DISTRIBUTION SHEET

To Distribution	From TWRS Safety Programs Engineering Support	Page 1 of 1 <hr/> Date 9/7/94			
Project Title/Work Order 241-SY-101 Mitigation Project / Standard-B Hydrogen Monitoring System		EDT No. 1007607 <hr/> ECN No.			
Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
RE Bauer	L6-37				X
RM Bender	L7-04	X			
JR Bunch	R1-51	X			
JA Hurley	R3-49				X
ML McElroy	S1-57	X			
TC Schneider	L7-04	X			
TT Tran	L7-04	X			
CV Vo	L7-04	X			
Central Files	L8-04	X			
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ENGINEERING DATA TRANSMITTAL

Page 1 of 21

1. EDT 607607

2. To: (Receiving Organization) Distribution				3. From: (Originating Organization) TWRs Safety Programs Eng. Support				4. Related EDT No.: 141159			
5. Proj./Prog./Dept./Div.: HMT/SHMS/8D210				6. Cog. Engr.: TC Schneider				7. Purchase Order No.: N/A			
8. Originator Remarks: Please indicate your approval by signing the appropriate block.								9. Equip./Component No.: N/A			
								10. System/Bldg./Facility: 241-SY-101/Tank Farms			
11. Receiver Remarks:								12. Major Assm. Dwg. No.: H-2-87275			
								13. Permit/Permit Application No.: N/A			
								14. Required Response Date: 09/08/94			
15. DATA TRANSMITTED											
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted				(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-ATR-078	ALL	0	Standard-B Hydrogen Monitoring System Acceptance Test Report				Q	1	1	/
16. KEY											
Impact Level (F)			Reason for Transmittal (G)				Disposition (H) & (I)				
1, 2, 3, or 4 (see MRP 5.43)			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				
(G)	(H)	17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)								(G)	(H)
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1	/	Cog. Eng. TC Schneider	<i>TC Schneider</i>	9-6-94	L7-04						
1	/	Cog. Mgr. RE Bauer	<i>RE Bauer</i>	9/7/94	L6-37						
1	1	QA ML McElroy	<i>M. L. McElroy</i>	9-8-94	S1-579						
		Env.									
		Proj Eng									
18. <i>Thanh Mai T. Tran</i> TT Tran 9/6/94 Signature of EDT Originator Date		19. _____ Authorized Representative Date for Receiving Organization				20. <i>R.E. Bauer</i> <i>RE Bauer</i> 9/7/94 Cognizant/Project Engineer's Manager Date		21. DOE APPROVAL (if required) Ltr. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments			

BD-7400-172-2 (07/91) GEF097

BD-7400-172-1 (07/91)

RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-ATR-078, Rev. 0

Document Title: STANDARD-B HYDROGEN MONITORING SYSTEM ACCEPTANCE
TEST REPORT

Release Date: 9/8/94

* * * * *

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

APPROVED FOR PUBLIC RELEASE

* * * * *

WHC Information Release Administration Specialist:

N. L. Solis

N.L. SOLIS

(Signature)

9/8/94

(Date)

SUPPORTING DOCUMENT		1. Total Pages 38
2. Title Standard-B Hydrogen Monitoring System Acceptance Test Report.	3. Number WHC-SD-WM-ATR-078	4. Rev No. 0
5. Key Words Gas Monitoring, 103-SY, Hydrogen Mitigation, Hydrogen, Acceptance Test Report.	6. Author Name: ThanhMai T. Tran <i>Thanhmai thi Tran 9/2/94</i> Signature Organization/Charge Code 8D210/N2C4P	
7. Abstract This Acceptance Test Report is to document the field testing of the Standard-B Hydrogen Monitoring System cabinet designed and fabricated to support the SY-Farms Hydrogen Mitigation Task.		
8. PURPOSE AND USE OF DOCUMENT - This document was prepared for use within the U.S. Department of Energy and its contractors. It is to be used only to perform, direct, or integrate work under U.S. Department of Energy contracts. This document is not approved for public release until reviewed. PATENT STATUS - This document copy, since it is transmitted in advance of patent clearance, is made available in confidence solely for use in performance of work under contracts with the U.S. Department of Energy. This document is not to be published nor its contents otherwise disseminated or used for purposes other than specified above before patent approval for such release or use has been secured, upon request, from the Patent Counsel, U.S. Department of Energy Field Office, Richland, WA. DISCLAIMER - This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.		10. RELEASE STAMP <div style="border: 1px solid black; padding: 5px; text-align: center;"> OFFICIAL RELEASE BY WHC DATE SEP 08 1994 35 Station 21 </div>
9. Impact Level Q		

STANDARD-B HYDROGEN MONITORING SYSTEM

ACCEPTANCE TEST REPORT

WHC-SD-WM-ATR-078

REV.0

APPROVAL DESIGNATOR Q

Issued by

TWRS Safety Programs Engineering Support

September 6, 1994

TABLE OF CONTENTS

1.0	INTRODUCTION	3
2.0	DESCRIPTION OF TEST	3
3.0	TEST METHOD AND TEST EQUIPMENT	3
4.0	TEST RESULTS AND CONCLUSIONS	3
5.0	DISPOSITION OF TEST ITEM	4
6.0	APPENDIX	4
	APPENDIX 1.	1-26
	APPENDIX A.	A1-A5
	APPENDIX B.	B1
	APPENDIX C.	C1

5.0 DISPOSITION OF TEST ITEM

The equipment inspected and tested by WHC-SD-WM-ATP-078 performed as expected, and was accepted for field operation.

6.0 APPENDIX

The original completed WHC-SD-WM-ATP-078 is included as Appendix 1 to this test report.

