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Title/Desc:

OTP FOR BELHAVEN FLAMMABLE GAS MONITOR AT 241T104

Pages: 52

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ENGINEERING DATA TRANSMITTAL

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16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
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		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

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1/4	1	Cog. Mgr. DB Engelman	<i>VC Boyle for</i>		R1-49						
1/4	1	QA KC Conrad	<i>KC Conrad</i>	3/1/96							
1/4	1	Safety LS Krogsrud	<i>LS Krogsrud</i>	2/27/96	R3-08						

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DOCUMENT ACCEPTANCE REVIEW FORM

Procedure Change Number WHC-SD-WM-OTP-208
 Document No. 0 Rev./Mod.

SQ
Approval Designator

Prepared By
SCOTT J. KUJAK
Name

- Plant Operating Procedure
 - Alarm Response Procedure
 - Operator Round Sheet
 - Facility Sampling Schedule
 - Operation Test Procedure
 - Operating Specification Document
- (Requires Checklist)

ECS/ICFKH
Title/Organization

New or Revised - Full Review Required

Procedure Change Authorization

Administrative Change

OTP FOR THE BELHAVEN FLAMMABLE GAS MONITOR INSTALLED ON T-104

Document Title

Procedure Changes/Changed Pages/Summary of change

PROCEDURE REVIEWERS SIGNATURES

DOCUMENT IS ACCEPTABLE

As Is	With Changes Noted	Signature	Print Name	Title/Org	Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Sallie Ann Huebner</i>	Sallie Ann Huebner	N/A	3-6-96
<small>Ensures that the procedure has been field validated and comments incorporated.</small>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>C. M. Taylor</i>	C. M. TAYLOR	ENGR/TUES AQ	3/1/96
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>L. E. Thomas</i>	L. E. THOMAS	ENR/TUES SFTY	2/28/96
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<small>Verifies documentation is complete, including Change Summary Signature Sheet</small>					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Richard E. Larson</i>	Richard E. Larson	ENGR/WTFO	3/1/96
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<input type="checkbox"/>	<input checked="" type="checkbox"/>	<i>Michael R. Koch</i>	MICHAEL R KOCH	77420/ENS	2-27-96
<small>Ensures that the technical aspects of the procedure are correct, and that the procedure has been reviewed per the approval designator.</small>					

ACCEPTANCE REVIEW CHAIRMAN

N/A (Signature) _____ (Print Name) _____ (Title/Org) _____ (Date)

APPROVAL AUTHORITY

[Signature] (Signature) _____ (Print Name) MSR/WTFT (Title/Org) 3/7/96 (Date)

OTP FOR BELHAVEN FLAMMABLE GAS MONITOR AT 241-T-104

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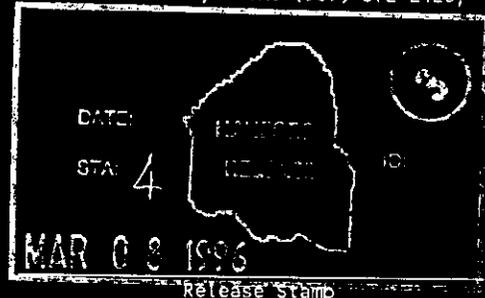
Abstract: This Operational Test Procedure tests the operability of the Safety Class 3 flammable gas monitoring system with equipment shutdown capability. This test includes the flammable gas monitor, heat trace system, pneumatic system, and the interface with existing equipment.

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Release Approval

3/8/96
Date



Approved for Public Release

TANK FARM
OPERATIONAL TEST PROCEDURE

SYSTEM
INTERIM STABILIZATION

**OTP FOR THE BELHAVEN FLAMMABLE GAS MONITOR INSTALLED ON
T-104**

Release Date

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TANK FARM OPERATIONAL TEST PROCEDURE

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TANK FARM OPERATIONAL TEST PROCEDURE

1.0 PURPOSE

1.1 There is a concern that flammable gases may exceed the LFL during interim stabilization. Therefore, there is a need for a system that will measure the flammable gas concentration and shut down all required pump pit pumping equipment (e.g. all equipment considered to be a potential sparking source such as the electric centrifugal pump) when the LFL criteria is exceeded. This OTP will test and verify the operability of the Flammable Gas Monitor system. Systems/checks that will be tested/performed include the following:

- Power System Check
- Pneumatic Systems Check
- FGM System Heat Trace Check
- FGM System Test

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TANK FARM OPERATIONAL TEST PROCEDURE

2.0 INFORMATION

2.1 SCOPE

2.1.1 POWER SYSTEM CHECK

This is a check to ensure that the FGM system "powers up" correctly. Inherent in this check will be the verification that the FGM system is connected to the pumping skid properly.

2.1.2 PNEUMATIC SYSTEMS CHECK

This section will hook up the FGM system to the compressed air source located on the pumping skid.

2.1.3 FGM SYSTEM HEAT TRACE TEST

This test will be performed to ensure that the FGM system Heat Trace functions properly.

2.1.4 FGM SYSTEM TEST

During this section an actual test of the FGM sensor is performed. Included will be a test of the response time and a verification that the FGM sensor is providing the correct data.

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TANK FARM OPERATIONAL TEST PROCEDURE

2.2 TERMS AND DEFINITIONS

- 2.2.1 ADC - Analog to Digital Converter
- 2.2.2 CCM - Cubic Centimeters per Minute
- 2.2.3 DMM - Digital Multi-Meter
- 2.2.4 ECAB - Electronics CABinet
- 2.2.5 ECN - Engineering Change Notice
- 2.2.6 FCV - Flow Control Valve
- 2.2.7 FGM - Flammable Gas Monitor
- 2.2.8 HEPA - High Efficiency Particulate Air
- 2.2.9 HPT - Health Physics Technician
- 2.2.10 JCS PM/S - Job Control System Preventative
Maintenance/Surveillance
- 2.2.11 JHA - Job Hazards Analysis
- 2.2.12 LS - Limit Switch
- 2.2.13 MCC - Motor Control Center
- 2.2.14 MMI - Man Machine Interface
- 2.2.15 NC - Normally Closed
- 2.2.16 NO - Normally Open
- 2.2.17 OTP - Operational Test Procedure
- 2.2.18 OTR - Operational Test Report
- 2.2.19 PLC - Programmable Logic Controller
- 2.2.20 PS - Pressure Switch
- 2.2.21 QC - Quality Control
- 2.2.22 RWP - Radiation Work Permit
- 2.2.23 SST - Single Shell Tanks
- 2.2.24 TFO - Tank Farm Operations
- 2.2.25 VCAB - Valve CABinet

