Testing of Liquid Detector (Liquid Level Element and Leak Detector/Level Probe Element)

Tank Farm Maintenance Procedure

MAINTENANCE

USQ # N/A-4

<table>
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<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
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<tr>
<td>L-1</td>
<td>10/22/2018</td>
<td>Maintenance Request</td>
<td>Updated sections 5.8 and 5.11. The changes provide clarification on and remove some steps that are not applicable to the specific leak detector in Section 5.11. Record Section Update.</td>
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<tr>
<td>K-2</td>
<td>11/10/2014</td>
<td>CHAMPS Removal</td>
<td>CHAMPS Removal</td>
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<td>K-1</td>
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<td>Maintenance request</td>
<td>Added “Level Probe” throughout the procedure. Corrected 702 AY/AZ OVERVIEW ID. Revised wording concerning alarm condition for clarity.</td>
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<td>K-0</td>
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<td>Periodic Review</td>
<td>Removed vague phrases, added mitigation steps for PPE and added clarification where applicable.</td>
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1.0  PURPOSE AND SCOPE

1.1  Purpose

The purpose of this procedure is to provide instructions for testing the electrode type Liquid Leak Detectors/Level Probes.

1.2  Scope

This procedure applies to testing electrode type Liquid Leak Detectors/Level Probes. There is no pit entry or detector removal from pit associated with this procedure.

2.0  INFORMATION

2.1  Terms and Definitions

- LED - Light Emitting Diode
- BOM - Bill of Materials

2.2  General Information

Steps in this procedure may require craft personnel to check position of relay contacts. The following method(s) may be used to verify contact status:

- Voltage checks (voltage is present in shutdown or alarm circuit)
- Resistance checks (voltage is not present in shutdown or alarm circuit)
- Visual inspection (contact status can clearly be verified).
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Compliance with DOE-0359, Hanford Site Electrical Safety Program is required when working with this procedure.

3.1.2 This test must be performed with the Liquid Level Element and Leak Detector/Level Probe Element systems energized. Voltages that are present range from 120 Volts to 240 Volts. Locks and tags are not required for testing per this procedure.

3.2 Radiation and Contamination Control

Work in radiological areas will be performed using a radiation work permit following review by Radiological Control per ALARA Work Planning procedure TFC-ESHQ-RP_RWP-C-03.

4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:

- Insulated test leads with approximately 2 watt 6-10 K Ohm resistor
- Insulated test leads with approximately 1 watt 800 Ohm resistor for annulus leak detector/level probes
- Insulated test leads with approximately 2 watt 5 K Ohm resistor
- Digital Multimeter
- Other tools, equipment and supplies as identified by Shift Manager/OE/FWS/User.

4.2 Performance Documents

The following documents may be needed to perform this procedure:

- 3-LDD-055, Troubleshooting and Repair of Liquid Detector (Liquid Level Element and Leak Detector Element)
- H-2-34965, Leak Detector Assembly Typical Details.
Testing of Liquid Detector (Liquid Level Element and Leak Detector/Level Probe Element)

4.3 Field Preparation

4.3.1 ENSURE system is not in an ALARM.

4.3.2 IF system is in an alarm condition, INFORM Operations and troubleshoot in accordance with 3-LDD-055.

4.3.2.1 IF troubleshooting/repair in accordance with 3-LDD-055 fails to clear system alarm condition, OBTAIN Shift Manager's concurrence AND INSTALL jumpers necessary to clear alarm for system testing.

4.3.3 IF Lifting Leads is required, DOCUMENT on the Work Record.

4.3.4 IF jumper is installed, VERIFY AND DOCUMENT on Craft Usage Log.

4.3.5 IF alarming condition cannot be cleared by jumpering, OBTAIN Shift Manager's permission to continue this procedure AND DOCUMENT exceptions on Data Sheet(s).

4.3.6 IF troubleshooting/repairs are needed at any point in this procedure, USE 3-LDD-055.

4.3.6.1 CONFIRM Bill of Materials (BOM) documentation has been placed in the work package before parts are replaced.

4.3.7 CHECK that maintenance activities performed since the last functional test have not affected the leak detector/level probe position.
5.0 PROCEDURE

NOTE - Section 5.1 does not need to be performed on Leak Detectors/Level Probes with a hold-in feature.

- Depending on the leak detector/level probe device being maintained, sections in this procedure may be worked in any logical order, concurrently or not at all.

5.1 Test Intrinsically Safe Leak Detectors/Level Probes at Local Station

5.1.1 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.1.1.1 to 5.1.1.4.

5.1.1.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.1.1.2 OPEN the door AND INSPECT for the following:
   - Loose connections
   - Signs of moisture and corrosion
   - Pitting
   - Signs of overheating
   - Condition of insulation
   - Condition of grounding conductors/straps
   - Wiring and components for damage or deterioration
   - Proper heater/air conditioner operation (if applicable).