APPENDIX 1

TEST EXECUTION SHEET

Date: 6-7-94		Document Number: WHC-SD-WM-ATP-078	
SHMS Unit Number: NAN-035Y		REV. 0-A	
TEST PERSONNEL			
WHC PROJECT ENGINEER:		TEST DIRECTOR: J.C. Schneider	
RECORDER: J.C. Schneider		WITNESSES:	
TEST EXECUTION			
J.C. Schneider		6-7-94	
Test Director		Date	
TEST WITNESS			
G. B. K.		6/7/94	
Witness		Date	
Luis J. Alcala		6/7/94	
Witness		Date	
TEST APPROVAL AND ACCEPTANCE			
Westinghouse Hanford Company			
☒ Without Exception ☐ With Exception/Resolved ☐ With Exception/Outstanding			
J. S. Krogh		8-16-94	
Plant Operations		Date	
M. L. McElroy		8-15-94	
Quality Assurance		Date	
J. R. Bunch		6-15-94	
Safety		Date	
Project Engineer		Date	

TABLE OF CONTENTS

TEST EXECUTION SHEET	2
1.0 PURPOSE	5
2.0 REFERENCES	5
2.1 DRAWINGS	5
2.2 PROCEDURES	6
3.0 RESPONSIBILITIES	6
3.1 WHC PROJECT ENGINEER	6
3.2 TEST DIRECTOR	7
3.3 WITNESSES	7
3.4 RECORDER	8
3.5 OCCUPATIONAL SAFETY AND HEALTH	8
4.0 ACCEPTANCE TEST PROCEDURE CHANGE CONTROL	9
5.0 TEST EXECUTION	9
5.1 WITHOUT EXCEPTION	9
5.2 WITH EXCEPTION/RESOLVED	10
5.3 WITH EXCEPTION/OUTSTANDING	10
6.0 RECORDING AND RESOLVING EXCEPTIONS	10
6.1 GENERAL	10
6.2 RECORDING	10
6.3 RETEST/RESOLUTION	11
6.4 APPROVAL AND ACCEPTANCE	11
6.5 DISTRIBUTION	11
7.0 SYSTEM DESCRIPTION	12
8.0 TEST CONDITIONS AND EQUIPMENT REQUIRED	12
8.1 TEST CONDITIONS	12
8.2 EQUIPMENT REQUIRED	13
9.0 ELECTRICAL SYSTEMS	14
9.1 SHMS POWER SUPPLY	14
9.2 ELECTRICAL DEVICES	14
9.2.1 Heating and Air Conditioning	14
9.2.2 Sample Pump	15
9.2.3 Panel Power Supply	15
9.2.4 Cabinet Instrumentation	16
9.2.4.1 Isolation Transformer	16
9.2.4.2 DC Power	16
9.2.4.3 Flow Alarm System	16

9.2.4.4	Hydrogen Sensors	17
9.2.4.5	Sample Gas Heat Trace	17
9.2.4.6	Calibration Gas Heat Trace	18
9.2.4.7	Cabinet Temperature	19
9.2.4.8	Alarm Systems	20
9.3	INTRINSIC SAFETY CIRCUITS	21
9.4	REVIEW	21
10.0	PNEUMATIC SYSTEMS	22
10.1	PIPING	22
10.2	SAMPLE MAIN FLOW LOOP	22
10.3	GAS GRAB SAMPLING LOOP	23
10.4	CALIBRATION LOOP	23
10.5	REVIEW	24
11.0	DATA SHEETS	25
11.1	TEST DATA SHEETS	25
11.2	TEST EXCEPTION SHEET	25
11.3	TEST LOG SHEET	26
APPENDIX A:	TEST DATA SHEETS	A1-A5
APPENDIX B:	TEST EXCEPTION SHEETS	B1
APPENDIX C:	TEST LOG SHEET	C1

**STANDARD HYDROGEN MONITORING SYSTEM
ACCEPTANCE TEST PROCEDURE**

1.0 PURPOSE

The purpose of this document is to demonstrate that the Standard Hydrogen Monitoring System is constructed as intended by design.

2.0 REFERENCES

2.1 DRAWINGS

- H-2-82821, 241-SY-101 Gas Monitoring Gas Bottle Rack.
- H-2-87275, Standard Hydrogen Monitoring System Drawing Index Tree.
- H-2-87276, Standard Hydrogen Monitoring System Piping & Instrumentation Diagram.
- H-2-87277, Standard Hydrogen Monitoring System Equipment Arrangement.
- H-2-87278, Standard Hydrogen Monitoring System Elementary & One-Line Diagrams.
- H-2-87279, Standard Hydrogen Monitoring System Cabinet Assembly.
- H-2-87280, Standard Hydrogen Monitoring System Exhaust Header Sample Line Installation.
- H-2-87281, Standard Hydrogen Monitoring System Trace Heat Details.
- H-2-87282, Standard Hydrogen Monitoring System Wiring Diagram.
- H-2-87283, Standard Hydrogen Monitoring System Cabinet Interior Panels.
- H-2-87284, Standard Hydrogen Monitoring System Enclosure Modifications.
- H-2-87285, Standard Hydrogen Monitoring System Sample Pump Stand Assembly.
- H-2-81829, Standard Hydrogen Monitoring System Loop Diagrams.

- H-2-81830, Standard Hydrogen Monitoring System PLC Ladder Diagram.
- H-2-81831, Standard Hydrogen Monitoring System Instrument Panel Assembly.

2.2 PROCEDURES

- WHC-CM-4-3, Volume 3, Program G-1, Energy Control Program.

3.0 RESPONSIBILITIES

Each company or organization participating in the conduct of this ATP will designate personnel to assume the responsibilities and duties as defined herein for their respective roles. The names of these designees shall be provided to the Recorder for listing on the Recorder's copy of the Test Execution Sheet prior to the performance of any part of this ATP.