TANK FARM OPERATIONAL TEST PROCEDURE

2.3 RESPONSIBILITIES

- 2.3.1 The Maintenance craft personnel are responsible for:
- Providing assistance during the test.
- 2.3.2 Quality Control (QC) is responsible for:
- Verifying that the procedure sections were performed correctly by witnessing procedure steps as they occur.
- 2.3.3 HPT personnel are responsible for:
- Conducting surveys of all equipment used during this OTP.
 - Conducting surveys of all affected areas
- 2.3.4 Test Director
- Provides concurrence that OTP may commence.
 - Ensures the equipment found in step 4.1 of this procedure is available.
 - Records equipment status and data per this procedure
 - Conducts a pre-job planning meeting.
 - Conducts a 241-T-104 facility walkdown.

2.4 REFERENCES

- 2.4.1 The following documents were used to write or are referenced in this procedure:
- WHC-CM-1-10, SAFETY MANUAL, "WKS-15, ELECTRICAL WORK SAFETY"
 - WHC-CM-6-1 EP 4.2., STANDARD ENGINEERING PRACTICE "TESTING PRACTICES"
 - WHC-CM-6-1 APPX L, STANDARD ENGINEERING PRACTICES "OPERABILITY TEST PROCEDURES AND REPORTS".
 - H-2-99136, SKID MOUNTED PORTABLE JET PUMP STATION WIRING DIAGRAM
 - WORK PACKAGE WS-96-00004/0
 - H-2-85626, PUMPING AND INSTRUMENTATION CONTROL SKID
 - H-2-78320, JUMPER ASSEMBLY SALTWELL JET PUMP
 - H-2-85621, INSTRUMENT AIR AND WATER SYSTEM DETAILS
 - H-2-85625, INSTRUMENTATION WEIGHT FACTOR ENCLOSURE
 - H-14-023960, SALTWELL CONTROL EQUIPMENT O & M SYSTEM P&ID

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TANK FARM OPERATIONAL TEST PROCEDURE

2.5 SAFETY

Warning - Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

2.5.1 Work will be performed in this OTP on energized circuits.

2.5.2 The following administrative procedures control work performed in this procedure:

- Building Emergency Plan, WHC-IP-0263-TF
- Industrial Hygiene Manual, WHC-CM-4-40
- Safety Manual, WHC-CM-1-10
- Tank Farm Health and Safety Plan (HASP), WHC-SD-WM-HSP-002

2.6 RADIATION AND CONTAMINATION CONTROL

2.6.1 HPT assistance is required in accordance with RWP.

2.6.2 The following administrative procedures control work performed in this procedure:

- Hanford Site Radiological Control Manual (HSRCM), Rev. 2
- Safety Manual, WHC-CM-1-10

2.6.3 The test shall be STOPPED and the TFO Shift Manager immediately notified, if radiation levels significantly increase as determined by a Radiation Monitor.

2.7 QUALITY ASSURANCE

2.7.1 Ensure that the test(s) are performed per procedure. The QC Inspector shall sign and date each procedure section authenticating the validity of the data (if any) obtained and verifying that the procedure section has been performed correctly.

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TANK FARM OPERATIONAL TEST PROCEDURE

2.8 GENERAL INFORMATION

- 2.8.1 Complete each procedure step in the given order, unless otherwise noted or as directed by the Test Director.
- 2.8.2 The FGM System Heat Trace Test (section 5.3) can be performed before sections 5.1 and/or 5.2.
- 2.8.3 Editorial changes required to this OTP may be made per the red line method by the Test Director and Cognizant Engineer as long as they do not impact operational facility safety function, or performance and will not compromise or influence the test data. Any changes affecting the above stated criteria shall be made in accordance with WHC-CM-6-1, *Standard Engineering Practices*, EP-2.2 Change Control.
- 2.8.4 All entries recorded in this procedure shall be made in black ink except for those noted using the redline method.
- 2.8.5 Any non-conformance of the instrumentation or unexpected results during testing shall be logged and recorded in OTP EXCEPTION LOG.
- 2.8.6 Do not perform any part of this procedure on faulty equipment. If faulty equipment is discovered, STOP the execution of this procedure and resolve the problem (i.e. repair equipment or write up faulty equipment as an exception and continue).
- 2.8.7 Section 5.5 of this procedure need not be performed as dictated by the weather conditions, or as directed by Tank Farm Operations.
- 2.8.8 If the performance of this procedure is suspended for any reason, ensure the requirements of the Lock and Tag System are met before leaving the test site.
- 2.8.9 This procedure DOES NOT contain any separate data/verification sheets. Verification of procedural steps and validity of the data is incorporated into the specific section.
- 2.8.10 A JHA form will be used in conjunction with the pre-job safety meeting form when any unusual hazards are identified. The PRE-JOB SAFETY MEETING FORM will be used to document all attendees.
- 2.8.11 If any alarm condition clears before the horn has been acknowledged then, the ALARM ACK (F1) button needs to be pushed only ONCE.

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TANK FARM OPERATIONAL TEST PROCEDURE

3.0 RECORDS

- 3.1 The completed working copy of this OTP, maintenance procedure data sheets and all exception logs and exception records generated by this OTP, will be kept as permanent records and released in an OTR.

4.0 PREREQUISITES

- 4.1 The following supplies shall be available at the workplace:

- Stopwatch
- Heat Gun
- Small Needle Nose Pliers
- Thermal Measuring Device
- Digital Multi-Meter

Calibration No. _____ Expiration Date _____

- NIST traceable Methane gas.

