### Change History (≤ Last 5 Rev-MDs)

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<th>Justification</th>
<th>Summary of Changes</th>
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<td>01/03/2017</td>
<td>Maintenance Request</td>
<td>Procedure Revision</td>
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<td>11/10/2015</td>
<td>Periodic Review</td>
<td>Changes Made: Removal of the following two statements in section 3.3, 1.) Access to LERF side of the fence will utilize radiological limits and controls specified in applicable LERF RWPs, 2.) Access to WRPS side of the fence will utilize radiological limits and controls specified in applicable WRPS RWPs. Removal of Step 3.1.2. Added Step 5.2.7, Section 5.3, Deleted Step 5.3.3, Changed Step references in Step 5.4.7, Deleted 5.3.9.2 and QAT signature.</td>
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<td>08/26/2014</td>
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<td>Title Change, added and/or removed information from step(s) 5.1.1 and 5.1.1.2, removed Checklist 1, removed reference to Vendor Supplied User Manual, removed Attachment 1, Connection to Other Devices (TTDM-128 User Manual) added ne Attachment 1 (Self Test Guidelines).</td>
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This is a new revision, the First Time Use process as defined in TFC-OPS-OPER-C-13 can be used during the initial performance of this revision.

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This procedure provides instructions for checking and replacing TraceTek®, encasement piping leak detector probes and checking the Model TTDM-128 Master Control Module.

1.2 Scope

This procedure involves checking and replacing the 6 TraceTek®, leak detector probes installed in encased process condensate line PC5000 running between 242-A Evaporator and LERF and the Model TTDM-128 Master Control Module. This procedure is to be performed only when the transfer of process condensate is not occurring and the system is isolated.

2.0 INFORMATION

2.1 Terms and Definitions

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>SI</td>
<td>The international system of units</td>
</tr>
<tr>
<td>SIM</td>
<td>Sensor Interface Module</td>
</tr>
<tr>
<td>UI</td>
<td>User Interface</td>
</tr>
<tr>
<td>CA</td>
<td>Contamination Area</td>
</tr>
</tbody>
</table>

2.2 General Information

2.2.1 Process Condensate from 242A is transferred to LERF via the PC-5000 process condensate transfer line. Electronic leak detection is provided at 1,000 foot intervals along the transfer line. There are six test risers that house the leak detection probes on the PC-5000 process condensate transfer line.
2.2 General Information (Cont.)

2.2.2 This work activity will require access to the 242AL-71 Instrument building at LERF. The TTDM-128 is located here.

2.2.3 The Tractek TTDM-128 Leak Detection Module is factory set to require a manual reset following a leak alarm. This allows the user to confirm that any equipment connected to the leak relay is ready to be switched back to normal state.

2.2.4 Instruction on maintenance and proper testing is directly derived from Tractek TTDM-128 Leak Detection Module manufacturer’s user manual.

2.2.5 The Tractek TTDM-128 Leak Detection Module is factory set so it will require a manual reset after each alarm and pressing the RESET button will clear the leak detector alarm.

2.2.6 One extremely useful function provided by the TTDM-128 is the ability to record a series of events. The TTDM-128 module keeps track of a list of up to 2048 events (the first 2048 events are numbered; if 2048 events are already stored, the oldest event is discarded as a new event is recorded). Events in the events history log may be specific to one SIM channel or may refer to the TTDM itself (such as user interactions). For a full list of event types, please refer to “Appendix 1 -Events Glossary” in owner’s manual.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Personnel Safety

3.1.1 LERF operations will be the Controlling Organization for any LO/TO.

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

3.1.3 If working around live circuits, extreme caution should be used. Failure to follow electrical safety practices as outlined in DOE-0359 Hanford Site Electrical Safety Program could result in serious injury.
3.2 Equipment Safety

CAUTION - Use of solvents or abrasive cleaners can result in damage to the Model TTDM-128 Master Control Module.

3.3 Radiation and Contamination Control

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 for LERF or 242-A side of fence.

