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Title/Desc:

STANDARD D HYDROGEN MONITORING SYSTEM ACCEPTANCE
TEST PROCEDURE

2

Page 1 of 2

1. EDT NO 612751

BD-7400-172-1

2. To: (Receiving Organization) DISTRIBUTION		3. From: (Originating Organization) CHARACTERIZATION MONITORING DEVELOPMENT		4. Related EDT No.: NONE	
5. Proj./Prog./Dept./Div.: ETN-94-0002, WATCH LIST TANK HYDROGEN MONITORING		6. Cog. Engr.: T J BOWMAN		7. Purchase Order No.: NONE	
8. Originator Remarks: SUBMITTED FOR APPROVAL AND RELEASE				9. Equip./Component No.: SHMS-D	
11. Receiver Remarks: APPROVED				10. System/Bldg./Facility: 200 AREA BY TANK FARMS	
				12. Major Assm. Dwg. No.: H-14-100295	
				13. Permit/Permit Application No.: NA	
				14. Required Response Date: ASAP	

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1	WHC-SD-WM-ATP-143		0	STANDARD-D HYDROGEN MONITORING SYSTEM ACCEPTANCE TEST PROCEEDURE	S,Q	1		

16 KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
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(G)		(H)		17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)				(G)	(H)
Reason	Disp	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN
1		Cog. Eng. T J BOWMAN				E K STRAASLAND		8/24/95 4637	
1		Cog. Mgr. V C BOYLES							
1		QA							
1		Safety							
		Env.							
1		R E BAUER		8/24/95 4637					
1		R M BENDER		8/24/95 4637					

18. Signature of EDT Originator	19. Authorized Representative Date for Receiving Organization	20. Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
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RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-ATP-143, REV 0

Document Title: Standard-D Hydrogen Monitoring System Acceptance Test Procedure

Release Date: 9/6/95

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

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

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SUPPORTING DOCUMENT

1. Total Pages

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2. Title

STANDARD-D HYDROGEN MONITORING SYSTEM ACCEPTANCE
TEST ~~PROCEEDURE~~ PROCEDURE

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7. Abstract

ACCEPTANCE TEST PROCEEDURE FOR THE SHMS-D

8.

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STANDARD-D HYDROGEN MONITORING SYSTEM

ACCEPTANCE TEST PROCEDURE

WHC-SD-WM-ATP-143

REV. 0

APPROVAL DESIGNATOR SQ

Issued by

Characterization Monitoring Development

August 1995

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TEST EXECUTION SHEET

Date:	Document Number:	WHC-SD-WM-ATP-143	
SHMS Unit		REV 0	
Number:		PAGE 2 OF 28	
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WHC PROJECT ENGINEER:		TEST DIRECTOR:	
RECORDER:		WITNESSES:	
TEST EXECUTION			
Installation Contractor		Date	Recorder
			Date
Test Director		Date	
TEST WITNESS			
Witness		Date	Witness
			Date
TEST ACCEPTANCE			
Kaiser Engineers Hanford			
Without		With	With
Exception		Exception/Resolved	Exception/Outstanding
_____		_____	_____
Field Engineering		Date	Project Engineer
			Date
TEST APPROVAL AND ACCEPTANCE			
Westinghouse Hanford Company			
Without		With	With
Exception		Exception/Resolved	Exception/Outstanding
_____		_____	_____
Plant Operations		Date	Quality Assurance
			Date
Safety		Date	Project Engineer
			Date

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STANDARD-D HYDROGEN MONITORING SYSTEM ACCEPTANCE TEST PROCEDURE

1.0 PURPOSE

The purpose of this document is to demonstrate that the Standard-D Hydrogen Monitoring System is constructed as intended by design. This document does not include testing of ammonia or organic sampling equipment. Additions of this type of equipment will require a separate test document.