3.1 WHC PROJECT ENGINEER

- 3.1.1 Designate a Test Director.
- 3.1.2 Coordinate testing with facility management.
- 3.1.3 Act as liaison between the participants in acceptance testing.
- 3.1.4 Distribute the approved testing schedule as soon as possible, but at least two days prior to testing.
- 3.1.5 Ensure field testing and inspection has been completed.
- 3.1.6 Schedule and conduct a pre-ATP meeting with test participants prior to start of testing.
- 3.1.7 Notify the persons performing and witnessing the test prior to the start of testing.
- 3.1.8 Notify all concerned parties when a change is made in the testing schedule.
- 3.1.9 Sign Test Execution Sheet when ATP is approved and accepted.
- 3.1.10 Take necessary action to clear exceptions to the ATP.

- 3.1.11 Sign Exception Sheet when exception has been resolved.
- 3.1.12 Provide a distribution list for the approved and accepted ATP.

3.2 TEST DIRECTOR

- 3.2.1 Coordinate all acceptance testing.
- 3.2.2 Confirm that field testing and inspection of the system or portion of the system to be tested has been completed.
- 3.2.3 Stop any test which may cause damage to the system until the test procedure has been revised.
- 3.2.4 Approve field changes to the ATP.
- 3.2.5 Obtain revisions to the ATP, as necessary, to comply with authorized field changes or to accommodate existing field conditions.
- 3.2.6 Evaluate recorded data, discrepancies, and exceptions.
- 3.2.7 Obtain from the WHC Project Engineer, any information or changes necessary to clear or resolve objections.
- 3.2.8 Sign Test Execution Sheet when ATP has been performed.
- 3.2.9 Sign Test Exception Sheet when retest has been executed and accepted.
- 3.2.10 Obtain required signatures on the ATP Master prior to reproduction and distribution.

3.3 WITNESSES (Provided by Participating Organizations)

- 3.3.1 Witness the tests.
- 3.3.2 Evaluate results of testing.
- 3.3.3 Assist the Test Director when requested.
- 3.3.4 Sign Test Exception Sheet as a Witness.
- 3.3.5 Sign Test Exception Sheet as a Witness when retest has been executed and accepted.

3.4 RECORDER

- 3.4.1 Record names of all designated personnel on Recorder's copy of ATP prior to start of testing.
- 3.4.2 Observe tests, record test data and maintain test log.
- 3.4.3 Sign the Test Exception Sheet as the Recorder.
- 3.4.4 Initial and date every test step on the Recorder's copy as it is completed, next to the step number or on a table, when provided. On tables where there is not room for both the initial and date, date may be entered in space provided at bottom of column.
- 3.4.5 Record authorized field changes to the ATP.
- 3.4.6 Record exceptions and test steps that are not performed on the Test Exception Sheet. Have the information transferred in ink or typed to the Master Exception Sheet(s). Additional Exception Sheets are to be added as needed.
- 3.4.7 Orally notify the Test Director at time the objection is made.
- 3.4.8 Assign page number to Data Sheets and Exception Sheets, after ATP is complete. Record Page numbers for these items and make corrections, as necessary, to page numbers shown for these pages in the index.
- 3.4.9 Transfer the final test results with Recorder's signature and dates for each step to the Master in ink or type. Submit the completed Master to the Test Director for approval signatures and distribution. Retain the Recorder's copy and a copy of the Master in the field project files.

3.5 OCCUPATIONAL SAFETY AND HEALTH

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. Facility line managers shall assure the safety of all activities within their areas to prevent injury, property damage, or interruption of operation. Performance of test activities shall always include safety and health aspects as delineated in the Operations Manuals and as directed by the WHC Project Engineer. Any hazard identified

during the performance of the ATP shall be reported to the manager of Waste Tank Safety Assurance.

4.0 ACCEPTANCE TEST PROCEDURE CHANGE CONTROL

Acceptance testing is to be conducted in accordance with the steps and requirements specified in this procedure. Any required changes must be authorized in accordance with Section 3.2 and with approved change control procedures.

5.0 TEST EXECUTION

The acceptance test procedures detailed in Sections 9.0 and 10.0 shall be performed in sequential steps starting with Section 9.0. As required by Section 3.4, the Recorder will initial and date every test step in the space provided on the Recorder's copy of the ATP as each step is completed. Any step that requires verification must also be recorded on the Test Data Sheet.

5.1 WITHOUT EXCEPTION

- 5.1.1 Check applicable space on Test Execution Sheet to show that the ATP has been performed and no exceptions have been recorded.
- 5.1.2 Sign and date Test Execution Sheet in the spaces provided.

- 5.1.3 Distribute requisite copies and send master of ATP to the client.

5.2 WITH EXCEPTION/RESOLVED

- 5.2.1 Check applicable space on Test Execution Sheet to show that the ATP has been performed with exceptions recorded and resolved.
- 5.2.2 Sign and date Test Execution Sheet in the spaces provided.
- 5.2.3 Distribute requisite copies and send master of ATP to the client.

5.3 WITH EXCEPTION/OUTSTANDING

- 5.3.1 Check applicable space on Test Execution Sheet to show that the ATP has been performed with exceptions recorded, part or all of which are presently outstanding, unresolved.
- 5.3.2 Sign and date Test Execution Sheet in the spaces provided.
- 5.3.3 Distribute requisite copies and send master of ATP to the client.

6.0 RECORDING AND RESOLVING EXCEPTIONS

6.1 GENERAL

Exceptions to the ATP are sequentially numbered and recorded on individual Exception Sheets. This enables case-by-case resolution, recording, approval, and distribution of each exception.