5.1.1.3 RECORD any discrepancies on the Work Record.

5.1.1.4 CLOSE the detector station or enclosure door AND TIGHTEN the bolts.

NOTE - The intrinsically safe leak detector/level probe circuit is equipped with one push button and one three-position selector switch.

5.1.2 IF installed, CONFIRM power light in ON.
5.1 Test Intrinsically Safe Leak Detectors/Level Probes at Local Station (Cont.)

5.1.3 PUSH Beacon Test button.

5.1.3.1 CONFIRM light is working.

5.1.3.2 RELEASE Beacon Test button.

5.1.4 SET three-position selector switch to "Probe Test" position.

5.1.5 CONFIRM indicator light has been activated.

5.1.6 IF listed on Data Sheet, CONFIRM remote alarm.

5.1.7 IF configured, CONFIRM that listed interlocks have been activated correctly.

5.1.8 ROTATE three-position selector switch to "Fail" position.

5.1.9 CONFIRM contacts on LD2 change position by observing leak detector/level probe indicating light illuminates.

5.1.10 RECORD results on the Data Sheet(s).

5.1.11 RETURN switch to operate.

5.1.12 ENSURE system is back to normal and all alarms are cleared.
5.2 Test Intrinsically Safe Leak Detectors/Level Probes at Local Station with Hold-In Feature

5.2.1 IF inspecting leak detector/level probe enclosure, **PERFORM** Steps 5.2.1.1 to 5.2.1.4.

5.2.1.1 **LOOSEN** the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.2.1.2 **OPEN** the door **AND**

**INSPECT** for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation (if applicable).

5.2.1.3 **RECORD** any discrepancies on the Work Record.

5.2.1.4 **CLOSE** the detector station or enclosure door **AND**

**TIGHTEN** the bolts.

**NOTE** - The intrinsically safe leak detection circuit is equipped with a Beacon Test push button, a Reset button, and one three-position selector switch.

5.2.2 IF installed, **CONFIRM** power light is ON.

5.2.3 **PUSH** Beacon Test button.

5.2.4 **CONFIRM** strobe/indicator light is working.

5.2.5 **RELEASE** Beacon Test button.

**NOTE** - This is an indication type reading only.

5.2.6 **CONFIRM** resistance of resistor is between 6K and 11K ohms.
5.2 **Test Intrinsically Safe Leak Detectors/Level Probes at Local Station with Hold-In Feature (Cont.)**

**NOTE** - Steps (5.2.7 through 5.2.10) confirm LD1 operates independently of LD3. Holding reset button prevents LD3 from activating.

5.2.7 **PRESS AND HOLD** Reset push button while TURNING three-position selector switch to "Probe Test" position.

5.2.8 **CONFIRM** local strobe/indicator light has been activated.

5.2.9 **CONFIRM** the LED on LD-3 stays on.

5.2.10 **IF** listed on Data Sheet, **CONFIRM** remote alarm has been activated.

5.2.11 **IF** configured, **CONFIRM** that listed interlocks have been activated correctly.

5.2.12 **ALLOW** three-position selector switch to return to "OPERATE" position.

5.2.13 **PUSH** Reset push button.

5.2.14 **RECORD** results on the Data Sheet(s).

5.2.15 **RESET** active alarms.

5.2.16 **ENSURE** system is back to normal and all alarms are cleared.

5.2.17 **ROTATE AND HOLD** three position switch to "Fail" position.

5.2.18 **CONFIRM** contacts on LD2 and LD3 change position by observing local strobe/indicating light illuminates.

5.2.19 **CONFIRM** remote alarms and listed interlocks have activated.

5.2.20 **ALLOW** three-position selector switch to return to "Operate" position, resetting the system.

5.2.21 **RECORD** results on the Data Sheet(s).

5.2.22 **RESET** active alarms.

5.2.23 **ENSURE** system is back to normal and all alarms are cleared.
5.2 Test Intrinsically Safe Leak Detectors/Level Probes at Local Station with Hold-In Feature (Cont.)

5.2.24 **ROTATE** three position switch to probe test, **THEN** allow switch to return to operate position.

5.2.25 **CONFIRM** contact on LD2 and LD3 change position by observing local strobe/indicating light illuminates.

5.2.26 **RECORD** results on Data Sheet.

5.2.27 **PRESS** reset push button.

5.2.28 **RESET** active alarms.

5.2.29 **ENSURE** system is back to normal and all alarms have cleared.
5.3 Test Intrinsically Safe Leak Detectors/Level Probes at Local Station with Latch

5.3.1 IF inspecting leak detector/level probe enclosure, **PERFORM** Steps 5.3.1.1 to 5.3.1.4.

5.3.1.1 **LOOSEN** the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.3.1.2 **OPEN** the door **AND**

**INSPECT** for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation (if applicable).

5.3.1.3 **RECORD** any discrepancies on the Work Record.