Calibration Gas concentration as defined by the LFL percentage:
_____ % LFL

Methane Calibration Gas Bottle Lot Number: _____

Test Gas concentration as defined by the LFL percentage:
_____ % LFL

Methane Test Gas Bottle Lot Number: _____

- 4.2 The following documents are required to be at the test site, before and during the performance of this procedure:

- WHC-IP-0842, Vol II Section 4.9.1, LOCKOUT/TAGOUT
- ECN 627368
- WORK PACKAGE, WS-96-00004/0

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TANK FARM OPERATIONAL TEST PROCEDURE

4.0 PREREQUISITES (Continued)

4.3 The following conditions must be met before this test may commence:

4.3.1 A pre-job safety meeting has been held before performing this procedure in accordance with WHC-IP-0842, Vol V Section 4.1, PRE-JOB SAFETY MEETING FORM.

4.3.2 Verify that all FGM systems have been pressure (leak) tested per work package WS-96-00004/0

4.3.3 Verify that the FGM system has been installed and connected per work package WS-96-00004/0

4.3.4 Notify the Tank Farm Shift Manager that the OTP is to be performed.

4.3.5 QC Inspector shall verify the current calibration and, record the calibration date and calibration due date on the table below.

INSTRUMENT	CALIBRATION DATE	CALIBRATION DUE DATE
FGM SYSTEM (SALW-AE-6010F) CALIBRATION		

TANK FARM OPERATIONAL TEST PROCEDURE

4.0 PREREQUISITES (Continued)

4.3.6 Test Director **SHALL VERIFY** that section 4.0 has been **COMPLETED** by **SIGNING** below.

Test Director Signature

Date

4.3.7 QC Inspector **SHALL VERIFY** that section 4.0 has been **COMPLETED** by **SIGNING** below.

QC Inspector Signature

Date

TANK FARM OPERATIONAL TEST PROCEDURE

5.0 PROCEDURE

5.1 POWER SYSTEM CHECK

- 5.1.1 VERIFY that the air driven vacuum pump is CONNECTED to the pumping skid air supply.
- 5.1.2 POSITION the "MAIN" SALW-DS-6002F DISCONNECT SWITCH to ON.
- 5.1.3 POSITION DISCONNECT SWITCH SALW-DS-6003F "TRANSFORMER T-1 PRIMARY SW 480 VAC" to ON.
- 5.1.4 POSITION DISCONNECT SWITCH SALW-DS-6004F "INSTR AIR CPRSR 480 VAC" to ON.
- 5.1.5 POSITION DISCONNECT SWITCH SALW-DS-6005F "SALT WELL PUMP 480 VAC" to ON.
- 5.1.6 POSITION air compressor hand switch (located on panel INST AIR COMPRESS ENCL) to ON.
- 5.1.7 POSITION "MAIN" circuit breaker #1 (located on the skid in panelboard SALW-DP-6001F) to ON.
- 5.1.8 POSITION "MAIN" circuit breaker #3 (located on the skid in panelboard SALW-DP-6001F) to ON.
- 5.1.9 POSITION "WEIGHT FACTOR INSTRUMENT ENCLOSURE" circuit breaker #2 (located on the skid in panelboard SALW-DP-6001F) to ON.

TANK FARM OPERATIONAL TEST PROCEDURE

5.1 POWER SYSTEM CHECK (continued)

- 5.1.10 **POSITION** "AIR COMPRESSOR CABINET HEATER 7 (1) RECEPTACLE" circuit breaker #4 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.11 **POSITION** "WATER TANK HEATER" circuit breaker #6 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.12 **POSITION** "INSTRUMENT ENCLOSURE" circuit breaker #7 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.13 **POSITION** "LEAK DETECTION/HEAT TRACE" circuit breaker #8 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.14 **POSITION** "HEAT TRACE FOR T-104" circuit breaker #9 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.15 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.16 **VERIFY** that there is power to the FGM system **BY OBSERVING** if the FGM system MMI screen **DISPLAYS** "SYSTEM WARMING UP".
- 5.1.17 **REMOVE** the flammable gas sensor's cover.
- 5.1.18 **WAIT** approximately seven (7) minutes for the Flammable Gas sensor calibration red light to **CLEAR**.
- 5.1.19 **VERIFY** that the FGM system is **FUNCTIONAL BY OBSERVING** that the FGM system MMI screen **DISPLAYS** "PRESS F2 TO START".
- 5.1.20 **PRESS** the START (F2) button.

TANK FARM OPERATIONAL TEST PROCEDURE

5.1 POWER SYSTEM CHECK (continued)

- 5.1.21 **VERIFY** that the FGM system MMI green and yellow indicating lights are **ILLUMINATED**.

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.1.22 **VERIFY** that the relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **ENERGIZED** (contacts closed).

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.1.23 **VERIFY** that the "dry contacts" on TB-4 terminals 23 and 24 (located in SALW-PNL-6013F) are **CLOSED**.

- 5.1.24 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **OFF**.

- 5.1.25 **VERIFY** that the relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **DE-ENERGIZED** (contacts open).

- 5.1.26 **VERIFY** that the "dry contacts" on TB-4 terminals 23 and 24 (located in SALW-PNL-6013F) are **OPEN**.

TANK FARM OPERATIONAL TEST PROCEDURE

5.1 POWER SYSTEM CHECK (continued)

- 5.1.27 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.1.28 **WAIT** approximately seven (7) minutes for the Flammable Gas sensor calibration red light to **CLEAR**.
- 5.1.29 **VERIFY** that the FGM system is **FUNCTIONAL BY OBSERVING** that the FGM system MMI screen **DISPLAYS** "PRESS F2 TO START".
- 5.1.30 **PRESS** the START (F2) button.
- 5.1.31 **VERIFY** that the FGM system MMI green and yellow indicating lights are **ILLUMINATED**.
- 5.1.32 **SET** the FGM alarm setpoint by **PERFORMING** the following:
- 5.1.32.1 **PRESS** the MENU button on the MMI keypad.
- 5.1.32.2 **PRESS** the up or down arrow buttons on the MMI keypad **UNTIL** "CALIBRATION" is **DISPLAYED**.
- 5.1.32.3 **PRESS** the enter button on the MMI keypad.
- 5.1.32.4 **PRESS** the up or down arrow buttons on the MMI keypad **UNTIL** "PASSWORD" is **DISPLAYED**.
- 5.1.32.5 **PRESS** the SELECT button on the MMI keypad **UNTIL** "LOCK" is **DISPLAYED**.
- 5.1.32.6 **PRESS** the up or down arrow buttons on the MMI keypad **UNTIL** "UNLOCK" is **DISPLAYED**.