6.2 RECORDING

- 6.2.1 Number each exception sequentially as it occurs and record it on an Exception Sheet.
- 6.2.2 Enter name and organization of objecting party for each exception.

- 6.2.3 Enter planned action to resolve each exception when such determination is made.

6.3 RETEST/RESOLUTION

- 6.3.1 Record the action taken to resolve each exception. Action taken may not be the same as planned action.
- 6.3.2 When action taken results in an acceptable retest, sign and date Retest Execution and Acceptance section of the Exception Sheet.
- 6.3.3 When action taken does not involve an acceptable retest, strike out the Retest Execution and Acceptance section of the Exception Sheet. Resolve exception as shown under 6.4 below.

6.4 APPROVAL AND ACCEPTANCE

- 6.4.1 The Project Engineer provides final approval and acceptance of exception by checking one of the following on Exception Sheet:
- Retest Approved and Accepted: Applicable when Retest Execution and Acceptance section is completed.
 - Exception Accepted-As-Is: Requires detailed explanation.
 - Other: Requires detailed explanation.
- 6.4.2 The Project Engineer signs and dates the Exception Sheet and obtains other internal approval, if required.

6.5 DISTRIBUTION

Distribute requisite copies of completed Exception Sheets to the client.

7.0 SYSTEM DESCRIPTION

The primary function of the Standard Hydrogen Monitoring System is to monitor specifically for hydrogen in the waste tank atmosphere which may also contain (but not be limited to) unknown quantities of air, nitrous oxide, ammonia, water vapor, carbon dioxide, carbon monoxide, and other gaseous constituents.

The SHMS will consist of hydrogen specific monitors, a grab sampler to collect samples for laboratory analysis, and the gas sample collection system necessary to support the operation of the instrumentation. This system will be located in a cabinet placed at the tank of interest.

8.0 TEST CONDITIONS AND EQUIPMENT REQUIRED

8.1 TEST CONDITIONS

The following conditions shall exist at the start of the acceptance testing.

- 8.1.1 Systems being tested have been inspected for workmanship and for compliance with design.
- 8.1.2 Continuity and megger tests have been performed on portions of the electrical and instrument systems being tested, as required.
- 8.1.3 Leak tests on the pneumatic systems have been performed.
- 8.1.4 The following circuit breakers and fuses are open
CB-1 through CB-7
FU-1 through FU-13
- 8.1.5 All test instruments have a currently valid calibration stamp attached that indicates a calibration traceable to the National Institute of Standards and Technology.
- 8.1.6 Personnel responsible for directing and witnessing the performance of the tests described in this ATP have read and understand appropriate certified vendor information (CVI) pertaining to the operation of the equipment to be tested.
- 8.1.7 The following sample lines/valves are CAPPED/CLOSED.

MV--1-1 through MV--1-4

MV--3-1 through MV--3-3

MV--4-3 through MV--4-4

MV--5-1 through MV--5-6

MV--7-3 through MV--7-4

Sample and exhaust line ends are capped.

8.1.8

The following sample line valves are OPEN

FCV--1-1

FI--3-1

MV--4-1 through MV--4-2

FI--5-1

MV--7-1 through MV--7-2

MV--8-1.

Check that all prerequisites have been met.

K. Schwerdt 6-7-94

8.2 EQUIPMENT REQUIRED

Maintenance shall supply all test equipment unless otherwise noted.

9.0 ELECTRICAL SYSTEMS

This procedure will demonstrate that all electrical devices function properly.

9.1 SHMS POWER SUPPLY

9.1.1 Verify resistance between system ground and cabinet enclosure is less than one (1) ohm.

9.1.2 Energize power source to the Standard Hydrogen Monitoring System. Refer to H-2-87278, Standard Hydrogen Monitoring System One Line & Elementary Diagrams.

9.1.3 Verify line voltages, L1, L2, and N, at terminal block.

9.2 ELECTRICAL DEVICES

9.2.1 Heating and Air Conditioning

9.2.1.1 Adjust Air Conditioner (ACU-*-01) temperature control to a value below ambient temperature.

9.2.1.2 Adjust Heater (HTR-*-01) temperature control to a value below ambient temperature.

9.2.1.3 Switch circuit breaker CB-1 to the CLOSED position.

9.2.1.4 Verify Air Conditioner is operating and Heater is off.

NOTE: If ambient temperature is below Air Conditioner's minimum setting, a heat gun may be used to heat the A/C's temperature probe.

9.2.1.5 Adjust Air Conditioner temperature control to a value above ambient temperature.

9.2.1.6 Verify Air Conditioner compressor turns OFF.

NOTE: Air Conditioner fan may still operate.

9.2.1.7 Adjust Heater temperature control to a value above ambient temperature.

- 10
10
10
- 9.2.1.8 Verify Heater operates.
- 9.2.1.9 Adjust Air Conditioner temperature control to a value below ambient temperature.
- 9.2.1.10 Verify Air Conditioner compressor turns ON and Heater power is removed by the K1-*-01 relay.

NOTE: Heat may still radiate from Heater.

- 10
10
10
- 9.2.1.11 Adjust Heater temperature control to 70° F.
- 9.2.1.12 Adjust Air Conditioner temperature control to 90° F.
- 9.2.1.13 Switch circuit breaker CB-1 to the OPEN position.

9.2.2 Sample Pump

- 10
10
10
10
10
- 9.2.2.1 Disconnect sample line outlet from sample pump P-*-01 at the closest convenient Swagelok fitting.
- 9.2.2.2 Switch circuit breaker CB-3 to the CLOSED position.
- 9.2.2.3 Verify pump turns ON.
- 9.2.2.4 Switch circuit breaker CB-3 to the OPEN position.
- 9.2.2.5 Reconnect sample line outlet to sample pump per manufacturer's guidance.