5.3.1.4 **CLOSE** the detector station or enclosure door **AND**

**TIGHTEN** the bolts.

**NOTE** - Voltages on Stations are 110 VAC Input, and 24 VDC on the secondary of power supply.

5.3.2 **DON** appropriate PPE.

5.3.3 **PUSH** Lamp Test button.

5.3.4 **CONFIRM** light is working.

5.3.5 **RELEASE** Lamp Test button.
5.3 Test Intrinsically Safe Leak Detectors/Level Probes at Local Station with Latch (Cont.)

NOTE - This is an indication type reading only.

5.3.6 CONFIRM resistance of resistor is between 6 K and 10 K ohms.

5.3.7 ROTATE AND HOLD three-position selector switch to "Probe Test" position.

5.3.8 CONFIRM strobe light has been activated.

5.3.9 CONFIRM remote alarm, as noted on the Data Sheet(s), has been activated.

5.3.10 CONFIRM that listed interlocks have been activated correctly.

5.3.11 ALLOW three-position selector switch to return to "OPERATE" position.

5.3.12 ROTATE the "Reset" switch, resetting the system.

5.3.13 ROTATE AND HOLD three-position selector switch to "FAIL RELAY TEST" position.

5.3.14 CONFIRM relay contacts have changed position by observing local strobe light activates.

5.3.15 IF configured, CONFIRM remote alarm and listed interlocks have activated.

5.3.16 ALLOW three-position selector switch to return to "OPERATE" position, re-setting the system.

5.3.17 ROTATE the "RESET" Switch resetting the system.

5.3.18 RECORD results on the Data Sheet(s).

5.3.19 ENSURE system is back to normal and all alarms have cleared.
5.4 Test Induction Style Leak Detectors/Level Probes

5.4.1 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.4.1.1 to 5.4.1.4.

5.4.1.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.4.1.2 OPEN the door AND INSPECT for the following:

- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.4.1.3 RECORD any discrepancies on the Work Record.

5.4.1.4 CLOSE the detector station or enclosure door AND TIGHTEN the bolts.

5.4.2 IF installed, CONFIRM power light in ON.
Testing of Liquid Detector (Liquid Level Element and Leak Detector/Level Probe Element)

5.4 Test Induction Style Leak Detectors/Level Probes (Cont.)

5.4.3 DON appropriate PPE.

5.4.4 SHORT the secondary side of induction relay using the insulated test leads with 6-10K Ohm resistor,

OR

PRESS the TEST button

OR

SET the three-position selector switch to the “TEST” position, as applicable.

5.4.5 REMOVE insulated test leads from on the induction relay,

OR

RELEASE the “TEST” button,

OR

SET the three-position selector switch to the “ON” position as applicable

AND

CONFIRM the induction relay has latched.
5.4 Test Induction Style Leak Detectors (Cont.)

5.4.6 CONFIRM local indicator light has been activated.

5.4.7 CONFIRM remote alarm, as noted on the Data Sheet(s), has been activated.

5.4.8 CONFIRM interlocks listed on the Data Sheet(s) have been activated correctly.

5.4.9 RECORD results on the Data Sheet(s).

5.4.10 ACTUATE reset button /switch to return system to normal.

5.4.11 ACKNOWLEDGE/RESET remote alarms.

5.4.12 ACTUATE reset button / switch again on induction relay cabinet control panel to simulate loss of power/failed.

5.4.13 CONFIRM contacts on LD2 change positions by observing that local indicating light illuminates.

5.4.14 CONFIRM the remote alarm, as noted on the Data Sheet(s), has been activated.

5.4.15 CONFIRM the interlocks, listed on the Data Sheets(s), have been activated correctly.

5.4.16 RETURN reset button / switch to “ON” position AND ENSURE indicator alarm condition has cleared.

5.4.17 ENSURE Data Sheet(s) is/are complete.

5.4.18 ACKNOWLEDGE/RESET remote alarms.
5.5 Test Induction Style Liquid Low Level Element

5.5.1 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.5.1.1 to 5.5.1.4.

5.5.1.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.5.1.2 OPEN the door AND INSPECT for the following:

- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.5.1.3 RECORD any discrepancies on the Work Record.

5.5.1.4 CLOSE the detector station or enclosure door AND TIGHTEN the bolts.
5.5 Test Induction Style Liquid Low Level Element (Cont.)

5.5.2 DON appropriate PPE.

5.5.3 REMOVE one of the probe leads from its terminal on the secondary side of the induction relay.

OR

5.5.4 CONFIRM indicator light has been activated, if applicable.

5.5.5 CONFIRM remote alarm, as noted on the Data Sheet(s), has been activated, if applicable.

5.5.6 CONFIRM interlocks listed on the Data Sheet(s) have been activated correctly.

5.5.7 RECORD results on the Data Sheet(s).

5.5.8 REPLACE probe lead to terminal on secondary side of the induction relay.

OR

5.5.9 RETURN test button to normal position.

5.5.10 ACTUATE reset button on induction relay cabinet located on the side of the control panel, to simulate loss of power, if applicable.