2.0 REFERENCES

2.1 DRAWINGS

- H-14-100295, Standard-D Hydrogen Monitoring System Piping & Instrumentation Diagram.
- H-14-100296, Standard-D Hydrogen Monitoring System Equipment Arrangement.
- H-14-100297, Standard-D Hydrogen Monitoring System One-Line, Elementary Diagrams.
- H-14-100298, Standard-D Hydrogen Monitoring System Cabinet Assembly.
- H-14-100299, Standard-D Hydrogen Monitoring System Wiring Diagram.
- H-14-100300, Standard-D Hydrogen Monitoring System Interior Panels & Brackets.
- H-14-100301, Standard-D Hydrogen Monitoring System Cabinet Modifications.
- H-14-100302, Standard-D Hydrogen Monitoring System Loop Diagrams.
- H-14-100303, Standard-D Hydrogen Monitoring System PLC Ladder Diagram.
- H-14-100304, Standard-D Hydrogen Monitoring System Instrument Panel Assembly.
- H-2-818214 Standard-B Hydrogen Monitoring System Gas Bottle Rack
- H-2-818220, Standard-B Hydrogen Monitoring System Sample Pump Stand Assembly.

2.2 PROCEDURES

- WHC-CM-4-3, Volume 1, Program E-2, Electrical Safety Practices.

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 (Appointed by Test Director, Provided by KEH if KEH installed equipment)

- 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 the 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 copy of the Master in the field project files. IF the cabinet is installed and tested by WHC, a separate Master test copy is not required, the Recorder's copy may be used.

3.5 CONSTRUCTION CONTRACTOR

- 3.5.1 Organize and perform this acceptance test under coordination of the Test Director.
- 3.5.2 Confirm that all equipment required for performing this test (as listed in Section 8.2) will be available at start of testing.
- 3.5.3 Provide equipment required for performing this acceptance test, which has not been designated as being provided by others.
- 3.5.4 Request in writing from the Project Engineer those services, materials, or equipment that have been

designated as being supplied by the Department of Energy (DOE) or others.

3.6 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**.
— SV-*03
— SV-*05
— SV-*07 through SV-*10
— SV-*12
— SV-*15
— SV-*16
— SV-*18
— SV-*19

SV-*21
SV-*23
SV-*25
SV-*31 through SV-*34
Sample and exhaust line ends are capped.

8.1.8 The following sample line valves are **OPEN**

SV-*06
SV-*11
SV-*17
SV-*20
SV-*22
SV-*24
FIV-*52
FIV-*56

Check that all prerequisites have been met.

8.2 EQUIPMENT REQUIRED

The Contractor 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-D Hydrogen Monitoring System. Refer to H-14-100297, Standard-D 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 (AC-*60) temperature control to a value below ambient temperature.
- ____ 9.2.1.2 Adjust Heater (HTR-*60) 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.

- ____ 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 CR-*60 relay.
- NOTE: Heat may still radiate from Heater.
- ____ 9.2.1.11 Adjust Heater temperature control to 80° F (27° C).
- ____ 9.2.1.12 Adjust Air Conditioner temperature control to 90° F (32° C).
- ____ 9.2.1.13 Switch circuit breaker CB-1 to the OPEN position.

9.2.2 Sample Pump

- ____ 9.2.2.1 Disconnect sample line outlet from sample pump P-*50 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

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

- _____ 9.2.3.5 Test GFI capability by depressing "TEST" button on receptacle. Verify zero voltage across receptacle hot and neutral. Reset GFI receptacle.
- _____ 9.2.3.6 Turn cabinet enclosure light switch to the OFF position.
- _____ 9.2.3.7 Switch circuit breaker CB-6 to the OPEN position.

9.2.4 Cabinet Instrumentation

9.2.4.1 Isolation Transformer

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

- _____ 9.2.4.2.1 Set fused switch FU-1 to the CLOSED position.
- _____ 9.2.4.2.2 Verify power is being supplied to the DC power source PS-*50. Record AC input and DC output voltages.

9.2.4.3 Flow Alarm System

- _____ 9.2.4.3.1 Set fused switch FU-13 to the CLOSED position.
- _____ 9.2.4.3.2 Set fused switch FU-3 to the CLOSED position.
- _____ 9.2.4.3.3 Visually verify instruments are operating: Transmitter FIT-*57, Flow Alarm FSL-*57.
- _____ 9.2.4.3.4 Verify zero voltage between PLC YYC-*01 Input Number 2 and PLC 120V Common.
- _____ 9.2.4.3.5 Set fused switch FU-3 to the OPEN position.

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

9.2.4.4 Hydrogen Sensors

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

____ 9.2.4.4.2 Visually verify instrument displays are operating:
____ Transmitter NIT-*54,
____ Transmitter NIT-*55,
____ Recorder NR-*54.