9.2.3 Panel Power Supply

- 10
10
10
10
- 9.2.3.1 Switch circuit breaker CB-6 to the CLOSED position.
- 9.2.3.2 Turn cabinet light switch HS-*-01 to the ON position.
- 9.2.3.3 Verify cabinet light is ON.
- 9.2.3.4 Verify power is being supplied to the cabinet receptacle RCPT-*-01 and record voltage readings.

101
9.2.3.5 Test GFI capability by depressing "TEST" button on receptacle. Verify zero voltage across receptacle hot and neutral. Reset GFI receptacle.

101
9.2.3.6 Turn cabinet light switch HS-*-01 to the OFF position.

101
9.2.3.7 Switch circuit breaker CB-6 to the OPEN position.

9.2.4 Cabinet Instrumentation

9.2.4.1 Isolation Transformer

101
9.2.4.1.1 Switch circuit breaker CB-7 to the CLOSED position.

101
9.2.4.1.2 Verify power is being supplied to the isolation transformer ISO XFMR. Record primary and secondary voltages.

9.2.4.2 DC Power

101
9.2.4.2.1 Set fused switch FU-1 to the CLOSED position.

101
9.2.4.2.2 Verify power is being supplied to the DC power source PWR-*-01. Record AC input and DC output voltages.

9.2.4.3 Flow Alarm System

101
9.2.4.3.1 Set fused switch FU-13 to the CLOSED position.

101
9.2.4.3.2 Set fused switch FU-3 to the CLOSED position.

101
9.2.4.3.3 Visually verify instruments are operating: Transmitter FIT-*-7-1, Flow Alarm FASL-*-7-1.

101
9.2.4.3.4 Verify zero voltage between PLC YYC-*-01 Input Number 2 and PLC 120V Common.

101
9.2.4.3.5 Set fused switch FU-3 to the OPEN position.

1c
9.2.4.3.6 Set fused switch FU-13 to the OPEN position.

1c
9.2.4.4 Hydrogen Sensors

1c
9.2.4.4.1 Set fused switches FU-2, FU-4, FU-5, and FU-10 to the CLOSED position.

1c
9.2.4.4.2 Visually verify instrument displays are operating:
Transmitter NIT-*-6-1,
Transmitter NIT-*-12-1,
Recorder NR-*-6/12-1.

1c
9.2.4.4.3 Verify 120V present between PLC YYC-*-01 Input Number 0 and PLC 120V Common and Input Number 1 and PLC 120V Common.

1c
9.2.4.4.4 Set fused switches FU-2, FU-4, FU-5, and FU-10 to the OPEN position.

9.2.4.5 Sample Gas Heat Trace

NOTE: These steps must be done in an expedited manner. The Heat Trace circuit may cause the sample gas temperature to rise at a fast rate. Adjust setpoints accordingly in order to prolong the test.

1c
9.2.4.5.1 Set fused switch FU-6 to the CLOSED position.

1c
9.2.4.5.2 Set circuit breaker CB-5 to the CLOSED position.

1c
9.2.4.5.3 Visually verify controller TIC-*-14-1 display is operating.

1c
9.2.4.5.4 Adjust controller temperature setpoint number 1 to a value at least 20 degrees above ambient temperature as indicated by the controller.

1c
9.2.4.5.5 Adjust controller temperature setpoint number 2 to a value 5 degrees less than setpoint number 1.

1c
9.2.4.5.6 Verify no AC voltage present between PLC YYC-*-01 Input Number 5 and PLC 120V Common.

- 9.2.4.5.7 Visually verify operation of heat trace HT-*-14-1 circuit. Temperature value of sample gas should begin increasing. Record initial temperature and increased temperature of nominally 10 degrees.
- 9.2.4.5.8 Adjust setpoint 2 to 20 degrees below indicated temperature.
- 9.2.4.5.9 Verify 120V present between PLC YYC-*-01 Input Number 5 and PLC 120V Common.
- 9.2.4.5.10 Reset controller temperature setpoint 1 to 85° F and setpoint 2 to 70° F.
- 9.2.4.5.11 Set fused switch FU-6 to the OPEN position.

9.2.4.6 Calibration Gas Heat Trace

NOTE: These steps must be done in an expedited manner. The Heat Trace circuit may cause the calibration gas temperature to rise at a fast rate. Adjust setpoints accordingly in order to prolong the test.

- 9.2.4.6.1 Set fused switch FU-7 to the CLOSED position.
- 9.2.4.6.2 Visually verify controller TIC-*-15-1 display is operating.
- 9.2.4.6.3 Adjust controller temperature setpoint number 1 to a value at least 20 degrees above ambient temperature as indicated by the controller.
- 9.2.4.6.4 Adjust controller temperature setpoint number 2 to a value 5 degrees less than setpoint number 1.
- 9.2.4.6.5 Verify no AC voltage present between PLC YYC-*-01 Input Number 4 and PLC 120V Common.
- 9.2.4.6.6 Visually verify operation of heat trace HT-*-15-1 circuit. Temperature value of calibration gas should begin increasing. Record initial temperature and increased temperature of nominally 10 degrees.

10

- 9.2.4.6.7 Adjust setpoint 2 to 20 degrees below indicated temperature.

10

- 9.2.4.6.8 Verify 120V present between PLC YYC-*-01 Input Number 4 and PLC 120V Common.

10

- 9.2.4.6.9 Reset controller temperature setpoint 1 to 85° F and setpoint 2 to 70° F.

10

- 9.2.4.6.10 Set fused switch FU-7 and circuit breaker CB-5 to the OPEN position.

9.2.4.7 Cabinet Temperature

10

- 9.2.4.7.1 Set fused switch FU-8 to the CLOSED position.