5.5.11 RETURN reset button to normal position.

5.5.12 ENSURE indicator alarm condition has cleared.

5.5.13 ENSURE Data Sheet(s) is/are complete.
5.6 Test High Level Probes (2-Wire)

5.6.1 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.6.1.1 to 5.6.1.4.

5.6.1.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.6.1.2 OPEN the door AND

INSPECT for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.6.1.3 RECORD any discrepancies on the Work Record.

5.6.1.4 CLOSE the detector station or enclosure door AND

TIGHTEN the bolts.

5.6.2 DON appropriate PPE in accordance with TFC-ESHQ-S_IS-C-02.

5.6.3 SHORT the probe terminals using the insulated test leads with 6-10K Ohm resistor.

5.6.4 CONFIRM annunciator window activates.

5.6.5 RECORD results on the Data Sheet(s).

5.6.6 REMOVE insulated test leads from terminals.

5.6.7 ENSURE annunciator window has cleared.

5.6.8 ENSURE Data Sheet(s) is/are complete.
5.7 Test Intrinsically Safe Level Probes and Leak Detectors/Level Probes with Rotary Switch at Local Station

5.7.1 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.7.1.1 to 5.7.1.4.

5.7.1.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.7.1.2 OPEN the door AND INSPECT for the following:
   • Loose connections
   • Signs of moisture and corrosion
   • Pitting
   • Signs of overheating
   • Condition of insulation
   • Condition of grounding conductors/straps
   • Wiring and components for damage or deterioration
   • Proper heater/air conditioner operation.

5.7.1.3 RECORD any discrepancies on the Work Record.

5.7.1.4 CLOSE the detector station or enclosure door AND TIGHTEN the bolts.

NOTE - The term Clear refers to the Alarms/Window Annunciators and the term Closed refers to the relay position.

5.7.2 CHECK Alarms/Window Annunciators/relay listed on Data Sheet are Clear/Closed.

5.7.3 IF an alarm is initially activated, CONTACT Shift Manager for resolution.

NOTE - The Element Selector Switch refers to the applicable Leak Detector/Level Probe Element or the Liquid Level Probe Element.

NOTE - This is an indication type reading only.

5.7.4 CHECK resistance of 7 K ohm test resistor is between 6- and 8 K ohms. Each Element Selector Switch has one resistor.
5.7 Test Intrinsically Safe Level Probes and Leak Detectors/Level Probes with Rotary Switch at Local Station (Cont.)

NOTE - If the Element Selector Switch position is other than "NORMAL" notify Shift Manager.

5.7.5 CHECK that Element Selector Switch is in the "NORMAL" position.

5.7.6 MOVE Element Selector Switch to the element to be verified.

5.7.7 PRESS AND HOLD Reset Button while TURNING Test Selector Switch to "PROBE TEST" position.

5.7.8 CONFIRM Alarms/Window Annunciators/relays listed on the Data Sheet properly respond.

5.7.9 RECORD results on the Data Sheet.

5.7.10 ALLOW Test Selector Switch to return to "OPERATE" AND THEN RELEASE Reset Button to return to normal (in this order).

5.7.11 CHECK Alarms/Window Annunciators/relays listed on Data Sheet are Clear/Closed.

5.7.12 TURN AND HOLD Test Selector Switch to "FAIL" position.

5.7.13 CONFIRM Alarms/Window Annunciator/relays listed on Data Sheet responds properly.

5.7.14 RECORD results on the Data Sheet.

5.7.15 ALLOW Test Selector Switch to return to "OPERATE".

5.7.16 CHECK Alarms/Window Annunciators/relays listed on Data Sheet are Clear/Closed.

5.7.17 RETURN Element Selector Switch to its "NORMAL" position upon completion of last Element verification.

5.7.18 ENSURE Data Sheet(s) is/are complete.
5.8  MCS System Power-Up / Log-On

5.8.1  IF MCS HMI is not already powered ON, POWER UP the HMI by performing the following:

5.8.1.1  PUSH the computer power button ON.

5.8.1.2  CONFIRM the computer starts by observing the Windows screen appearing.

5.8.1.3  PRESS Ctrl-Alt-Del keys at the same time to get to the Windows login screen.

LOG ON to MCS

NOTE -  The password levels are:

- HPT
- Operator (NCO)
- Transfer Operator
- Power Operator
- Technician (Maintenance craft)
- Supervisor (OE, Shift Manager)
- Engineer (Administrator).

- It is the responsibility of each Operations Engineer, and Shift Manager to ensure distribution of a password is only to their respective function. The passwords are to be controlled with confidentiality consistent with any computer system password.