____ 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.

____ 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.

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

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

____ 9.2.4.5.3 Visually verify controller TIC-*50 display is operating.

____ 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.

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

- 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-*50 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 125° F (52° C) and setpoint 2 to 65° F (18° C).
- 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-*56 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-*56 circuit. Temperature value of calibration gas should begin increasing. Record initial temperature and increased temperature of nominally 10 degrees.
- 9.2.4.6.7 Adjust setpoint 2 to 20 degrees below indicated temperature.
- 9.2.4.6.8 Verify 120V present between PLC YYC-*01 Input Number 4 and PLC 120V Common.
- 9.2.4.6.9 Reset controller temperature setpoint 1 to 125° F (52° C) and setpoint 2 to 65° F (18° C).
- 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

- 9.2.4.7.1 Set fused switch FU-8 to the CLOSED position.
- 9.2.4.7.2 Visually verify temperature indicator TIS-*62 display is operating.
- 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.
- 9.2.4.7.4 Adjust controller temperature setpoint number 2 to a value 20 degrees less than the indicated ambient temperature.
- 9.2.4.7.5 Verify 120V AC voltage present between PLC YYC-*01 Input Number 3 and PLC 120V Common.
- 9.2.4.7.6 Adjust setpoint 2 to 10 degrees above indicated temperature.
- 9.2.4.7.7 Verify zero voltage present between PLC YYC-*01 Input Number 3 and PLC 120V Common.

- 9.2.4.7.8 Adjust controller temperature setpoint number 2 to a value 20 degrees less than the indicated ambient temperature.
- 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 100° F (38° C) and setpoint 2 to 75° F (24° C).
- 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 PB-*51 followed by the Horn Acknowledge pushbutton PB-*50. (Due to lack of operating inputs the PLC may interpret alarm conditions exist.)
- 9.2.4.8.3 Depress and hold Alarm Test pushbutton PB-*52. Verify the following conditions exist:
 - Horn, YAH-*50, is ON.
 - High Hydrogen Beacon NAH-*55 is ON.
 - Open contacts between High Hydrogen Remote terminals TB2-21 and TB2-22.
 - Trouble Beacon XA-*63 is ON.
 - Open contacts between Cabinet Trouble Remote terminals TB2-23 and TB2-24.
 - All Indicating Lights EXCEPT the RESET SAMPLER light are ON.

9.2.4.8.4 Release Alarm Test pushbutton.

9.2.4.8.5 Depress Alarm Reset pushbutton PB-*51 followed by the Horn Acknowledge pushbutton PB-*50. Verify all inactive alarms are reset.

9.2.4.8.6 Set fused switch FU-9 and FU-10 to the OPEN position.

9.2.4.9 Auto Sampler System

9.2.4.9.1 Set fused switch FU-10 to the CLOSED position.

9.2.4.9.2 Depress the Reset Sampler pushbutton PB-*58 located inside the enclosure.

9.2.4.9.3 Depress the Grab Sample pushbutton PB-*59 located inside the enclosure. Verify the following conditions exist:

The Grab Sample pushbutton light PBL-*59 is illuminated.

The Reset Sample pushbutton light PBL-*58 is illuminated.

The Reset Sample light YAL-*58 is illuminated.

9.2.4.9.4 After five minutes verify that the Grab Sample pushbutton light PBL-*59 goes out and both the Reset Sample lights YAL-*58 and the Reset Sample pushbutton light PBL-*58 remain on.

9.2.4.9.5 Depress the Grab Sample pushbutton PB-*59 and verify that the Grab Sample pushbutton light remains out.

9.2.4.9.6 Depress the Reset Sample pushbutton PB-*58 and verify that both the Reset Sample light YAL-*58 and the Reset Sample pushbutton light PBL-*58 go out.

9.2.4.9.7 Set fused switch FU-10 to the OPEN position.

9.3 INTRINSIC SAFETY CIRCUITS

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

INTRINSIC SAFETY DEVICES:

NE-*54	EB-*54	NIT-*54
NE-*55	EB-*55	NIT-*55

____ 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-*54 / NE-*54
EB-*55 / NE-*55

____ 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.

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**.
 - ____ SV-*03
 - ____ SV-*05
 - ____ SV-*07 through SV-*10
 - ____ SV-*12
 - ____ SV-*15
 - ____ SV-*16
 - ____ SV-*18
 - ____ SV-*19
 - ____ SV-*21
 - ____ SV-*23
 - ____ SV-*25
 - ____ SV-*31 through SV-*34
 - ____ Sample and exhaust line ends are capped.
- ____ 10.1.4 Verify the following sample line valves are **OPEN**.
 - ____ SV-*06
 - ____ SV-*11
 - ____ SV-*17
 - ____ SV-*20
 - ____ SV-*22
 - ____ SV-*24
 - ____ FIV-*52
 - ____ FIV-*56