10

- 9.2.4.7.2 Visually verify temperature indicator TI-*-16-1 display is operating.

10

- 9.2.4.7.3 Adjust controller temperature setpoint number 1 to a value at least 20 degrees above ambient temperature as indicated by the controller.

10

- 9.2.4.7.4 Adjust controller temperature setpoint number 2 to a value 20 degrees less than the indicated ambient temperature.

10

- 9.2.4.7.5 Verify 120V AC voltage present between PLC YYC-*-01 Input Number 3 and PLC 120V Common.

10

- 9.2.4.7.6 Adjust setpoint 2 to 10 degrees above indicated temperature.

10

- 9.2.4.7.7 Verify zero voltage present between PLC YYC-*-01 Input Number 3 and PLC 120V Common.

10

- 9.2.4.7.8 Adjust controller temperature setpoint number 2 to a value 20 degrees less than the indicated ambient temperature.

10

- 9.2.4.7.9 Verify 120V AC voltage present between PLC YYC-*-01 Input Number 3 and PLC 120V Common.

- 9.2.4.7.10 Adjust setpoint 1 to 10 degrees below indicated temperature.
- 9.2.4.7.11 Verify zero voltage present at PLC YYC-*-01 Input Number 3 and PLC 120V Common.
- 9.2.4.7.12 Reset controller temperature setpoint 1 to 85° F and setpoint 2 to 60° F.
- 9.2.4.7.13 Set fused switch FU-8 to the OPEN position.

9.2.4.8 Alarm Systems

- 9.2.4.8.1 Set fused switch FU-9 and FU-10 to the CLOSED position.
- 9.2.4.8.2 Depress Alarm Reset HS-*-20-1 followed by the Horn Acknowledge pushbutton HS-*-19-1. (Due to lack of operating inputs the PLC may interpret alarm conditions exist.)
- 9.2.4.8.3 Depress and hold Alarm Test pushbutton HS-*-21-1. Verify the following conditions exist:
- Horn, YAH-*-9-1, is ON.
 - High Hydrogen Beacon YAL-*-10-2 is ON.
 - Open contacts between High Hydrogen Remote terminals TB2-21 and TB2-22.
 - Trouble Beacon YAL-*-18-1 is ON.
 - Open contacts between Cabinet Trouble Remote terminals TB2-23 and TB2-24.
 - All Indicating Lights are ON.
- 9.2.4.8.4 Release Alarm Test pushbutton.
- 9.2.4.8.5 Depress Alarm Reset pushbutton HS-*-20-1 followed by the Horn Acknowledge pushbutton HS-*-19-1. Verify all inactive alarms are reset.
- 9.2.4.8.6 Set fused switch FU-9 and FU-10 to the OPEN position.

10

9.3 INTRINSIC SAFETY CIRCUITS

9.3.1 Verify INTRINSIC SAFETY APPARATUS nameplates are located near intrinsic safety devices.

INTRINSIC SAFETY DEVICES:

NE-*-6-1 EB-*-6-1 NIT-*-6-1
NE-*-12-1 EB-*-12-1 NIT-*-12-1

10

9.3.2 Verify intrinsic safety wiring is labeled per NFPA-70 Section 504-80 and ISA RP 12.6.

INTRINSIC SAFETY WIRING: (Wiring between the following devices)

EB-*-6-1 / NE-*-6-1
EB-*-12-1 / NE-*-12-1

10

9.3.3 Verify resistance between intrinsic safety single point field ground and intrinsic safety device ground is less than one ohm. Record value.

9.4 REVIEW

Check that all steps have been completed.

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10.0 PNEUMATIC SYSTEMS

This procedure will demonstrate that all process lines and devices function properly.

10.1 PIPING

- 10.1.1 Verify sample line heat trace from sample source to the cabinet is at least 15 feet in length.
- 10.1.2 Verify calibration line heat trace from calibration gas tank to the cabinet is at least 10 feet in length.
- 10.1.3 Verify the following sample lines/valves are **CAPPED/CLOSED**.
MV-*-1-1 through MV-*-1-4
MV-*-3-1 through MV-*-3-3
MV-*-4-3 through MV-*-4-4
MV-*-5-1 through MV-*-5-6
MV-*-7-3 through MV-*-7-4
Sample and exhaust line ends are capped.
- 10.1.4 Verify the following sample line valves are **OPEN**
FCV-*-1-1
FI-*-3-1
MV-*-4-1 through MV-*-4-2
FI-*-5-1
MV-*-7-1 through MV-*-7-2
MV-*-8-1.

10.2 SAMPLE MAIN FLOW LOOP

- 10.2.1 Set fused switch FU-1 and FU-13 to the CLOSED position.
- 10.2.2 Remove end caps from sample inlet and outlet lines. Take care in not allowing foreign objects to enter lines.
- 10.2.3 OPEN valves:
MV-*-1-1
MV-*-1-2
MV-*-1-3
MV-*-1-4
MV-*-7-1
MV-*-7-2
- 10.2.4 Switch circuit breaker CB-3 to the CLOSED position.

- 10.2.5 Adjust flow control valve FCV-*-1-1 to nominally 5" H₂O as indicated on FIT-*-7-1.
- 10.2.6 Verify air is being extracted from the sample inlet line and air is being exhausted through the sample outlet line.
- 10.2.7 OPEN valves MV-*-4-1 and MV-*-4-2.
- 10.2.8 Verify the pressure differential indicator PDI-*-4-1 indicates an upscale reading of less than 40" H₂O.