- If the password provided to the user does not allow the individual to perform the function needed, only the Operations Engineer or Shift Manager may enter the supervisory password to allow the required function.

- The Operations Engineer or Shift Manager who enters the supervisory password will then notify the TFMCS System Administrator to determine if a change in user functions will be necessary.

- It may be required to press the “Switch User” button if the username displayed is not the username desired.

5.8.2  LOG-ON as LD_Technician, or if the correct user name is already being displayed at the login screen, ENTER the password supplied by Shift Manager or TFMCS administrator.
Testing of Liquid Detector (Liquid Level Element and Leak Detector/Level Probe Element)

5.8  MCS System Power-Up / Log-On (Cont.)

5.8.3  IF username is not the required username, **PERFORM** the following:

5.8.3.1  **CLICK** on the “Switch User” button.

5.8.3.2  **CLICK** “other user”.

5.8.3.3  **ENTER** the username and password supplied by Shift Manager or TFMCS administrator.

5.8.4  **ENSURE** the MCS software fully loads by confirming the following:

- System reaches the Tank Farm Monitoring and Control System Overview screen
- The user login is displayed in the lower right part of the screen.

**GRAPHICS SCREEN**

**NOTE** - Steps 5.8.5 and 5.8.7 may be performed in any logical order and may be repeated as often as necessary during the performance of this Section.

- If necessary, troubleshooting may be performed per procedure 3-LDD-055.

5.8.5  **IF** performing Sections 5.9, 5.10, or 5.11, **ACCESS** the “GRAPHICS SCREEN” on the HMI as follows:

5.8.5.1  **ON** the “Tank Farm Monitoring and Control System Screen”, **LEFT CLICK** on the Farm and then the Tank and/or Pit where the leak detector/level probe to be tested is located.

**NOTE** - When a leak detector/level probe is in alarm, the green circle representing the leak detector/level probe will turn red in color and be flashing with the words ALARM or FAIL inside the circle.

- When a leak detector/level probe has alarms inhibited, the circle will be black with white “OOS” text inside it.

5.8.5.2  **CONFIRM** leak detector/level probe to be tested is displayed as a green circle with black text which displays “NORMAL” in the leak detector/level probe circle.
5.8 MCS System Power-Up / Log-On (Cont.)

5.8.6 IF performing Sections 5.12 or 5.13, PERFORM the following.

5.8.6.1 AT the Tank Farm MCS overview, SELECT 702 AY/AZ OVERVIEW button,

OR

SELECT 702 AZ Exhauster Icon.

NOTE - The NAVIGATE button will return to the page with the list of graphics.

5.8.6.2 SELECT the button for the graphic identified on the Data Sheet.

ALARM LIST

5.8.7 ACCESS the “ALARM LIST” on the HMI as follows:

5.8.7.1 RIGHT CLICK the Leak Detector/Level Probe graphic symbol to be tested which will show a drop down menu.

5.8.7.2 LEFT CLICK on the “Alarm List”.

NOTE - If the graphics screen is solid green for a given leak detector/level probe, no alarm will be displayed on the alarm list corresponding to that leak detector/level probe (see leak detector/level probe datasheet for alarm designations). If the graphics screen is flashing green, one or both of the alarms listed on the datasheet will be displayed with a “RTN” under the “State” column on the alarm list. If the graphics screen is solid red, one or both of the alarms listed on the datasheet will be displayed on the alarm list with “ACT” displayed under the “State” column of the alarm list.

5.8.7.3 ENSURE alarms listed on Data Sheet are not active.

5.8.7.4 IF system is in an alarm condition, INFORM OE

5.8.7.5 IF alarming condition cannot be cleared, OBTAIN OE permission to continue this procedure (referencing supplied Data Sheet).

5.8.7.6 IF work is complete, LOG OFF by pressing “CTRL+ALT+DELETE” on keyboard AND

LEFT CLICK “LOG OFF” on the screen.
5.9 Monitoring and Control System (MCS) Leak Detector/Level Probes

Leak Detector/Level Probe Station/Enclosure Inspection

NOTE - The inspection portion is required to be done only once for each leak detector/level probe station or enclosure.

5.9.1 IF not already logged in, INITIATE login as LD_Technician, using password provided by the HMI System Administrator.

5.9.2 IF inspecting co-located or leak detector/level probe enclosure, PERFORM Steps 5.9.3 to 5.9.6 only ONCE.

5.9.3 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.9.4 OPEN the door AND INSPECT for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.9.5 RECORD any discrepancies on the Work Record.

5.9.6 CLOSE the detector station or enclosure door AND TIGHTEN the bolts.
5.9 Monitoring and Control System (MCS) Leak Detector/Level Probes (Cont.)

Leak Detector/Level Probe Testing

5.9.7 CONFIRM Alarm/Equipment Status initial conditions are in the status listed in the “Initial Condition” of the data sheet for the leak detector/level probe under test.