3.4 Environmental Protection

3.4.1 REQUEST the 242-A Shift Manager NOTIFY the Environmental on-call in accordance with TFC-ESHQ-ENV_FS-C-01, Environmental Notification if any of the following occur:

- The discovery of the presence of radioactive contamination on items removed from the secondary encasement piping (e.g. leak detector probe)
- The failure of a leak detection probe or system to pass the specified performance criteria identified as part of executing this procedure
- Any spills or release of material to secondary containment or the environment.
4.0 PREREQUISITES

4.1 Special Tools, Equipment and Supplies

The following supplies may be needed to perform this procedure:

- Heat gun
- Small electrical generator
- Rubber matting
- Other tools, equipment and supplies identified by Shift Manager/OE/FWS/User.
- Bucket
- Gloves
- Water
- Plastic Bag
- Rags
- Cover Lifting Device
- Channel Lock Pliers

4.2 Field Preparation

4.2.1 NOTIFY LERF facility manager leak detectors are to be tested.

4.2.2 PRIOR to working in the field, PERFORM a documented Pre-Job Briefing.

4.2.3 REVIEW the following Lessons Learned:

- RPP-WTP-LL-09-0483 Employees mistakenly cross radiological barriers
- WRPS-IB-13-008 Reminders Needed for Authorized Worker Lock and Tag.

4.2.4 PRIOR to starting work REQUEST Shift Manager/OE confirm the transfer of process condensate is not occurring and the system is isolated.

4.2.5 ENSURE alarms at LERF and 242-A Evaporator are Un-Inhibited.
5.0 PROCEDURE

5.1 Prepare to Access Probes

5.1.1 STAGE required materials needed for waste management as identified in the Waste Planning Checklist (drums, labels, etc.).

5.1.2 REQUEST LERF personnel to PERFORM the following valve line-up.

<table>
<thead>
<tr>
<th>Valve</th>
<th>Position</th>
<th>Check Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV-43-2</td>
<td>OPEN</td>
<td></td>
</tr>
<tr>
<td>60M-43T</td>
<td>OPEN</td>
<td></td>
</tr>
<tr>
<td>60M-43R</td>
<td>OPEN</td>
<td></td>
</tr>
<tr>
<td>60M-43S</td>
<td>CLOSED</td>
<td></td>
</tr>
</tbody>
</table>

5.1.3 REMOVE the pipe cap downstream of valve 60M-43T.

NOTE - Valves 1-18B, BV-LRF-1 and BV-LRF-2 are located in the basement of 242-A condenser room.

5.1.4 REQUEST 242-A operations PERFORM 5.1.5 through 5.1.7

5.1.5 CONFIRM BV-LRF-2 and 1-18B are OPEN

5.1.6 CONFIRM BV-LRF-1 is CLOSED

5.1.7 CONFIRM PI-LRF-1 reads 0 ± 1 psig.
5.2 Self-Test of TTDM-128 Control Module

NOTE - An arrow at the bottom left-hand corner (pointing down) indicates that there are further events “below” (occurring before) the one being displayed.

- To locate Alarm(S) before Resetting see Attachment 6 – Accessing the Events History Log.

5.2.1 IF in Alarm, MANUALLY RESET Tracetek TTDM-128 Leak Detection Module as follows: (Data Sheet Item 1)

5.2.1.1 RECORD the As-Found alarms in the comments section using the information from Attachment 6 – Accessing the Events History Log.

5.2.1.2 PRESS the RESET button on the Tracetek TTDM-128 Leak Detection Module.

5.2.1.3 CHECK that the green monitoring LED is lit.

5.2.1.4 IF alarms do not reset, GO TO Step 5.2.5 (Data Sheet Item 2).

CAUTION
Use of solvents or abrasive cleaners can result in damage to the Model TTDM-128 Master Control Module.

5.2.2 CLEAN the outside surface of the enclosure using a damp cloth or sponge (Data Sheet Item 3).

5.2.3 INSPECT all connections.

5.2.4 PERFORM all self-tests of the Tracetek TTDM-128 Leak Detection Module using Attachment 1 Self-Test Guidelines (Data Sheet Item 4).

5.2.5 IF the Leak Alarm is indicated, determine the location per TTDM-128 Attachment 3 - Leak Alarm AND GO TO Section 5.3 for each probe in alarm.

5.2.6 IF all self-tests show no faults or errors, GO TO Section 5.4
5.3 **Trouble Shoot and Repair**

- Probes LDE-A1-05 and LDE-A1-06 are located on the LERF side of the fence

5.3.1 **STAGE** tools and/or equipment to perform this activity, and any contingency tools/equipment at the work location.

5.3.2 **REQUEST** HPT PERFORM a contamination and radiation survey of the work area **AND**

**RECORD** the RSR number on Data Sheet by the end of the shift.

5.3.3 **CONTROL** the area around test riser as a CA until radiological surveys are complete.

5.3.4 **AFTER** radiological surveys are completed, **CONTROL/POST** area around the test riser in accordance with survey results.

5.3.5 **PLACE** ground cover around test riser in preparation for removal of potentially contaminated probe.

