Operate Tank Surface Level Monitoring Devices

Tank Farm Plant Operating Procedure

SURVEILLANCE

USQ #TF-17-0748-S, Rev. 0

CHANGE HISTORY (≤ LAST 5 REV-MODS )

<table>
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<tr>
<th>Rev-Mod</th>
<th>Release Date</th>
<th>Justification</th>
<th>Summary of Changes</th>
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<tr>
<td>J-2</td>
<td>06/15/2017</td>
<td>DSA Change</td>
<td>References to AC 5.8.3 have been deleted, and replaced with AC 5.8.2.</td>
</tr>
<tr>
<td>J-1</td>
<td>04/19/2017</td>
<td>Engineering request</td>
<td>Added use of Fluke 28 II EX True RMS Multimeter and areas required for ignition controls when taking manual tape or zip cord readings to Sections 4.1, 5.2, 5.3 and 5.4. Added use of digital display response throughout procedure.</td>
</tr>
<tr>
<td>J-0</td>
<td>05/19/2016</td>
<td>Periodic Review</td>
<td>Updated the Radcon statement at 3.1.2. Updated a performance document Title. Added a Restoration section.</td>
</tr>
<tr>
<td>I-0</td>
<td>12/03/2013</td>
<td>Periodic Review.</td>
<td>Removed vague phrases, reworded steps to comply with standard, and updated procedure to reflect GHA standards (No Warnings).</td>
</tr>
<tr>
<td>H-0</td>
<td>08/19/2010</td>
<td>Periodic Review and identified changes</td>
<td>Deleted 244-CR-003. Deleted reference to silver shield gloves</td>
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REFERENCE | TO-040-180 | J-2 | 06/15/2017 | 1 of 17
## Operate Tank Surface Level Monitoring Devices

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**Figure 1** - ENRAF 854 ATG

**Figure 2** - ENRAF 854 ATG Display

**Figure 3** – Widget
1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides operating instructions for tank level indicating transmitters and manual tapes. This procedure also provides instructions for operating a Zip cord for catch tanks, leak detection pits and flush pits.

1.2 Scope

This procedure involves obtaining/reading level data from tank surface level instruments. This procedure also involves using a Zip cord device as follows:

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<td>Liquid level</td>
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<td>244-BX Flush Pit</td>
<td>Identifying Presence of Liquid</td>
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<td>242-TA Vault</td>
<td>Liquid Level.</td>
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2.0 INFORMATION

2.1 Terms and Definitions

- LIT - Level Indicating Transmitter
- ENRAF – ENRAF 854 ATG Gauge
- Widget – Hanford Site name for clamp seal assembly located on some open-real manual tape assemblies to maintain containment on tank when manual tape is not used.
Operate Tank Surface Level Monitoring Devices

2.2 General Information

Reports

2.2.1 Reports on automatic/manual level indicating transmitters and manual tapes may be obtained from the Surveillance Analysis Computer System.

ENRAF Brand Gauges

2.2.2 ENRAF 854 ATG gauge (ENRAF) operation is based on displacement (buoyancy). When a set change in buoyancy of displacer is detected, gauge stops and sends level reading to local display, and to TMACS. Refer to Figure 1 and Figure 2.

2.2.3 ENRAF 854 ATG gauge (ENRAF) can be read in two ways:

Automatic ENRAF: The tank level reading is transmitted to TMACS whenever polled using either a 4-20 mA analog signal (Acromag) or digitally through an ENRAF Communications Interface Unit (CIU). Both connections provide real-time digital readout at TMACS, although the CIU has additional features.

Manual ENRAF: The gauge is not connected to TMACS and must be read manually in the field. The data is typically written on the appropriate Round Sheet.

Manual Tapes

2.2.4 Open-reel manual tape device consists of a steel tape attached to a non-enclosed reel permanently mounted on, and electrically insulated from, the riser. A DC-meter is used to detect level by measuring conductivity between plummet, waste, and tank.