5.9.8 IF an alarm is initially activated or has alarms inhibited, CONTACT FWS for resolution.

5.9.9 LEFT CLICK the leak detector/level probe circle which will pull up the leak detector/level probe faceplate.

5.9.10 CONFIRM the leak detector/level probe identified on the faceplate matches the leak detector to be tested on the data sheet.

5.9.11 SELECT the ”Test” faceplate tab, which is the tab farthest to the right.

5.9.12 IF testing AZ Valve Pit leak detectors/level probes, PRESS AND HOLD RESET pushbutton at the local leak detector/level probe station.

5.9.13 LEFT CLICK the “Press to Leak Test” pushbutton THEN CLICK “APPLY BUTTON” on the faceplate.

NOTE - Alarm will take 10 seconds to activate.

5.9.14 CONFIRM Alarm/Equipment Status Indicators are in the status listing on the data sheet for “Simulating Leak”.

NOTE - Upon completion of steps 5.9.15 and 5.9.20, the alarm being tested should indicate inactive [RTN] by flashing green on the graphics screen. Once the alarm cleared condition is verified the alarm can be acknowledged by the Operator at the Operator’s discretion.

5.9.15 LEFT CLICK the “Reset Leak Test” pushbutton AND CLICK “APPLY BUTTON” button on the faceplate.
5.9 Monitoring and Control System (MCS) Leak Detector/Level Probes (Cont.)

5.9.16 IF testing AZ Valve Pit leak detectors/level probes, RELEASE RESET pushbutton at the local leak detector/Level Probe station.

5.9.17 CONFIRM Alarm/Equipment Status Indicators are in the status listing on the data sheet, step “Reset Leak Test”.

5.9.18 LEFT CLICK the “Press to Fail Test” pushbutton THEN CLICK “APPLY BUTTON” on the faceplate.

NOTE - Alarm will take 10 seconds to activate.

5.9.19 CONFIRM Alarm/Equipment Status Indicators are in the status listing on the data sheet for “In Fail Test”.

5.9.20 LEFT CLICK the “Reset Fail Test” pushbutton THEN CLICK “APPLY BUTTON” on the faceplate.

5.9.21 CONFIRM Alarm/Equipment Status Indicators are in the status listing on the data sheet step “Reset Fail Test”.

5.9.22 INITIAL/DATE on the data sheet to indicate the preceding testing steps passed.

5.9.23 LEFT CLICK on the X button in the upper right corner to CLOSE the leak detector/level probe and alarm faceplates.

5.9.24 IF testing is completed, log off the LD_Technician account.
Testing of Liquid Detector (Liquid Level Element and Leak Detector/Level Probe Element)

5.10 Monitoring & Control System (MCS) Intrinsically Safe Ganged Relay Leak Detectors/Level Probes

5.10.1 LOG-ON per Section 5.8.

5.10.2 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.10.2.1 to 5.10.2.4.

5.10.2.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.10.2.2 OPEN the door AND

INSPECT for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.10.2.3 RECORD any discrepancies on the Work Record.

5.10.2.4 CLOSE the detector station or enclosure door AND TIGHTEN the bolts.

5.10.3 PRESS AND HOLD Reset Button AND

TURN Selector Switch to “Probe Test”.

5.10.4 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “Simulating Leak”.

NOTE - Alarm will take 10 seconds to activate at the MCS.

5.10.5 IF the Alarm/Equipment Status Indicators cannot be verified according to the line “Simulating Leak” on the datasheet, RECORD condition on Comment Page AND

CONTINUE functionally checking leak detector/level probe loops according to the datasheet.
5.10 Monitoring & Control System (MCS) Intrinsically Safe Ganged Relay Leak Detectors/Level Probes (Cont.)

5.10.6 ALLOW Selector Switch to return to “OPERATE AND
RELEASE Reset Button to return to normal (in this order).

5.10.7 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “Reset Leak Test”.

5.10.8 TURN AND HOLD Selector Switch to “FAIL” position.

5.10.9 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “Reset Fail Test”.

NOTE - Alarm will take 10 seconds to activate at the MCS.

5.10.10 IF the Alarm/Equipment Status Indicators cannot be verified according to the line “Reset Fail Test” on the datasheet, RECORD condition on comment page and continue functionally checking leak detector/level probe loops according to the datasheet.

5.10.11 ALLOW Selector Switch to return to “OPERATE”.

5.10.12 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “Reset Fail Test”.
5.11 AP Flush Pit Leak Detector/Level Probe Testing (APFP-WT-LDE-701)

NOTE- Leak Detector/Level Probe Elements for the Flush Pit is monitored via one Leak Detector/Level Probe Element Selector Switch.

5.11.1 **LOG-ON** per Section 5.8.

5.11.2 **IF** inspecting leak detector/level probe enclosure, **PERFORM** Steps 5.11.2.1 to 5.11.2.3.