TANK FARM OPERATIONAL TEST PROCEDURE

5.1 POWER SYSTEM CHECK (continued)

- 5.1.32.7 PRESS the SELECT button on the MMI keypad UNTIL "ENTER PASSWORD" is DISPLAYED.
- 5.1.32.8 ENTER "9446" USING the MMI keypad.
- 5.1.32.9 PRESS the enter button on the MMI keypad.
- 5.1.32.10 PRESS the MENU button on the MMI keypad.
- 5.1.32.11 PRESS the up or down arrow buttons on the MMI keypad UNTIL "SYSTEM PARAMETERS" is DISPLAYED.
- 5.1.32.12 PRESS the enter button on the MMI keypad.
- 5.1.32.13 WHEN "SETPOINT LFL" is DISPLAYED on the MMI, PRESS the enter button on the MMI keypad.
- 5.1.32.14 VERIFY "ENTER THE SETPOINT LFL" is DISPLAYED on the MMI.
- 5.1.32.15 ENTER 10 USING the MMI keypad.
- 5.1.32.16 PRESS the enter button on the MMI keypad.
- 5.1.33 LOCK the FGM alarm setpoint by PERFORMING the following:
- 5.1.33.1 PRESS the MENU button on the MMI keypad.
- 5.1.33.2 PRESS the up or down arrow buttons on the MMI keypad UNTIL "CALIBRATION" is DISPLAYED.

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TANK FARM OPERATIONAL TEST PROCEDURE

5.1 POWER SYSTEM CHECK (continued)

5.1.33.3 PRESS the enter button on the MMI keypad.

5.1.33.4 PRESS the up or down arrow buttons on the MMI keypad UNTIL "PASSWORD" is DISPLAYED.

5.1.33.5 PRESS the SELECT button on the MMI keypad UNTIL "LOCK" is DISPLAYED.

5.1.33.6 PRESS the SELECT button on the MMI keypad UNTIL "KEY PAD IS LOCKED" is DISPLAYED.

5.1.34 RECORD the MEASURED LFL value (from the MMI screen) on the table below.

MEASURED LFL	% LFL
--------------	-------

5.1.35 Test Director SHALL VERIFY that section 5.1 is COMPLETE by SIGNING below.

Test Director Signature

Date

5.1.36 QC Inspector SHALL VERIFY that section 5.1 is COMPLETE by SIGNING below.

QC Inspector Signature

Date

TANK FARM OPERATIONAL TEST PROCEDURE

5.2 PNEUMATIC SYSTEMS CHECK

- 5.2.1 ENSURE that the skid air compressor is SET to ON.
- 5.2.2 ENSURE there is air flow to the FGM system vacuum pump BY LISTENING for pump operation.
- 5.2.3 ENSURE that the NIST traceable Methane calibration gas bottle pressure is GREATER THAN 250 psig.
- 5.2.4 IF the NIST traceable Methane calibration gas bottle pressure is NOT GREATER THAN 250 psig, EXCHANGE the bottle for a new one.
- 5.2.5 ENSURE that the calibration gas bottle valve is OPEN.
- 5.2.6 VERIFY that SAMPLE gas is FLOWING BY OBSERVING a flow INDICATION on the FGM system rotameter FI-1 (located in the FGM VCAB).
- 5.2.7 RECORD SAMPLE gas flow on the table below.

SAMPLE GAS FLOW AS INDICATED BY ROTAMETER FI-1	
---	--

- 5.2.8 IF REQUIRED, ADJUST FCV-1 (located in the FGM VCAB) to provide a 250 ccm to 350 ccm range on FI-1.

TANK FARM OPERATIONAL TEST PROCEDURE

5.2 PNEUMATIC SYSTEMS CHECK (continued)

5.2.9 Test Director **SHALL VERIFY** that section 5.2 is **COMPLETE** by **SIGNING** below.

Test Director Signature

Date

5.2.10 QC Inspector **SHALL VERIFY** that section 5.2 is **COMPLETE** by **SIGNING** below.

QC Inspector Signature

Date

TANK FARM OPERATIONAL TEST PROCEDURE

5.3 FGM HEAT TRACE SYSTEM TEST

- 5.3.1 VERIFY that there is power to the FGM Heat Trace system.
- 5.3.2 POSITION "HEAT TRACE FOR T-104" circuit breaker #9 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.3.3 EXPOSE SALW-TS-6016F CONTROL THERMOSTAT THERMOCOUPLE BULB to the AMBIENT ATMOSPHERE.
- 5.3.4 CONNECT DMM to the SALW-TS-6016F CONTROL THERMOSTAT.
- 5.3.5 VERIFY that the SALW-TS-6016F CONTROL THERMOSTAT contacts are CLOSED.
- 5.3.6 DIRECT a heat gun at the SALW-TS-6016F CONTROL THERMOSTAT THERMOCOUPLE BULB.
- 5.3.7 VERIFY that the SALW-TS-6016F CONTROL THERMOSTAT contacts are OPEN.
- 5.3.8 REINSTALL the SALW-TS-6016F CONTROL THERMOSTAT THERMOCOUPLE BULB.
- 5.3.9 EXPOSE SALW-TS-6015F CONTROL THERMOSTAT THERMOCOUPLE BULB to the AMBIENT ATMOSPHERE.
- 5.3.10 CONNECT a DMM to the SALW-TS-6015F CONTROL THERMOSTAT.
- 5.3.11 VERIFY that the SALW-TS-6015F CONTROL THERMOSTAT contacts are CLOSED.