5.3.6 **LIFT AND REMOVE** test riser pit cover for probe being tested.

5.3.7 **REMOVE** leak detector probe from the test riser.

5.3.8 **REMOVE** moisture and debris from probe using a dry cloth.
5.3 Trouble Shoot and Repair (Cont.)

NOTE - The Tracetek TTDM-128 Leak Detection Module is factory set so it will require a manual reset after each alarm. The RESET button will clear the leak detector alarm.

5.3.9 IF in Alarm, MANUALLY RESET Tracetek TTDM-128 Leak Detection Module.

5.3.9.1 PRESS the RESET button on the Tracetek TTDM-128 Leak Detection Module.

5.3.9.2 CHECK that the green power light and monitoring light illuminate (System Normal).

5.3.10 VERIFY Alarm(s) Reset (Data Sheet Item 5).

5.3.10.1 IF Alarm for this probe does not Reset, REPLACE probe AND GO TO Step 5.3.9.

5.3.10.2 IF troubleshooting prior to completing Self-Test GO TO step 5.2.4 OR

GO TO step 5.4.8
5.4 **Water Test Leak Detector Probe.**


-  Probes LDE-A1-05 and LDE-A1-06 are located on the LERF side of the fence.

5.4.1 **CONFIRM** HPT has performed a contamination and radiation survey of the work area AND **RECORD** the RSR number on Data Sheet by the end of the shift.

5.4.2 **CONTROL** the area around test riser as a CA until radiological surveys are complete.

5.4.3 **AFTER** radiological surveys are completed **CONTROL/POST** area around test riser in accordance with survey results.

5.4.4 **PLACE** ground cover around test riser in preparation for removal of potentially contaminated probe.

5.4.5 **LIFT AND REMOVE** test riser pit cover for probe being tested.

5.4.6 **REMOVE** leak detector probe from the test riser.

5.4.7 **REMOVE** moisture and debris from probe using a dry cloth.

5.4.8 **LOWER** probe into a bucket of water

5.4.9 **CHECK** alarm/equipment status indicators are in the status listed in the Data Sheet, line "Probe Test" (*Data Sheet Item 6*).
5.4 Water Test Leak Detector Probe. (Cont.)

5.4.10 REMOVE probe from water AND DRY the probe.

NOTE - The Traceteck TTDM-128 Leak Detection Module is factory set so it will require a manual reset after each alarm. The RESET button will clear the leak detector alarm.

5.4.11 MANUALLY RESET Traceteck TTDM-128 Leak Detection Module.

5.4.11.1 PRESS the RESET button on the Traceteck TTDM-128 Leak Detection Module.

5.4.11.2 CHECK that the green monitoring LED illuminates.

5.4.11.3 IF Traceteck TTDM-128 Leak Detection Module does not reset, GO TO 5.3.10.1

5.4.12 CHECK alarm/equipment status indicators are in the status listed in the Data Sheet, line "RESET" (Data Sheet Item 7).

5.4.13 RE-INSTALL leak detector probe inside the test riser.

5.4.14 CONFIRM TRACE TEK MINI PROBE height is one half (½”) inch plus or minus one fourth (¼”) inch from the bottom of the riser.

5.4.15 RE-INSTALL pit cover for test riser.

5.4.16 REMOVE ground cover from around the test riser.

5.4.17 PERFORM a contamination and radiation survey of the area AND DOWNPOST in accordance with survey results.

5.4.18 IF all probes scheduled for testing and/or replacement have been completed GO TO Section 5.5.
5.5 Restoration

5.5.1 INFORM FWS test is complete.

5.5.2 NOTIFY 242-A and LERF Shift Manager testing is complete.

5.5.3 NOTIFY 242-A Shift Manager LERF Encasement Line Purge air may be configured per TO-640-140.

5.6 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.

5.7 Review

5.7.1 FWS REVIEW AND CHECK 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.
5.8 Records

The following records are generated during the performance of this procedure. PM Data Sheets associated with the procedure, are records and are maintained in the work package as record material.

5.8.1 **CONFIRM** the completed records have been submitted to the shift office for record retention.