2.2.5 Closed-reel manual tape device (Flake box) functions the same as an open-reel manual tape, but the tape reel is enclosed with a plastic enclosure (flake box) to maintain tank containment.

Zip cord

2.2.6 A Zip cord is a conductivity probe which is attached to a conductivity meter. It is used to detect moisture or liquids in catch tanks, leak detection pits or flush pits when moisture is present. If no liquid is present, the cord will go slack when bottom of containment is encountered. Measurement may be determined by slowly raising until it becomes taut and reading line increments on cord.
3.0 PRECAUTIONS AND LIMITATIONS

3.1 Radiation and Contamination Control

3.1.1 When disconnecting, breaching or opening systems or system components that are currently or previously connected to waste tanks or waste transfer systems;
- Continuous HPT coverage is required
- Pre-job and post-job surveys are required
- A wet rag will be used to contain the breach until radiological verifications have been performed.

3.1.2 When this procedure is worked in radiological areas, an approved radiological work permit (RWP) is required. If radiological conditions or work performed falls outside the scope of the RWP, all work activities must be discontinued until a new or revised RWP has been issued in accordance with TFC-ESHQ-RP_RWP-C-03, ALARA Work Planning.

3.2 Limits

TECHNICAL SAFETY REQUIREMENTS

SAC 5.8.2 Flammable Gas Controls
AC 5.9.2 Ignition Controls.
4.0 PREREQUISITES

4.1 Special Tools, Equipment, and Supplies

The following supplies may be needed to perform this procedure:
- Fluke 28 II EX True RMS Multimeter.
- Gloves may be required if handling zip cords.

4.2 Performance Documents

The following procedures may be needed to perform this procedure:
- TO-020-420, Clean, Level-Indicating Transmitter Tapes, Plummets and Displacers.
- TO-040-540, Water Surveillance and Usage
- 5-LCD-125, ENRAF Series 854, Maintenance and Calibration.

4.3 Field Preparation

4.3.1 Shift Manager has requested operation of level indicating transmitters/manual tapes.
5.0  PROCEDURE

NOTE - Surface level readings must be taken at the frequencies stated in OSD-T-151-00031 or at frequencies specified by Shift Manager. Level indicating transmitters not currently being monitored by TMACS are to be read in field and readings manually entered into Surveillance Analysis Computer System.

- When TMACS is not operational, or when individual automatic level indicating transmitters cannot be read by TMACS, manual field readings are required.

5.1  Obtain Tank Level Readings Using an ENRAF Level Gauge

NOTE - ENRAF display, alarm and error codes can be found in Figure 2.

5.1.1  IF ENRAF is powered down, PERFORM the following:

5.1.1.1  REQUEST permission from Shift Manager to power up ENRAF at local switch.

5.1.1.2  TURN power ON for ENRAF at local switch.

5.1.1.3  WAIT until ENRAF indicates normal operation with no error or alarm codes displayed (See Figure 2).

5.1.2  IF ENRAF displays error or alarm codes or if Display differs from basic format (See Figure 2), INFORM Shift Manager/OE.

NOTE - “CA” or “LT” displayed on ENRAF indicates displacer is rising, which is not permitted without HPT support.

5.1.3  IF “CA” or “LT” appears on ENRAF display, CONTACT Shift Manager/OE AND REQUEST permission to POWER DOWN ENRAF.

5.1.4  READ waste level reading from ENRAF.

5.1.5  RECORD level reading on applicable operator round or data sheet.
5.2 Obtain Tank Level Readings Using an Open-Reel Manual Tape

5.2.1 ENSURE meter is a Fluke 28 II EX True RMS Multimeter. (SAC 5.8.2, AC 5.9.2)

5.2.2 ENSURE leads are plugged into the two lower right ports labeled Ω and COM AND

SET dial to Ω.

5.2.3 CONNECT meter leads together AND

OBSERVE digital display response to verify meter is operable.

5.2.4 ATTACH one lead of meter to a suitable ground terminal AND

ATTACH other lead to terminal on reel assembly found on manual tape installations.