10.3 GAS GRAB SAMPLING LOOP

- 10.3.1 OPEN valves:
MV-*-3-1
MV-*-3-2
MV-*-3-3
Gas Sample Assembly Valves
- 10.3.2 Adjust FCV-*-3-1 to nominally 10% flow through FI-*-3-1.
- 10.3.3 CLOSE valves MV-*-1-4 and MV-*-1-3. Verify that FI-*-3-1 still indicates flow.
- 10.3.4 OPEN valves MV-*-1-3 and MV-*-1-4. CLOSE valves MV-*-3-3, MV-*-3-2, and MV-*-3-1.

10.4 CALIBRATION LOOP

- 10.4.1 Remove plug to atmosphere upstream of F-*-5-1.
- 10.4.2 OPEN valves:
MV-*-5-4
MV-*-5-5
- 10.4.3 Adjust to nominally 2.0 cfh flow through FI-*-5-1.
- 10.4.4 CLOSE valves MV-*-5-4 and MV-*-5-5. Verify that FI-*-5-1 indicates zero flow.
- 10.4.5 OPEN valves:
MV-*-5-4

- 10
- 10
- 10
- 10.4.6 MV-*5-6 Adjust to nominally 2.0 cfh flow through FI-*5-1.
- 10.4.7 CLOSE valves MV-*5-4 and MV-*5-6. Verify that FI-*5-1 indicates zero flow.
- 10.4.8 Switch circuit breaker CB-3 to the OPEN position.
- 10.4.9 CLOSE the following sample line valves.
MV-*1-1 through MV-*1-4
MV-*3-1 through MV-*3-3
MV-*4-1 through MV-*4-4
MV-*5-1 through MV-*5-6
MV-*7-1 through MV-*7-4
MV-*8-1
- 10
- 10.4.10 Replace end caps on sample inlet and outlet lines. Replace plug upstream of F-*5-1.
- 10
- 10.4.11 Open the following circuit breakers and fuses:
CB-1 through CB-7
FU-1 through FU-13
- 10
- 10.4.12 De-energize power source to the Standard Hydrogen Monitoring System. Refer to H-2-87278, Standard Hydrogen Monitoring System One Line & Elementary Diagrams.

10.5 REVIEW

Check that all steps have been completed.

J. Schneider 6-7-88

11.0 DATA SHEETS

11.1 TEST DATA SHEETS

The Test Data Sheets are used to document any procedure step requiring verification. A description of the data sheet format follows.

1. Date--Record the date the test is performed.
2. Title Of Test--There are two tests being performed by this procedure, the Electrical Systems test and the Pneumatic Systems test.
3. SHMS Unit Number--Record the unit number of the Standard Hydrogen Monitoring System, e.g. NAN-101-J.
4. Equipment Serial Number(s)--Record the serial numbers of any device used during the tests.
5. Test Performed By--Print the name of the craftsman performing the test.
6. Procedure Number--This column contains the test steps requiring verification.
7. Item--This column contains the item being verified, e.g., Pump, Air Conditioner, Heater, etc.
8. Value--This column contains the quantitative or qualitative measure of the item being verified, i.e. a line voltage may have a value of 120V, whereas a pump may have a value of ON or OFF.
9. Range--This column indicates the anticipated value of the item being measured.
10. Accept/Reject--Indicate whether the value obtained is acceptable in comparison with the Range.
11. Comment--If the value is rejected, give a justification for denial.

Test Data Sheets are included in Appendix A.

11.2 TEST EXCEPTION SHEET

Exception Data Sheets are used to document exceptions to the test procedure. Actions taken regarding disposition are noted on the exception sheet. Typical dispositions are:

1. Test approved with exception (i.e. rerun of the acceptance test unnecessary).

2. Entire acceptance test to be repeated after the discrepancy has been corrected.
3. Acceptance Test Procedure step(s) affected to be repeated after the discrepancy has been corrected.

Test Exception Sheets are included in Appendix B.

11.3 TEST LOG SHEET

Test Log Sheets are used to document test start and stop times and to document any other notes concerning the execution of the Acceptance Test Procedure.

Test Log Sheets are included in Appendix C.

APPENDIX A: TEST DATA SHEETS

TEST DATA SHEET

Date: <i>6-7-94</i>			SHMS Unit Number: <i>NAN-103-J</i>		
Title of Test: Electrical Systems			Equipment Serial Number(s): <i>Col. Code 817-45-08-023</i> <i>Fluke Voltmeter (3-2-95)</i>		
Test Performed By: <i>Jon Alcala</i>					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.1.1	Resistance	<i>0.5</i>	< 1 Ohm	<i>A</i>	
9.1.3	Line Voltages: L1 L2 N	<i>120.8</i> <i>120.7</i> <i>0</i>	L1, L2: 120V ±5% N: 0V	<i>A</i>	
9.2.1.4	ACU-*-01 & HTR-*-01	<i>HTR OFF</i> <i>AC ON</i>	A/C Compressor ON, Heater OFF	<i>A</i>	
9.2.1.6	ACU-*-01	<i>AC OFF</i>	A/C Compressor OFF	<i>A</i>	
9.2.1.8	HTR-*-01	<i>HTR ON</i>	Heater ON	<i>A</i>	
9.2.1.10	ACU-*-01 & HTR-*-01	<i>AC ON</i> <i>HTR OFF</i>	A/C Compressor ON, Heater OFF	<i>A</i>	
9.2.2.3	P-*-01	<i>ON</i>	Pump ON	<i>A</i>	
9.2.3.3	LT1	<i>ON</i>	Light ON	<i>A</i>	
9.2.3.4	RCPT: H N	<i>120.6</i> <i>0</i>	H: 120V ± 5% N: 0V	<i>A</i>	
9.2.3.5	RCPT: H N	<i>0</i> <i>0</i>	H: 0V N: 0V	<i>A</i>	
9.2.4.1.2	XFMR1: Primary Secondary	<i>120.3</i> <i>124</i>	Primary, Secondary: 120V ± 5%	<i>A</i>	