TANK FARM OPERATIONAL TEST PROCEDURE

5.3 FGM HEAT TRACE SYSTEM TEST (continued)

- 5.3.12 **DIRECT** a heat gun at the SALW-TS-6015F CONTROL THERMOSTAT THERMOCOUPLE BULB.
- 5.3.13 **VERIFY** that the SALW-TS-6015F CONTROL THERMOSTAT contacts are **OPEN**.
- 5.3.14 **REINSTALL** the SALW-TS-6015F CONTROL THERMOSTAT THERMOCOUPLE BULB.
- 5.3.15 **POSITION** "HEAT TRACE FOR T-104" circuit breaker #9 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.3.16 Test Director **SHALL VERIFY** that section 5.3 is **COMPLETE** by **SIGNING** below.

Test Director Signature

Date

- 5.3.17 QC Inspector **SHALL VERIFY** that section 5.3 is **COMPLETE** by **SIGNING** below.

QC Inspector Signature

Date

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.1 **VERIFY** that the relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **ENERGIZED** (contacts closed).

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.2 **VERIFY** with a DMM that there is **POWER** to contacts IN 5 and OUT 5, located in the DATA 6 compartment of the PLC on the pumping skid.
- 5.4.3 **REMOVE** the existing polyethylene line from port 1 of valve SV-1 (located in the FGM system's VCAB).
- 5.4.4 **INSTALL** a TEE onto the polyethylene line that was disconnected from port 1 of valve SV-1.
- 5.4.5 **CONNECT** a test line to one end of the TEE.
- 5.4.6 **CONNECT** the other end of the test line to port 1 on valve SV-1 (located in the FGM system's VCAB).

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

5.4.7 **CONNECT** the 25% LFL Methane test gas bottle to the open end of the TEE.

5.4.8 **OPEN** the Methane gas bottle valve **AND INTRODUCE** a sample of 25% LFL Methane gas into the sample line.

NOTE - The FGM system should provide a stabilized reading in approximately two minutes. The FGM system should alarm when the LFL exceeds 10%. This should occur before 52 seconds has elapsed

5.4.9 **WHEN** the FGM system LFL reading has **STABILIZED**, **CLOSE** the Methane gas bottle valve.

5.4.10 **VERIFY** that the MMI **INDICATES** 25% LFL ($\pm 2\%$ LFL).

5.4.11 **VERIFY** that the horn is **SOUNDING**.

5.4.12 **VERIFY** that the white strobe light (on the FGM cabinet) is **FLASHING**.

5.4.13 **VERIFY** that the green light on the MMI is **NOT ILLUMINATED**.

5.4.14 **VERIFY** that the yellow light on the MMI is **NOT ILLUMINATED**.

5.4.15 **VERIFY** that the red light located on the MMI is **FLASHING**.

5.4.16 **ACKNOWLEDGE** horn by **PRESSING** the ALARM ACK (F1) button located on the MMI.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

- 5.4.17 VERIFY that the MMI screen ALTERNATELY DISPLAYS "HIGH LFL READING" and "FAULT HASN'T CLEARED".
- 5.4.18 WAIT for the LFL to drop below the 10% LFL setpoint BEFORE CONTINUING.
- 5.4.19 VERIFY that the MMI screen ALTERNATELY DISPLAYS "HIGH LFL READING" and "PRESS F1 TO STOP ALM".
- 5.4.20 DISCONNECT the Methane test gas bottle from the TEE.
- 5.4.21 REMOVE the polyethylene line from the TEE AND, RECONNECT to port 1 of valve SV-1 (located in the FGM system's VCAB).
- 5.4.22 RESTART the FGM system BY PERFORMING the following:
- 5.4.22.1 PRESS the ALARM ACK (F1) button located on the MMI.
- 5.4.22.2 PRESS the START (F2) button located on the MMI.

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.23 OPEN the FGM system PLC ADC loop BY LIFTING the CH 1(+) red wire in the PLC F2-04AD-2 compartment in the FGM VCAB.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

5.4.24 **VERIFY** the FGM system PLC ADC responds to a loss of loop condition by **OBSERVING** the following:

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.24.1 **VERIFY** that the relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **DE-ENERGIZED** (contacts open).
- 5.4.24.2 Horn is **SOUNDING**.
- 5.4.24.3 White strobe light (on the FGM cabinet) is **FLASHING**.
- 5.4.24.4 Green light on the MMI is **NOT ILLUMINATED**.
- 5.4.24.5 Yellow light on the MMI is **NOT ILLUMINATED**.
- 5.4.24.6 Red light located on the MMI is **FLASHING**.
- 5.4.25 **ACKNOWLEDGE** horn by **PRESSING** the ALARM ACK (F1) button located on the MMI.
- 5.4.26 **VERIFY** that the MMI screen **ALTERNATELY DISPLAYS** "NO SENSOR SIGNAL" and "PRESS F1 TO STOP ALARM".

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.27 RESTORE the PLC ADC loop BY RECONNECTING the CH 1(+) red wire in the PLC F2-04AD-2 compartment in the VCAB.
- 5.4.28 VERIFY that the MMI screen DISPLAYS "NO SENSOR SIGNAL".
- 5.4.29 RESTART the FGM system BY PERFORMING the following:
- 5.4.29.1 PRESS the ALARM ACK (F1) button located on the MMI.
- 5.4.29.2 PRESS the START (F2) button located on the MMI.
- 5.4.30 VERIFY that the red light located on the MMI is OFF.
- 5.4.31 VERIFY that the white strobe light (on the FGM cabinet) is OFF.
- 5.4.32 VERIFY that the green light located on the MMI is ON.
- 5.4.33 VERIFY that the yellow light located on the MMI is ON.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.34 **VERIFY** that the relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **ENERGIZED** (contacts closed).
- 5.4.35 **DISCONNECT** the polyethylene line from port 1 of valve SV-1 (located in the FGM system's VCAB).
- 5.4.36 **INSTALL** a TEE onto the polyethylene line that was disconnected from port 1 of valve SV-1.
- 5.4.37 **CONNECT** a test line to one end of the TEE.
- 5.4.38 **CONNECT** the other end of the test line to port 1 on valve SV-1 (located in the FGM system's VCAB).
- 5.4.39 **CONNECT** the 25% LFL Methane test gas bottle to the open end of the TEE.
- 5.4.40 **OPEN** the Methane gas bottle valve **AND INTRODUCE** a sample of 25% LFL Methane gas into the sample line.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

NOTE - The FGM system should alarm when the LFL exceeds 10%. The **RESPONSE TIME** is the time between the introduction of the test gas and the initial alarm annunciation. The FGM system PLC should start to respond before 30 seconds has elapsed but, it will take up to 52 seconds for a full scale reading.