5.11.2.1 **OPEN** the Intrinsically Safe LDK Relay Enclosure door **AND INSPECT** for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.11.2.2 **RECORD** any discrepancies on the Work Record.

5.11.2.3 **CLOSE** the Intrinsically Safe LDK Relay Enclosure door.

5.11.3 **CHECK** Leak-Detector-Element Selector Switch S2A is in “NORMAL” position

5.11.3.1 **IF** Leak-Detector-Element Selector Switch is not in “NORMAL” position, **CONTACT** the FWS prior to changing selector switch position.

5.11.4 **CONFIRM** Alarm/Equipment Status Indicators are in the status listed on the datasheet line “Initial Condition”.

5.11.5 **MOVE** Leak-Detector-Element Selector Switch S2A located on the Intrinsically Safe LDK Relay Enclosure to the element to be verified.
Testing of Liquid Detector (Liquid Level Element and Leak Detector/Level Probe Element)

5.11 AP Flush Pit Leak Detector/Level Probe Testing (Cont.)

NOTE 1 – An audible alarm is expected in the 241-AP-271 Instrument Building on the “Auxiliary” panel, Window 6 when performing “Probe Test”. The alarm may be silenced by pressing the red silence push button on the HVAC panel.

NOTE 2 – The probe test requires pressing and holding the “Reset” push button until alarms on the instrument panel and HMI are checked and acknowledged as directed. The selector switch and reset button are not released until directed to do so by this procedure. The test selector switch must be released BEFORE releasing the “reset” push button.

5.11.6 PRESS AND HOLD Reset Pushbutton WHILE TURNING Test Selector Switch to “PROBE TEST” position.

NOTE - Alarm will take 10 seconds to activate at the MCS.

5.11.7 IF alarm is received at the 241-AP-271 Instrument Building on the “Auxiliary” panel, Window 6, ACKNOWLEDGE alarm by pressing the “ACK” button on the Auxiliary panel.

5.11.8 CONFIRM Alarm/Equipment Status Indicators are in the status listed in the datasheet line “PROBE TEST” position.

5.11.9 REPORT any other unexpected alarms.

5.11.10 ALLOW Test Selector Switch to return to “OPERATE” AND RELEASE Reset Pushbutton to return to normal (in this order).

5.11.11 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “RESET”.

NOTE 1 - An audible alarm is expected in the 241-AP-271 Instrument Building on the “Auxiliary” panel, Window 6 and 16. The alarm may be silenced by pressing the red silence push button on the HVAC panel.

NOTE 2 – The fail test requires turning and holding the test selector switch until alarms on the instrument panel and HMI are checked and acknowledged as directed. The selector switch is not released until directed to do so by this procedure.

5.11.12 TURN AND HOLD Test Selector Switch to “FAIL” position.
5.11 AP Flush Pit Leak Detector/Level Probe Testing (Cont.)

NOTE - Alarm will take 10 seconds to activate at the MCS.

5.11.13 IF alarm is received at the 241-AP-271 Instrument Building on the “Auxiliary” panel, Window 6 and 16, ACKNOWLEDGE alarm by pressing the “ACK” button on the Auxiliary panel.

5.11.14 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “FAIL”

5.11.15 REPORT any other unexpected alarms.

5.11.16 ALLOW Test Selector Switch to return to “OPERATE”.

5.11.17 CONFIRM Alarm/Equipment Status Indicators are in the status listed on the datasheet line “RESET”.

5.11.18 RETURN Leak-Detector-Element Switch to the “Normal” position.
5.12 Fail Safe Leak Detectors/Level Probes A (AY/AZ Primary/Recirc Vent)

5.12.1 IF inspecting leak detector/level probe enclosure, PERFORM Steps 5.12.1.1 to 5.12.1.3.

5.12.1.1 LOOSEN the bolts on the leak detector/level probe station or enclosure door for the equipment listed on the Data Sheet.

5.12.1.2 OPEN the door AND INSPECT for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration
- Proper heater/air conditioner operation.

5.12.1.3 RECORD any discrepancies on the Work Record.

NOTE - The term Clear refers to the Alarms both local and remote Graphic User Annunciator.

Special Instruction

Not all leak detectors/level probes that will be tested in this section will have a push-to-test button. If this is the case, then skip "Open Circuit" test step and proceed to the next step.

A shorting jumper will not be necessary to test leak detector/level probe LY-AZPCSP-1B. This step shall be skipped when testing the leak detector/level probe.

5.12.2 CHECK that leak detector/level probe Alarms listed on Data Sheet are clear.

5.12.3 IF an alarm is initially activated, CONTACT Operations for resolution.

Special Instruction

It may be necessary to remove probe and swab out the riser to clear leak detector/level probe alarms.

5.12.4 PUSH the "TEST" button to "OPEN CIRCUIT" test the leak detector/level probe.
5.12 Fail Safe Leak Detectors/Level Probes A (AY/AZ Primary/Recirc Vent) (Cont.)