The record custodian identified in the Company Level Record Inventory and Disposition Schedule (RIDS) is responsible for record retention in accordance with TFC-BSM-IRM_DC-C-02.
Attachment 1 Self-Test Guidelines

The Self-Test menu provides access to Specific user-selected test routines

1. Push the “Menu” button
2. Using the down arrow scroll down to the “self-test” selection hit “Enter”
3. At the prompt enter the “Password” as provided by the FWS
4. Select the following items and check no faults/errors are identified
   - UI version
   - Memory Test
   - SI Test
   - Display Test
   - UI Relay Test
   - Keypad Test
5. To return to the main menu (get out of the “self-test”) hit “Esc” twice

Interpreting 4-20 mA output values

The TTDM-128 adjusts its current loop output based on the leak detection status of the selected SIM channel, as detailed in the table below. Outputs in the range of 0 to 4 mA are used to indicate fault conditions (0 to 3.5 mA) or normal operation (4 mA), while outputs in the 5 to 20 mA range indicate the location of a leak. The leak location values output by the 4-20 mA board have a resolution of 0.5\% of the scale range.

Fault conditions coded into the 0-4 mA range:
Output (mA) Description

0 Electronics fault or loss of power
1.0 Fault — SIM communications
2.0 Fault — cable break
3.0 Fault — cable damage
3.5 Service Required alarm (loop imbalance)

Normal condition and leaks:
Output (mA) Description

4.0 System normal
5.0–20.0 Leak — value scaled to indicate location of leak
Attachment 2 - Current Event/Status Display

A representation of the Current Event/Status Display screen is shown below.

Line 1 CH01 SERVER ROOM
Line 2 LEAK 125 M
Line 3
Line 4 12:30 21-01-2003

A guideline for the Current Event/Status Display is shown below.

**Line 1** - identifies the channel currently displayed, showing the SIM channel number and user-defined ID tag (up to 14 characters). For a new system, the default label is SIM until edited by the user.

**Line 2** - indicates the current status of the SIM channel identified on Line 1, or in the case of Leak re-alarm, displays the initial leak location of the SIM channel identified on Line 1.

**Line 3** - may advise action or provide special instructions, or in the case of leak re-alarm, indicates the current status of the SIM channel identified on Line 1.

**Line 4** - displays the current time (in 24 hour format) and date; the colon blinks once a second, or in the case of Leak re-alarm may advise action or provide special instructions.

The LCD display is a backlit 4-line by 20-character display. If there is no activity for several minutes, the back lighting turns off, until any key is pressed.

**Hint:** The LCD contrast may be adjusted (feature 30 in the TTDM-128 Internal View diagram).

If no new alarm conditions exist, the LCD display scrolls through each connected SIM channel in sequence. The LCD presents the current event/status display for each channel for about 4 seconds, then continues to the next connected SIM channel. Once the last SIM channel is displayed, the process starts again at the first channel.

If the TTDM-128 detects a new Service, Fault, or Leak event, it immediately changes the display to the SIM channel affected, turns on the LCD back light, and pauses at that channel. After several minutes, or after any key is pressed, the scrolling process starts again.
Attachment 3 - Leak Alarm

When liquid is detected by a sensor in any channel, the following occur:
- The audible alarm sounds (If audible alarms are not required, the module can be set to disable them - see Leak Setup section).
- The red Leak LED illuminates.
- The display changes to show the channel and location of the leak.

CH01 USER_LABEL_0001
Leak 504 m
hh:mm DD-MMM-YYYY

- The interfaces signal the event (Leak relay, 4-20 mA, and serial port)
- The following actions should then be taken:
  - Silence the alarm (if necessary).
  - Locate the leak and clear the system.
  - Reset the leak relay (This occurs automatically if Auto-Reset is enabled; see Leak Setup section).

To Locate the Leak
Using the channel number and location displayed by the TTDM-128, refer to the system map and determine where the leak was detected.

To Clear the System
Fix the leak and clean up the area affected. Then clean and dry the sensing cable (in the case of TT1000 and TT1100-OHP and TT3000 and TT-FFS series) or replace the affected section (TT5000 series/TT5001 series and TT-7000-HUV). Once the sensing cable is clear, the module responds and the display changes:

CH01 USER_LABEL_0001
Leak Cleared
Press reset
hh:mm DD-MMM-YYYY

Notice that the red LED remains on. This indicates that the leak relay is still in the alarm state.

To Reset the Leak Relay
In order to reset the leak relay and return the module to the “SIM Normal” state, press the Reset button. Before doing so, check that any external equipment controlled by the leak relay is ready to be reset. Once the Reset button is pressed, the relay returns to normal, the red Leak LED turns off, and the LCD returns to the normal display.

Hint: If manual reset is not required, the TTDM-128 can be set to auto-reset; see Leak Setup section.
Attachment 4 - Service Events

Introduction
A TraceTek sensing circuit consists of two electrical loops. The SIM module constantly monitors for current passing between loops. When the system is normal, there is no current passing between the loops.