5.4.41 **TEST** the FGM system by **PERFORMING** the following:

5.4.41.1 **SIMULTANEOUSLY OPEN** the Methane gas test bottle valve **AND START** the stopwatch.

5.4.41.2 **WHEN** the MMI display **INDICATES** an **INCREASING** LFL level, **CLOSE** the Methane test bottle valve.

5.4.41.3 **RECORD** the data as **INDICATED** by the table below.

METHANE GAS FGM SYSTEM TEST	FGM SYSTEM RESPONSE TIME	HORN ANNUNCIATES (YES/NO)	% LFL THAT GIVES AN ALARM INDICATION	DMM READING OF THE CONTACTOR (OPEN/CLOSED)
TEST 1				
TEST 2				
TEST 3				
TEST 4				
TEST 5				
FGM SYSTEM RESPONSE TIME AVERAGE				

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

- 5.4.41.4 White strobe light (on the FGM cabinet) is **FLASHING**.
- 5.4.41.5 Green light on the MMI is **NOT ILLUMINATED**.
- 5.4.41.6 Yellow light on the MMI is **NOT ILLUMINATED**.
- 5.4.41.7 **VERIFY** that the MMI screen **ALTERNATELY DISPLAYS** "HIGH LFL READING" and "FAULT HASN'T CLEARED".
- 5.4.41.8 Red light located on the MMI is **FLASHING**.
- 5.4.41.9 **ACKNOWLEDGE** the horn by **PRESSING** the ALARM ACK button located on the MMI.
- 5.4.41.10 **WAIT** for the LFL to drop below the 10% LFL setpoint **BEFORE CONTINUING**.
- 5.4.41.11 **VERIFY** that the MMI screen **ALTERNATELY DISPLAYS** "HIGH LFL READING" and "PRESS F1 TO STOP ALM".

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.41.12 **VERIFY** that relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **DE-ENERGIZED** (contacts open).

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.41.13 **VERIFY** with a DMM that there is **NO POWER** to contacts IN 5 and OUT 5, located in the DATA 6 compartment of the PLC on the pumping skid.

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.41.14 **REQUEST** electrician to **VERIFY** that there is **NO** power to the PS **BY, CHECKING** for no power at the 120 VAC red wire terminal (located in the skid Instrument Enclosure on the third terminal board from the left, tenth terminal from the top, reference drawing H-2-85626 sheet 14).

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.41.15 **REQUEST** electrician to **VERIFY** that there is **NO** power to the LS **BY, CHECKING** for no power at the 120 VAC red wire terminal (located in the skid Instrument Enclosure on the third terminal board from the left, tenth terminal from the top, reference drawing H-2-85626 sheet 14).

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.41.16 **REQUEST** electrician to **VERIFY** that there is NO power to the Leak Detector probes **BY, CHECKING** for no power at red wire terminals SD1, SD2, and SD3 (located in the skid Interconnect Enclosure on the primary leak detector terminal board, leak detector #1 terminal board, and leak detector #2 terminal board respectively, reference drawing H-2-85626 sheet 12).



WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.41.17 **REQUEST** electrician to **VERIFY** that there is NO power to the flowmeter **BY, CHECKING** for no power at terminals 16, 18, 19, and 21 (located in the skid SALW-FQIT-6001F SUPERNATANT VALVE enclosure, reference drawing H-2-85625 sheet 4).



TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

5.4.41.18 **REQUEST** electrician to **VERIFY** that there is **NO** power to the jet pump jumper heat trace by **VERIFYING** there is **NO** power to the heat trace terminals 10, 11, and 12 (located in the skid Interconnect Enclosure on the jumper controls terminal board, reference drawing H-2-85626 sheet 12).

5.4.42 **RESTART** the FGM system **BY PERFORMING** the follow:

5.4.42.1 **PRESS** the ALARM ACK (F1) button located on the MMI.

5.4.42.2 **PRESS** the START (F2) button located on the MMI.

5.4.42.3 **VERIFY** that the red light located on the MMI is **OFF**.

5.4.42.4 **VERIFY** that the white strobe light (on the FGM cabinet) is **OFF**.

5.4.42.5 **VERIFY** that the green light located on the MMI is **ON**.

5.4.42.6 **VERIFY** that the yellow light located on the MMI is **ON**.

5.4.42.7 **VERIFY** that the **MEASURED** LFL is **LESS THAN** 10%.

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TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.42.8 **VERIFY** that relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **ENERGIZED** (contacts closed).

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.42.9 **VERIFY** with a DMM that there is **POWER** to contacts IN 5 and OUT 5, located in the DATA 6 compartment of the PLC on the pumping skid.

- 5.4.43 **REPEAT** steps 5.4.41 through 5.4.42.9 four (4) more times **AND RECORD** the data as test 2 through test 5 in the table provided in step 5.4.41.3.

- 5.4.44 **AVERAGE** FGM system response times **AND RECORD** in the space provided in the table above.

