Calibrate Pressure or Vacuum Switches

Tank Farm Maintenance Procedure

MAINTENANCE

USQ # Routine Maintenance

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<th>Rev-Mod</th>
<th>Release Date</th>
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<th>Summary of Changes</th>
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<td>G-3</td>
<td>07/12/2018</td>
<td>Maintenance Request</td>
<td>Added note to Calibration Instructions.</td>
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<td>G-2</td>
<td>06/06/2018</td>
<td>Engineering Request</td>
<td>Changes to address druck pressure calibrator and indicator usage. Added figures and attachments.</td>
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<tr>
<td>G-1</td>
<td>06/14/2017</td>
<td>Maintenance Request / Process</td>
<td>Added information to Section 4.1, Added New Section 4.2 Performance Documents. Added new Steps and Sub Steps to Section 5.1. Added &quot;Attachment 1 Water Trap/Pressure M&amp;TE&quot;. Added &quot;Figure 1 How the Trap Works&quot;.</td>
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<td>G-0</td>
<td>03/22/2016</td>
<td>Periodic Review</td>
<td>Struck Warning above Step 3.1.1, Warning Box above Step 5.1.4, Struck Step 5.1.4, 5.1.7,4. Reword Steps 4.2.1, 4.2.2, 5.1.3, and 5.1.5.3.</td>
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<td>F-5</td>
<td>11/18/2014</td>
<td>CHAMPS Removal</td>
<td>Removed reference to CHAMPS, updated records statements and removed next periodic review date.</td>
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Calibrate Pressure or Vacuum Switches

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides a safe, uniform method of calibrating pressure or vacuum switches.

1.2 Scope

This procedure applies to calibrating pressure or vacuum switches.

2.0 INFORMATION

NONE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 Use safe electrical practices as outlined in DOE–0359, Hanford Site Electrical Safety Program, when connecting and disconnecting from terminal strips, or working in the vicinity of energized electrical circuits.

3.1.2 If a Lock and Tag or Authorized Worker Lockout/Tagout is required during the performance of this procedure, comply with DOE-0336, Hanford Site Lockout/Tagout Procedure.

3.2 Radiation and Contamination Control

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

3.2.2 If calibration is on a contaminated or potentially contaminated system, follow the Calibration Instructions. (Attachment 2)
4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies may be needed to perform this procedure:

- Digital Manometer, or equivalent
- Digital or analog Multimeter (DMM)
- Vacuum or pressure source
- Water trap device Figure 1.

4.2 Performance Documents

The following documents may be required during the performance of this procedure.

- Radiological survey plan
- Waste planning checklist
- Pressure M&TE vendor manual.

4.3 Field Preparation

4.3.1 IF lock and tag is required during the performance of this procedure, comply with the DOE-0336, Hanford Site Lockout/Tagout Procedure.

4.3.2 IF an Energized Electrical Work Permit is required during the performance of this procedure, comply with the DOE–0359, Hanford Site Electrical Safety Program.

4.3.3 REQUEST Operations configure system to allow for performance of this procedure.
5.0 PROCEDURE

NOTE - Calibration may be performed in-place or instrument may be returned to the shop for bench calibration.

5.1 Calibrate Pressure or Vacuum Switches

5.1.1 IF performing this procedure on a system that has the potential for free liquids or moisture to enter the Pressure M&TE, USE a water trap device.

5.1.2 ENSURE the Water Trap is installed in a vertical position to operate correctly Figure 1.

5.1.2.1 IF liquids or moisture gets into the Water Trap or Pressure M&TE REFER to Attachment 1.

5.1.2.2 IF calibration is on a contaminated or potentially contaminated system, FOLLOW Calibration Instructions. (Attachment 2)

5.1.3 IF pressure or vacuum switch is in service, REMOVE the pressure or vacuum switch from service.

5.1.4 IF potential for radiological contamination exists, PERFORM equipment survey prior to beginning maintenance or removal of equipment or component from installed location.

5.1.5 REMOVE calibration caps or signal lines to pressure or vacuum switch for testing.

5.1.6 VERIFY lockout/tagout and overlocking requirements have been satisfied per DOE-0336, Hanford Site Lockout/Tagout Procedure.

5.1.7 CONFIRM contact actuation by one (1) of the following methods:

5.1.7.1 LIFT leads then connect Multimeter across contacts at switch.

5.1.7.2 LIFT leads at the nearest junction AND

CONNECT Multimeter across contacts.

5.1.7.3 CONNECT Multimeter across contacts of pressure or vacuum switch.
5.1 Calibrate Pressure or Vacuum Switches (Cont.)

NOTE - High pressure alarms are approached with increasing pressure. Low pressure alarms are approached with decreasing pressure.

- High vacuum alarms are approached with increasing vacuum. Low vacuum alarms are approached with decreasing vacuum.

5.1.8 APPLY test input value(s) specified by data sheet AND RECORD each corresponding output value and/or switch response As-Found value(s) on Data Sheet.

5.1.9 IF As-Found value(s) is/are not within specified tolerance per Data Sheet, GO TO Step 5.1.12.

5.1.10 IF As-Found value(s) is/are within specified tolerance, but deemed marginal, and optimization is desired, GO TO Step 5.1.12,

5.1.11 IF As-Found value(s) is/are within specified tolerance, RECORD As-Found value(s) as, As-Left value(s) on Data Sheet AND GO TO Restoration, Section 5.2.