10.2 SAMPLE MAIN FLOW LOOP

- ____ 10.2.1 Set fused switch 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:
SV-*03
SV-*05
SV-*16
SV-*25
- 10.2.4 Switch circuit breaker CB-3 to the CLOSED position.
- 10.2.5 Adjust flow control valve SV-*24 to nominally 5" H₂O as indicated on FIT-*57.
- 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 Verify the pressure differential indicator PDI-*51 indicates an upscale reading of less than 40" H₂O.

10.3 AUTO GRAB SAMPLING LOOP

- 10.3.1 Set fused switch FU-10 to the CLOSED position.
- 10.3.2 OPEN valves:
SV-*15
Gas Sample Assembly Valves
- 10.3.3 Depress the Grab Sample pushbutton PB-*59. Verify that FIV-*52 indicates flow.
- 10.3.4 Adjust FIV-*52 to nominally 10% flow.
- 10.3.5 CLOSE valves SV-*16 and SV-*25. Verify that FIV-*52 still indicates flow.
- 10.3.6 OPEN valves SV-*16 and SV-*25. CLOSE valve SV-*15. Verify that FIV-*52 indicates no flow.
- 10.3.7 Depress the Reset Sample pushbutton PB-*58.
- 10.3.8 Set fused switch FU-10 to the OPEN position.

10.4 CALIBRATION LOOP

- _____ 10.4.1 Remove plug to atmosphere upstream of FLT-*55.
- _____ 10.4.2 OPEN valves:
 - _____ SV-*18
 - _____ SV-*31
- _____ 10.4.3 Adjust to nominally 2.0 cfh flow through FIV-*56.
- _____ 10.4.4 CLOSE valves SV-*18 and SV-*31. Verify that FIV-*56 indicates zero flow.
- _____ 10.4.5 OPEN valves:
 - _____ SV-*19
 - _____ SV-*31
- _____ 10.4.6 Adjust to nominally 2.0 cfh flow through FIV-*56.
- _____ 10.4.7 CLOSE valves SV-*19 and SV-*31. Verify that FIV-*56 indicates zero flow.

10.5 ANALYTIC INSTRUMENT LOOP

- _____ 10.5.1 Open SV-*10, verify inward flow of gas.
- _____ 10.5.2 Switch circuit breaker CB-3 to the OPEN position.
- _____ 10.5.3 CLOSE the following sample line valves.
 - _____ SV-*03
 - _____ SV-*05
 - _____ SV-*10
 - _____ SV-*16
 - _____ SV-*25
- _____ 10.5.4 Replace end caps on sample inlet and outlet lines. Replace plug upstream of FLT-*55.
- _____ 10.5.5 Open the following circuit breakers and fuses:

CB-1 through CB-7
FU-1 through FU-13

10.5.6 De-energize power source to the Standard Hydrogen
Monitoring System. Refer to H-14-100297, Standard-D
Hydrogen Monitoring System One Line & Elementary
Diagrams.

10.6 REVIEW

Check that all steps have been completed.

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.
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:			SHMS Unit Number:		
Title of Test: Electrical Systems			Equipment Serial Number(s):		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.1.1	Resistance		< 1 Ohm		
9.1.3	Line Voltages: L1 L2 N		L1,L2: 120V $\pm$ 5% N: 0V		
9.2.1.4	AC-*60 & HTR-*60		A/C Compressor ON, Heater OFF		
9.2.1.6	AC-*60		A/C Compressor OFF		
9.2.1.8	HTR-*60		Heater ON		
9.2.1.10	AC-*60 & HTR-*60		A/C Compressor ON, Heater OFF		
9.2.2.3	P-*50		Pump ON		
9.2.3.3	LT1		Light ON		
9.2.3.4	RCPT: H N		H: 120V $\pm$ 5% N: 0V		
9.2.3.5	RCPT: H N		H:0V N:0V		