- 5.4.45 **IF** the FGM system average response time is \geq thirty (30) seconds, **PERFORM** the following:

- 5.4.45.1 **DETERMINE** the cause of the abnormal FGM system response time.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

- 5.4.45.2 **LOG AND RECORD** the abnormal FGM system response time and the resolution on the OTP EXCEPTION LOG and OTP EXCEPTION RECORD respectively.
- 5.4.45.3 **IF REQUIRED, REPEAT** steps 5.4.41 through 5.4.44.
- 5.4.46 **ENSURE** that the Methane gas test bottle valve is **CLOSED**.
- 5.4.47 **DISCONNECT** the Methane test gas bottle from the TEE.
- 5.4.48 **REMOVE** the polyethylene line from the TEE **AND, RECONNECT** to port 1 of valve SV-1 (located in the FGM system's VCAB).
- 5.4.49 **ALLOW** the sample line to **CLEAR** by **WAITING** approximately seven (7) minutes before proceeding to the next step.
- 5.4.50 **UNSCREW AND DISCONNECT** the blue polyethylene line swagelock fitting connected to BHC-10 (located on the interior side bulkhead of the FGM VCAB).
- 5.4.51 **PLUG** the blue polyethylene swagelock fitting with thumb **WHILE SIMULTANEOUSLY STARTING** stopwatch.
- 5.4.52 **WHEN** horn **ANNUNCIATES, STOP** the stopwatch.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

5.4.53 WHEN horn ANNUNCIATES, OBSERVE the %LFL reading on the MMI.

5.4.54 VERIFY that the horn ANNUNCIATES.

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

5.4.55 RECORD the time, if relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is ENERGIZED or DE-ENERGIZED, and % LFL reading on the table below.

STOPWATCH TIME FROM STEP 5.4.52	
Contactor DMM READING	
MMI % LFL READING	

5.4.56 VERIFY that the white strobe light (on the FGM cabinet) is FLASHING.

5.4.57 VERIFY that the green light on the MMI is NOT ILLUMINATED.

5.4.58 VERIFY that the yellow light on the MMI is NOT ILLUMINATED.

5.4.59 VERIFY that the red light located on the MMI is FLASHING.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

- 5.4.60 **ACKNOWLEDGE** the horn by **PRESSING** the ALARM ACK (F1) button located on the MMI.
- 5.4.61 **VERIFY** that the MMI screen **ALTERNATELY DISPLAYS** "RESTRICTED FLOW ALM" and "FAULT HASN'T CLEARED".
- 5.4.62 **RECONNECT** the blue polyethylene line swagelock fitting to BHC-10 (located on the interior side bulkhead of the FGM VCAB).
- 5.4.63 **WAIT** for the MMI screen to **DISPLAY** "PRESS F1 TO STOP ALM".
- 5.4.64 **RESTART** the FGM system **BY PERFORMING** the following:
- 5.4.64.1 **PRESS** the ALARM ACK (F1) button located on the MMI.
- 5.4.64.2 **PRESS** the START (F2) button located on the MMI.
- 5.4.65 **VERIFY** that the red light located on the MMI is **OFF**.
- 5.4.66 **VERIFY** that the white strobe light located (on the FGM cabinet) is **OFF**.
- 5.4.67 **VERIFY** that the green light located on the MMI is **ON**.
- 5.4.68 **VERIFY** that the yellow light located on the MMI is **ON**.
- 5.4.69 **VERIFY** that the **MEASURED** LFL is **LESS THAN** 10%.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

5.4.70 **VERIFY** that relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **ENERGIZED** (contacts closed)

NOTE - The following steps (5.4.71 through 5.4.111) will test the LONG CONFIDENCE LOOP of the FGM system.

5.4.71 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **OFF**.

5.4.72 **CLOSE** the Methane calibration gas bottle valve.

5.4.73 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013P" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **ON**.

5.4.74 **ALLOW** approximately seven (7) minutes for the Flammable Gas sensor calibration red light to **CLEAR**.

5.4.75 **WHEN** "PRESS F2 TO START" is **DISPLAYED** on the MMI screen, **PRESS** the START (F2) button.

5.4.76 **WAIT APPROXIMATELY** thirty (30) seconds for the PLC to **DETERMINE** there is a Long Confidence Loop fault.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

- 5.4.77 VERIFY that the horn ANNUNCIATES.
- 5.4.78 VERIFY that the white strobe light (on the FGM cabinet) is FLASHING.
- 5.4.79 VERIFY that the green light on the MMI is NOT ILLUMINATED.
- 5.4.80 VERIFY that the yellow light is NOT ILLUMINATED.
- 5.4.81 VERIFY that the red light located on the MMI is FLASHING.
- 5.4.82 VERIFY that the MMI screen DISPLAYS "LONG LOOP FAILED".
- 5.4.83 ACKNOWLEDGE the horn by PRESSING the ALARM ACK button located on the MMI.

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.84 VERIFY that relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is DE-ENERGIZED (contacts open)

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.85 **VERIFY** with a DMM that there is **NO POWER** to contacts IN 5 and OUT 5, located in the DATA 6 compartment of the PLC on the pumping skid.
- 5.4.86 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **OFF**.
- 5.4.87 **OPEN** the Methane calibration gas bottle valve.
- 5.4.88 **POSITION** "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to **ON**.
- 5.4.89 **ALLOW** approximately seven (7) minutes for the Flammable Gas sensor calibration red light to **CLEAR**.
- 5.4.90 **VERIFY** that the FGM system is **FUNCTIONAL BY OBSERVING** that the FGM system MMI screen **DISPLAYS** "PRESS F2 TO START".
- 5.4.91 **PRESS** the START (F2) button.
- 5.4.92 **VERIFY** that the FGM system MMI green and yellow indicating lights are **ILLUMINATED**.
- 5.4.93 **VERIFY** that the **MEASURED LFL** is **LESS THAN** 10%.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

- 5.4.94 CLOSE the Methane calibration gas bottle valve.
- 5.4.95 WAIT APPROXIMATELY thirty (30) seconds for the PLC to DETERMINE there is a Long Confidence Loop fault.
- 5.4.96 VERIFY that the horn ANNUNCIATES.
- 5.4.97 VERIFY that the white strobe light (on the FGM cabinet) is FLASHING.
- 5.4.98 VERIFY that the green light on the MMI is NOT ILLUMINATED.
- 5.4.99 VERIFY that the yellow light on the MMI is NOT ILLUMINATED.
- 5.4.100 VERIFY that the red light located on the MMI is FLASHING.
- 5.4.101 VERIFY that the MMI screen DISPLAYS "LONG LOOP FAILED".
- 5.4.102 ACKNOWLEDGE the horn by PRESSING the ALARM ACK (F1) button located on the MMI.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.103 **VERIFY** that relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is **DE-ENERGIZED** (contacts open).