5.2.5 REQUEST HPT monitor for contamination on manual tape as tape is raised.

5.2.6 IF widget is installed on manual tape. TURN thumb screw counterclockwise AND

RETRACT widget from tape (See Figure 3).

NOTE - Surface is indicated by a digital display response of meter if liquids are present. A solid surface may also be indicated by a slacking of manual tape (slack tape).

5.2.7 LOWER manual tape plummet by turning crank handle counterclockwise until one of the following:

• Contact with surface level is indicated by a digital display response
• Slack tape is condition observed.

5.2.8 READ tape by sighting horizontally along top most reference bar on reel assembly (See Figure 3).

NOTE - Manual tape must be raised after obtaining level reading to prevent formations on plummet.

5.2.9 RAISE manual tape plummet approximately 1 ft above surface level by turning crank handle clockwise.
## 5.2 Obtain Tank Level Readings Using an Open-Reel Manual Tape (Cont.)

- **NOTE** - Widget must be firmly closed to maintain primary tank containment.

- **5.2.10** IF widget is installed on manual tape, **TURN** thumbscrew clockwise until widget is closed snug against manual tape (See Figure 3).

- **5.2.11** **RECORD** level reading on applicable operator round or data sheet.
5.3 Obtain Tank Level Readings Using a Closed-reel Manual Tape (Flake Box)

NOTE - Wheel handle of manual tape is spring loaded to engage locking pin device. The locking pin device will prevent the tape from unreeling into the tank.

5.3.1 ENSURE meter is a Fluke 28 II EX True RMS Multimeter. (SAC 5.8.2, AC 5.9.2)

5.3.2 ENSURE leads are plugged into the two lower right ports labeled Ω and COM AND

SET dial to Ω.

5.3.3 CONNECT meter leads together AND

OBSERVE digital display response to verify meter is operable.

5.3.4 ATTACH one lead of meter to terminal provided on flake box AND

ATTACH other lead to a suitable ground at flake box installation.

5.3.5 DEPRESS AND HOLD wheel handle to disengage locking pin.

NOTE - Surface level is indicated by a digital display response of meter if liquids are present. A solid surface may also be indicated by a slacking of manual tape (slack tape).

5.3.6 LOWER tape by turning wheel counterclockwise until one of the following:

- Contact with surface level is indicated by a digital display response
- Slack tape condition is observed.

5.3.7 READ measurement by sighting across reference bar located on sight glass.

NOTE - Manual tape must be raised after obtaining level reading to prevent formations on plummet.

5.3.8 RAISE tape approximately 1 ft above surface level by turning wheel handle clockwise and engaging locking pin.

5.3.9 RECORD level reading on applicable operator round or data sheet.
5.4 **Obtain Level Readings Using a Zip Cord**

**NOTE** - This section only applies to catch tanks, flush pits, and leak detection pits listed in Section 1.2.

- Liquid level will be read directly from zip cords that have increments of both feet and inches.
- A ruler will be used to measure readings between foot indications when zip cords have only foot increments.
- Operator may perform the following measurements as many times as required to obtain a valid reading.

5.4.1 **ENSURE** meter is a Fluke 28 II EX True RMS Multimeter. *(SAC 5.8.2, AC 5.9.2)*

5.4.2 **ENSURE** leads are plugged into the two lower right ports labeled Ω and COM AND SET dial to Ω.

5.4.3 **REQUEST** HPT to monitor for contamination on zip cord as zip cord is raised.

5.4.4 **DON** Gloves if zip cord has potential for contacting tank waste.

5.4.5 **IF** performing level reading methods that requires use of a meter, **PERFORM** the following:

5.4.5.1 **CONNECT** meter leads together AND **OBSERVE** digital display response to verify the meter is operable.

5.4.5.2 **IF** utilizing a one wire zip cord, **ATTACH** one meter lead to zip cord wire AND **ATTACH** one meter lead to a suitable ground (e.g. riser or pipe)

5.4.5.3 **IF** utilizing a two wire zip cord, **ATTACH** one meter lead to each wire of zip cord.
5.4 Obtain Level Readings Using a Zip Cord (Cont.)