TEST DATA SHEET

Date:			SHMS Unit Number:		
Title of Test: Electrical Systems			Equipment Serial Number(s):		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.2.4.1.2	XFMR1: Primary Secondary		Primary, Secondary: 120V $\pm$ 5%		
9.2.4.2.2	PS-*50: AC In DC Out		Incoming AC: 120V $\pm$ 5% Outgoing DC: 24V $\pm$ 5%		
9.2.4.3.3	Visual: FIT-*57 FSL-*57		Power Indication Lights ON		
9.2.4.3.4	YYC-*01 In #2 Voltage:		0V		
9.2.4.4.2	NIT-*54 NIT-*55 NR-*54		Displays powered ON.		
9.2.4.4.3	YYC-*01 In #0 In #1 Voltage:		120V $\pm$ 5%		
9.2.4.5.3	TIC-*50		Display powered ON.		
9.2.4.5.6	YYC-*01 In #5 Voltage:		0V		
9.2.4.5.7	HT-*50: Initial Temp. Final Temp.		Final Temp. = Initial Temp. + 10°F		

TEST DATA SHEET

Date:			SHMS Unit Number:		
Title of Test: Electrical Systems			Equipment Serial Number(s):		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.2.4.5.9	YYC-*01 In #5 Voltage:		120V $\pm$ 5%		
9.2.4.6.2	TIC-*56		Display powered ON.		
9.2.4.6.5	YYC-*01 In #4 Voltage:		0V		
9.2.4.6.6	HT-*56: Initial Temp. Final Temp.		Final Temp. = Initial Temp + 10°F		
9.2.4.6.8	YYC-*01 In #4 Voltage:		120V $\pm$ 5%		
9.2.4.7.2	TIS-*62		Display powered ON.		
9.2.4.7.5	YYC-*01 In #3 Voltage:		120V $\pm$ 5%		
9.2.4.7.7	YYC-*01 In #3 Voltage:		0V		
9.2.4.7.9	YYC-*01 In #3 Voltage:		120V $\pm$ 5%		
9.2.4.7.11	YYC-*01 In #3 Voltage:		0V		

TEST DATA SHEET

Date:			SHMS Unit Number:		
Title of Test: Electrical Systems			Equipment Serial Number(s):		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.2.4.8.3	YAH-*50 NAH-*55 CR-*55 XA-*63 CR-*63 TAL-*50 TAHL-*62 FAL-*57 NAH-*54		ON ON Infinite Resistance Between TB2-21 and TB2-22. ON Infinite Resistance Between TB2-23 and TB2-24. ON ON ON ON		
9.2.4.8.5	Inactive Alarms		OFF		
9.2.4.9.3	PBL-*59 PBL-*58 YAL-*58		ON ON ON		
9.2.4.9.4	PBL-*59 PBL-*58 YAL-*58		OFF ON ON		
9.2.4.9.5	PBL-*59		OFF		
9.2.4.9.6	PBL-*58 YAL-*58		OFF OFF		
9.3.1	Nameplates		Near IS Devices.		

TEST DATA SHEET

Date:			SHMS Unit Number:		
Title of Test: Electrical Systems			Equipment Serial Number(s):		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
9.3.2	Wiring		Proper Labeling.		
9.3.3	Resistance		< 1 Ohm		

Test Witnesses:

Test Director_____
Date_____
Recorder_____
Date_____
Quality Assurance_____
Date

TEST DATA SHEET

Date:			SHMS Unit Number:		
Title of Test: Pneumatic Systems			Equipment Serial Number(s):		
Test Performed By:					
Procedure Number	Item	Value	Range	(A/R)	Comment
10.1.1	Sample Line Heat Trace Length		> 15 Feet		
10.1.2	Calibration Line Heat Trace Length		> 10 Feet		
10.1.3	Sample Line Valves		CLOSED		
10.2.6	Sample Intake & Exhaust		Air going in through Intake, leaving through Exhaust		
10.2.7	PDI-*51		< 40" H ₂ O		
10.3.3	FIV-*52		Indicates Flow		
10.3.6	FIV-*52		Indicates No Flow		
10.4.4	FIV-*56		Zero Flow		
10.4.7	FIV-*56		Zero Flow		
10.5.1	SV-*10		Air flow into system		

Test Witnesses:

Test Director

Date

Recorder

Date

Quality Assurance

Date

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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

WHC Project Engineer Date

Recorder Date

Witness Date

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APPENDIX C: TEST LOG SHEET

TEST LOG

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