When there is a leak on the system, the maximum current flows. If a SIM detects a lower but significant level of current flow between the loops, the TTDM-128 will signal a Service Alarm.

A low-level current could indicate one or more of the following:

- A very small leak (which may soon develop into a full leak alarm).
- Heavy condensation or small spills (coffee, tea, etc.) on a water or aqueous solutions sensing cable (TT1000 and TT3000 for example).
- Conductive material on a water or aqueous solutions sensing cable. The material might be metal filings, concrete dust, flux, mastic, or other construction debris, or carbon-based dust from air-handling units, printers, or copiers.

While service alarms should be investigated, they do not disable the operation of the system. The TTDM-128 and TTSIM will continue to detect leaks during a service alarm. However, service alarms may affect the accuracy of leak location in certain cases.
Attachment 5 - Service Alarm

When the TTDM-128 detects a condition requiring service (such as described above), it signals the event by taking the following actions:

- Sounds an intermittent beep.
- Illuminates the yellow Service LED.
- Switches the service relay to alarm state.
- Changes the LCD display to the following:

CH01 USER_LABEL_0001
Service Req’d [147]
hh:mm DD-MMM-YYYY

The number in square brackets indicates the estimated location of the material causing the alarm. The number is shown with square brackets to indicate that the value is only an estimate.

**Hint:** Because the cause (concrete dust, for example) of low-level current may be distributed over a long length of sensing cable, it is not always possible for the TTDM-128 to report a precise location. However, the indicated location is always a good point from which to begin a troubleshooting procedure.

The following actions should be taken:
- Silence the audible alarm.
- Clear the cable.

**IMPORTANT:** When the cable is cleared, the yellow Service LED, the alarm relay, and the LCD display will automatically return to their normal (non-alarm) state. No reset is required.

**To Clear the Cable**
Investigate the cause of the alarm and conduct cleanup or maintenance accordingly.

**Hint:** If material causing a service alarm is spread throughout the system, it is often useful to subdivide the system; see INVESTIGATING LEAKS AND FAULTS in the Maintenance section for
Attachment 6 – Accessing the Events History Log

1. **PRESS** Menu, from the Current Events/Status display.
2. **PRESS** Enter to select Events History.
3. **PRESS** the Up and Down arrow keys to scroll through the events history log. The events will be displayed in chronological order, with the most recent event displayed first.

**NOTE** - To quickly move to a view of the most recent event, press the Right arrow key. To move to the oldest event, press the Left arrow key.

**TYPICAL TTDM-128 EVENT DISPLAY**
Event # xxxx
Alarm Silenced
HH:MM DD-MON-YYYY

**TYPICAL SIM EVENT DISPLAY**
Event #xxxx
CH01 USER_LABEL_0001
Leak 237 ft
The new procedure for the Sub-Zero Ice Machine is currently being reviewed for approval in WRAP. Attached is the developmental roster for the new procedure which already has the FWS and User signatures. This procedure is HOT so can you please print, sign, and scan the Developmental Roster back to me. Let me know if you have any questions.
HH:MM DD-MON-YYYY
# Test Model TTDM-128 Master Control Module

## Table 1

<table>
<thead>
<tr>
<th>Description Identifier</th>
<th>Normal Output Range Drawing H-2-88766 Sheet 1</th>
<th>Test</th>
<th>Current Output Range</th>
<th>Alarm Active Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDE-A1-01 Located at JB-LDE-02</td>
<td>20.16 – 22.46 mA</td>
<td>1</td>
<td>20.16 – 22.46 mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>20.16 – 22.46 mA</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3</td>
<td>20.16 – 22.46 mA</td>
<td></td>
</tr>
<tr>
<td>LDE-A1-02 Located at JB-LDE-04</td>
<td>17.45 – 19.75 mA</td>
<td>1</td>
<td>17.45 – 19.75 mA</td>
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<tr>
<td>LDE-A1-05 Located at JB-LDE-08</td>
<td>9.26 – 11.56 mA</td>
<td>1</td>
<td>9.26 – 11.56 mA</td>
<td></td>
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<td>9.26 – 11.56 mA</td>
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</tr>
<tr>
<td>LDE-A1-06 Located at JB-LDE-09</td>
<td>6.45 – 8.75 mA</td>
<td>1</td>
<td>6.45 – 8.75 mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>6.45 – 8.75 mA</td>
<td></td>
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<td></td>
<td></td>
<td>3</td>
<td>6.45 – 8.75 mA</td>
<td></td>
</tr>
</tbody>
</table>

**COMMENTS:**

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