5.4.6 OBTAIN level readings by using one of the following methods:

**Level Reading Method – Dry Surface**

5.4.6.1 UNTIL a solid surface is sensed

OR

UNTIL the zip cord goes slack, LOWER zip cord.

5.4.6.2 UNTIL there is no slack RAISE zip cord AND

TAKE measurement.

5.4.6.3 GO TO Step 5.4.7.

**Alternate Level Reading Method – Dry Surface**

5.4.6.4 IF water is to be added, ENSURE requirements of TO-040-540 are followed.

5.4.6.5 UNTIL contact with liquid surface is indicated by digital display response of conductivity meter, LOWER zip cord

5.4.6.6 IF digital display response is obtained, GO TO Step 5.4.7.

5.4.6.7 IF digital display response is not obtained, ADD ≤ 1 gallon of water to pit or tank AND

GO TO Step 5.4.6.5.

5.4.6.8 IF digital display response is still not obtained, CONTACT Shift Manager.
5.4 Obtain Level Readings Using a Zip Cord (Cont.)

**Level Reading Method – Liquid Surface**

5.4.6.9 UNTIL contact with liquid surface is indicated by digital display response of meter, LOWER zip cord AND TAKE measurement.

5.4.6.10 GO TO Step 5.4.7.

**Alternate Level Reading Method Liquid Surface**

NOTE – This method is only used for zip cords with non-existent or suspect increment markings.

5.4.6.11 UNTIL bottom of tank or pit is felt, LOWER zip cord.

5.4.6.12 PINCH zip cord with fingers at top of riser or entry point into tank or pit.

5.4.6.13 UNTIL digital indication of continuity is lost, RAISE zip cord.

5.4.6.14 MEASURE distance between fingers and top of riser or entry point into tank or pit.

5.4.6.15 GO TO Step 5.4.7.

NOTE - Zip cord must be raised to prevent formations on plummet.

5.4.7 RAISE zip cord approximately one foot above waste level AND SECURE zip cord to prevent it from falling into Catch tank or Pit.

5.4.8 RECORD level reading on applicable operator round or data sheet.
5.5 Restoration
None

5.6 Records

NOTE - No records are generated during the performance of this procedure.
Figure 1 - ENRAF 854 ATG

- ENRAF Series
- 854 ATG

- SIGHT GLASS
- PRESSURE PORT
- BALL VALVE
- RISER

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Figure 2 - ENRAF 854 ATG Display

LEVEL

UNITS

\( \text{in} = \text{INCH} \)

LEVEL TYPE

\( \text{INN} = \text{INNAGE} \)
\( \text{INC} = \text{COMP INNAGE} \)
\( \text{ULL} = \text{ULLAGE} \)

EXAMPLE OF DISPLAY IN NORMAL OPERATION

+ 0 0 2 5 3.3 4 in NN

ALARMS

\( \text{HH} = \text{HIGH HIGH ALARM} \)
\( \text{LL} = \text{LOW LOW ALARM} \)
\( \text{H} = \text{HIGH ALARM} \)
\( \text{L} = \text{LOW ALARM} \)
\( - = \text{NORMAL OPERATION} \)

LIMIT SWITCHES

\( \text{C} = \text{MOTOR LIMIT SWITCH REACHED} \)
\( - = \text{NORMAL OPERATION} \)

DISPLACER

\( 1 = \text{DISPLACER GOES UP} \)
\( 4 = \text{DISPLACER GOES DOWN} \)

OPERATIONAL STATUS

\( \text{DM} = \text{DIP MODE} \)
\( \text{FL} = \text{SPU FAILURE OR MAINT. MODE} \)
\( \text{I1} = \text{INTERFACE 1 MODE} \)
\( \text{I2} = \text{INTERFACE 2 MODE} \)
\( \text{I3} = \text{INTERFACE 3 MODE} \)
\( \text{TG} = \text{TEST GAUGE} \)
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Figure 3 – Widget