5.12.5 ENSURE AND RECORD local and remote alarms have been activated according to Data Sheet.

5.12.6 RELEASE the "TEST" button.

5.12.7 ENSURE AND RECORD that all alarms condition have cleared according to Data Sheet.

5.12.8 IF required by the Data Sheet, SHORT the probe terminals (Terminals 14 and 15) using an insulated test lead jumper with a 2 watt 5 K ohm resistor.

5.12.9 ENSURE AND RECORD local and remote alarms have been activated according to Data Sheet.

5.12.10 REMOVE the insulated test lead jumper.

5.12.11 ENSURE AND RECORD that all alarms condition have cleared according to Data Sheet.

5.12.12 ENSURE the Data Sheet(s) is/are complete.

5.12.13 GO TO Section 5.8 MCS System Power-Up / Log-On
5.13 Test 241-AZ-301 Condensate System Leak Detectors/Level Probes

Test Leak Detector/Level Probe AZ301-COND-LDE-130

5.13.1 LOOSEN bolts on leak detector/level probe enclosure door.

5.13.2 OPEN door AND

INSPECT for the following:
- Loose connections
- Signs of moisture and corrosion
- Pitting
- Signs of overheating
- Condition of insulation
- Condition of grounding conductors/straps
- Wiring and components for damage or deterioration.

5.13.3 RECORD any discrepancies on Comment Section below Data Table.

5.13.4 CLOSE detector enclosure door AND

TIGHTEN bolts.

5.13.5 CHECK Alarm/Equipment Status column on line “Initial Conditions” are in the status listed in Data Sheet.

5.13.6 PUSH “LDK-130 TEST PUSHBUTTON” AND

RELEASE.

5.13.7 CONFIRM Alarm/Equipment Status Indicators are in the status listed in the Data Sheet, line “Simulate a Leak”.

5.13.8 PUSH “LDK-130 RESET PUSHBUTTON” AND

RELEASE.
5.13 Test 241-AZ-301 Condensate System Leak Detectors/Level Probes (Cont.)

5.13.9 **CONFIRM** Alarm/Equipment Status Indicators are in the status listed in the attached Data Sheet, line "Reset 1".

5.13.10 **PUSH** LD3 TEST “LOSS OF POWER TEST PUSHBUTTON” **AND** RELEASE.

5.13.11 **CONFIRM** Alarm/Equipment Status Indicators are in the status listed in Data Sheet, line “LD3 Test loss of Power”

5.13.12 **PUSH** “LDK-130 RESET PUSHBUTTON” **AND** RELEASE.

5.13.13 **CONFIRM** Alarm/Equipment Status Indicators are in the status listed in Data Sheet, line "Reset 2".

Test Leak Detector/Level Probe AZ301-COND-LDE-131, 132, 133, and 134

5.13.14 **PUSH** “TEST PUSHBUTTON” for LDK-131, LDK-132, LDK-133 or LDK-134 as applicable **AND** RELEASE.

5.13.15 **CONFIRM** Alarm/Equipment Status Indicators are in the status listed in the Data Sheet, line “Simulate a Leak”.

5.13.16 **PUSH** “RESET PUSHBUTTON” for LDK-131, LDK-132, LDK-133 or LDK-134 as applicable **AND** RELEASE.

5.13.17 **CONFIRM** Alarm/Equipment Status Indicators are in the status listed in the attached Data Sheet, line "Reset".

5.13.18 **CONFIRM** the Data Sheet is complete.

5.13.19 **REPEAT** Steps 5.13.14 through 5.13.18 for all four LDEs.
5.14 Restoration

5.14.1 IF jumper was installed to perform the test, REMOVE jumper AND DOCUMENT (signature and date) on Craft Usage Log.

5.14.2 ENSURE Test Equipment has been disconnected and removed.

5.14.3 ENSURE Test Equipment information and calibration status are recorded on Data Sheet.

5.14.4 ENSURE equipment system restoration by observing indications are consistent with expected conditions.

5.14.5 NOTIFY Operations that testing is complete and system may be returned to desired configuration.

5.15 Acceptance Criteria

Acceptance Criteria has been met when Steps in this procedure have been satisfactorily performed and As-Left values meet the specifications and tolerance(s) per the Data Sheet.

5.16 Review

5.16.1 INFORM FWS test is complete.

5.16.2 FWS REVIEW AND ENSURE the following:
  • Completed Data Sheets meet the acceptance criteria.
  • Comments sections are filled out appropriately.
  • Work requests needed as a result of this procedure are identified and generated.
  • Work request number(s) of any work documents generated as a result of this procedure, are recorded in the Comments/Remarks section of the Data Sheet.

5.17 Records

This procedure is performed within a work package, as such, the procedure in its entirety will be maintained as a record per the Work Control process.