specific valves, pressure transducers, etc. These references are made using P & ID designations. Refer to Figure 1, "Void Fraction Instrument Front Panel," for identification of these items.

3.1.1. System Setup

Testing will be conducted in the field. The hardware should be setup in accordance with the instructions in the forthcoming document, Operations and Maintenance Manual."

3.1.2. Void Fraction Calculation Test

Test successful calculation of the void. Also tests side affects of the software changes.

- Step 1) Turn on power to instrumentation. The computer screen should show the graphical user interface.
- Step 2) Start LabView program by doubling clicking on LabView icon.
- Step 3) Select "Void Fraction.vi" from the file selector dialog box.
- Step 4) The void fraction instrument front panel should now be displayed on the computer screen. Click on the run icon.
- Step 5) Open solenoid valve YV1 by clicking on it. It should change from red to green.
- Step 6) Drive the arm to a 90 degree angle with the mast by clicking on solenoid valve YV2.
- Step 7) After the flowmeter updates, click on the Test Cycle switch.
- Step 8) Wait for a dialog box to be presented. When dialog box is shown on the screen note the value at the 1st Void indicator to the test data sheet. This value should be approximately 100 (must be above 90), because the test is being performed in air which is a 100% void.
- Step 9) Answer Yes to the dialog box which begins another pressurization.
- Step 10) When the pressurization is done note the value from the 2nd Void indicator to the test data sheet. Should be approximately 100%.
- Step 11) Note any unusual occurrences to the test data sheet. Was a data file created?

3.1.3. Adjust Level Gauge

Tests operation of the adjust level gauge control.

- Step 1) Attach weight to the string potentiometer and move weight approximately ten yards from string potentiometer.

- Step 2) Zero the level gauge. Record the reading to the test data sheet. The elevation value should be zero inches.
- Step 3) Move the weight approximately five feet towards the string potentiometer. Record the elevation value to the test data sheet.
- Step 4) Click on the Adjust Level Gauge switch. Then move the weight approximately three feet away from the string potentiometer. Record the elevation value to the test data sheet.
- Step 5) Click on the Adjust Level Gauge switch again. Record the value to the test data sheet. The value should be the same value that was recorded in Step 3).

3.1.4. Record Data Control

Tests the continuous record feature of the Record Data control.

- Step 1) Click on the Record Data control.
- Step 2) Move the weight back to the string potentiometer.
- Step 3) Click on the Record Data control.
- Step 4) Open the resulting file. Record on the test data sheet the frequency of data entries. Did the elevation value change?

3.2. TEST EXECUTION SECTION

3.2.1. Test Data Sheets

The test data sheets are shown on the following pages.

EXCEPTION TO SOFTWARE ACCEPTANCE TEST
FOR
TANK 101-SY VOID FRACTION INSTRUMENT

Test Performer: _____

QA Witness: _____

Date of Test _____

Step	Description	Data	Expected
Test 3.1.2 Void Fraction Calculation Test			
8	Reading of 1st Void indicator	_____ %	100%
10	Reading of 2nd Void indicator	_____ %	100%
11	Any unusual occurrences?	Y N	N
11	Was a data file created?	Y N	Y
Test 3.1.3 Adjust Level Gauge			
2	Reading of elevation indicator	_____ inches	0 inches
3	Reading of elevation indicator	_____ inches	
4	Reading of elevation indicator	_____ inches	
5	Reading of elevation indicator	_____ inches	same as Step 3)
Test 3.1.4 Record Data Control			
4	Time interval for recording to file	_____ seconds	10 seconds
4	Did the elevation change?	Y N	Y

Test Performer

QA Witness

3.3. EXCEPTIONS TO ACCEPTANCE TEST

The test exception sheet is shown on the following page.

EXCEPTION TO SOFTWARE ACCEPTANCE TEST
FOR
TANK 101-SY VOID FRACTION INSTRUMENT

EXCEPTIONS			CORRECTION APPROVAL		
Paragraph No.	Date	Description	Org.	Initials	Date

TEST APPROVED WITH EXCEPTIONS

Cognizant Engineer

Date

Quality Assurance

Date

4. REFERENCES

1. WHC-CM-6-1, "Standard Engineering Practices".
2. ANSI/IEEE Standard 829-1983, "IEEE Standard for Software Test Documentation".