NOTE - Trip points are approached from above desired pressure for low settings, and from below desired pressure for high settings.

5.1.12 APPLY appropriate pressure or vacuum signal to pressure/vacuum switch as specified on data sheet.
5.1 Calibrate Pressure or Vacuum Switches (Cont.)

5.1.13 ADJUST trip-point to value(s) specified on data sheet.

5.1.14 APPLY pressure or vacuum signal to pressure/vacuum switch AND CHECK set-point Tolerance.

5.1.15 IF trip-point value(s) is/are within tolerance per Data Sheet, RECORD As-Left value(s) on Data Sheet AND

GO TO Restoration, Section 5.2.

5.1.16 IF value(s) is/are not within tolerance per Data Sheet, REPEAT Steps 5.1.12 through 5.1.15 up to four (4) times or until value(s) is/are within tolerance.

5.1.16.1 IF unable to bring value(s) into tolerance and replacement parts are required, PERFORM the following:

a. NOTIFY FWS.

b. CONTACT Planning for BOM.

c. REQUEST Planning to print new Data Sheet(s).

d. ACQUIRE new part(s) from material coordinator.

e. INSTALL new part(s) REPEAT Steps 5.1.12 through 5.1.15 up to four (4) times or until value(s) is/are within tolerance.
5.2 Restoration

5.2.1 DISCONNECT AND REMOVE all test equipment.

5.2.2 REPLACE any leads lifted in Step 5.1.7.

5.2.3 REPLACE calibration cap(s) or signal line(s) removed in Step 5.1.5 AND RETURN switch to service.

5.2.4 RECORD measuring and test equipment and calibration status on data sheet.

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

5.2.6 INFORM Shift Manager and FWS calibration is complete.

5.2.7 ENSURE all values are recorded in Data Sheet.

5.3 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.

5.4 Review

5.4.1 FWS REVIEW AND CONFIRM the following:

- Completed data sheets meet the acceptance criteria
- Comments sections are filled out correctly
- 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.

5.5 Records

The performance of this procedure generates no records. However, PM Data Sheets associated with the procedure, are records and are maintained in the work package as record material.

The record custodian identified in the Company-level Records Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
Attachment 1 - Water Trap/Pressure M&TE

**Water Trap with Potentially Contaminated Liquid**

1. If potentially contaminated liquid gets into Water Trap, Suspend the work.
2. Notify the FWS.
3. When provided approval from the FWS proceed as follows.
4. Remove Pressure M&TE from field.
5. Return to a RMA.
6. Disassemble the Water Trap.
7. Allow trap to dry overnight.
8. Survey disassembled trap components in accordance with Radcon survey plan.
9. If the Water Trap can be released return it to tool crib.
10. If the Water Trap cannot be released, dispose of it per waste planning checklist.

**Water Trap with Clean Liquid (NOT Contaminated)**

1. If clean liquid gets into Water Trap, disassemble the Water Trap.
2. Allow Water Trap to dry overnight.
3. Re-assemble the Water Trap.
4. Return the Water Trap to the tool crib.
M&TE with Potentially Contaminated Liquid

1. If potentially contaminated liquid gets past water trap and inside Pressure M&TE, Suspend the work.

2. Notify FWS.

3. Wait for further directions.

M&TE with Clean Liquid (NOT Contaminated)

1. If clean liquid gets past the water trap disassemble and dry out Pressure M&TE per manufactures direction.

2. Return the M&TE to the tool crib.

3. Request the M&TE to be returned to NIST calibration lab for recalibration.
Attachment 2 – Calibration Instructions

Positive pressure calibrations:

Note: Vent Valve (VV) assembly is required on all positive pressure calibrations to ensure M&TE is not contaminated by venting potential process air back through M&TE.
Install vent valve assembly Per Figure 3
Ensure isolation valve (IV) is open and VV is closed
Proceed with calibration per work package
  ➢ Whenever venting is required during calibration steps, vent stored pressure as follows.

NOTE - Valve IV can remain open when reading is required via M&TE.

Ensure IV valve is closed
Ensure VV valve is opened
Repeat sequence as necessary to complete the calibration.
After all steps are completed for the calibration, perform RCT survey release plan.

Negative pressure calibrations:

Note: use of surrogate filter is required for negative pressure calibrations to ensure M&TE is not contaminated by pulling process air into M&TE while drawing Vacuum.
Negative calibrations should be performed as Follows.
Ensure surrogate filter holder has media installed.
Connect filter in-line per

Ensure IV is open
Pull a representative vacuum into M&TE through filter
Ensure IV is closed
Vent through VV
RCT to perform survey of the media.
IF no contamination found remove surrogate filter holder and proceed with calibration.
1. Gas/Air enters through the top slot which goes into the chamber.
2. Dirt and Moisture particles are collected in the chamber, which is visible through the clear transparent glass window.
3. Then Gas/Dry Air goes into the centre slot where it enters the instrument.
Figure 2 - Negative Pressure Connection
Calibrate Pressure or Vacuum Switches

Figure 3 – Positive Pressure Connection