TEST DATA SHEET

Date: 6-7-94			SHMS Unit Number: NAN-103-J		
Title of Test: Electrical Systems			Equipment Serial Number(s): Cal. Code 817-45-08-023 (3-2-95)		
Test Performed By: Lou Alcala			Fluke VM		
Procedure Number	Item	Value	Range	(A/R)	Comment
9.2.4.2.2	PWR-*-01: AC In DC Out	120.3 128.4 24.0	Incoming AC: 120V ± 5% Outgoing DC: 24V ± 5%	A	
9.2.4.3.3	Visual: FIT-*-7-1 FASL-*-7-1	Indicator ON	Power Indication Lights ON	A	
9.2.4.3.4	YYC-*-01 In #2 Voltage:	0	0V	A	
9.2.4.4.2	NIT-*-6-1 NIT-*-12-1 NR-*- 6/12-1	All	Displays powered ON.	A	
9.2.4.4.3	YYC-*-01 In #0 In #1 Voltage:	123 123	120V ± 5%	A	
9.2.4.5.3	TIC-*-14-1	ON	Display powered ON.	A	
9.2.4.5.6	YYC-*-01 In #5 Voltage:	0	0V	A	
9.2.4.5.7	HT-*-14-1: Initial Temp. Final Temp.	67°F 76°F	Final Temp. = Initial Temp. + 10°F	A	
9.2.4.5.9	YYC-*-01 In #5 Voltage:	123.6	120V ± 5%	A	
9.2.4.6.2	TIC-*-15-1	ON	Display powered ON.	A	
9.2.4.6.5	YYC-*-01 In #4 Voltage:	0	0V	A	

TEST DATA SHEET

Date: 6-7-94			SHMS Unit Number: NAN-103-J		
Title of Test: Electrical Systems			Equipment Serial Number(s): Col. Code 817-45208-023 Fluke VM (3-295)		
Test Performed By: <i>Don Alcala</i>					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.2.4.6.6	HT-*-15-1: Initial Temp. Final Temp.	75 85	Final Temp. = Initial Temp + 10°F	A	
9.2.4.6.8	YYC-*-01 In #4 Voltage:	123.2	120V ± 5%	A	
9.2.4.7.2	TI-*-16-1	ON	Display powered ON.	A	
9.2.4.7.5	YYC-*-01 In #3 Voltage:	123.2	120V ± 5%	A	
9.2.4.7.7	YYC-*-01 In #3 Voltage:	0	0V	A	
9.2.4.7.9	YYC-*-01 In #3 Voltage:	123.2	120V ± 5%	A	
9.2.4.7.11	YYC-*-01 In #3 Voltage:	0	0V	A	
9.2.4.8.3	YAH-*-9-1 YAL-*-10-2 BY-*-10-1 YAL-*-18-1 BY-*-18-1 YAL-*-14-1 YAL-*-15-1 YAL-*-16-1 YAL-*-7-1 YAL-*-10-1	ON ON ∞ ON shorted OPEN & ON ON ON ON ON	ON ON Infinite Resistance Between TB2-21 and TB2-22. ON Infinite Resistance Between TB2-23 and TB2-24. ON ON ON ON ON	A	PR Bunch for T.C. Schneider per TALKCON 6-15-94 JCD 6-7-94 The remote trouble contact remained shorted due to a valid cabinet alarm. The contacts opened when fault was cleared to deenergize the alarm P.C.

TEST DATA SHEET

Date: 6-7-84			SHMS Unit Number: NAN-103-J		
Title of Test: Electrical Systems			Equipment Serial Number(s): Col. Code 817-48-08-023 Fluke VM. (3-2-95)		
Test Performed By: <i>Don Alcala</i>					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.2.4.8.5	Inactive Alarms	OFF	OFF	A	
9.3.1	Nameplates	<i>Nameplate</i>	Near IS Devices.	A	
9.3.2	Wiring	OK	Proper Labeling.	A	
9.3.3	Resistance	0.2	< 1 Ohm	A	

Test Witnesses:

J. Schneider

Test Director

6-7-84

Date

J. Schneider

Recorder

6-7-84

Date

M. L. McElroy

Quality Assurance

6-8-84

Date

TEST DATA SHEET

Date: 6-7-84			SHMS Unit Number: VAN-103-J		
Title of Test: Pneumatic Systems			Equipment Serial Number(s): Cal. Code 817-45-08-023 Flake VM (3-295)		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
10.1.1	Sample Line Heat Trace Length	17 ft.	> 15 Feet	A	
10.1.2	Calibration Line Heat Trace Length	12 ft.	> 10 Feet	A	
10.1.3	Sample Line Valves	CLOSED	CLOSED	A	
10.2.6	Sample Intake & Exhaust	Sample Air Flowing	Air going in through Intake, leaving through Exhaust	A	
10.2.8	PDI-*-4-1	24"	< 40" H ₂ O	A	
10.3.3	FI-*-3-1	Indicates Flow	Indicates Flow	A	
10.4.4	FI-*-5-1	No Flow	Zero Flow	A	
10.4.7	FI-*-5-1	No Flow	Zero Flow	A	

Test Witnesses:

Test Director

Date

Recorder

Date

Quality Assurance

Date

APPENDIX B: TEST EXCEPTION SHEETS

TEST EXCEPTION SHEET

SHMS Unit Number:			Title of Test:		
EXCEPTIONS			CORRECTION APPROVAL		
Procedure Number	Date	Description	Initials/Date		
			Project Engineer	Test Director	Witnesses

TEST APPROVED WITH EXCEPTIONS

N/A
 WHC Project Engineer _____ Date _____
N/A
 Recorder _____ Date _____
N/A
 Witness _____ Date _____