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

- 5.4.104 **VERIFY** with a DMM that there is **NO POWER** to contacts IN 5 and OUT 5, located in the DATA 6 compartment of the PLC on the pumping skid.
- 5.4.105 **OPEN** the Methane calibration gas bottle valve.
- 5.4.106 **RESTART** the FGM system **BY PERFORMING** the following:
- 5.4.106.1 **PRESS** the ALARM ACK (F1) button located on the MMI.
- 5.4.106.2 **PRESS** the START (F2) button located on the MMI.
- 5.4.107 **VERIFY** that the red light located on the MMI is **OFF**.
- 5.4.108 **VERIFY** that the green light located on the MMI is **ON**.
- 5.4.109 **VERIFY** that the yellow light located on the MMI is **ON**.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

5.4.110 VERIFY that the MEASURED LFL is LESS THAN 10%.

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

5.4.111 VERIFY that relay GMS-1 (located in the LEAK DETECTION/HEAT TRACE CONTROL PANEL SALW-PNL-6004F on the skid) is ENERGIZED (contacts closed).

WARNING

Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions. Comply with WHC-CM-1-10, WKS-15, ELECTRICAL WORK SAFETY.

5.4.112 VERIFY with a DMM that there is POWER to contacts IN 5 and OUT 5, located in the DATA 6 compartment of the PLC on the pumping skid.

5.4.113 PLACE a thermal measuring device NEAR the bimetallic thermocouple located in the PLC cabinet within the FGM ECAB.

5.4.114 DIRECT heat gun at the bimetallic temperature switch.

TANK FARM OPERATIONAL TEST PROCEDURE

5.4 FGM SYSTEM TEST (continued)

5.4.115 **OBSERVE** the thermal measuring device, **WHEN** approximately 130°F is **MEASURED** by the thermal measuring device, **REDIRECT** heat gun **AWAY** from the bimetallic temperature switch.

5.4.116 **OBSERVE** the thermal measuring device, **VERIFY** the ECAB fan **STARTS UP** when the measured temperature is 100 °F ± 30 °F.

5.4.117 **OBSERVE** the thermal measuring device, **VERIFY** the ECAB fan **SHUTS DOWN** when the measured temperature is ≤ 90 °F.

5.4.118 **REMOVE** the thermal measuring device from the bimetallic temperature switch.

5.4.119 Test Director **SHALL VERIFY** that section 5.4 is **COMPLETE** by **SIGNING** below.

Test Director Signature

Date

5.4.120 QC Inspector **SHALL VERIFY** that section 5.4 is **COMPLETE** by **SIGNING** below.

QC Inspector Signature

Date

TANK FARM OPERATIONAL TEST PROCEDURE

5.5 SHUTDOWN OF THE FGM SYSTEM

- 5.5.1 CLOSE the Methane calibration gas bottle valve.
- 5.5.2 POSITION "MAIN" circuit breaker #1 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.3 POSITION "MAIN" circuit breaker #3 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.4 POSITION "WEIGHT FACTOR INSTRUMENT ENCLOSURE" circuit breaker #2 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.5 POSITION "AIR COMPRESSOR CABINET HEATER 7 (1) RECEPTACLE" circuit breaker #4 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.6 POSITION "WATER TANK HEATER" circuit breaker #6 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.7 POSITION "INSTRUMENT ENCLOSURE" circuit breaker #7 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.8 POSITION "LEAK DETECTION/HEAT TRACE" circuit breaker #8 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.9 POSITION "HEAT TRACE FOR T-104" circuit breaker #9 (located on the skid in panelboard SALW-DP-6001F) to OFF.
- 5.5.10 POSITION "FLAMMABLE GAS MONITOR FOR T-104: SALW-PNL-6013F" circuit breaker #10 (located on the skid in panelboard SALW-DP-6001F) to OFF.

TANK FARM OPERATIONAL TEST PROCEDURE

5.5 SHUTDOWN OF THE FGM SYSTEM (continued)

- 5.5.11 POSITION the "MAIN" SALW-DS-6002F DISCONNECT SWITCH to OFF.
- 5.5.12 POSITION DISCONNECT SWITCH SALW-DS-6003F "TRANSFORMER T-1 PRIMARY SW 480 VAC" to OFF.
- 5.5.13 POSITION DISCONNECT SWITCH SALW-DS-6004F "INSTR AIR CPRSR 480 VAC" to OFF.
- 5.5.14 POSITION DISCONNECT SWITCH SALW-DS-6005F "SALT WELL PUMP 480 VAC" to OFF.
- 5.5.15 IF REQUIRED, DISCONNECT the vacuum pump from the compressed air supply.
- 5.5.16 REPLACE the Flammable Gas sensor cover.
- 5.5.17 Test Director SHALL VERIFY that section 5.5 is COMPLETE by SIGNING below.

Test Director Signature

Date

- 5.5.18 QC Inspector SHALL VERIFY that section 5.5 is COMPLETE by SIGNING below.

QC Inspector Signature

Date

TANK FARM OPERATIONAL TEST PROCEDURE

OTP EXCEPTION RECORD

This page may be reproduced as necessary.

OTP step number:	OTP Exception Log Number:
Description of Exception:	
Resolution of Exception:	
Date of Resolution:	
Test Director signature:	
Cognizant Engineer signature:	
Quality Assurance signature:	
Tank Farm Operations signature:	

TANK FARM OPERATIONAL TEST PROCEDURE

OTP ACCEPTANCE RECORD

This OTP has been completed and the results, including red-line changes, exceptions, and exception resolutions, have been reviewed for compliance with the intent of the Purpose (Section 1.0). The OTP results are accepted by the undersigned:

Cognizant Engineer

Date

Tank Farm Operations

Date

Safety

Date

Quality Control

Date

Test Director

Date